

HP StorageWorks 4400 Enterprise Virtual Array Installation Guide

This guide describes how to install the HP StorageWorks 4400 Enterprise Virtual Array (EVA4400) and is intended for users with knowledge of storage area networks and basic operating system commands and utilities.

The EVA4400 is customer self installable. However, you may purchase installation service by an HP-authorized service provider if preferred. For more information, contact HP technical support in North America at 1-800-474-6836. Outside North America, call HP technical support at the nearest location. Telephone numbers for worldwide technical support are listed on the HP website: <http://www.hp.com/support>.

To assist you in installing the EVA4400, videos of the procedures have been produced. Go to the Services Media Library website: <http://www.hp.com/go/sml> and navigate to your product to view these videos.



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1 Review and confirm your plans

Overview

Before installing the EVA, HP recommends that you:

- Develop an installation and configuration plan for your environment.
- Review all videos and documentation.
- Determine if the EVA will be fabric-attached (connected to Fibre Channel switch) or direct-attached (connected to Fibre Channel adapter in server). The EVA4400 is factory configured for fabric-attached. To change to direct-attached mode, see [Chapter 6](#).



NOTE:

Models of the EVA4400 with an embedded switch (also known as the HSV300-S controller) are configured in fabric-attach mode and must remain fabric-attached.

Prerequisites

Prerequisites for using this product include:

- A Fibre Channel switch installed in your environment
- An equipment cabinet suitable for 2U sized enclosures
- A management server running Windows for HP Command View EVA software (server-based management)
- A management module running HP Command View EVA software (array-based management)
- A CD-ROM drive attached to either the management server or the server attached to the management module

Plan your storage configuration

Proper planning of the system storage and its subsequent performance is critical to a successful deployment of the EVA. Improper planning or implementation can result in wasted storage space, degraded performance, or inability to expand the system to meet growing storage needs. Planning considerations include:

- System and performance expectations
- Striping methods
- RAID levels
- Hard drive sizes and types
- Spare drives
- Array sizing (capacity)

 **NOTE:**

For the minimum supported configuration, and other configuration information, see the QuickSpecs document at: <http://www.hp.com/go/eva4400>

System and performance expectations

To help determine the best way to configure your storage, rank the following three storage characteristics in order of importance:

- Fault tolerance (high availability)
- I/O performance
- Storage efficiency

With your priorities established, you can determine which striping method and RAID level to use.

As highlighted in the following section, some configuration methods offer greater fault tolerance, while other configuration methods offer better I/O performance or storage efficiency.

RAID levels

Vraid is the HP term for the implementation of RAID (Redundant Array of Independent Disks) storage. Vraid is also referred to as *redundancy* in HP management software. Virtual disks with HP Vraid use three key RAID methods: data striping, data mirroring, and parity error checking. Unlike traditional RAID, all HP Vraid levels distribute data across *all* available physical disks.

Data striping improves speed by performing virtual disk I/O with an entire group of physical disks at the same time. Mirroring provides data redundancy by storing data and a copy of the data. Parity also provides data redundancy by storing data and the calculated parity for each stripe of data. If a subset of the data on a physical disk becomes corrupt or the entire physical disk fails, the data can be automatically recovered from redundancy so that data loss does not occur.

The EVA has four Vraid types: Vraid0, Vraid1, Vraid5, and Vraid6. Each Vraid type provides unique I/O speed and has a different level of data redundancy, which directly effects the amount of physical space used. Once a virtual disk is created, the Vraid type or level cannot be changed.

See [Table 1](#) for a comparison of the different RAID levels.

Table 1 Raid Level Comparison

	Summary	Best practices	Data redundancy	RAID method
Vraid0	Vraid0 is optimized for I/O speed and efficient use of physical disk capacity, but provides no data redundancy.	IMPORTANT: HP does not recommend using Vraid0 for virtual disks when high availability is required. Consider Vraid0 only for noncritical storage. Vraid0 virtual disks provide the best performance for applications that use random I/O.	None	Striping

	Summary	Best practices	Data redundancy	RAID method
Vraid1	Vraid1 is optimized for data redundancy and I/O speed, but uses the most physical disk space. IMPORTANT: Vraid1 uses about 100% more physical disk space than Vraid0.	In general, Vraid1 virtual disks provide better performance characteristics over a wider range of application workloads than Vraid5.	High	Striping and mirroring
Vraid5	Vraid5 provides a balance of data redundancy, I/O speed, and efficient use of physical disk space. Vraid5 uses about 20% more physical disk space than Vraid0.	Vraid5 virtual disks provide as good or better performance than Vraid1 for applications that use sequential writes. Vraid5 has much lower random write performance in comparison to Vraid1, but has much higher capacity efficiency.	Medium	Striping and parity
Vraid6	Vraid6 is similar to Vraid5, but provides a higher level of redundancy by storing two parity blocks per stripe instead of one. Vraid6 uses 33% more physical disk space than Vraid0.	Performance characteristics of Vraid6 for random and sequential write workloads will be slightly slower than Vraid5. Vraid6 provides the highest level of redundancy protection of all the Vraid types.	Very high	Striping and double parity

 **NOTE:**

For best practice information, see the *HP StorageWorks 4400 Enterprise Virtual Array configuration best practices white paper* available at:

http://h18006.www1.hp.com/storage/arraywhitepapers.html?jumpid=reg_R1002_USEN

HP Command View EVA implementation

HP Command View EVA can be implemented in two ways:

- **Server-based management**—HP Command View EVA is installed on a management server connected to the EVA, providing management of multiple HP EVA storage systems. All components of the software suite (HP Command View EVA, HP Command View EVAPerf, HP Storage System Scripting Utility, SMI-S EVA) are installed. Server-based management is applicable to all EVA models.
- **Array-based management**—Beginning with HP Command View EVA 8.1, the EVA4400 is shipped with HP Command View EVA **pre-installed** on the management module within the controller enclosure. Only one component of the software suite (HP Command View EVA) is installed. Array-based management is applicable to the EVA4400 only.

2 Prepare your site

Overview

Preparing your site means providing:

- Physical rack space for the equipment
- AC power for the EVA
- Proper ventilation and temperature conditions
- LAN or Fibre Channel cables to attach the EVA hardware to your network.

To ensure continuous, safe, and reliable operation of your equipment, place your system in an approved environment.

Consider using the HP Enterprise Configurator (eCO) to help plan and configure racks and rack-mountable devices. The eCO is available on the HP website:

<http://h30099.www3.hp.com/configurator>

Click **Configure** under Disk products.

Provide adequate structural support for the floor

Calculate the total weight of your equipment and verify that your site can support the weight.

Provide adequate clearance space and ventilation

Be sure to provide adequate clearance around the front and back of the racks. Provide at least 25 inches (63.5 cm) in the front of the rack to allow the doors to open fully and provide at least 30 inches (76.2 cm) in the rear of the rack to allow for servicing and airflow.

If there are unused spaces in your rack, attach blanking panels across those empty spaces to force the airflow through the components instead of through the open spaces.

Provide adequate and redundant sources of power

Make sure that you have two high-line power feeds installed near your computer. These two power sources usually come from the same external power grid, but occasionally may originate from different grids or even entirely different sources.

For protection against a power-source failure, obtain and include two uninterruptible power supplies in your installation.

For power consumption specifications, see the QuickSpecs document at:

<http://www.hp.com/go/eva4400>

Remove product from packaging

1. Remove product from boxes.
2. Verify that contents match your expectations and site requirements.
 - EVA4400 controller enclosure should contain:
 - One 2U controller enclosure with two HSV300 or HSV300-S controller modules, two power supply modules, two fan modules, and two battery modules installed.
 - Rack mounting hardware
 - Two 2.0 meter FC copper cables
 - Two power cords
 - Installation documentation
 - XCS controller software recovery CD
 - Each FC disk shelf should contain:
 - One 2U M6412 disk enclosure, two power supply modules, two fan modules, and two battery modules.
 - Rack mounting hardware kit
 - Two 0.41 meter FC copper cables
 - Two power cords
3. Inspect for damage.
If damage is present, contact your local HP representative.

3 Install components

Overview

Component installation includes:

- Rail kits
- Controller and disk enclosures
- Disk drives



NOTE:

If you have ordered the factory integrated product, skip this chapter and go to [Chapter 5](#).

Rack installation best practices

In addition to industry-standard recommendations, consider the following:

- Locate the heaviest items, such as uninterruptible power supplies (UPS) and additional disk enclosures near the bottom of the rack.
- To make cabling easy, install the disk enclosures below the controller enclosure.
- Install similar components next to each other in the rack. Because enclosures, switches, and servers are of differing depths, if you have more than one of a device, mount those devices adjacent to one another to accommodate working behind the rack.



WARNING!

To reduce the risk of personal injury or damage to the equipment, be sure that:

- At least two people lift the storage system during removal or installation, if the weight, exceeds 22.7 kg (50 lb). If the system is being loaded into the rack above chest level, a third person **MUST** assist with aligning the system with the rails while the other two people support the weight of the system.
 - The leveling jacks on the rack are extended to the floor.
 - The full weight of the rack rests on the leveling jacks.
 - The stabilizing feet are attached to the rack if it is a single-rack installation.
 - The racks are coupled together in multiple-rack installations.
 - Only one component in a rack is extended at a time. A rack may become unstable if more than one component is extended.
 - To prevent damage and to ease insertion of the device into the rack, support the weight of the device and keep it level when sliding it into the rack.
-

Review [Figure 1](#) before installing the EVA components in the rack.

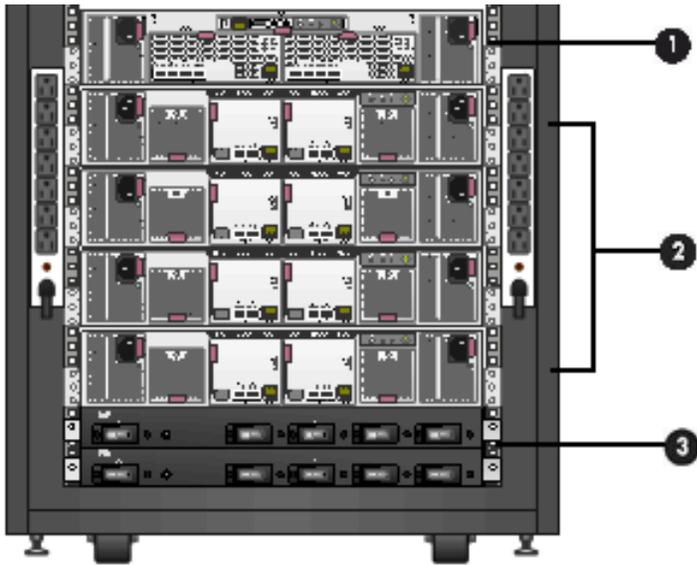


Figure 1 Typical EVA installed in rack (preferred layout)

1. Controller enclosure
2. Disk enclosures
3. PDU (at rear of enclosure)

Attach the brackets for a longer chassis

If you are installing a longer chassis into your cabinet, such as for the controller enclosure, you must remove the shipping retaining bracket and install the smaller brackets supplied in the accessory kit.

 **NOTE:**

A No. 2 Phillips head screwdriver is required for this procedure.

1. Remove the existing thumbscrew and shipping retaining bracket from the rear of the rail.

2. Insert a screw through the bottom hole of the new bracket and loosely secure the bracket to the rear of the rail.

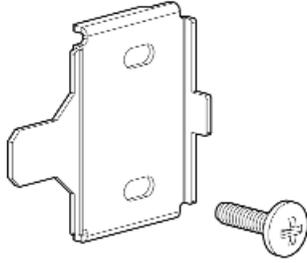


Figure 2 Inserting screw into the new bracket

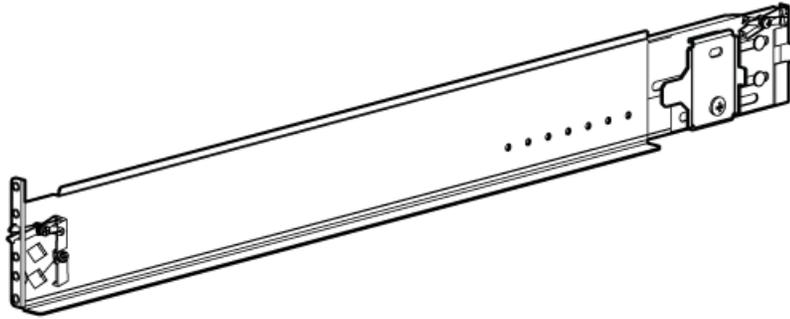


Figure 3 Attaching the brackets

3. Repeat [Step 1](#) and [Step 2](#) for the remaining rail.

Converting the rails

The rail kit supplied with the disk enclosure comes configured for square-hole racks.

ⓘ IMPORTANT:

Do not remove the pins from the ends of the rails unless you are converting the rails for use in round-hole racks. These load-bearing pins are designed to fit through the holes without being removed.

To convert the rails for a round-hole rack:

1. Locate the bag of eight round-hole pins included in the rail kit.

2. Use a No. 2 Phillips screwdriver to remove the standard pins from the front and back of the left and right rails (four pins on each rail).

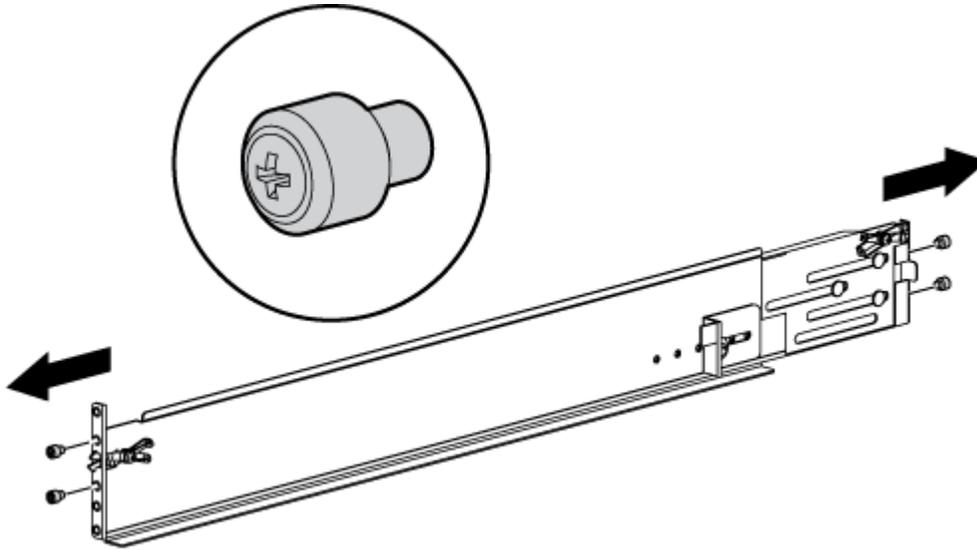


Figure 4 Configuring the rails

3. Insert the round-hole pins into the eight holes on the rails where the standard pins were removed.

Attach the rails

 **NOTE:**

The left and right rails are designated by the letters R (right) and L (left) stamped in the metal on the front of the rack.

Consider the following when installing the rails:

- Installing the rails does not require any tools for assembly.
- HP recommends that you install all the rail kits before installing any other components.
- Ensure that the rails are level before installing any other components.

 **WARNING!**

Before you begin, ensure that the rack is sufficiently stable. If provided, lower the rack leveler feet and make sure any required stabilizers are installed. If provided, extend the anti-tip device. Failure to extend the anti-tip device could cause personal injury or damage if the rack tips over.

1. On the rear of the rail, squeeze the scissor latch (1, [Figure 5](#)) together to insert the rail and pins through the rack holes (2) until the latch engages.

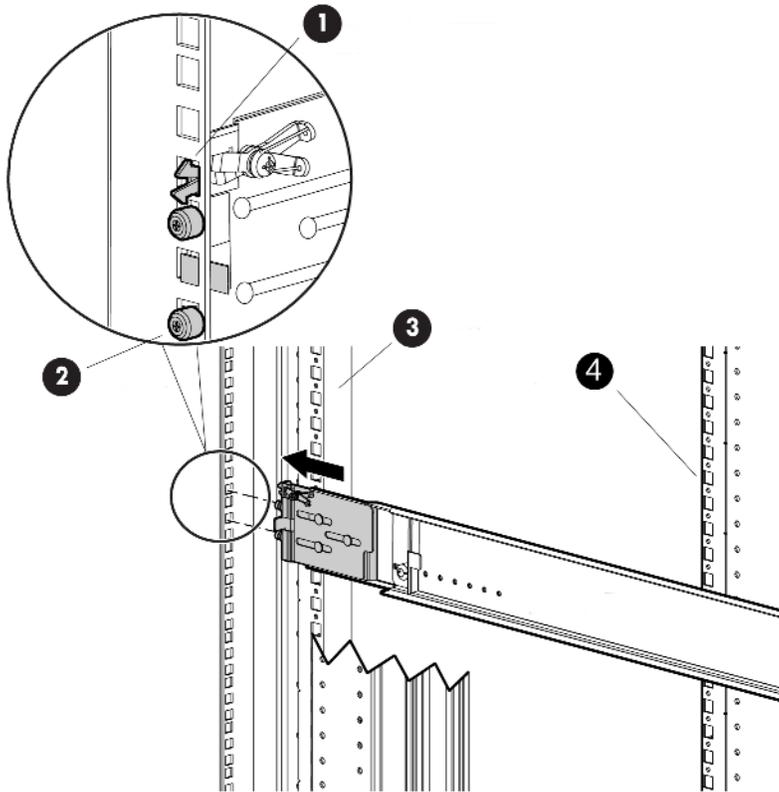


Figure 5 Attaching the rear rail

2. On the front of the rail, pull the locking latch to release the scissor latch (1, [Figure 6](#)) and squeeze the scissor latch together to insert the rail and pins through the rack upright holes (2) until the latch engages (3).

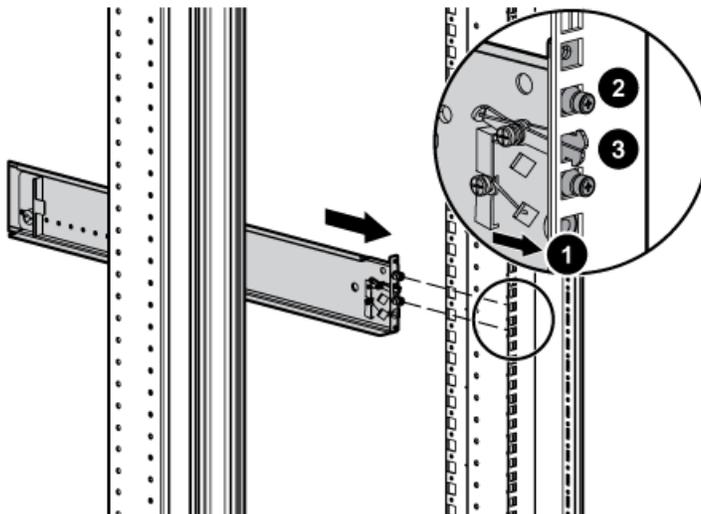


Figure 6 Attaching the front rail

3. Loosen the locking nut (1, [Figure 7](#)) on the shipping retaining bracket (2) and slide the bracket to the farthest position on the rear of the rail. This moves the bracket out of the way to allow you to install the chassis in the rails.



NOTE:

[Figure 7](#) shows a disk enclosure rail and bracket. If you are installing a longer chassis into your cabinet, such as a chassis for a controller enclosure, see [Attach the brackets for a longer chassis](#) for additional information.

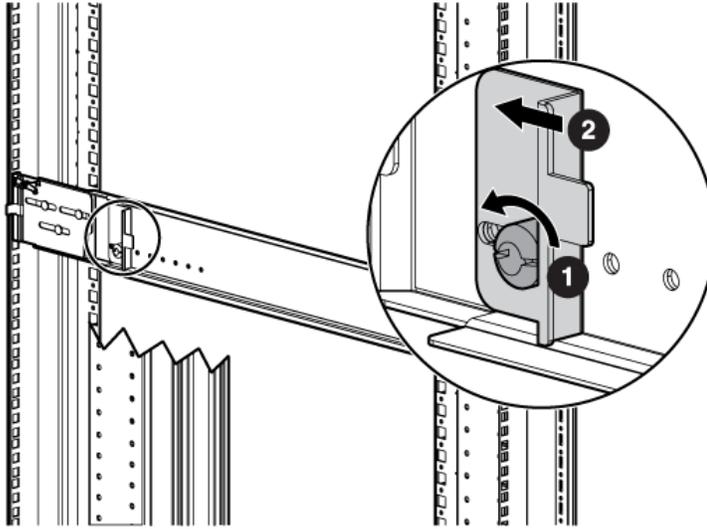


Figure 7 Locking nut and retaining bracket

4. After attaching the rail, grab and move the rail gently to be sure it is firmly engaged in the rack and that all latches are engaged in the rack holes.
5. Repeat [Step 1](#) through [Step 4](#) for the other rail.

Install the enclosures

To install disk and controller enclosures:

1. Remove the bezels installed over the thumbscrews on the front of the enclosure ([Figure 8](#)).

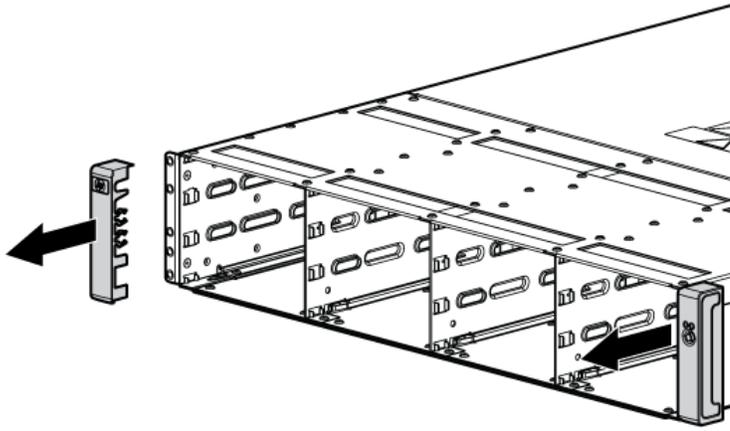


Figure 8 Removing bezels from enclosure

2. Align the enclosure with the rails and slide it into the rack (Figure 9).

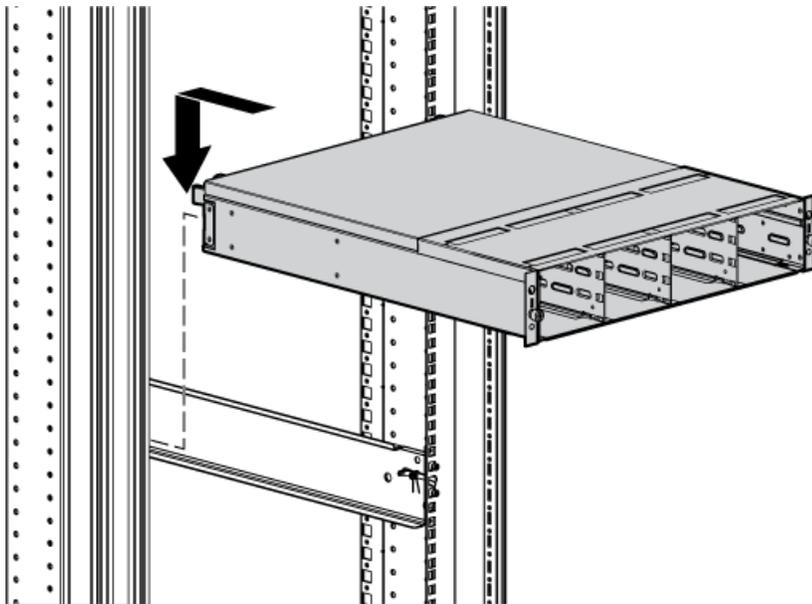


Figure 9 Installing an enclosure (view from front of rack)

3. Continue sliding the enclosure into the rack until the front edge is flush with the front of the rack (1, Figure 10). Tighten the enclosure thumbscrews into the rack (2) taking care not to strip the thumbscrews.

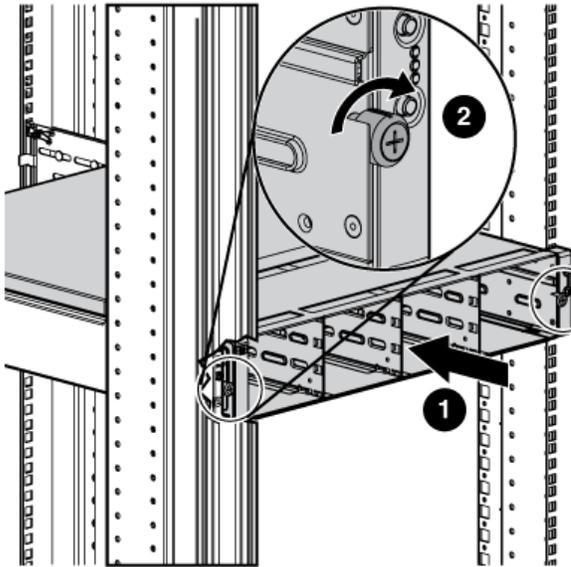


Figure 10 Securing the rear of the enclosure in the rack (view from front of rack)

4. Reattach the front bezel covers.
5. At the rear of the rack, loosen the thumbscrew on the shipping retaining bracket (1, [Figure 11](#)) and slide the bracket forward (2) until the tab engages the slot in the chassis. Tighten the thumbscrew on the bracket.

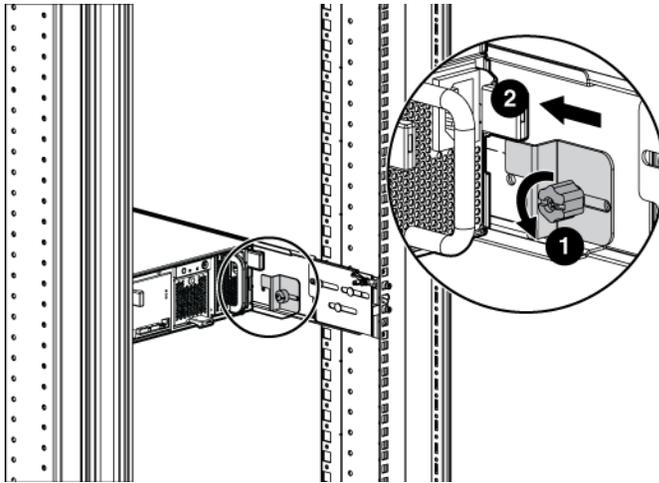


Figure 11 Securing the rear of the enclosure (view from rear of rack)

6. Repeat 1 through 5 to install the controller enclosures.

Installing the hard drives into the drive bays

After the disk enclosures are secured in the rack, install the hard drives into the drive bays. Drives must be installed in the proper bay sequence (see [Figure 12](#)) in the enclosures for optimum HP Command View EVA performance and data integrity.

For example, if you have four enclosures, and eight drives, you should install four drives into bay 1 of each enclosure and four drives into bay 2 of each enclosure. Do not install all the drives into enclosure 1 and leave the other enclosures empty.

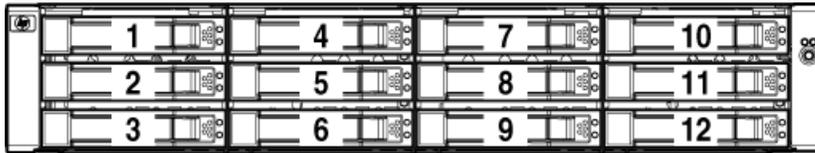


Figure 12 Disk drive numbering

△ **CAUTION:**

Install hard drives in the enclosures only after securing the enclosures in the rack:

- An enclosure populated with hard drives is too heavy to lift safely.
- Movement of an enclosure during installation might damage the internal storage media of installed hard drives.

△ **CAUTION:**

Follow industry-standard practices when handling hard drives. Internal storage media can be damaged when drives are shaken, dropped, or roughly placed on a work surface. When installing a hard drive, make sure it is fully seated in the drive bay. To remove a hard drive, press the release button and pull the drive only slightly out of the enclosure. Then, to allow time for the internal disk to stop rotating, wait approximately 10 seconds before completely removing the drive from the enclosure.

To install the hard drives:

1. Insert the disk drive into the drive bay (1, [Figure 13](#)) until it clicks, locking the drive.
2. Rotate the drive lever to the right (2, [Figure 13](#)) until it locks.

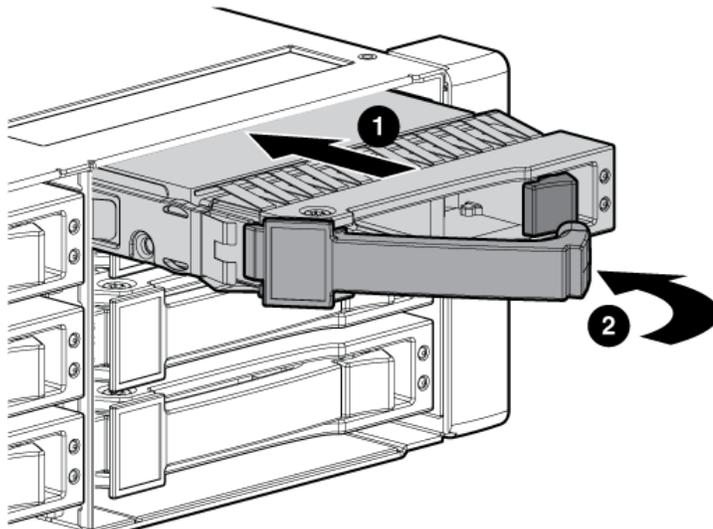


Figure 13 Installing drives into the enclosures

Installing SFPs

The HSV300-S controller uses Small Form Factor Pluggable (SFPs) transceiver modules on the FC ports. Four SFPs are factory installed in the HSV300-S, but you will need to install additional SFPs if you plan to use more than four switch ports. If you purchased extra SFPs, install them now, following the instructions shipped with the SFPs.

 **NOTE:**

The HSV300-S requires 4 Gb or higher SFPs.

4 Connect cables and power cords

Overview

 **NOTE:**

If you have ordered the factory integrated product, skip this section and go to [Chapter 5](#).

To connect cables and power cords:

1. Read the cabling best practices.
2. Attach Fibre Channel and/or LAN cables to controller, drives, and servers.
3. Label all cables using the supplied cable labeling kit.
4. Plug in all power cables.

Cabling best practices

- Use the shortest possible cable between devices. Shorter cables are easier to manage and route along the back of the rack. In addition, shorter cables reduce the possibility of signal degradation that may occur over longer distances.
- Gather the cables in the rear of the EVA to ensure that the cabling in the back of the rack system does not interfere with system operation or maintenance. Bind the cables loosely with cable ties and route the excess cables out of the way, along the side of the rack. When the cables are tied together and routed down the side of the rack, system components and indicators are easily visible and accessible.
- Attach a label near both ends of each cable to identify the device connected to that cable. Include the device type, device name, port, or other information that you think will be helpful.
- Use colored markers to color code both ends of each cable, to help you visually identify a particular cable without having to read or locate the label.
- In multipath configurations, you may want to loosely bind the matching pair of cables connecting devices.

Connecting the Fibre Channel cables

To connect the EVA to the SAN, use standard Fibre Channel cables, observing the following caution for good cabling-handling practices.

△ CAUTION:

Use appropriate precautions when handling Fibre Channel cables:

- Touching the end of a Fibre Channel cable will either damage the cable or cause performance problems, including intermittent difficulties accessing the storage.
 - Whenever a Fibre Channel cable is not connected, replace the protective covers on the ends of the cable.
 - Make certain that the Fibre Channel cables are installed and supported so that no excess weight is placed on the connectors. This prevents damage to the connector and cable. Excess cable should be loosely coiled and tied out of the way, being careful not to coil the cable in a tight loop. The minimum bend radius is 25 mm for 50, 62.5, and 9 micron fiber optic cable.
-

Connecting device port Fibre Channel cables to the EVA (rear view)

See [Figure 24](#) and [Figure 25](#) in Appendix A.

Connecting Fibre Channel cables to the EVA (front end)

See [Figure 26](#) and [Figure 28](#) in Appendix A for front end connections with server-based management. See [Figure 27](#) and [Figure 29](#) in Appendix A for front end connections with array-based management.

Connecting cables to an HSV300-S controller enclosure (front end)

See [Figure 30](#) for server-based management or [Figure 31](#) for array-based management in Appendix A.

Labeling cables using labeling kit

Label each end of each cable using the materials in the supplied labeling kit.

Connecting the power cords

△ WARNING!

To reduce the risk of electric shock or damage to the equipment:

- Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
 - Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.
 - To remove power to the equipment, unplug the power cord from the power supply.
 - Route the power cord so that it is not likely to be walked on or pinched by items placed against it. Pay particular attention to the plug, electrical outlet, and the point where the cord is attached to the EVA.
-

To protect your system from power failure related downtime, each EVA ships with a redundant power supply. See [Table 2](#) to determine the best method for connecting your power supplies to your power source to eliminate downtime due to power-related failure.

When connecting the power cables, use the power cables shipped with the EVA. After power is supplied to the EVA, the power supply automatically senses the input voltage and the power supply LED illuminates as solid amber.

Table 2 Power cable connections

Connection Method	Level of Protection
EVA power supplies connected to one power source	Protects you from downtime when one of the EVA power supplies fails. The remaining power supply/fan module can operate the EVA until you install a replacement module.
EVA power supplies connected to two separate power sources	Protects you from downtime when one of the EVA power supplies fails. Protects you from data loss when one of your power sources fails, due to a pulled cable or tripped breaker. The remaining power source can power the EVA until the failed power source is restored or relocated. Depending on the cause and duration of the power outage, you can use this time to properly shut down your storage sub-system.
EVA power supplies connected to: <ul style="list-style-type: none"> • Two uninterruptible power supplies • Two separate power sources 	Protects you from downtime when one of the EVA power supplies fails. Protects you from data loss when one or both of your power sources fails, due to a pulled cable, tripped breaker, or local power outage. The remaining power source or the UPS will power the EVA until power is restored to the source. Depending on the cause and duration of the power outage, you can use this time to properly shut down your storage sub-system.

For more information about power sources, see the *HP StorageWorks 4400 Enterprise Virtual Array User Guide*.

5 Turn on power

Power on the devices

After the EVA and its disk enclosures are installed and connected to the SAN, power up all of the devices in the SAN and verify that they are operating properly.

1. Apply power to the power distribution unit (PDU) in the rack:
 - If the controller enclosure was shipped with the power button in the ON position, the controller enclosure and connected disk enclosures will automatically power on. Otherwise, press the power/standby button on the front panel of the controller enclosure.
 - When the controller enclosure is powered on, the LED for the power/standby buttons changes from amber to solid green.
 - Wait for a solid green LED on each disk enclosure to ensure that each enclosure has successfully powered on.
2. Apply power to each external Fibre Channel switch.
3. Wait (up to five minutes) for the EVA to complete its startup routine and for the Fibre Channel switches to boot.
4. Apply power to the servers in the SAN with access to the EVA, start the operating system, and log on as administrator.

△ **CAUTION:**

When you power on the server, the monitor may display a “New Hardware Found” message and to a prompt to install an HBA driver. Cancel out of this window to prevent the installation of an unsupported HBA driver.

5. Verify that each component in the SAN is operating properly as described in the following sections.

Verify the operating status of the EVA

To verify the operating status of the EVA, view the LEDs on the EVA.

Each module of the EVA is equipped with an LED display (Figure 14). See Table 3 for LED information. The enclosure external health LED (2) on the panel should be lit when the unit is operating properly. Check the LEDs located on the enclosure first before checking the LEDs on individual replaceable units in the EVA.

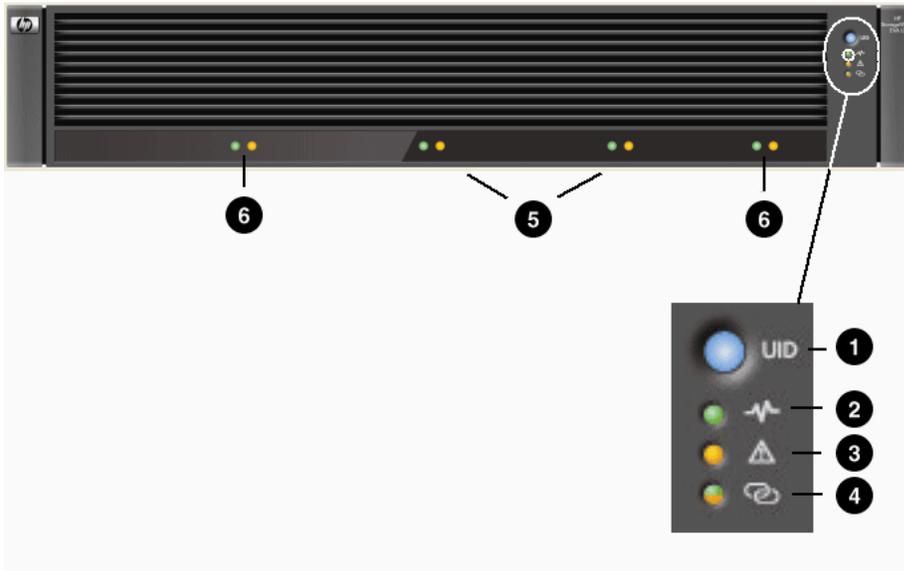


Figure 14 EVA4400 front panel LEDs

Table 3 EVA4400 status lights during startup

Number	LED function	Startup condition	Operating condition	Fault condition
1	UID (Unit ID)	Blinking blue	Off—Blinking if turned on remotely	N/A
2	Enclosure external health	Blinking green	Green	
3	Enclosure fault warning	Off	Off	Blinking amber
4	Link to host	Solid amber	Green	Amber—Indicates link lost
5 (2 LEDs)	Fan condition	Solid amber	Green	Blinking green—Indicates charging or defective FRU
6 (2 LEDs)	Battery condition	Solid amber	Green	Blinking amber—Indicates defective FRU

If the LED patterns described in Table 3 are not illuminated:

- Check your cable connections between the device and the EVA.
- Check the availability of your power source.
- Review the installation procedures.
- Remove and reinsert the module.

Verify the operating status of the disk enclosures

To verify that the disk enclosures and hard drives are operating properly, view the enclosure and hard drive LEDs and compare them with the patterns described in the documentation for these devices. If the LEDs indicate a fault, see the *HP StorageWorks 4400 Enterprise Virtual Array User Guide*.



Figure 15 Rear and front view of the disk enclosure

Verify the operating status of the Fibre Channel switches and adapters

To verify that your switches are operating properly, view the switch LEDs and compare them with the patterns described in the documentation for these devices. If the LEDs indicate a fault, see the documentation that came with the switch for help.

Optional Step: If you will be using Fibre Channel to attach the EVA to your existing servers, you must install Fibre Channel adapters in those servers and test the Fibre Channel adapters prior to installing HP Command View EVA.

Ensure that you have the correct quantity and length of Fibre Channel cables available to attach your servers to the EVA.

Installing Fibre Channel drivers

If you are using Windows, the HP SmartStart EVA Storage software automatically loads the required Fibre Channel drivers. This occurs during this installation process when you run HP SmartStart EVA Storage.

For other operating systems, load the drivers as directed in (Configuring application servers) in the *HP StorageWorks 4400 Enterprise Virtual Array User Guide*.

Configuring the embedded switch in an HSV300-S controller

The embedded switch in an HSV300-S controller has a default IP addresses that may not be visible in your network. Any configuration changes must be made to both embedded switches in an HSV300-S controller enclosure. This process involves connecting a cable from the Ethernet port of each switch to a laptop computer and supplying switch addresses that are valid for your network.

 **NOTE:**

For complete switch configuration and management instructions, see the *HP StorageWorks Fabric OS 6.1.x administrator guide* at: <http://www.hp.com/support/manuals>. Under Storage, click **Disk Storage Systems** and then click **HP StorageWorks 4400 Enterprise Virtual Array** under EVA Disk Arrays.

To configure an embedded switch in an HSV300-S controller:

1. Obtain a laptop and an Ethernet cable (straight-through or crossover type), and change the IP address of the laptop to have an address in the same IP range as the embedded switch (for example **10.77.77.79**, with a subnet mask of: **255.255.255.0**).

 **NOTE:**

The embedded switch has an MDI-X port that supports straight-through or crossover Ethernet cables. Use a Cat 5e or greater cable.

If needed, you can connect directly to the switch using the console port (2, [Figure 16](#)) and the provided console cable (manufacturing part number 259992-001). You may need a USB adapter for this cable if your laptop does not have a serial port.

2. Connect the Ethernet port (2, [Figure 16](#)) of the embedded switch to the laptop.

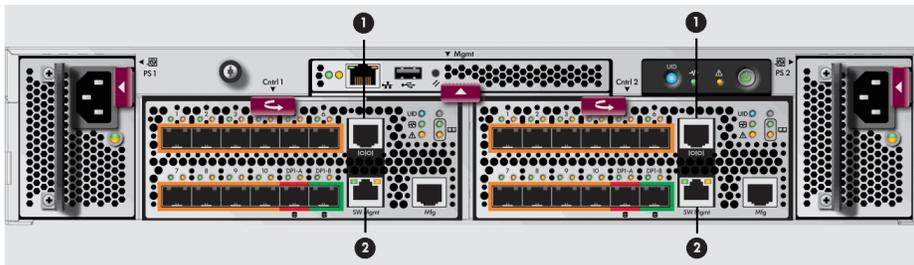


Figure 16 HSV300-S rear view

1. Console port
2. Ethernet port

3. Browse to **http://10.77.77.77** for the Controller 1 switch.

 **NOTE:**

Fibre Channel switches are referred to as *left slot switch* and *right slot switch* in Brocade Web Tools.

The switch management GUI (Brocade Web Tools) appears ([Figure 17](#)).

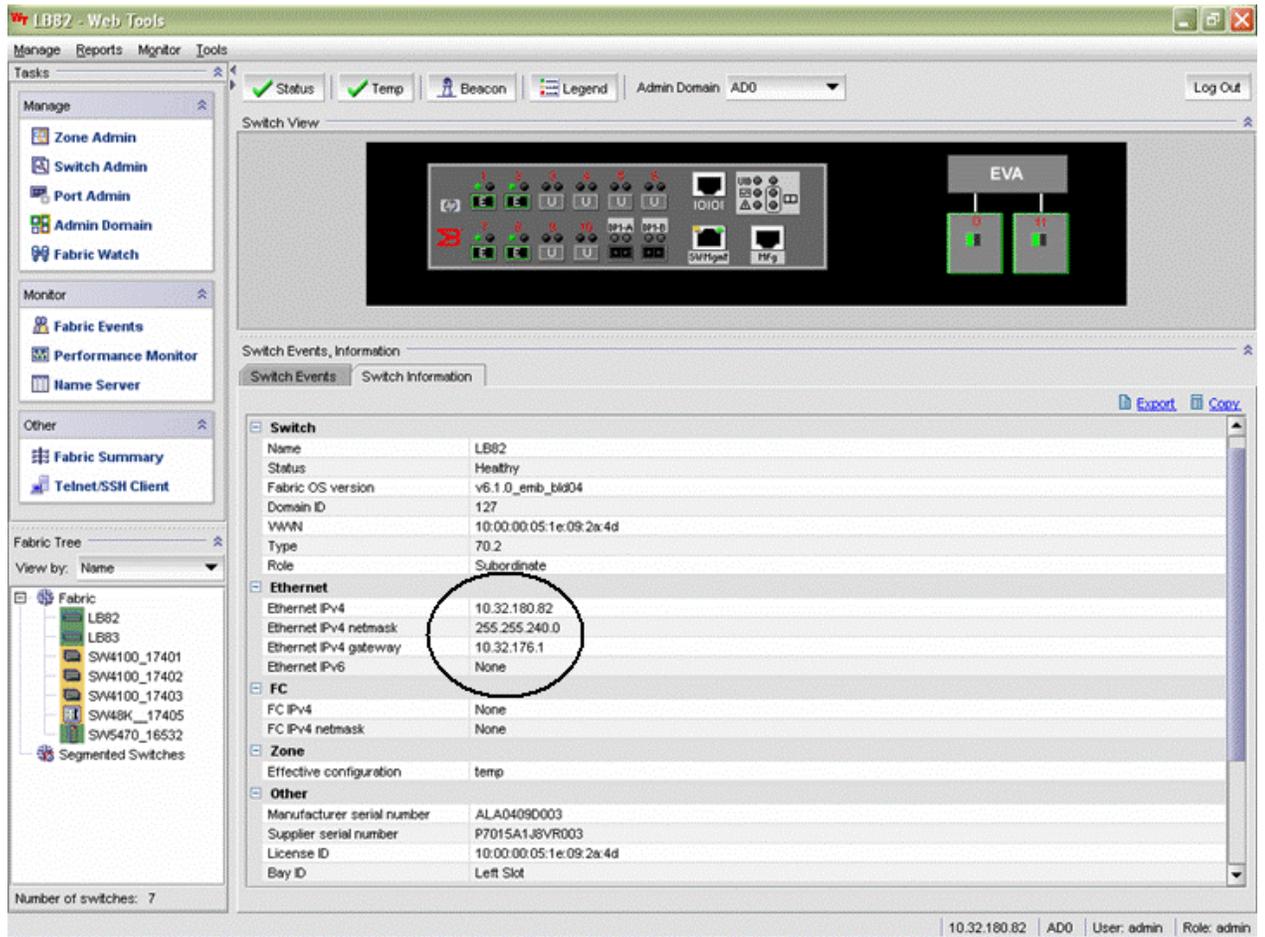


Figure 17 Switch Management GUI

4. Change the IP address and other settings of the switch as appropriate for your network. You may also rename the switch or perform other configuration activities at this time.
5. Remove the Ethernet cable from the first switch and connect the cable to the Ethernet port (2, [Figure 16](#)) of the other embedded switch. Browse to **http://10.77.77.78** for the Controller 2 switch and repeat 4.



NOTE:

If you are renaming or performing other configuration activities on the Controller 2 switch, be aware that two switches cannot have the same domain ID in the same fabric.

Verify the operating status of the servers

Although the EVA is not yet visible to the server, verify that the server is operating properly. A simple test is to verify that your operating system loaded and then open a software application or your browser.

If your server is not operating properly, see the documentation that came with the server for help.

6 Connecting to the management module

Overview

This chapter describes several optional procedures. Complete the procedures in this chapter if any of the following situations apply. Otherwise, continue with [Chapter 7](#).

- Run HP Command View EVA from the management module, which eliminates the requirement for a management server.
- Change the default operating mode (via the WOCP) for a direct connect configuration.
- Access the web-based operator control panel (WOCP) to view array state and status information and edit basic configuration settings. See the WOCP user guide for more information.

The management module has an MDI-X port that supports straight-through or crossover Ethernet cables. Use a Cat 5e or greater cable to connect the management module from its Ethernet jack (1, [Figure 18](#)) to the management server.

Connecting to the management module

You can connect to the management module through a public or a private network.

NOTE:

If you are using HP Command View EVA on the management server to manage the EVA4400, HP recommends that when accessing HP Command View EVA on either the management server (server-based management) or the management module (array-based management), you use the same network. This is recommended until a multi-homed solution is available, which would allow the management module access to be configured on a separate network (private or different).

If you use a laptop to connect to the management module, configure the laptop to have an address in the same IP range as the management module (for example **192.168.0.2**, with a subnet mask of **255.255.0.0**).

Connecting through a public network

1. Initialize the EVA4400 storage system, using HP SmartStart EVA Storage or HP Command View EVA.
2. If it is currently connected, disconnect the public network LAN cable from the back of the management module in the controller enclosure.
3. Press and hold the recessed Reset button (2, [Figure 18](#)) for 4 to 5 seconds. This sets an IP address of 192.168.0.1. If you are running HP Command View EVA 9.3 or later on the management module, the amber indicator on the top right corner of the Ethernet port (1, [Figure 18](#)) will flash momentarily when the reset starts. When the reset is complete (approximately two minutes), the green indicator on the top left corner of the Ethernet port stays on. If you are running an earlier

version of HP Command View EVA on the management module, the amber indicator will flash momentarily when the reset is completed.

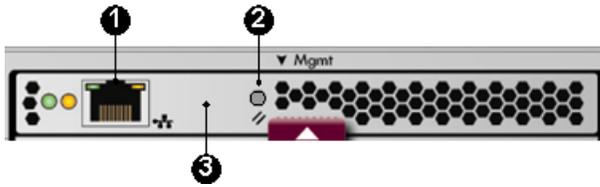


Figure 18 management module

4. Temporarily connect a LAN cable from a private network to the management module. A laptop computer works well for this.
5. From a computer on the private network, browse to `https://192.168.0.1:2373` and log in as an administrator. The user name is `admin`. No password is required. The WOCP GUI appears.

❗ **IMPORTANT:**

The WOCP previously used port 2372 but now uses 2373.

6. Select **Administrator Options > Configure Network Options**.
7. Enter an IP address and other network settings that apply.

📝 **NOTE:**

If you configure the management module in the 10.0.0.x network, do not use 10.0.0.1, 10.0.0.2, or 10.0.0.3 as the IP address for the management module or any device connected to the management module. These addresses are used by the management module.

8. Click **Save Changes**.

📝 **NOTE:**

The IP address changes immediately, causing you to lose connectivity to the WOCP. You cannot save changes if the EVA4400 storage system has not been initialized.

9. Remove the LAN cable connecting to the private network and reconnect the cable to the public network.
The new IP address is stored and remains in effect even when the storage system is shut down or restarted. However, the IP address will be lost if the storage system is uninitialized and the WOCP is reset.
10. From a computer on the public network, browse to `https://newly configured ip address:2373` and log in as an administrator. The user name is `admin`. No password is required. The WOCP GUI appears.

 **NOTE:**

If the password for either the administrator or user account is changed, it should be recorded since it cannot be cleared without performing a complete reset of the WOCP.

Connecting through a private network

Use this procedure when the management module will not be connected through a public network or the array has not yet been initialized.

1. Press and hold the recessed Reset button (2, [Figure 18](#)) for 4 to 5 seconds. This sets an IP address of 192.168.0.1. If you are running HP Command View EVA 9.3 or later on the management module, the amber indicator on the top right corner of the Ethernet port (1, [Figure 18](#)) will flash momentarily when the reset starts. When the reset is complete (approximately two minutes), the green indicator on the top left corner of the Ethernet port stays on. If you are running an earlier version of HP Command View EVA on the management module, the amber indicator will flash momentarily when the reset is completed.
2. Browse to `https://192.168.0.1:2373` and log in as an administrator. The user name is `admin`. No password is required. The WOCP GUI appears.
3. If network setting changes are required, select **Administrator Options > Configure Network Options**. Enter an IP address and other network settings that apply.

 **NOTE:**

If you configure the management module in the 10.0.0.x network, do not use 10.0.0.1, 10.0.0.2, or 10.0.0.3 as the IP address for the management module or any device connected to the management module. These addresses are used by the management module.

4. Click **Save Changes**.

 **NOTE:**

The IP address changes immediately, causing you to lose connectivity to the WOCP. You cannot save changes if the EVA4400 storage system has not been initialized.

The new IP address is stored and remains in effect, even when the storage system is shut down or restarted. However, the IP address will be lost if the storage system is uninitialized and the WOCP reset.

5. From a computer on the private network, browse to `https://newly configured ip address:2373` and log in as an administrator. The user name is `admin`. No password is required. The WOCP GUI appears.

Accessing HP Command View EVA on the management module

To access HP Command View EVA on the management module complete the following:

1. Click **Launch Command View EVA**.

2. Click **Use management module server**.
The logon window appears.
3. Enter the username and password for accessing HP Command View EVA.

Changing the default operating mode

By default, the EVA4400 is shipped to operate in a Fibre Channel switch environment and is configured in *fabric* mode. If you choose to connect the EVA4400 directly to a server, you must change the default operating mode of the EVA4400 to *direct* mode. If you do not change this mode, the EVA4400 will be unable to communicate with your server. Use the web-based operator control panel (WOCP) to change the default operating mode.



NOTE:

Change your browser settings for the WOCP window as described in the *HP StorageWorks Command View EVA Installation Guide*. You must have administrator privilege to change the settings in the WOCP.

To change the default operating mode:

1. Connect to the management module using one of the methods described in [Connecting through a public network](#) or [Connecting through a private network](#).
2. Log into the WOCP as an administrator. The default username is admin and the password field is blank. For security reasons, change the password after you log in.
3. Select **Administrator Options > Configure controller host ports**.
The WOCP is displayed ([Figure 19](#)).

Figure 19 WOCB Configure controller host ports page

4. In the Topology box, select **Direct** from the dropdown menu.
5. Click **Save Changes**.
6. Change the default operating mode for the other controller.
7. Close the WOCB and remove the Ethernet cable from the server.

Accessing the WOCB through HP Command View EVA

1. Select the EVA4400 storage system you want to access.
2. Select **Hardware > Controller Enclosure > Management Module**.
3. Click **Launch WOCB**.

On rare occasions, the Launch WOCB button may not appear due to invalid array state or if the management module IP address is unknown to HP Command View EVA.

7 Configuring servers using HP SmartStart EVA storage

Configuring management servers using HP SmartStart EVA Storage

Use this procedure if you are connecting the EVA4400 to a management server for server-based management. To complete array configuration for array-based management, see “Completing the array configuration” in the *HP StorageWorks Command View EVA Installation Guide*.

1. Insert the HP SmartStart EVA Storage CD in the drive of the management server. The HP SmartStart EVA Storage tool runs automatically.
2. Read the conceptual information and browse the online help.
3. Click **Configure as Management Server** on the display (Figure 20).
4. Follow the prompts to configure this system as your management server.

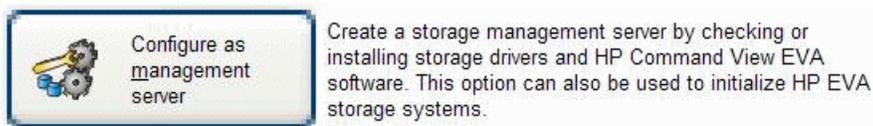


Figure 20 Configure as management server option

Configuring application servers for Windows using HP SmartStart EVA Storage

1. Insert the HP SmartStart EVA Storage CD in the drive of an application server. This may be the same server as your management server.
The HP SmartStart EVA Storage tool runs automatically.

2. Select one of the options shown in [Figure 21](#) to initially configure the application server or to create and mount additional storage volumes:

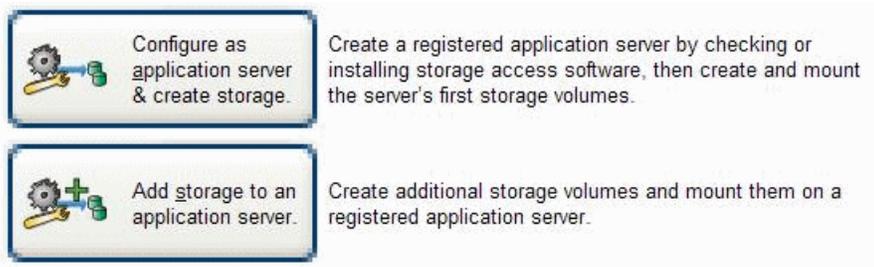


Figure 21 Configure storage initially or add storage

3. Repeat this configuration process for each server in your HP Command View EVA configuration.

 **NOTE:**

To configure non-Windows application servers, see "Configuring application servers" in the *HP StorageWorks 4400 Enterprise Virtual Array User Guide*. See [Related information](#) for document location.

8 Using and monitoring your storage

Using your storage

To use the storage you have installed:

1. Start a server application.
2. Browse to a file system window and verify the drive letter of the virtual drive you have created.

Firmware recovery

A recovery CD containing the original XCS firmware installed on the array is shipped along with your EVA4400. The CD is only needed for recovery purposes. The latest firmware can be found on the HP software depot web page: <http://h20392.www2.hp.com/portal/swdepot/index.do>

HP Insight Remote Support software

HP strongly recommends that you install HP Insight Remote Support software to complete the installation or upgrade of your product and to enable enhanced delivery of your HP Warranty, HP Care Pack Service or HP contractual support agreement. HP Insight Remote Support supplements your monitoring, 24x7 to ensure maximum system availability by providing intelligent event diagnosis, and automatic, secure submission of hardware event notifications to HP, which will initiate a fast and accurate resolution, based on your product's service level. Notifications may be sent to your authorized HP Channel Partner for on-site service, if configured and available in your country. The software is available in two variants:

- HP Insight Remote Support Standard: This software supports server and storage devices and is optimized for environments with 1-50 servers. Ideal for customers who can benefit from proactive notification, but do not need proactive service delivery and integration with a management platform.
- HP Insight Remote Support Advanced: This software provides comprehensive remote monitoring and proactive service support for nearly all HP servers, storage, network, and SAN environments, plus selected non-HP servers that have a support obligation with HP. It is integrated with HP Systems Insight Manager. A dedicated server is recommended to host both HP Systems Insight Manager and HP Insight Remote Support Advanced.

Details for both versions are available at:

<http://www.hp.com/go/insightremotesupport>

To download the software, go to Software Depot:

<http://www.software.hp.com>

Select **Insight Remote Support** from the menu on the right.

9 Support and other resources

Contacting HP

HP technical support

For worldwide technical support information, see the HP support website:

<http://www.hp.com/support>

Before contacting HP, collect the following information:

- Product model names and numbers
- Technical support registration number (if applicable)
- Product serial numbers
- Error messages
- Operating system type and revision level
- Detailed questions

Subscription service

HP recommends that you register your product at the Subscriber's Choice for Business website:

<http://www.hp.com/go/wwalerts>

After registering, you will receive e-mail notification of product enhancements, new driver versions, firmware updates, and other product resources.

Documentation feedback

HP welcomes your feedback.

To make comments and suggestions about product documentation, please send a message to storedocsFeedback@hp.com. All submissions become the property of HP.

Related information

Documents

For documents referenced in this guide, see the Manuals page on the Business Support Center website:

<http://www.hp.com/support/manuals>

HP websites

- HP:
<http://www.hp.com>
- HP Storage:
<http://www.hp.com/go/storage>
- HP Partner Locator:
http://www.hp.com/service_locator
- HP Software Downloads:
<http://www.hp.com/support/downloads>
- Hp Software Depot:
<http://www.software.hp.com>
- HP Single Point of Connectivity Knowledge (SPOCK):
<http://www.hp.com/storage/spock>
- HP StorageWorks SAN manuals:
<http://www.hp.com/go/sdgmanuals>

Typographic conventions

Table 4 Document conventions

Convention	Uses
Blue text: <code>Table 4</code>	Cross-reference links and email addresses
Blue, underlined text: <code>http://www.hp.com</code>	Website addresses
Text	<ul style="list-style-type: none">• Keys that are pressed• Text typed into a GUI element, such as a box• GUI elements that are clicked or selected, such as menu and list items, buttons, tabs, and check boxes
<i>Text</i>	Text emphasis
Monospace text	<ul style="list-style-type: none">• File and directory names• System output• Code• Commands, their arguments, and argument values
<i>Monospace, italic text</i>	<ul style="list-style-type: none">• Code variables• Command variables
Monospace, bold text	Emphasized monospace text
...	Indication that the example continues.
WARNING!	An alert that calls attention to important information that if not understood or followed can result in personal injury.
CAUTION:	An alert that calls attention to important information that if not understood or followed can result in data loss, data corruption, or damage to hardware or software.
IMPORTANT:	An alert that calls attention to essential information.
NOTE:	An alert that calls attention to additional or supplementary information.
TIP:	An alert that calls attention to helpful hints and shortcuts.

Customer self repair

HP customer self repair (CSR) programs allow you to repair your StorageWorks product. If a CSR part needs replacing, HP ships the part directly to you so that you can install it at your convenience. Some parts do not qualify for CSR. Your HP-authorized service provider will determine whether a repair can be accomplished by CSR.

For more information about CSR, contact your local service provider or see the CSR website:

<http://www.hp.com/go/selfrepair>

Rack stability

Rack stability protects personnel and equipment.

⚠ WARNING!

To reduce the risk of personal injury or damage to equipment:

- Extend leveling jacks to the floor.
- Ensure that the full weight of the rack rests on the leveling jacks.
- Install stabilizing feet on the rack.
- In multiple-rack installations, fasten racks together securely.
- Extend only one rack component at a time. Racks can become unstable if more than one component is extended.

Location of WWN and serial number

For service and support purposes, the location of the controller serial number, world wide name (WWN), and controller product number (after removing the controller front bezel) is shown in the red circle in [Figure 22](#).

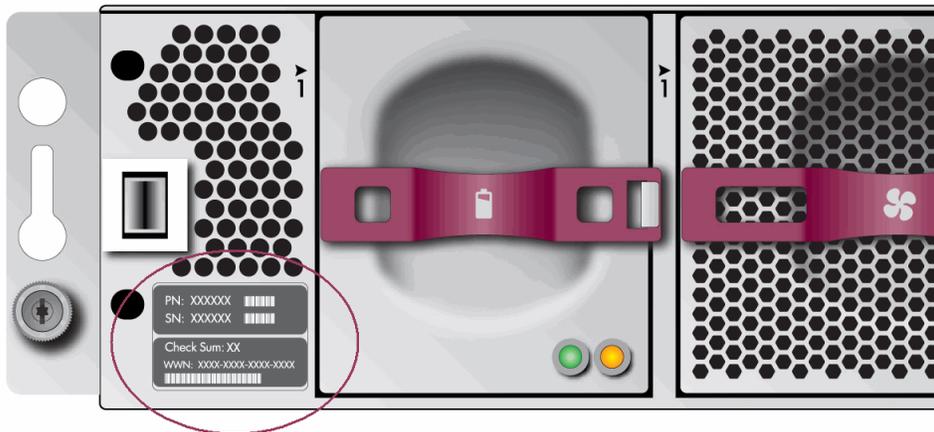
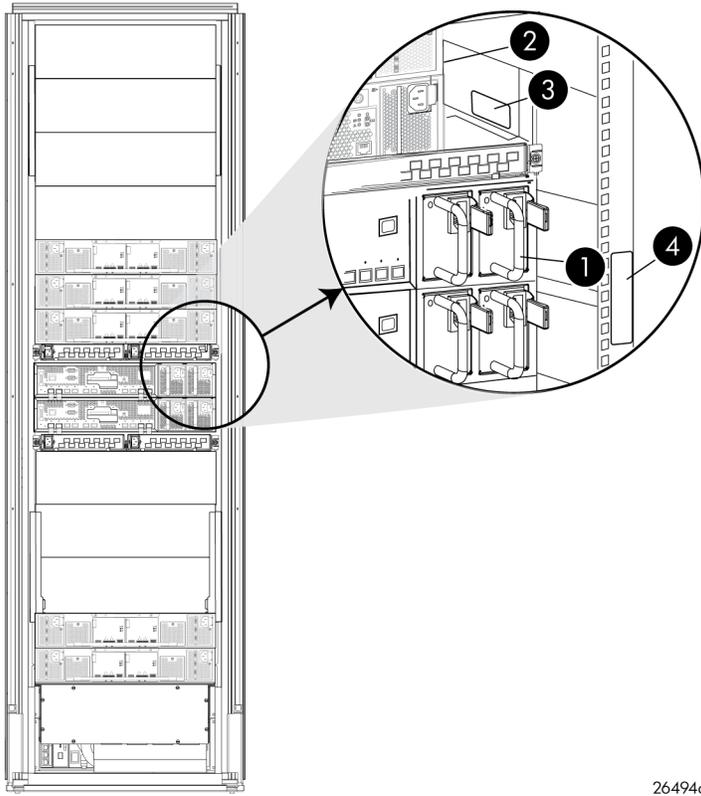


Figure 22 Location of WWN and serial number

📝 NOTE:

For products ordered as bundled products that contain multiple products, the product number and serial number needed for service and support is shown in the circled area in [Figure 23](#), callouts 3 and 4.



26494a

Figure 23 Location of WWN and serial number for bundled products

A EVA4400 cabling diagrams

This appendix contains cabling diagrams for common EVA4400 installation environments. If you plan to configure the EVA4400 with an iSCSI device, see the *HP StorageWorks EVA iSCSI Connectivity User Guide*. See [Related information](#) for the location of this guide.

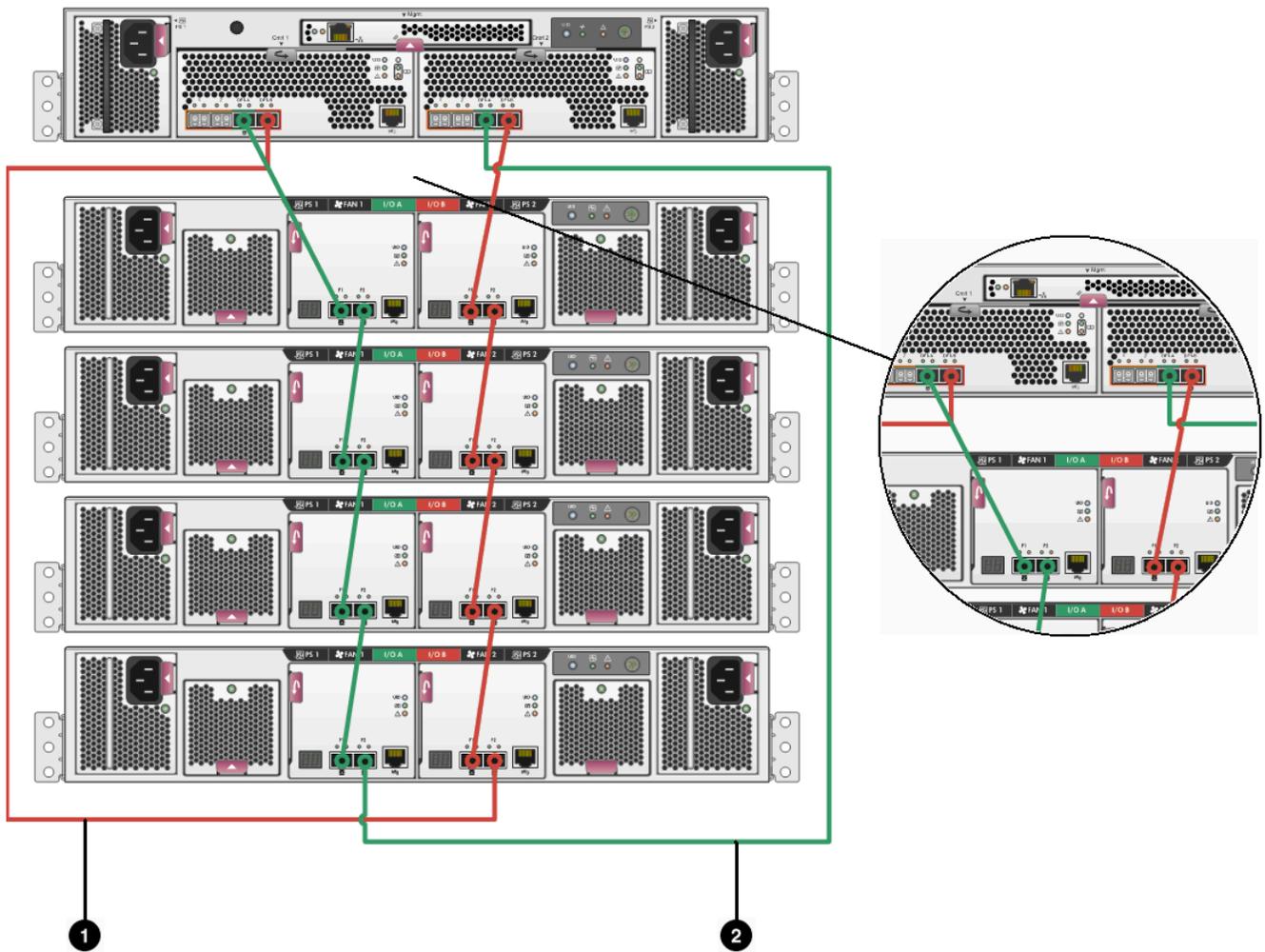
Connecting device port Fibre Channel cables to the EVA4400 (rear view)

This section shows two views of how to connect cables to the controller. [Figure 24](#) shows the controller mounted on top of the disk shelves in the rack, and [Figure 25](#) shows the controller with disk shelves mounted above and below it.

- For configurations with the controller *above* the disk enclosures, attach the cables to the EVA as shown in [Figure 24](#).

 **NOTE:**

All controller device port A cabling must be plugged into the A I/O modules on all enclosures.
All controller B device port cabling must be plugged into the B I/O modules on all enclosures.



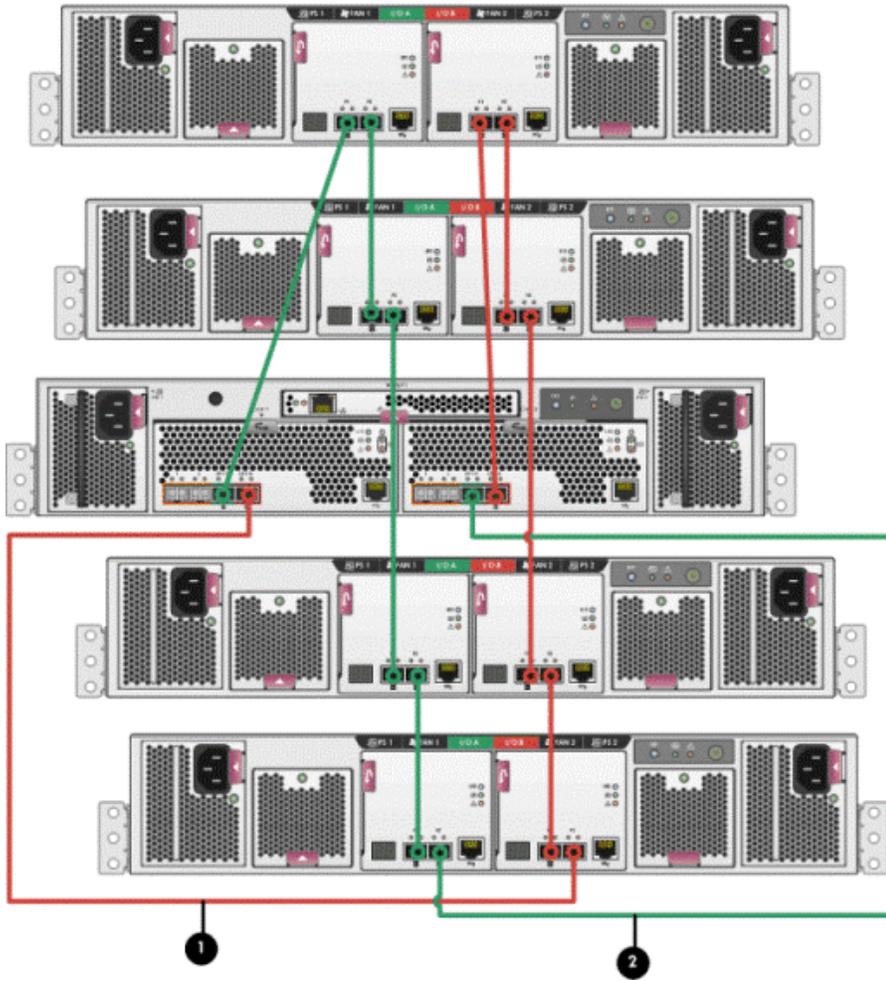
1. This cable connects controller 1, device port 1B (top left—Cntrl 1, DP1B) to I/O module B, port 2 (bottom right—I/O B, P2).
2. This cable connects controller 2, device port 1A (top right—Cntrl 2, DP1A) to I/O module A, port 2 (bottom left—I/O A, P2).

Figure 24 Fibre Channel cabling for the EVA (rear view, top-mounted controller)

- For configurations with the controller *between* the disk enclosures, attach the cables to the EVA as shown in [Figure 25](#).

NOTE:

All controller device port A cabling must be plugged into the A I/O modules on all enclosures. All controller B device port cabling must be plugged into the B I/O modules on all enclosures.



1. This cable connects controller 1, device port 1B (top left—Cntrl 1, DP1B) to I/O module B, port 2 (bottom right—I/O B, P2).
2. This cable connects controller 2, device port 1A (top right—Cntrl 2, DP1A) to I/O module A, port 2 (bottom left—I/O A, P2).

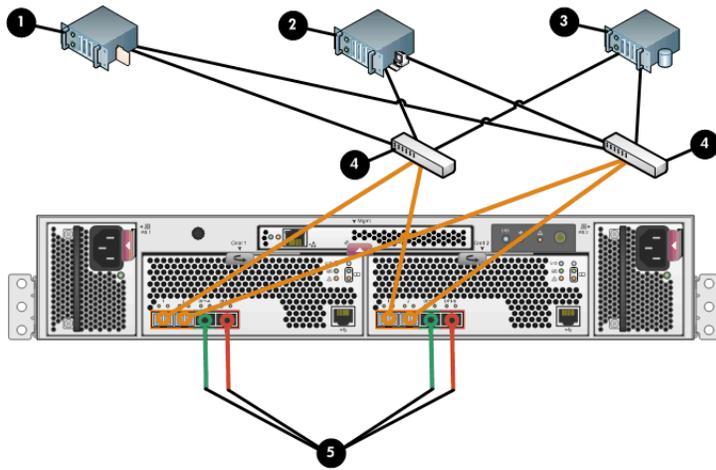
Figure 25 Fibre Channel cabling for the EVA (rear view, mid-mounted controller)

Connecting Fibre Channel cables to the EVA4400 (front end)

You can cable the front end of your EVA4400 either to external Fibre Channel switches or directly to servers. See [Figure 26](#) and [Figure 28](#) for front end connections with server-based management. See [Figure 27](#) and [Figure 29](#) for front end connections with array-based management.

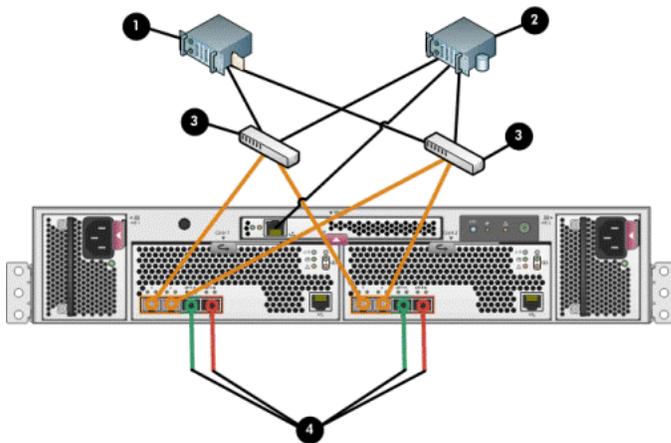
NOTE:

The cabling diagrams in [Figure 26](#) through [Figure 29](#) require fabric connect mode, which is the default as shipped.



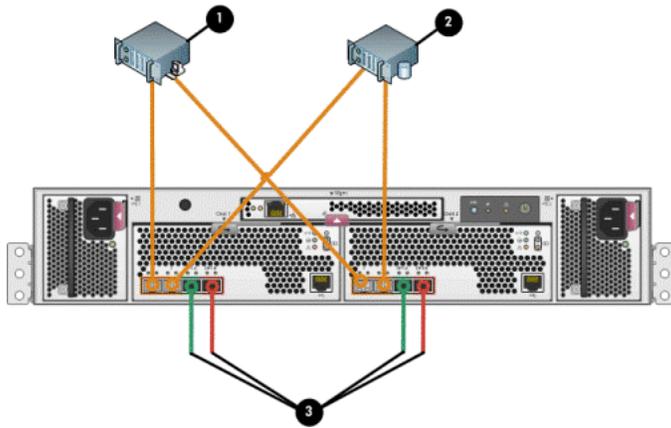
1. File server
2. Management server
3. Database server
4. Fiber channel switch
5. LED status indicators for cabling connections to disk enclosures. See [Figure 24](#) and [Figure 25](#) for cabling connections.

Figure 26 Cabling the controller to front end component—Fibre Channel to switch detail view with server-based management



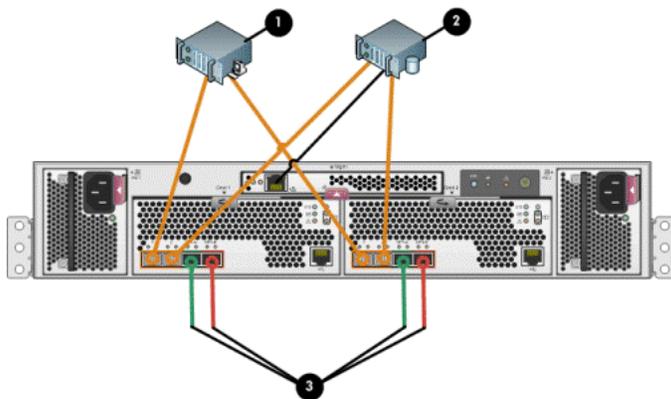
1. File server
2. Database server
3. Fiber channel switch
4. LED status indicators for cabling connections to disk enclosures. See [Figure 24](#) and [Figure 25](#) for cabling connections.

Figure 27 Cabling the controller to front end components—Fibre Channel to switch detail view with array-based management



1. Management server
2. Database server
3. LED status indicators for cabling connections to disk enclosures. See [Figure 24](#) and [Figure 25](#) for cabling connections.

Figure 28 Cabling the controller to front end components—Direct Fibre Channel to servers with server-based management



1. File server
2. Database server
3. Indicates cabling connections to disk enclosures. See [Figure 24](#) and [Figure 25](#) for cabling connections.

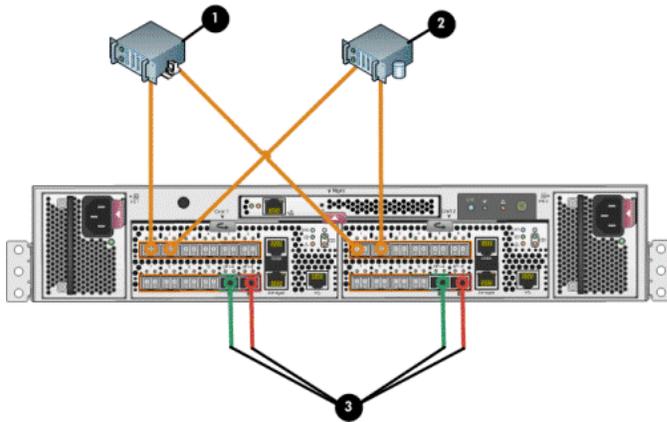
Figure 29 Cabling the controller to front end component—direct Fibre Channel to servers with array-based management

Connecting to the HSV300-S controller enclosure

The HSV 300-S controller enclosure includes a switch within each controller. The switches are configured to be redundant during the manufacturing process. [Figure 30](#) and [Figure 31](#) shows an HSV300-S controller enclosure with external hosts connected to the embedded Fibre Channel switches.

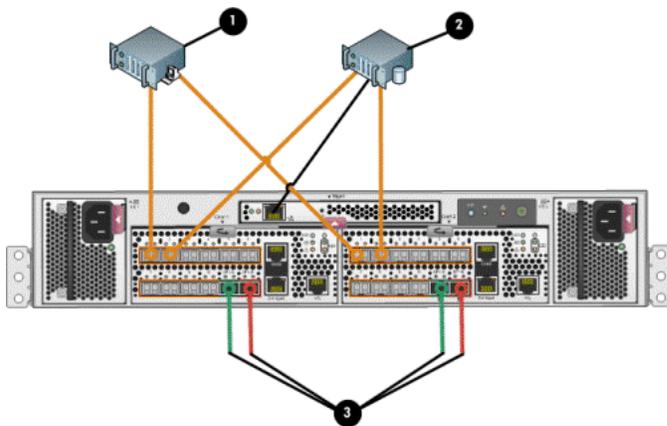
 **NOTE:**

Additional external switches can be connected to the HSV300-S controller enclosure.



1. Management server
2. Database server
3. Indicates cabling connections to disk enclosures. See [Figure 24](#) and [Figure 25](#) for cabling connections.

Figure 30 HSV300-S controller enclosure in an embedded Fibre Channel switch configuration with server-based management



1. File server
2. Database server
3. Indicates cabling connections to disk enclosures. See [Figure 24](#) and [Figure 25](#) for cabling connections.

Figure 31 HSV300-S controller enclosure in an embedded Fibre Channel switch configuration with array-based management