

### Overview

#### Models

Enterprise Models are modular, scalable, no-single-point-of-failure solutions with disaster tolerance and business continuance support for storage consolidation on heterogeneous SANs.

##### Models in 42U Opal cabinets

<b>Model 8C8D</b>	4 M3220 3U Controller assembly with eight HSV1 10 controllers, eight M5214 3U Dual-redundant FC Loop 14 bay disk enclosures, 42U Opal Storage Cabinet	239782-001 60Hz
-------------------	---	--------------------

##### B Models in 41U Graphite cabinets

<b>Model 8C8D-B</b>	4 M3220 3U Controller assembly with eight HSV1 10 controllers, eight M5214 3U Dual-redundant FC Loop 14 bay disk enclosures, 41U Graphite Storage Cabinet	283263-B21 60Hz
---------------------	---	--------------------

Other available General Purpose Enterprise models are listed in the Enterprise Virtual Array QuickSpec - <http://www.compaq.com/products/storageworks/enterprise/index.html>

#### Technical Computing Product

The HP StorageWorks Enterprise Virtual Array is the newest generation of StorageWorks Disk Array family and is the first that is enabled by VersaStor technology. It is an ultra-high performance, ultra-high capacity and ultra-high availability "virtual" RAID (Vraid) storage solution for the upper-end of the enterprise marketplace that removes the time, space and cost boundaries of traditionally architected storage.

Enterprise complements and extends the current ma8000/ema12000/ema16000 HP StorageWorks solutions and can co-exist in the same 1 Gb Open Fibre Channel SAN networks, while providing 2 Gb end-to-end Fibre Channel in 2 Gb Open Fibre Channel SAN networks.

Enterprise is designed for the data center where there is a critical need for improved storage utilization and scalability while meeting application specific demands for consistently high transaction I/O and MB per second data rate performance, seamless capacity expansion, instantaneous replication, and simplified storage administration.

The Technical Computing Enterprise Product is specifically designed to deliver maximum, high-bandwidth, performance for low latency read/write operations typically demanded by High Performance Technical Computing and other compute intensive application environments.

The pre-defined 8C8D configuration is available in a 42U opal cabinet or 41U graphite cabinet that is optimized for high performance technical computing environments. The solution includes support for the most popular multi-vendor operating system platforms and stringent data center availability enhancements such as multi-pathing and clustering. Configure-to-Order will be available at a future date for the creation of flexible custom solutions using the Enterprise modular storage assemblies. Other General Purpose product configurations are covered in a separate Enterprise QuickSpec document.

For technical computing centers with continuously increasing capacity/replication requirements, Top Gun performance demands, and ever-increasing operations continuance needs, the Enterprise Virtual Array is the clear choice for creating impressive value opportunities within a customer's enterprise in the areas of space, time and cost savings.

#### Unique Customer Benefits/Value

- Outstanding self-tuning performance insures consistency in meeting application Service Level Agreements, allowing your users/clients to accomplish more in less time, scale capacity on-demand and minimize data administration overhead.
- State-of-the-art controller software, with VersaStor-enabled virtualization technology, helps improve performance, increases disk utilization efficiency, and allows for easy dynamic storage expansion, all of which helps lower costs
- High density packaging containing four controller pairs with over 16 TB of disk storage in approximately 5.9 square feet (0.5 square meters) using
- 146 GB disks and up to 28 disks per controller pair.
- Very high bandwidth and high performance package capable of providing aggregate sustained I/O rates up to 672K IOPS and Sequential Read I/O throughput at up to 2,100 MB/s (on 2 Gb SANs) for the HPTC model.
- A new Virtually Capacity Free Snapshot (Vsnap) function can save customers significant disk space and improve disk utilization efficiency
- A new Virtually Instantaneous Snapclone copy capability allows immediate use of the clone copy and can save customers significant savings of time
- Ordering of complete integrated configurations with a single part number, plus disk drives, VCS controller software and operating system platform software kits, is easy and helps ensure that the storage solution completely meets the customer requirements when it arrives
- Easy to use LiteTouch Management tools, which allows management of larger SAN configurations with more servers and more storage solutions, reduces management time up to 15x and substantially lowers costs

### Product Highlights

#### Fibre Channel (FC) Technology

Enterprise takes advantage of the benefits of FC in distance, performance and connectivity. The use of optical fibre cabling allows distances between connected segments of a SAN to be up to 500 meters @ 1 Gb; 300 meters @ 2 Gb using short wave multi-mode cable and up to 10 kilometers (6.21 miles) @ 1 Gb when using long wave cable. (There is presently no long wave cable capability with 2 Gb.) Enterprise is 2 Gb enabled on each FC path, but will also support 1 Gb FC paths for backwards compatibility. Storage Area Networks (SANs) can initially be constructed using 8-, 16-, 32- or 64-port Fibre Channel Switches for fabric connectivity (currently up to a maximum of 20 switches supported).

Enterprise also takes advantage of FC distance, performance and connectivity to interconnect and support a larger number of disk drives per controller pair. Enterprise HSV110 controllers can support up to 240 FC disk drives at 2 Gb transfer rates using four FC loops arranged in dual redundant FC loop configurations. However, the Enterprise Model 8C8D is designed for applications where performance is paramount, such as applications writing large amounts of sequential data. To meet these unique criteria the number of disk drives connected to a pair of controllers has been optimized at 28.

#### Enterprise Product Packaging

Enterprise solutions are built with new storage assembly enclosure packaging. The packaging consists of a 3U FC Vraid dual controller assembly, the StorageWorks Enclosure Model 3220, and 3U 14 bay FC drive enclosures, Model 5214. The controller and drive enclosures are independent of each other to allow a wide range of configuration options. The Enterprise pre-defined models are designed to address medium to high capacity needs as well as ultra-high performance options in technical computing environments. The models are available in 42U opal cabinets or in 41U graphite cabinets.

#### High Storage Density

The high performance configuration provides over 16 TB in a single cabinet using 146 GB disks (disk and controller enclosures included) with a footprint of only 5.9 square feet (0.55 square meter) of floor space utilized in 42U opal cabs (6.4 square feet (0.59 square meter) in 41U graphite cabs). The Enterprise is a fully wired solution, which reduces installation time and provides carefree on-site deployment. The internal design of the cabinet allows easy serviceability ensuring Non-Stop high availability.

#### Multi-Vendor Platform

Support for industry-leading Operating System platforms including: Microsoft Windows NT , Windows 2000 (Advanced Server), Windows Datacentre 2000, Tru64 UNIX , OpenVMS, SUN Solaris, HP-UX, IBM AIX, Linux and NetWare.

#### No-Single-Point-of-Failure

Enterprise redundant architecture and value added software eliminates single points of failure from server to storage in clustered or single server configurations with multi-pathing.

#### Clustered Server and High Availability System Support

Dual and multi-node cluster support is provided for host level fault tolerance and high system availability. TruCluster support is provided on Tru64 UNIX; OpenVMS Clusters support on OpenVMS platforms; and VERITAS Cluster 1.3 support and SUN Cluster 2.2 support is provided on SUN Solaris; Microsoft Cluster Server (MSCS) is provided for ProLiant and other x86 platforms for Microsoft Windows NT 4.0 Enterprise Edition and Windows 2000 Advanced Server (Datacenter 2000 clustering not supported at this time) ; and HACMP 4.4 is supported on IBM AIX. MSCS requires the use of Secure Path v4.0. Formal MSCS HCL certification (with Secure Path V4.0) is pending. See: <http://www.compaq.com/products/sanworks/softwaredrivers/securepath/index.html>. MC Service Guard 11.13 and 11.14 (without Metro or Continental Clusters) is supported on HP-UX.

#### Multi-Server Shared Support for Storage Consolidation

Heterogeneous and homogeneous host support provides the ability to share storage between multiple servers. The Enterprise provides storage access control (i.e. Selective Storage Presentation or LUN masking) assuring that a host cannot access data belonging to a different host. SAN-based Data Zoning is also supported.

#### Single-pathing (Single HBA per host)

Single pathing (or single HBA per host) support is being enabled with VCS v2.0a for Tru64, OVMS, SUN Solaris, WNT/W2K, HP-UX, Linux and NetWare but not IBM AIX. Secure Path is not required for single pathing. Use of single pathing, which does not offer a redundant path option, should be used with care. Failure of the single HBA will result in loss of access for that host until the HBA is repaired/replaced.

### Product Highlights

**Enclosure Capacity** The 42U opal Enterprise Model 8C8D and 41U graphite Enterprise Model 8C8D-B provides space for four (4) 3U M3220 controller assemblies with eight (8) controllers and eight (8) 3U 14 bay M5214 FC disk enclosures that accommodates up to 112 disk drives for a maximum Enterprise cabinet capacity of 4 TB using 36 GB drives, 8 TB using 72 GB drives or 16 TB using 146 GB drives. In the 42U 8C8D, 6U of cabinet space is available space for optional FC Switches or co-requisite Management Appliance; in the 41U 8C8D-B, 5U of cabinet space is available.

### Solution Capacity

Model	Number of Drive Bays	Maximum Capacities (GB)		
		36 GB	72 GB	146 GB
Enterprise Virtual Array Model 8C8D, 8C8D-B	112	4 TB	8 TB	16 TB

**36 GB, 72 GB, and 146 GB 10K rpm Drive Support** Enterprise supports 36 GB, 72 GB, and 146 GB 10K rpm dual ported 2 Gb FC disk drives at full rated transfer rates. An Enterprise controller pair can support up to 240 disk drives of single or mixed drive capacities. The Model 8C8D and 8C8D-B are configured to support up to 28 drives per controller pair. VCS v2.0a controller code is required to support the 146 GB 10K rpm disks.

**36 GB and 72 GB 15K rpm Drive Support** Enterprise supports 36 GB and 72 GB 15K rpm dual ported 2 Gb FC disk drives at full rated transfer rates. The Model 8C8D and 8C8D-B are configured to support up to 28 drives per controller pair. VCS v2.0a controller code is required to support the 36 GB and 72 GB 15K rpm disks.

**Fibre Channel Switch Support** Support for 8-, 16-, 32- and 64-port FC Switches (up to twenty) operating at 1 Gb and 8-, 16-, 32- and 64-port FC SAN Switches operating at 2 Gb allow the full benefits of a Storage Area Network (SAN), providing exceptional connectivity while increasing the effective bandwidth of the network. Supported SAN features include zoning for communication isolation, and inter-switch links (hops) up to 10 km. Enterprise is 2 Gb FC enabled with VCS v2.0a.

**Transfer Speeds** Enterprise has two FC ports per HSV110 controller. Each controller-to-host interface is 2 Gb enabled. With dual 2 Gb host interfaces per controller, each controller is capable of 8 Gb aggregate data transfer rates. The controllers are also compatible with 1 Gb and 2 Gb FC Switches, HBAs, servers and other storage solutions. Each HSV110 controller pair interfaces with disk drives over four, 2 Gb FC-AL loops for an aggregate data transfer rate of 8 Gb. The loops are arranged in redundant pairs connecting to up to 120 disk drives per loop pair. The redundant pair allows for load balancing between each loop and redundancy, should any loop become inoperable. The Enterprise Model 8C8D contains eight controllers capable of delivering an aggregate data transfer rate of 32 Gb for controller-to-host connections via the Fibre Channel SAN fabric. The aggregate data transfer rate to the disk drives is 32 Gb.

**Easy Installation** Enterprise predefined models ship from the factory fully configured! After unpacking, they can be plugged into power sources, connected to the FC SAN, enabled and configured with the Management Appliance and they are ready for use.

**Fault Tolerance** Redundant drive enclosure power supplies, blowers, controllers, cache battery backup, distributed hot spare disks and a multi-level Vraid architecture (Vraid0 - no redundancy, Vraid1 - high redundancy and Vraid5 - medium redundancy levels) ensure fault tolerance against system outages and data loss.

**Fault Recovery - Data Replication Manager for Disaster Tolerance Applications** DRM (Data Replication Manager) remote copy functionality will not be available with this release of Enterprise. Enterprise can be upgraded to support this option at a future release date.

### Product Highlights

#### High Availability

All Enterprise models provide redundant cooling, power redundancy and environmental monitoring. Drives and most solution components are hot swappable. Each solution is configured with dual controllers that operate in dual redundant mode. Each controller has a pair of FC host ports. In the event of a path failure, the alternate path to the controller can be utilized with the use of multi-path software in the Operating System or in Secure Path software. The M5214 FC drive enclosure also supports dual redundant FC loops that provide load balancing and redundant paths should either FC loop become unavailable. The M5214 also has a mini FC hub on each FC loop; so that the FC loop can be re-routed should the next enclosure (disk or controller) in the loop become unavailable.

#### Hot Pluggable Support

The M5214 FC Drive Enclosure supports hot plug (power on) removal or insertion of FC disk drives.

#### Integration

With VCS v2.0a code, all Enterprise models are 2 Gb FC Switched Fabric "ready" (but not supported at first release) and can operate on 1 Gb FC Switched Fabric SANs. They can co-exist in the same FC SAN with ma6000/ma8000/ema12000/ema16000 FC and ra8000/esa12000 FC storage solutions.

#### Manageability

A dedicated Management Appliance is required to manage Enterprise models. An HSV Element Manager feature provides this capability with the Open SAN Manager for the SAN Management Appliance. This powerful tool provides an easy mechanism to manage a large number of Enterprise units in a large SAN configuration.

#### Performance

Fibre Channel host connections provide up to 200 MB/s bandwidth for each path. Each controller has 2 Fibre Channel host ports (4 ports in a redundant pair of controllers) assuring the availability of bandwidth for the most stringent applications. In addition, up to 2 GB of cache per controller pair ensures high performance. Mirrored write caching capability maintains optimal performance while assuring data integrity in the event of a failure.

#### Scalability

A Management Appliance can manage up to 16 Enterprise controller pairs in any one fabric. An Enterprise controller pair will initially support up to 256 host connections (up to 1024 HBAs). An Enterprise 8C8D model will scale up to 112 disks, 16 TB using 146 GB disks. Other models of Enterprise will scale up to 168 disks, 24.5 TB using 146 GB disks, in a single cabinet. With the addition of an optional expansion cabinet, an Enterprise will scale up to 240 disks, 35 TB using 146 GB disks. Configure to Order (CTO) options allow even greater flexibility and scalability. Enterprise Virtual Array 2C6D customers can configure their new Enterprise units from HP manufacturing with up to four additional drive enclosures (for a total of 10 drive enclosures). Existing 2C6D customers can also purchase two, four, or six additional drive enclosures (for a total of 8, 10, or 12 enclosures). These drive enclosures are installed on-site by HP Global Services.

#### Servers Supported - Single and Clustered

- ProLiant servers from the new HP and other X86 servers
- AlphaServer Systems from the new HP
- SUN servers
- HP servers
- IBM servers

#### Software Supported

The HSV110 controller supports VCS v2.0a software, Base (required) and Snapshot (optional). For host connections, select the Operating System Kit appropriate for your operating system: Windows NT v4.0 (SP 6a)/Windows 2000 5.0 (SP2, SP3), Windows Data Center Advanced Server v5.0 SP2, Tru64 UNIX v5.1 (BL 19) and v5.1a (BL 2), OpenVMS (7.2-2 with FIBRE\_SCSI-V0100) and v7.3 (with UPDATE-V0100), SUN Solaris v2.6, v7, v8, HP-UX v11.0 and v11.1 and IBM AIX v4.3.3 and v5.1 for Linux Red Hat 7.2 & Advanced Server 2.1 for X86 (Single path support only, at this time); SLES 7 for X86, NetWare 5.1 & 6.0 (Single path support only, at this time). (See Configuration Information section for part numbers.) Supported software includes: Enterprise Volume Manager (EVM) v2.0D\*, HP SANworks Network View v2.0B, Storage Resource Manager (SAR) v4.0A, HP OpenView Storage Virtual Replicator (VR) v3.0, Secure Path v4.0 for Windows, Secure Path v3.0a for SUN Solaris, Secure Path v2.0B for IBM AIX, and Secure Path v3.0A for HP-UX. Please see: [http://www.hp.com/storage/software\\_index.html](http://www.hp.com/storage/software_index.html) for additional information.

### Product Highlights

#### Cabinet Density

Enterprise Virtual Array Model 8C8D is available in a 42U opal storage cabinet or in a 41U graphite storage cabinet. Up to 16 TB of data, using 146 GB disks, can be housed in a single cabinet frame.

#### Power Distribution

Pre-configured solutions are equipped with suitable 0U Power Distribution Units according to the voltage used in the country. These PDUs allow redundant power and are located in the bottom and back of the cabinet for power cable entrance by the floor.

The PDUs are 220/240V only and are 0U high with a total of two AC power cords extending outside the cabinet.

#### Total Cost of Ownership

The new Enterprise has one of the highest density disk storage solutions in the industry. Additionally, the unique virtual architecture allows up to twice the normal effective capacity utilization of traditionally architected storage offerings. And with the virtually Capacity-Free Snapshot (Vsnap), significant duplicate capacity requirements can be eliminated resulting in fewer/smaller storage acquisitions.

### Family Information

Model	8C8D, 8C8D-B	2C6D, 2C6D-A, 2C6D-B	2C12D, 2C12D-A, 2C12D-B
Drive Interface	Sixteen, Dual ported 2 Gb FC-AL	Dual ported 2 Gb FC-AL	Dual ported 2 Gb FC-AL
Controller Software	VCS v2.0a	VCS v2.0a	VCS v2.0a
Cache per controller	1024 MB	1024 MB	1024 MB
RAID Support	Vraid0, Vraid1 and Vraid5	Vraid0, Vraid1 and Vraid5	Vraid0, Vraid1 and Vraid5
Channels	Sixteen, 2 Gb FC-AL	Four 2 Gb FC-AL	Four 2 Gb FC-AL
Maximum Drives per Model	112	84	168
Maximum drives with optional expansion cabinet	Not available	Not available	240
Maximum Capacity per Model	4.0 TB (with 36 GB disks) 8.0 TB (with 72 GB disks) 16.3 TB (with 146 GB disks)	3.1 TB (with 36 GB disks) 6.2 TB (with 72 GB disks) 12.2 TB (with 146 GB disks)	6.2 TB (with 36 GB disks) 12.3 TB (with 72 GB disks) 24.5 TB (with 146 GB disks)
Maximum Capacity with optional expansion cabinet	Not available	Not available	8.7 TB (with 36 GB disks) 17.5 TB (with 72 GB disks) 35.0 TB (with 146GB disks)
Maximum capacity with optional CTO M5214 drive enclosures	Not applicable	6.2 TB (with 36 GB disks) 12.3 TB (with 72 GB disks) 24.5 TB (with 146 GB disks)	Not applicable
Redundant Controllers	Yes	Yes	Yes
Drive Capacities	36 GB 10K rpm 72 GB 10K rpm 146 GB 10K rpm 36 GB 15K rpm 72 GB 15K rpm	36 GB 10K rpm 72 GB 10K rpm 146 GB 10K rpm 36 GB 15K rpm 72 GB 15K rpm	36 GB 10K rpm 72 GB 10K rpm 146 GB 10K rpm 36 GB 15K rpm 72 GB 15K rpm

### Service and Support, HP Care Pack and Warranty Information

#### Software Warranty

HP warrants that the Software will perform substantially as described in the documentation accompanying the Software for a period of 90 days from delivery.

Upgrades to the 90 days software conformance to warranty are available as HP Care Pack services. These services are available to upgrade the warranty to (1 or 3) full year of 9 hours by 5 days (or 24x7) software advisory and remedial software telephone support, new version license rights, and media and documentation distribution service.

#### Software Product Services

- Software Support (Stand-alone software advisory and remedial software telephone support)
- Software Product Subscription (New version license rights, and Media and documentation distribution service)
- Installation services

These software product services are sold under the HP Care Pack Services program.

- HP Care Pack is defined as an upgrade to the product warranty attribute, available for a specific duration and hours of coverage.
- HP Care Pack is available for sale anytime during the warranty period for most products, but the commencement date will be the same as the Warranty Start Date (delivery date to end user customer). Proof of purchase may be required.
- HP Care Pack services are prepaid.
- For additional information on Software Product Services and HP Care Pack, as well as orderable part numbers, please refer to the URL listed below:  
[http://www.compaq.com/services/carepaq/us/priority/cp\\_storage.html](http://www.compaq.com/services/carepaq/us/priority/cp_storage.html)
- For additional HP Care Pack (hardware & software and installation support) information for European and other countries, as well as orderable part numbers, please refer to the URL listed below and select the country of your choice:  
<http://www.compaq.com/services/CarePaq/us/>
- If you have specific questions about availability or how to obtain services contact your local HP representative. Contact information for your local area can be found at: <http://www.compaq.com/support/>
- Maintenance releases, bug fixes and software patches will be available at no charge to customers on the HP support website at: <http://www.compaq.com/support/sanworks/>

#### HP Availability Assessment Services for SAN

The new Enterprise has one of the highest density disk storage solutions in the industry. Additionally, the unique virtual architecture allows up to twice the normal effective capacity utilization of traditionally architected storage offerings. And with the virtually Capacity-Free Snapshot (Vsnap), significant duplicate capacity requirements can be eliminated resulting in fewer/smaller storage acquisitions.

#### HP Availability Management Services for SAN

The HP Availability Management Service for SAN applies an established proactive and best practice approach to assist customers in the ongoing maintenance of availability levels in their SAN infrastructure. This service complements the standard remedial and added value software and hardware services by providing a focus on the key areas of IT Management best practices to sustain and align the availability of the customer's business critical systems requirements. Contact your local Services department for more details.

#### Hardware Product Service

- Hardware Product Warranty varies by location, please see the warranty information for your country or contact your local HP sales organization for details
- 5-year duration upgrades, coverage upgrades and response time upgrades options offered during the warranty period
- Post-warranty onsite maintenance coverage
- Performance consulting via statement of work

### Service and Support, HP Care Pack and Warranty Information

#### Installation and Startup Services

The Installation and Startup Service package provides installation and configuration of StorageWorks and OpenView Storage products. Major categories of work could include:

- Pre-Installation consulting and planning
- Hardware Installation, configuration and verification. The part numbers are:
  - For Enterprise Model 8C8D 60Hz, 236048-002
  
- Vraid Array Configuration initialized.
- Installation, configuration and verification of StorageWorks/OpenView Storage Software.
- Service Tools installed, configured, and verified.
- Customer orientation.

#### Priority Service Packages Information

- Priority Service Package is defined as an upgrade to the product warranty attribute, available for a specific duration and hours of coverage.
- Priority Service Package is not available for less than the products warranty duration.
- Priority Service Package is available for sale anytime during the warranty period for most products, but the commencement date will be the same as the Warranty Start Date (delivery date to end user customer). Proof of purchase may be required.
- Priority Service Package services are prepaid.

### Configuration Information

The Enterprise is a scalable, no-single-point-of-failure, modular solution, with disaster tolerance and business continuity for storage consolidation on heterogeneous SANs.

### Step 1: Modular Solutions -Base Configuration

Select one:

	Models	Description	Models with Installation and Startup Services Included	Part Number
<b>Models in 42U Opal cabinets</b>	Model 8C8D	42U opal storage cabinet, 4 M3220 Controller assembly with dual HSV110 controllers, 6 M5214 dual FC loop 14 bay drive enclosures	261685-001/60 Hz	239782-001/60 Hz
<b>B Models in 41U Graphite cabinets</b>	Model 8C8D-B	41U graphite storage cabinet, 4 M3220 Controller assembly with dual HSV110 controllers, 6 M5214 dual FC loop 14 bay drive enclosures	288713-001/60 Hz	283263-B21/60Hz

### Step 2 – Required Options (For Pre-Defined Models)

**StorageWorks Enterprise FC Drives** (Four disk drives, either size/type, is required per Disk enclosure per system - 32 for 8C8D, 8C8D-B.)

36 GB 10K rpm dual-port 2 Gb FC-AL 1 in (2.54 cm) drive	221691-B21
72 GB 10K rpm dual-port 2 Gb FC-AL 1 in (2.54 cm) drive	221691-B22
146 GB 10K rpm dual-port 2 Gb FC-AL 1 in (2.54 cm) drive	221691-B23
36 GB 15K rpm dual-port 2 Gb FC-AL 1 in (2.54 cm) drive	221691-B26
72 GB 15K rpm dual-port 2 Gb/s FC-AL 1 in (2.54 cm) drive	221691-B27

#### 2 Gb (LC to SC)

The 2 Gb GBICs on the ports of the Enterprise HSV110 controllers are a smaller form factor than 1 Gb GBICs. One of these cables (either LC to SC or LC to LC) is required per FC port of each HSV110 controller. 4 required per HSV110 controller pair.

**NOTE:** Before selecting the FC cables to connect between the controllers and the switches, please check to see what kind of connectors are on the switches that will be connected to the controllers. A few new switches have recently been introduced (SAN Switch 2/16 and SAN Director 64) which utilize a small form-factor profile (SFP) connector. The SFP connector can support 2 Gb I/Os and/or 1 Gb I/Os, but the device connected to it may not currently be enabled for 2 Gb. The SFP connector is also referred to as an LC connector (not SC). The older large form factor 1 Gb connector is also referred to as an SC connector.

**FC cable - 1 Gb to 2 Gb (LC to SC)** The 2 Gb GBICs on the ports of the Enterprise HSV110 controllers are a smaller form factor than 1 Gb GBICs. One of these cables (either LC to SC or LC to LC) is required per FC port of each HSV110 controller. 4 required per HSV110 controller pair.

FC Short Wave 2-Meter Cable, LC/SC (1 Gb to 2 Gb)	221691-B21
FC Short Wave 5-Meter Cable, LC/SC (1 Gb to 2 Gb)	221691-B22
FC Short Wave 15-Meter Cable, LC/SC (1 Gb to 2 Gb)	221691-B23
FC Short Wave 30-Meter Cable, LC/SC (1 Gb to 2 Gb)	221691-B26
FC Short Wave 50-Meter Cable, LC/SC (1 Gb to 2 Gb)	221691-B27

### Configuration Information

<b>FC cable - 2 Gb to 2 Gb (LC to LC)</b>	The 2 Gb GBICs (SFP - small form-factor profile) on the ports of the Enterprise HSV110 controllers are a smaller form factor than 1 Gb GBICs. When connected into 1 Gb FC SANs, one of these cables (either LC to SC or LC to LC) is required per FC port of each HSV110 controller. 4 required per HSV110 controller pair.	
	2m LC-LC Multi-Mode Fibre Cable	221692-B21
	5m LC-LC Multi-Mode Fibre Cable	221692-B22
	15m LC-LC Multi-Mode Fibre Cable	221692-B23
	30m LC-LC Multi-Mode Fibre Cable	221692-B26
	50m LC-LC Multi-Mode Fibre Cable	221692-B27
<hr/>		
<b>Controller Software</b>	One VCS copy is required per controller pair. VCS v2.0a is needed to support the new features, such as 2 Gb host support, IBM-AIX, HP-UX and the 36GB 15K disk drives. Optional VCS Snapshot software is listed under Step 4.	
	VCS PKG v2.0a DUAL HSV CNTLR (base controller software license is required)	250203-B24
<hr/>		
<b>Operating System Solution Kits</b>	One kit required per operating system type per SAN	
	WNT/W2K KIT v2.0 ENT VIR ARY (for Windows NT 4.0 (SP6a)/Windows 2000 (SP2 and SP3); Secure Path v4.0 for Windows required with this OS to support multiple HBAs per host)	250195-B22
	Windows Datacenter 2000 Kit V2.0 for Enterprise Virtual Array (for Windows Data Center Advanced Server v5.0 SP2; single host support)	312930-B21
	T64 KIT v2.0 ENT VIR ARY (for Tru64 UNIX 5.1 Patch Kit 6, 5.1a Patch Kit 3)	250193-B22
	SOLARIS KIT v2.0 ENT VIR ARY (for SUN Solaris v6, v7, v8 (or v2.6, v2.7, v2.8); Secure Path 3.0a for SUN Solaris required with this OS to support multiple HBAs per host)	250197-B22
	OpenVMS KIT v2.0 ENT VIR ARY (for OpenVMS 7.2-1H1 with TIMA v300, 7.3)	250194-B22
	IBM KIT v2.0 ENT VIR ARY (for IBM AIX v4.3.3 and v5.1; Secure Path v2.0B for IBM AIX required with this OS to support multiple HBAs per host)	282447-B21
	HP KIT v2.0 ENT VIR ARY (for HP-UX v11.0 and v11.1; Secure Path v3.0A for HP-UX required with this OS to support multiple HBAs per host)	282448-B21
	Linux Kit v2.0 ENT VIR ARY (for Linux Red Hat 7.2 & Advanced Server 2.1 for X86; SLES 7 for x86)	309622-B21
	<b>NOTE: Single path support only at this time.</b>	
	NetWare Kit v2.0 ENT VIR ARY (for NetWare 5.1 & 6.0)	309621-B21
	<b>NOTE: Single path support only at this time.</b>	

### Configuration Information

<b>HA Software</b>	Secure Path v3.0A for SUN Solaris (required with SUN Solaris OS to support multiple HBAs per host)	
	1 license	165991-B23
	5 licenses	231300-B23
	10 licenses	231301-B23
	25 licenses	231302-B23
	50 licenses	231303-B23
	Secure Path Upgrade to v3.0A for SUN Solaris	165990-B22
	Secure Path v4.0 for Windows (required with Windows NT/2000 OS to support multiple HBAs per host)	
	<a href="http://www.HP.com/products/sanworks/softwaredrivers/securepath/index.html">http://www.HP.com/products/sanworks/softwaredrivers/securepath/index.html</a>	
	1 license	165989-B22
	5 licenses	231292-B22
	10 licenses	231293-B22
	25 licenses	231294-B22
	50 licenses	231295-B22
	Secure Path Upgrade to v4.0 for Windows	165988-B22
	Secure Path v2.0B for IBM AIX (required with IBM AIX to support multiple HBAs per host)	
	<a href="http://www.HP.com/products/sanworks/softwaredrivers/securepath/index.html">http://www.HP.com/products/sanworks/softwaredrivers/securepath/index.html</a>	
1 license	231495-B22	
5 licenses	231312-B22	
10 licenses	231313-B22	
Secure Path v3.0A for HP-UX (required with HP-UX to support multiple HBAs per host)		
<a href="http://www.HP.com/products/sanworks/softwaredrivers/securepath/index.html">http://www.HP.com/products/sanworks/softwaredrivers/securepath/index.html</a>		
1 license	261705-B22	
5 licenses	261706-B22	
10 licenses	261707-B22	
25 licenses	261708-B22	
50 licenses	261709-B22	

<b>Management Appliance</b>	One Open SAN Manager for the SAN Appliance is required per SAN fabric containing an Enterprise Virtual Array	
	Management Appliance II	189715-002
	<b>NOTE:</b> Management Appliance Update Kit 1.0D Service Pack 2 is required to support Enterprise with VCS v2.0a. This update will be shipping with VCS v2.0a. It will also be available at: <a href="http://www.HP.com/products/sanworks/managementappliance/index.html">http://www.HP.com/products/sanworks/managementappliance/index.html</a>	
	<b>NOTE:</b> The Management Appliance is qualified to be mounted in the Enterprise cabinet at this time.	

### Step 3 – Configure to Order-Required

Disk drives (a minimum of four drives per Drive enclosure are required), must be included with the model orders, will be installed in the models at the factory. In addition, the configure-to-order part number is also required.

Other options, such as FC Switches that are on the order, will be installed if there is space in the unit. For example, a 3U 16-port FC Switch will be installed in the top 3U of an Enterprise 8C8D model, if the switch is on the order.

Configure-To-Order Is required	258158-888
--------------------------------	------------

### Configuration Information

#### Step 4 – Optional Components and Software

##### Optional Controller Software

One VCS Base copy is required per controller pair. VCS v2.0a is needed to support the new features, such as 2 Gb host support, IBM-AIX, HP-UX and the 36 GB 15K disk drives. The Snapshot controller software listed here is optional. The license is for a pair of controllers. The VCS Base is not included with the Snapshot software. The capacity points are based on the disk storage capacity connected to the controller pair.

SNP VCS v2.0 1.6 TB (Snapshot controller software license for up to 1.6 TB)	253255-B22
SNP VCS v2.0 3.1 TB (Snapshot controller software license for up to 3.1 TB)	253256-B22
SNP VCS v2.0 6.2 TB (Snapshot controller software license for up to 6.2 TB)	253257-B22
SNP VCS v2.0 12.3 TB (Snapshot controller software license for up to 12.3 TB)	253258-B22
SNP VCS v2.0 17.5 TB (Snapshot controller software license for up to 17.5 TB)	274522-B22
(Upgrades are available for future capacity expansions.)	
SNP VCS v2.0 UPG 1.6-3.1 TB	253259-B22
SNP VCS v2.0 UPG 1.6-6.2 TB	253260-B22
SNP VCS v2.0 UPG 1.6-12.3 TB	253261-B22
SNP VCS v2.0 UPG 3.1-6.2 TB	253262-B22
SNP VCS v2.0 UPG 3.1-12.3 TB	253263-B22
SNP VCS v2.0 UPG 6.2-12.3 TB	253264-B22
SNP VCS v2.0 UPG 1.6-17.5 TB	274523-B22
SNP VCS v2.0 UPG 3.1-17.5 TB	274524-B22
SNP VCS v2.0 UPG 6.2-17.5 TB	274525-B22
SNP VCS v2.0 UPG 12.6-17.5 TB	274526-B22

---

<b>Enterprise Graphite Utility Cabinet</b>	Enterprise 41U Graphite Utility Cabinet (with two 0U PDUs and eight power strips)	289191-B21/ 60 Hz
--	---	----------------------

Enterprise 41U graphite cabinet customers have the option to mount supporting SAN equipment, the SAN Appliance and/or supported SAN Switches, in a matching utility cabinet.

##### Enterprise Cable Management Kits

Enterprise 2C6D-A, -B and 2C12D-A, -B models employ some cable management hardware to help keep the FC cables neat and to help maintain the proper bend radius. Some of this same cable management hardware, plus some additional hardware, is being made available for use with the 41U Graphite Utility cab (or other utility cabs) where SAN switches with many FC cables can benefit from the cable management hardware. The three kits, with some helpful hints for use, are listed below.

##### **FC Cable Routing Spools**

12 cable routing spools are included in the kit. This kit should be used in conjunction with the two "rail" kits below. One kit should be sufficient for a cabinet full of switches. 293357-B21

##### **Rail-to-Rail FC Cable Routing**

2 rail-to-rail routing brackets and 12 Velcro ties are included in the kit. This kit should be used with the older 1 Gb SAN switches - 8, 16, 8-EL and 16-EL. One kit should be sufficient for up to 32 FC ports - four 8-ports switches or two 16-port switches. This kit should not be used with the newer switches that are fairly deep as there is not sufficient cabinet depth to fit. 293358-B21

##### **Side-Rail FC Cable Routing HW**

Six side rail routing brackets with eight Velcro ties are included in the kit. This kit should be used on the newer SAN switches, the 2/x switches, the new SAN Director 64, and the new HP StorageWorks Core Switch 2/64. One kit should be sufficient for up to six (6) 2/16 SAN switches or one (1) 64-port Director or Core switch. 293359-B21

### Configuration Information

#### SAN Components

<b>Fibre Channel Host Bus Adapters, 1 Gb</b>	FC SBUS HBA/64 for SUN	123503-001
	FC PCI HBA for SUN	380576-001
	FC PCI HBA for Tru64 & OpenVMS	168794-B21
	FC PCI HBA for WinNT/X86	176479-B21
	FC PCI HBA for HP-UX	218408-B21 (discontinued) or HP A5158A
	FC HP-HSC HBA for HP-UX	A6685A
	FC PCI HBA for IBM AIX	197819-B21
	FCA2257c 64-bit/66-MHz cPCI HBA for SUN Solaris	254457-B21
	FCA2257s 64-bit/66-MHz SBUS HBA for SUN Solaris	254458-B21
	FCA2210 64-bit/122-MHz PCI-X for NetWare	281540-B21
	FCA2214 64-BIT/133-MHz PCI-X for Linux	281541-B21

<b>Fibre Channel Host Bus Adapters, 2 Gb</b>	FCA2101 64-bit/66-MHz PCI HBA for WinNT/W2K	245299-B21
	FCA2354 64-bit/66-MHz PCI HBA for Tru64 and OpenVMS	261329-B21
	FCA2257p 64-bit/66-MHz PCI HBA for SUN Solaris	254456-B21
	HP A6795A 64-bit/66-MHz PCI HBA for HP-UX	HP A6795A

<b>Fibre Channel Switches, 1 Gb</b>	The following Fibre Channel switches are qualified to be mounted in the cabinet if sufficient free space is available.	
	SAN Switch 16 (1 Gb) (Discontinued)	158223-B21
	SAN Switch 8 (1 Gb) (Discontinued)	158222-B21
	SAN Switch 8-EL (1 Gb/) (Discontinued)	176219-B21
	SAN Switch 16-EL (1 Gb) (Discontinued)	212776-B21
	SAN Switch Rack Kit for 8, 8-EL, 16	167365-B21
	SAN Switch Redundant Power option	160407-B21
	SAN Switch Integrated/32 (1 Gb)	230616-B21
	SAN Switch Integrated/64 (1 Gb)	230617-B21
	SAN Director 64 (1 Gb, but uses SFP connectors.)	254512-B21

<b>Fibre Channel Switches, 2 Gb/s</b>	The following Fibre Channel Switches are qualified to be mounted in the cabinet if sufficient free space is available.	
	SAN Switch 2/16 (Discontinued)	240602-B21
	SAN Switch 2/16 with 2 power supplies	287055-B21
	Hot plug power supply for 2/16 switch	260255-B21
	SAN Switch 2/16-EL	283056-B21
	SAN Switch 2/8-EL	258707-B21
	Core Switch 2/64	254508-B21
	Director 2/64 base- 32-port configuration	254508-B21
	Edge Switch 2/32	286810-B21
	Edge Switch 2/16	286811-B21

<b>GBICS for Switches, 1 Gb Transceiver</b>	FC Short wave GBIC (1 Gb)	380561-B21
	FC Long Wave GBIC (1 Gb)	127508-B21
	FC Connection Kit 3 SW GBICS, 2 Cables	380579-B21
	FC Connection Kit 2 SW GBICS, 2 Cables	380596-B21

## Configuration Information

---

<b>2 Gb SFP (Small Form-Factor Profile) Transceiver</b>	2 Gb SFP Fibre Channel Transceiver Kit (used on switches with SFP Ports).	221470-B21
---	---	------------

---

<b>Fibre Channel Cables, 1 Gb</b>	FC Short Wave 2-Meter Cable	234457-B21
	FC Short Wave 5-Meter Cable	234457-B22
	FC Short Wave 15-Meter Cable	234457-B23
	FC Short Wave 30-Meter Cable	234457-B24
	FC Short Wave 50-Meter Cable	234457-B25

---

### TechSpecs

<b>Model</b>	Enterprise Virtual Array Model 8C8D, 8C8D-B					
<b>Controller Model</b>	HSV110					
<b>Number of Controllers</b>	8					
<b>Controller Cache</b>	1024 MB per controller standard					
<b>Battery Backup for Cache</b>	Yes, up to 96 hours					
<b>Virtual Controller Software (VCS)</b>	FC Switch support VCS v2.0a, Base and optional Snapshot					
<b>Host Interface</b>	Fibre Channel Switched Fabric					
<b>Host Ports</b>	Sixteen, 2 Gb FC enabled with VCS v2.0a (running at 1 Gb with 1 Gb switches and HBAs)					
<b>Drive Interface</b>	Sixteen, 2 Gb FC-AL ports in redundant pairs					
<b>RAID Levels</b>	Vraid0, Vraid1, Vraid5					
<b>Maximum Disks Supported</b>	112					
<b>Non-RAID JBOD Support</b>	No					
<b>Fibre Channel Switches</b>	64-, 32-, 16-, and 8- Port Optical					
<b>O/S Support</b>	Windows NT, Windows 2000, Windows Datacenter 2000, Tru64 UNIX, OpenVMS, SUN Solaris, HP-UX, IBM AIX, Linux, NetWare					
<b>Sustained I/O Rate</b>	672K IOPS, cached aggregate					
<b>Sequential I/O Throughput</b>	2,100 MB/s, sustained aggregate					
<b>Redundant Blowers</b>	Yes.					
<b>Environmental Monitoring Unit</b>	Yes. Monitors Power and Temperature					
<b>Regulatory approvals</b>	UL, CSA, TUV, FCC, CE MARK, CTICK, BSMI, VCCI					
<b>Management Software</b>	HSV Element Manager contained within the Management Appliance Operating System running on a Management Appliance					
<b>Disk Drives, Interface</b>	Dual-port 2 Gb FC-AL					
	<b>Spindle speed</b>	36 GB 10K rpm	72 GB 10K rpm	36 GB 15K rpm	72 GB 15K rpm	146GB 10k rpm
	<b>Rotational latency</b>	2.99 msec	2.99 msec	2.0 msec	2.0 msec	2.99 msec
	<b>Average Read/Write Seek Time</b>	4.7/5.2 msec	5.1/5.5 msec	3.6/4.2 msec	3.8/4.2 msec	4.5/5.5 msec
	<b>Track-to-track Read/Write Seek Time</b>	0.6/0.9 msec	0.6/0.9 msec	0.3/0.4 msec	0.4/0.6 msec	0,55/0.75 msec
<b>Power requirements (Domestic/Japan) - maximum configuration</b>	<b>AC plug type (quantity 4)</b>	3 wire NEMA No. L6-30R, 30 amp (208 to 240V 60Hz 30A)				
	<b>Number of phases</b>	Single				
	<b>Rated current</b>	17A @200V-240V AC, 60Hz total, 4.25 A per power cord				
	<b>BTU rating</b>	11,604 BTU per hour				
	<b>Nominal airflow</b>	660 cubic ft/minute				
	<b>Wattage</b>	3600 Watts maximum				
	<b>Nominal Line Voltage</b>	208 or 230V				
	<b>Range Line Voltage</b>	187 to 256V				
	<b>Line Frequency</b>	60Hz				
	<b>Maximum Input Current</b>	20.0 amps on 2 power cords (AC failover condition)				
<b>Operating environment</b>	<b>Operating Temperature</b>	50 to 95 F/10 to 35 C - Reduce rating by 1 F for each 1000 ft altitude (1.8°C/1,000 m)				
	<b>Shipping Temperature</b>	-40 to 150 F/-40 to 66 C				
	<b>Humidity</b>	40% to 60% non-condensing				
	<b>Shipping Humidity</b>	10% to 80% non-condensing				
	<b>Altitude</b>	Up to 8,000 ft /2,400 m				
	<b>Air Quality</b>	Not to exceed 500,000 particles per cubic foot of air at a size of 0.5 micron or larger				

### TechSpecs

#### Cabinet Physical Dimensions

Model	Height in/cm	Width in/cm	Depth in/cm	Max Weight lb/kg	Req. Front Clearance in/cm	Req. Rear Clearance in/cm
Enterprise 8C8D	78.75/200.03	23.7/60.2	35.8/90.9	1375/625	30/76.2	30/76.2
Enterprise 8C8D-B	78.75/200.03	23.7/60.2	39.1/99.3	1375/625	30/76.2	30/76.2
Enterprise Utility Cab (41U Graphite cab)	78.75/200.03	23.7/60.2	39.1/99.3	307/140	30/76.2	30/76.2

#### Cabinet Shipping Dimensions

	Height in/cm	Width in/cm	Depth in/cm	Max Loaded Weight (with packaging) lb/kg
Enterprise 8C8D (42U Opal cab)	85.38/216.87	36.0/91.44	48.0/121.92	1568/713
Enterprise 8C8D-B (41U Graphite cab)	85.38/216.87	36.0/91.44	48.0/121.92	1568/713
Enterprise Utility Cab (41U Graphite cab)	85.38/216.87	36.0/91.44	48.0/121.92	500/227
FC Cable Routing Spools	21.1/53.6	11.4/28.96	3.8/9.7	3/1.4
Rail-to-Rail FC Cable Routing	21.1/53.6	11.4/28.96	3.8/9.7	3/1.4
Side-Rail FC Cable Routing	14.6/37.08	8.8/22.35	4.0/10.16	2/0.9

© Copyright 2003 Hewlett-Packard Development Company, L.P.

The information contained herein is subject to change without notice.

Microsoft, Windows, and NT are U.S registered trademarks of Microsoft Corporation. UNIX is a registered trademark of The Open Group in the U.S. and other countries. All other product names mentioned herein may be trademarks of their respective companies.

The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.