

RA8000 / ESA12000

FC-AL Configurations

for Novell Netware

COMPAQ
STORAGeworks

Application Note
EK-FCALN-AA.A01

Visit Our Web Site for the Latest Information

At Compaq we are continually making additions to our storage solutions product line. Please check our web site for more information on the complete line of Fibre Channel storage products, product certification, technical information, updates, and documentation. This information can be accessed through our web page at:

www.compaq.com/storageworks

NOTE

This application note describes RA8000/ESA12000 FC-AL standard configurations.

Enterprise Network Storage Architecture (ENSA)

Compaq StorageWorks RAID Array 8000 (RA8000 FC) and Enterprise Storage Array 12000 (ESA12000 FC) products are the latest in fully integrated Fibre Channel RAID storage solutions. These products provide the key initial step in delivering on Compaq's ENSA vision. ENSA addresses the issues that customers expect to face now and in the future. Both products address today's issues including: economical capacity growth, data protection, high availability, increased distance, multi-vendor platform support, and investment protection by being the base for building the ENSA vision.

Product Overview

The RA8000 and ESA12000 FC storage systems are based on a common architecture and offer customers centralized management, high availability, and exceptional performance and scalability in open systems environments. These products provide a Fibre Channel storage solution with industry leading SAN (Storage Area Network) support utilizing FC-AL (arbitrated loop) technology.

The RA8000 FC is a mid-range storage system available in a pedestal enclosure for departmental use in the office. It can also be installed in server racks for small data centers. An easy-to-deploy, flexible solution for open systems, the RA8000 supports up to 1.3 TB of storage.

The ESA12000 FC, designed for the data center, is available in three easy-to-order building blocks, each optimized for specific, high-capacity customer requirements. The ESA12000 FC offers unprecedented levels of storage, scaling in performance and capacity as user requirements increase.

These storage systems incorporate the latest in RAID technology providing RAID levels 0, 1, 0+1, adaptive 3/5, and non-RAID disks. Compaq's implementation of RAID capability assures that data availability will be maintained despite hardware failure. Features such as read ahead cache and mirrored write back cache improve or minimize the affect on performance while preserving data availability and supporting high availability.

The RA8000/ESA12000 FC platform kits contain the necessary operating system specific software and documentation needed to install, configure, and monitor your storage system. All platform kits include the StorageWorks Command Console (SWCC) for storage management operations including configuring, status inquiry and notification facilities. SWCC provides a user oriented graphical user interface (GUI) simplifying the most complex of storage management operations.

General Configuration Guidelines

Fibre Channel storage technology offers more configuration flexibility than parallel SCSI storage. This application note describes typical RA8000/ESA12000 FC Netware configurations based on the configuration maximums listed. It is strongly recommended that you not exceed the maximums listed.

The maximums and notes listed apply to all configurations, additional information specific to particular configurations is provided in each configuration section.

Configuration Maximums

- 500 meters per optical cable segment, 1 kilometer distance between server and storage
- For the maximum number of FC HBAs per server, please reference your server documentation.
- When configuring more than one FC HBA in a single server, each HBA must be connected to a different loop
- Controller Transparent Failover Mode
 - 1 server on a single loop with 1 storage system
 - Up to 2 servers on two loops (1 server per loop) with 1 storage system
- The maximum storage capacity stated (1.3 TB) assumes 18GB disks, increases in disk drive capacity will increase overall storage capacity for the same enclosure footprint

General Configuration Notes

- All single controller enclosure configurations can be upgraded to dual controller configurations
- Dual redundant controllers can be configured for Transparent Failover Mode
- All configuration diagrams show a front view of the storage system, Controller A is the top controller; Controller B is the bottom controller. Controller Host Port 1 is the left port; Host Port 2 is the right port
- Each storage system can be configured using SWCC or the Command Line Interface (CLI) configured through the HSG80 controller maintenance serial port
- All configurations utilize ACS V8.3 (Array Controller Software) configured for FC-AL topology
- All configurations utilize short wavelength lasers and multi-mode fibre channel optical cables in each cable segment. Label both ends of each FC cable with the same unique identification marking (number, letter, etc.) prior to installation
- All configurations require the Connection Name *Operating System* parameter set to “WINNT”
- By default the HSG80 Command Console LUN (CCL) is enabled. This must be disabled for Netware (using the CLI, “SET *controller* NOCOMMAND_CONSOLE_LUN”)
- All configuration require the Arbitrated Loop Physical Address (AL_PA) to be set to hard and a unique address for each port.
 - Set *controllername* port_1_topology = loop_hard
 - Set *controllername* port_1_al_pa=71
 - Set *controllername* port_2_topology = loop_hard
 - Set *controllername* port_2_al_pa=72
- Record the FC HBA *Worldwide ID* (WWID) IEEE address shown on the back of each FC HBA prior to installing into a server
- Use the recorded WWID to identify the connection name displayed from the CLI at the controller using the “SHOW CONNECTIONS” command
- Rename connection names. By default new connection names are automatically added to the controller connection name table as “!NEWCONnn” (where nn is a number from 1 to 32). The

controllers add a connection when a path to an adapter from each active controller host port is detected. Once you have identified each connection using the FC HBA WWID, rename the connection names to a name meaningful to the specific configuration i.e., SERVER1P1, using the CLI, “`RENAME old-name new-name`”. (Note: Connection names can be a maximum of 9 characters)

- Each active controller host port on a loop presents one SCSI Target ID to each FC HBA on the same loop. LUNs (logical units) can consist of single disks (JBOD), a storageset of multiple disks or a partition, configured for a specific RAID level of 0, 1, 0 + 1, or 3/5

Configuration Descriptions

Table 2 lists the most common RA8000 / ESA12000 FC Novell Netware configurations and the pages of this document where a description of capacities and configuration notes are provided.

Table 2 Typical RA8000 / ESA12000 FC-AL Novell Netware Configurations - Index

Configuration #	Description	Page
1	One Server, Single Controller	4
2	One Server, Dual Controller Transparent Failover	5
3	Two Servers, Single Controller, Shared Storage Enclosure	6
4	Two Servers, Dual Controller Transparent Failover, Shared Storage Enclosure	7

Configuration Parts Lists

A list of parts for each specific configuration is provided at the end of this document following the configuration descriptions.

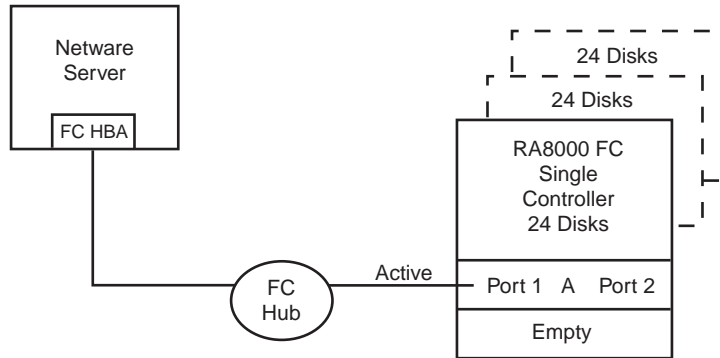
Additional Information/References

For reference information refer to Table 3 at the end of this application note. Refer to the documents listed for more details on the product installation and configuration.

Configuration 1 - One Server, Single Controller

The single controller configuration (Figure 1) is an entry-level RA8000 or ESA12000 that can be expanded to accommodate additional storage capacity or performance needs as required. The configuration consists of an RA8000 or ESA12000 storage enclosure with a single HSG80 array controller on a single fibre channel loop. In the initial configuration a single controller host port (Port 1) is active providing access up to 24 disks. An additional 48 disks can be added using two expansion enclosures. Additional servers can be added to this configuration as required using the existing hub.

Figure 1 Configuration 1



SHR-1465

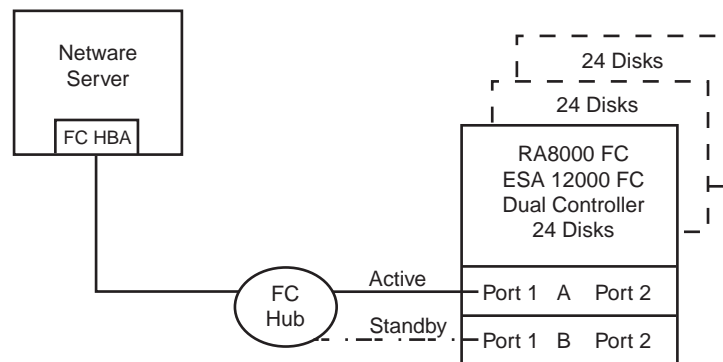
Configuration 1 Notes

- Single Fibre Channel Loop
- This configuration consists of a single HSG80 controller, controller failover is not available
- Up to 500 meters per cable segment
- Up to 72 disks with 2 optional expansion enclosures
- In the Figure 1 configuration 1 logical connection is available

Configuration 2 - One Server, Dual Controller Transparent Failover

This two-controller configuration (Figure 2) provides dual redundant controllers configured in Transparent Failover mode. The configuration consists of an RA8000 or ESA12000 storage enclosure with two HSG80 array controllers on a single loop. In normal operation Controller A provides the active path for all storage sets to the server through Port 1. A second controller, Controller B is a hot standby. Controller B will automatically become active in the event of a failure in Controller A. All units being accessed through Port 1 of Controller A will become accessible through Port 1 of Controller B. In the initial configuration a single controller host port (Port 1) is active providing access up to 24 disks. An additional 48 disks can be added using two expansion enclosures. Additional servers can be added to this configuration as required using the existing hub.

Figure 2 Configuration 2



SHR-1467

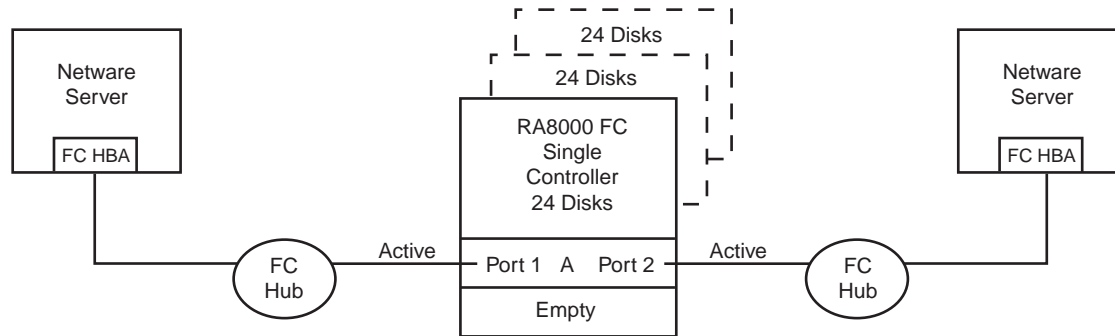
Configuration 2 Notes

- Single Fibre Channel Loop
- Dual HSG80 controllers configured in Transparent Failover Mode
- Up to 500 meters per cable segment
- Up to 72 disks with 2 optional expansion enclosures
- In the Figure 3 configuration 1 logical connections is available

Configuration 3 – Two Servers, Single Controller, Shared Storage Enclosure

Configuration three (Figure 3) utilizes the second controller host port to provide storage to a second separate (non-cooperating) server. The two servers share the storage enclosure in that each server has exclusive access to its own LUNs through the use of mutually exclusive LUN numbering. This configuration utilizes two separate fibre channel loops. Additional servers can be added to this configuration as required using the existing hubs.

Figure 3 Configuration 3



SHR-1469

Configuration 3 Notes

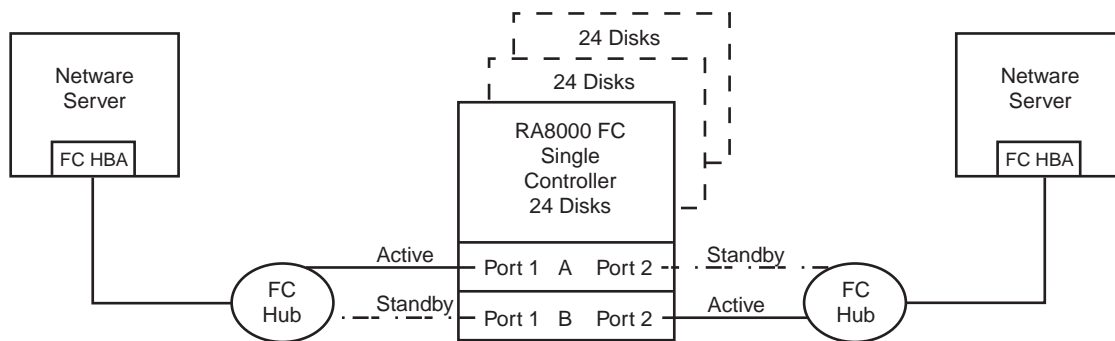
- Two Fibre Channel Loops
- Shared storage enclosure
- This configuration consists of a single HSG80 controller, controller failover is not available
- Up to 500 meters per cable segment
- Up to 72 disks with 2 optional expansion enclosures
- In this configuration 2 logical connections are available

Configuration 4 – Two Servers, Dual Controller Transparent Failover, Shared Storage Enclosure

Configuration four (Figure 4) utilizes a dual controller pair to provide storage and controller redundancy to a second separate (non-cooperating) server. The two servers share the storage enclosure in that each server has exclusive access to its own LUNs through the use of mutually exclusive LUN numbering. This configuration utilizes two separate fibre channel loops. Each server has access to its own dedicated controller. In the event of a controller failover, the surviving controller will continue to provide full access to units to both servers.

In normal operation Controller A provides the active path for all storage sets assigned to server 1 through Port 1. A second controller, Controller B provides the active path for all storage sets assigned to server 2 through Port 2. Each server also has a dedicated standby port in the event that there is a controller failover.

Figure 4 Configuration 4



SHR-1470

Configuration 4 Notes

- Two Fibre Channel Loops
- Shared storage enclosure
- Dual HSG80 controllers configured in Transparent Failover Mode
- Up to 500 meters per cable segment
- Up to 72 disks with 2 optional expansion enclosures
- In this configuration 2 logical connections are available
- By default, setting the controller pair in Transparent Failover mode will automatically configure Port 1 and Port 2 of both controllers to the Active and Standby state indicated, and set the unit offset values to 0 for Port 1 and 100 for Port 2
- Utilization of the second controller host port requires a second Netware Server, FC host bus adapter, hub and cables

Configuration 1 Parts List

- One Netware 4.2 or 5.0 Server

Compaq Part #	Description	Quantity
380559-001	RA8000/ESA12000 FC Solution Software V8.3 for Novell Netware – Platform Kit	1
380577-001	ACS V8.3 FC-AL Controller SW	1
223180-B21	Compaq Fibre Channel Adapter	1
380550-B21 (Blue) 380550-B22 (Opal) 380660-B21	RA8000 Pedestal w/single HSG80 RA8000 Pedestal w/single HSG80 RA8000 Rackable w/single HSG80	Choose 1
234453-001 295573-B22	FC Optical Hub, 7-Port (no GBICs) FC Optical Hub, 12-Port (no GBICs)	Choose 1
380561-B21	FC Optical GBIC	2
234457-B21 234457-B22 234457-B23 234457-B24 234457-B25	FC 2 Meter Optical Cable FC 5 Meter Optical Cable FC 15 Meter Optical Cable FC 30 Meter Optical Cable FC 50 Meter Optical Cable	Choose 2
380691-B21 380595-B21 380694-B21 380588-B21 380589-B21	4GB UW 7200 RPM Disk 9GB UW 7200 RPM Disk 18GB UW 7200 RPM Disk 9GB UW 10000 RPM Disk 18GB UW 10000 RPM Disk	Choose up to 24

Configuration 1 Optional Components

Compaq Part #	Description	Quantity
380570-B21 (Blue) 380570-B22 (Opal) 380568-B21	Pedestal Expansion w/add'l 24 slots Pedestal Expansion w/add'l 24 slots Rackable Expansion w/add'l 24 slots	Up to 2
See Above	Additional Disks Drives Additional FC Optical GBIC Additional FC Optical Cable	Up to 48 1 1

Configuration 2 Parts List

- One Netware 4.2 or 5.0 Server

Compaq Part #	Description	Quantity
380559-001	RA8000/ESA12000 FC Solution Software V8.3 for Novell Netware – Platform Kit	1
380577-001	ACS V8.3 FC-AL Controller SW	2
223180-B21	Compaq Fibre Channel Adapter	1
380560-B21 (Blue) 380560-B22 (Opal) 380660-B21 380580-001 (Blue) 380580-002 (Opal) 380590-B21 (Blue) 380590-B22 (Opal) 380600-001 (Blue) 380600-002 (Opal) 380610-B21 (Blue) 380610-B22 (Opal)	RA8000 Pedestal w/dual HSG80 RA8000 Pedestal w/dual HSG80 RA8000 Rackable w/dual HSG80 ESA12000 w/dual HSG80 24 Slot 60HZ ESA12000 w/dual HSG80 24 Slot 60HZ ESA12000 w/dual HSG80 24 Slot 50HZ ESA12000 w/dual HSG80 24 Slot 50HZ ESA12000 w/dual HSG80 48 Slot 60HZ ESA12000 w/dual HSG80 48 Slot 60HZ ESA12000 w/dual HSG80 48 Slot 50HZ ESA12000 w/dual HSG80 48 Slot 50HZ	Choose 1
234453-001 295573-B22 (DEC) 295573-001 (CPQ)	FC Optical Hub, 7-Port (no GBICs) FC Optical Hub, 12-Port (no GBICs) FC Optical Hub, 12-Port (no GBICs)	Choose 1
380561-B21	FC Optical GBIC	2
234457-B21 234457-B22 234457-B23 234457-B24 234457-B25	FC 2 Meter Optical Cable FC 5 Meter Optical Cable FC 15 Meter Optical Cable FC 30 Meter Optical Cable FC 50 Meter Optical Cable	Choose 2
380691-B21 380595-B21 380694-B21 380588-B21 380589-B21	4GB UW 7200 RPM Disk 9GB UW 7200 RPM Disk 18GB UW 7200 RPM Disk 9GB UW 10000 RPM Disk 18GB UW 10000 RPM Disk	Choose up to 24 (48 for ESA 48 slot)

Configuration 2 Optional Components

Compaq Part #	Description	Quantity
380570-B21 (Blue) 380570-B22 (Opal) 380568-B21 380640-001 (Blue) 380640-002 (Opal) 380650-B21 (Blue) 380650-B22 (Opal)	Pedestal Expansion 24 slots Pedestal Expansion 24 slots Rackable Expansion 24 slots ESA12000 Expansion 48 Slot 60HZ ESA12000 Expansion 48 Slot 60HZ ESA12000 Expansion 48 Slot 50HZ ESA12000 Expansion 48 Slot 50HZ	Up to 2 OR Choose 1
See above	Additional Disks Drives Additional FC Optical GBIC Additional FC Optical Cable	Up to 48 2 Choose 2

Configuration 3 Parts List

- Two Netware 4.2 or 5.0 Servers

Compaq Part #	Description	Quantity
380559-001	RA8000/ESA12000 FC Solution Software V8.3 for Novell Netware – Platform Kit	1
380577-001	ACS V8.3 FC-AL Controller SW	1
223180-B21	Compaq Fibre Channel Adapter	2
380560-B21 (Blue) 380560-B22 (Opal) 380660-B21 380580-001 (Blue) 380580-002 (Opal) 380590-B21 (Blue) 380590-B22 (Opal) 380600-001 (Blue) 380600-002 (Opal) 380610-B21 (Blue) 380610-B22 (Opal)	RA8000 Pedestal w/dual HSG80 RA8000 Pedestal w/dual HSG80 RA8000 Rackable w/dual HSG80 ESA12000 w/dual HSG80 24 Slot 60HZ ESA12000 w/dual HSG80 24 Slot 60HZ ESA12000 w/dual HSG80 24 Slot 50HZ ESA12000 w/dual HSG80 24 Slot 50HZ ESA12000 w/dual HSG80 48 Slot 60HZ ESA12000 w/dual HSG80 48 Slot 60HZ ESA12000 w/dual HSG80 48 Slot 50HZ ESA12000 w/dual HSG80 48 Slot 50HZ	Choose 1
234453-001 295573-B22 (DEC) 295573-001 (CPQ)	FC Optical Hub, 7-Port (no GBICs) FC Optical Hub, 12-Port (no GBICs) FC Optical Hub, 12-Port (no GBICs)	Choose 2
380561-B21	FC Optical GBIC	4
234457-B21 234457-B22 234457-B23 234457-B24 234457-B25	FC 2 Meter Optical Cable FC 5 Meter Optical Cable FC 15 Meter Optical Cable FC 30 Meter Optical Cable FC 50 Meter Optical Cable	Choose 4
380691-B21 380595-B21 380694-B21 380588-B21 380589-B21	4GB UW 7200 RPM Disk 9GB UW 7200 RPM Disk 18GB UW 7200 RPM Disk 9GB UW 10000 RPM Disk 18GB UW 10000 RPM Disk	Choose up to 24 (48 for ESA 48 slot)

Configuration 3 Optional Components

Compaq Part #	Description	Quantity
380570-B21 (Blue) 380570-B22 (Opal) 380568-B21 380640-001 (Blue) 380640-002 (Opal) 380650-B21 (Blue) 380650-B22 (Opal)	Pedestal Expansion 24 slots Pedestal Expansion 24 slots Rackable Expansion 24 slots ESA12000 Expansion 48 Slot 60HZ ESA12000 Expansion 48 Slot 60HZ ESA12000 Expansion 48 Slot 50HZ ESA12000 Expansion 48 Slot 50HZ	Up to 2 OR Choose 1
See above	Additional Disks Drives	Up to 48

Configuration 4 Parts List

- Two Netware 4.2 or 5.0 Servers

Compaq Part #	Description	Quantity
380559-001	RA8000/ESA12000 FC Solution Software V8.3 for Novell Netware	1
380577-001	ACS V8.3 FC-AL Controller SW	2
223180-B21	Compaq Fibre Channel Adapter	2
380560-B21 (Blue) 380560-B22 (Opal) 380660-B21 380580-001 (Blue) 380580-002 (Opal) 380590-B21 (Blue) 380590-B22 (Opal) 380600-001 (Blue) 380600-002 (Opal) 380610-B21 (Blue) 380610-B22 (Opal)	RA8000 Pedestal w/dual HSG80 RA8000 Pedestal w/dual HSG80 RA8000 Rackable w/dual HSG80 ESA12000 w/dual HSG80 24 Slot 60HZ ESA12000 w/dual HSG80 24 Slot 60HZ ESA12000 w/dual HSG80 24 Slot 50HZ ESA12000 w/dual HSG80 24 Slot 50HZ ESA12000 w/dual HSG80 48 Slot 60HZ ESA12000 w/dual HSG80 48 Slot 60HZ ESA12000 w/dual HSG80 48 Slot 50HZ ESA12000 w/dual HSG80 48 Slot 50HZ	Choose 1
234453-001 295573-B22 (DEC) 295573-001 (CPQ)	FC Optical Hub, 7-Port (no GBICs) FC Optical Hub, 12-Port (no GBICs) FC Optical Hub, 12-Port (no GBICs)	Choose 2
380561-B21	FC Optical GBIC	6
234457-B21 234457-B22 234457-B23 234457-B24 234457-B25	FC 2 Meter Optical Cable FC 5 Meter Optical Cable FC 15 Meter Optical Cable FC 30 Meter Optical Cable FC 50 Meter Optical Cable	Choose 6
380691-B21 380595-B21 380694-B21 380588-B21 380589-B21	4GB UW 7200 RPM Disk 9GB UW 7200 RPM Disk 18GB UW 7200 RPM Disk 9GB UW 10000 RPM Disk 18GB UW 10000 RPM Disk	Choose up to 24 (48 for ESA 48 slot)

Configuration 4 Optional Components

Compaq Part #	Description	Quantity
380570-B21 (Blue) 380570-B22 (Opal) 380568-B21 380640-001 (Blue) 380640-002 (Opal) 380650-B21 (Blue) 380650-B22 (Opal)	Pedestal Expansion 24 slots Pedestal Expansion 24 slots Rackable Expansion 24 slots ESA12000 Expansion 48 Slot 60HZ ESA12000 Expansion 48 Slot 60HZ ESA12000 Expansion 48 Slot 50HZ ESA12000 Expansion 48 Slot 50HZ	Up to 2 OR Choose 1
See above	Additional Disks Drives	Up to 48

Product Details

The RA8000/ESA12000 storage systems utilize the Compaq HSG80 RAID controller running Array Controller Software (ACS) V8.3. The ACS software is designed to support multiple platforms providing features including: dual controller operation, two controller failover modes – Transparent and Multiple-Bus, mirrored write back cache, read ahead cache, RAID implementation, disk mirroring, and disk partitioning capabilities. In addition, ACS manages host interconnect and protocol services to provide data for event notification and status such as displayed by SWCC.

The HSG80 controller has two FC host ports providing up to a total of nearly 200 Mbytes per second of available bandwidth. Disk drives are connected to the controller through 6 UltraSCSI channels providing up to 40 Mbytes per second per channel of available bandwidth. Servers can use multiple host bus adapters (HBAs) to multiple RA8000 FC systems for unlimited storage capacity.

The RA8000 FC is supplied in two basic building blocks, a pedestal style cabinet and what has been termed a “rackable” model. The pedestal is a self-contained desk height cabinet, it is available in Digital Classic Top Gun blue and in Compaq Opal. The rackable is shipped ready to be mounted in a 19” Compaq rack or a 19” cabinet/rack using an included universal RETMA/metric mounting kit.

RA8000 FC controllers come with 64 MB of cache. Cache options allow for 128 MB, 256 MB and 512MB of cache in each controller. ESA12000 FC controllers come with 256 MB of cache. Cache options allow for 512MB of cache in each controller. Cache features include read ahead and mirrored write back cache for use in optimizing performance where redundant capabilities are required for high availability system configurations. In the rare event that a storage controller fails the mirrored data is immediately available to the remaining controller for continuing operation.

The RA8000 FC pedestals and rackables come in both single controller and in dual controller models to allow the customer to select the level of high availability required for their application. A single controller model can be upgraded to a dual controller model when warranted by the application.

High availability is supported by the use of redundancy and hot swappable components. The RA8000 FC disk enclosures include redundant cooling, and have 5 power supplies providing N+1 redundancy. Power can be upgraded to full redundancy with the addition of 3 more supplies and a 2nd power distribution unit for AC input redundancy. StorageWorks components are “hot” swappable including storage controllers when operating as a redundant pair.

You can configure and monitor the RA8000 and ESA12000 FC using the StorageWorks Command Console (SWCC), a client/server tool, included in the HSG80 Software Solutions Platform kit. The client provides an easy to use graphical user interface. It can be used to monitor your storage system and notify you of events by updating a graphic display, sending electronic mail, or alerting via a pager. The Command Console Client includes applications (or Storage Windows) that communicate with the Command Console Agent software running on the host platform.

The Command Console client is available on Windows 95 and on Intel/Alpha platforms running Windows NT. A Storage Window for the HSG80 controller supports the Array Controller Software (ACS) V8.3 and offers integration with Compaq's Insight Manager (CIM). Insight Manager can receive SNMP traps from the Command Console Agent and Insight Manager services can directly launch SWCC for notification or configuring operations.

Configuration References

Table 3 lists the documents that provide further information on the configuration of RA8000 and ESA12000 Fibre Channel Storage Systems:

Table 3 Configuration Reference Material

Topic	Document Title	Order Number
<i>HSG80 Array Controller – Release Notes</i>	<i>Release Notes, HSG80 Array Controller (ACS V8.3) for Novell Netware</i>	<i>AA-RFB8A-TE</i>
<i>Quick Setup Guide</i>	<i>RAID Array 8000/ESA12000 Fibre Channel Storage Subsystem for Novell Netware</i>	<i>AA-RFB7A-TE</i>
<i>Solution Software Installation for Netware</i>	<i>RA8000/ESA12000 Fibre Channel Solution Software V8.3 for Novell Netware – Installation Reference Guide</i>	<i>AA-RFB9A-TE</i>
<i>HSG80 Array Controller Configuration</i>	<i>HSG80 Array Controller ACS Version 8.3 Configuration and CLI Reference Guide</i>	<i>EK-HSG80-RG</i>
<i>HSG80 Array Controller Maintenance</i>	<i>HSG80 Array Controller ACS Version 8.3 Maintenance and Service Guide</i>	<i>EK-HSG80-SV</i>
<i>StorageWorks Command Console</i>	<i>Command Console V2.1 (HSG80) for RAID Array 8000/ESA12000 – User's Guide</i>	<i>AA-RFA2A-TE</i>
<i>Warranty Information</i>	<i>DIGITAL StorageWorks Warranty Terms and Conditions</i>	<i>EK-HSXSU-WC</i>
<i>HSG80 Array Controller Parts</i>	<i>HSG80 Array Controller Illustrated Parts Map</i>	<i>EK-HSG80-MP or 355217-001</i>
<i>RA8000/ESA12000 Configuration</i>	<i>RA8000/ESA12000 Fibre Channel HSG80 Storage Subsystem Configuration Poster</i>	<i>EK-HSG80-CP or 355207-001</i>

Netware is a registered trademark of Novell Corporation

Intel is a registered trademark of Intel Corporation.

Windows NT and MSCS are trademarks of Microsoft Corporation.

STORAGWORKS and the Compaq Logo are trademarks of Compaq Computer Corporation.

All other trademarks and registered trademarks are the property of their respective owners.

