

# **Security Analytics**

## **Configuration Guide for E5660 300T**

### **Intelligent Storage Arrays**

Document Version: 1.5

15 Mar 2019



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## About This Document

This document contains instructions to connect a "head unit" (Security Analytics SA-S500-30-FA Forensic Appliance, Security Analytics 10G-HD Appliance, or Dell® PowerEdge® R630 Rack Server with high-density enhancements) to 1–5 "storage arrays" (Security Analytics E5660 300T Intelligent Storage Arrays or NetApp® E5660 Storage Systems), connected either directly or through redundant Fibre Channel switches.

To configure Dell MD3860f storage arrays, consult the [Security Analytics High-Density Storage Configuration Guide for Dell Hardware](#) (DOC10402 on [support.symantec.com](http://support.symantec.com)).

Find the approved bills of material (BoMs) for the head units and storage arrays on the [Symantec Security Analytics documentation site](#) by selecting Hardware Guide for the document type. For the quick-start guides for each hardware unit, select Getting Started Guide for the document type.

This document is not intended as a guide to policies or procedures for network security or network forensics.

For assistance with the installation of this software:

- Security Analytics Support: [support.symantec.com/en\\_US/contact-support.html](http://support.symantec.com/en_US/contact-support.html)
- Security Analytics Documentation: [support.symantec.com/content/unifiedweb/en\\_US/Documentation.1145515.html](http://support.symantec.com/content/unifiedweb/en_US/Documentation.1145515.html)

## Changes to This Document

Version	Date	Change	Pages
1.6	14 Mar 2019	Note that there is no disk encryption procedure for SA-S500 disks.	14
1.5	3 Oct 2018	Add the show storageArray healthStatus command before running the script.	44, 55
1.4	20 Jul 2018	Add instructions to delete the default capture and index config files before building the drives.	49
1.3	16 Feb 2018	Add SA-S500-30-FA as a head unit.	
1.2	11 Jan 2018	Emphasize that disk encryption is a destructive process, and that the -p and -P parameters enable disk encryption on the storage array.	16, 45

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## 1. Requirements

This installation requires the following:

- Head Unit:
  - Security Analytics SA-S500-30-FA Forensic Appliance
  - Security Analytics 10G-HD Appliance (Dell PowerEdge R630 Rack Server with high-density enhancements):
    - Eight SED (2.5-inch) disk drive bays and 3 PCIe slots
    - Two Emulex LPe16002B Dual Port 16 Gb Fibre Channel Low Profile HBAs, including Short Wave Optical – LC SFP+ optics
- One or more Security Analytics E5660 300T Intelligent Storage Arrays or NetApp E5660 Storage Systems, no more than five per head unit.

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**Note** Consult the approved bills of material (BoMs) for the head units and storage arrays on the [Security Analytics documentation site](#) by selecting **Hardware Guide** for document type.

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- Optional—Fibre Channel switches: Brocade® 6500-series or equivalent (must support 16 Gbps and WWN zoning):
  - For one or two storage arrays connected to the same head unit, Fibre Channel switches are optional, because the arrays can be connected directly to the head unit.
  - For three or more storage arrays connected to the same head unit, redundant Fibre Channel switches are mandatory.
  - Consult the [Fibre Channel Switch Sizing Guide](#) on page 6 for switch-port requirements.
  - Required for Fibre Channel Switch Deployment—Four Fibre Channel cables of sufficient length to extend from the head unit to the Fibre Channel switches.
- License Key—Consult your eFulfillment Letter for instructions on retrieving the key.
- Two Separate 200 V– 240 V Inputs—Each power supply on the array draws 7–10 amps.
- Windows or Linux workstation with one of the following supported browsers:
  - Microsoft® IE 9+
  - Firefox® 18+
  - Safari® 5+
  - Chrome® 24+

## 1.1. Fibre Channel Switch Sizing Guide

Consult the table below for switch-port and SFP+ transceiver requirements, given redundant switches:

- Head Unit—Two ports per switch
- Storage Array—Four ports per switch
- SFP+ Transceivers—For each switch port, one 16 Gb SFP+ transceiver is required. Do not use transceivers that support less than 16 Gb.

Head Units	Arrays per HU	Ports per Switch	Total SFP+ Modules	Zones per Switch	Brocade Models
1	1*	6	12	2	6505, 6510, 6520
1	2*	10	20	2	6505, 6510, 6520
1	3	14	28	2	6505, 6510, 6520
1	4	18	36	2	6505, 6510, 6520
1	5	22	44	2	6505, 6510, 6520
2	1*	12	24	4	6505, 6510, 6520
2	2*	20	40	4	6505, 6510, 6520
2	3	28	56	4	6510, 6520
2	4	36	72	4	6510, 6520
2	5	44	88	4	6510, 6520
3	1*	18	36	6	6505, 6510, 6520
3	2*	30	60	6	6510, 6520
3	3	42	84	6	6510, 6520
3	4	54	108	6	6520
3	5	66	132	6	6520

\* Using Fibre Channel switches for this number of storage arrays is optional.

## 1.2. Head Unit I/O Configuration

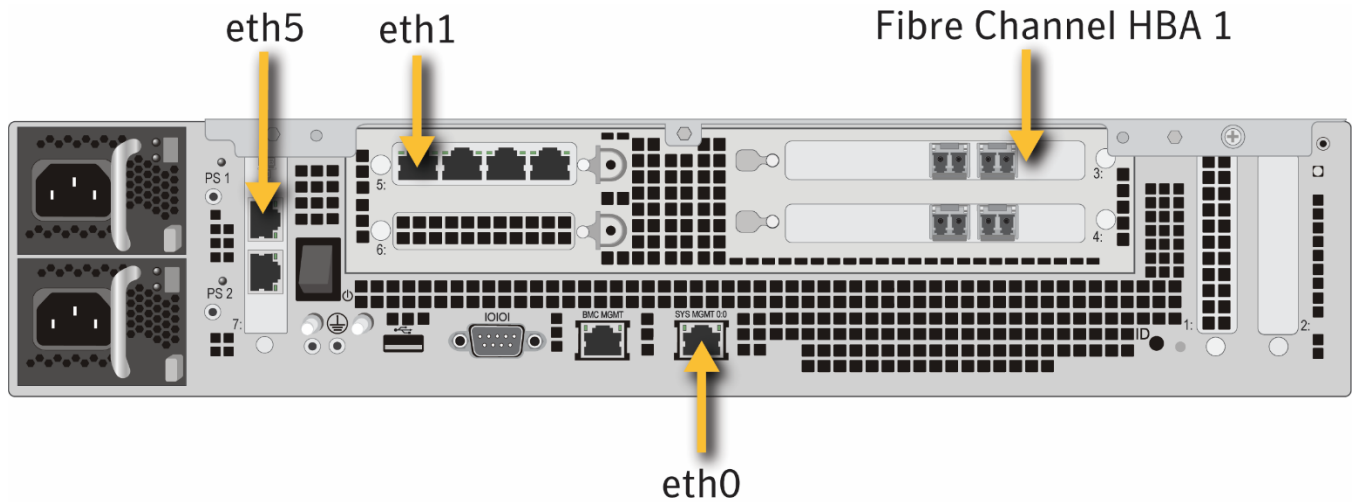


Figure 1: Symantec Security Analytics SA-S500-30-FA Forensic Appliance—Rear View

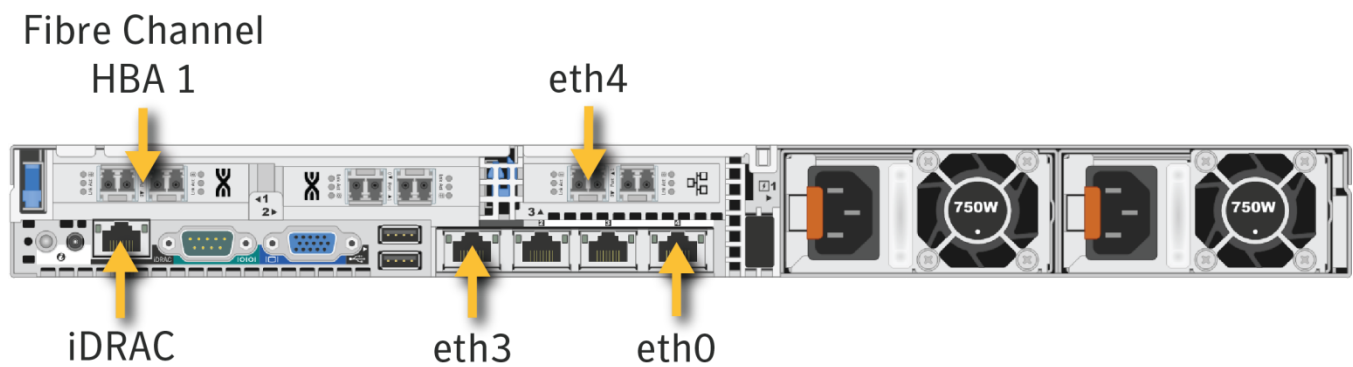


Figure 2: Dell PowerEdge R630 Rack Server with High-Density Enhancements—Rear View

**IMPORTANT** The location of the management port on the Dell head unit is valid only after Security Analytics software has been installed. If your head unit is a Dell R630 that was not purchased through Blue Coat or Symantec, consult "Appendix B: Initial Head-Unit Configuration" in the [Security Analytics High-Density Storage Configuration Guide for Dell Hardware](#) to configure the R630 before continuing this procedure.

### 1.3. Storage Array I/O Configuration

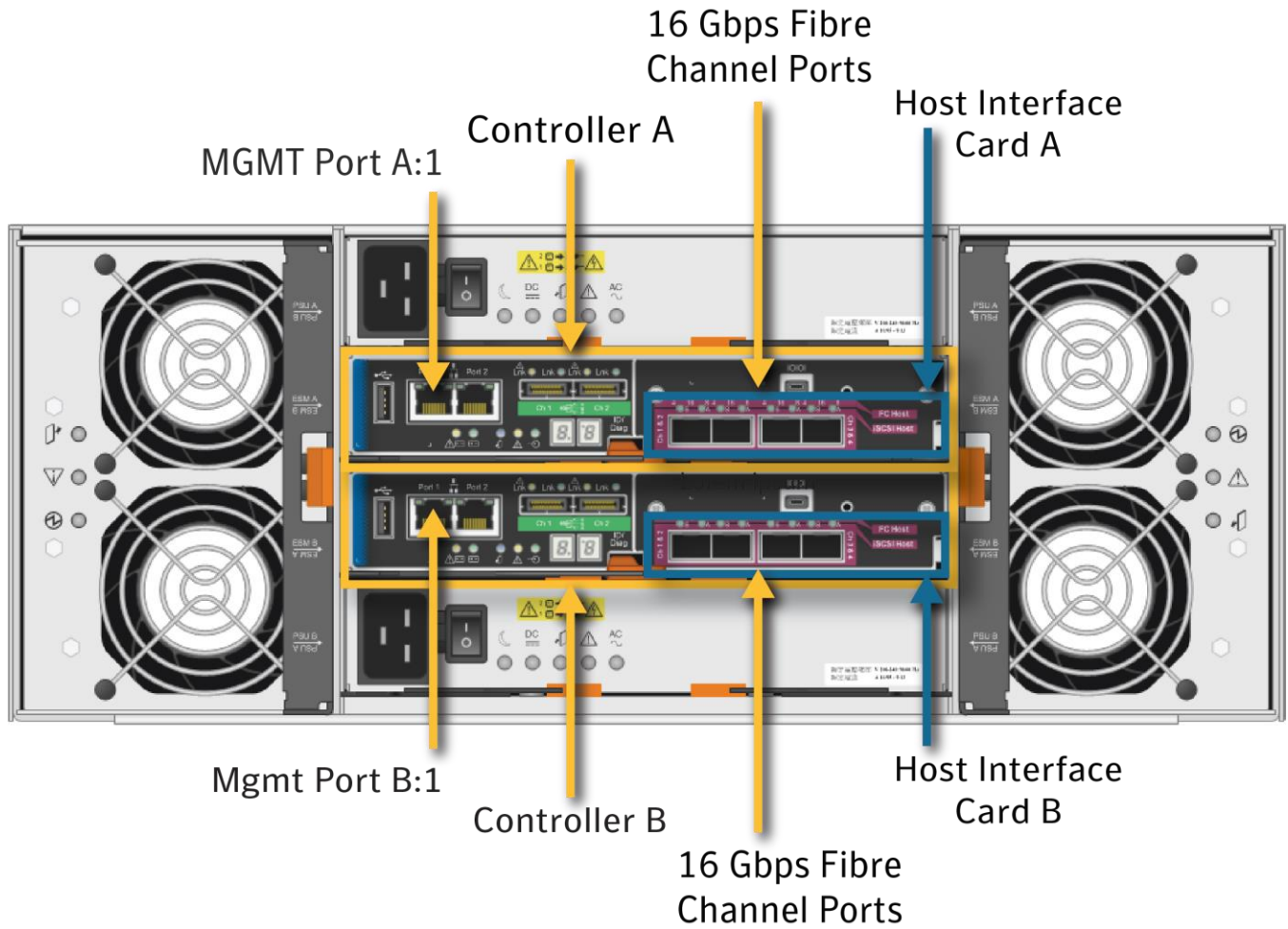


Figure 3: Symantec Security Analytics E5660 300T Intelligent Storage Array (NetApp E5660 Storage System)—Rear View



## 2. Supported Configurations

The illustrations below show supported head unit/storage array combinations and topologies.

**IMPORTANT** Do not cable the head unit to the storage arrays or switches until indicated, later in these instructions.

### 2.1. Point-to-Point Connections

Security Analytics supports two types of point-to-point connections: one head unit plus one or two storage arrays.

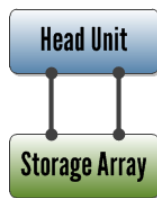


Figure 4: One Head Unit + One Storage Array

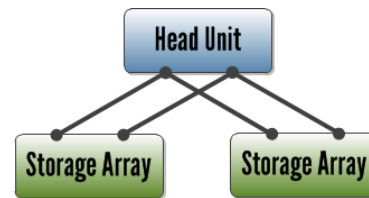


Figure 5: One Head Unit + Two Storage Arrays

### 2.2. Fibre Channel Switch Fabric

Security Analytics supports one head unit plus up to five storage arrays that are connected by redundant Fibre Channel switches.

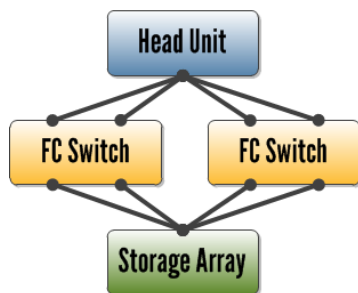


Figure 6: One Head Unit + One Storage Array

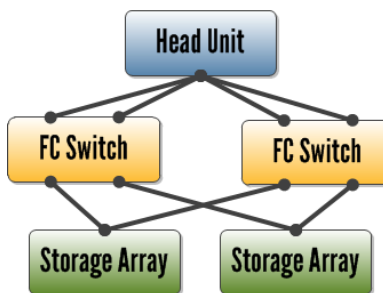


Figure 7: One Head Unit + Two Storage Arrays

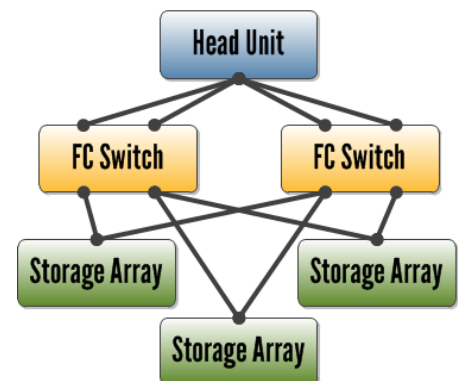


Figure 8: One Head Unit + Three Storage Arrays

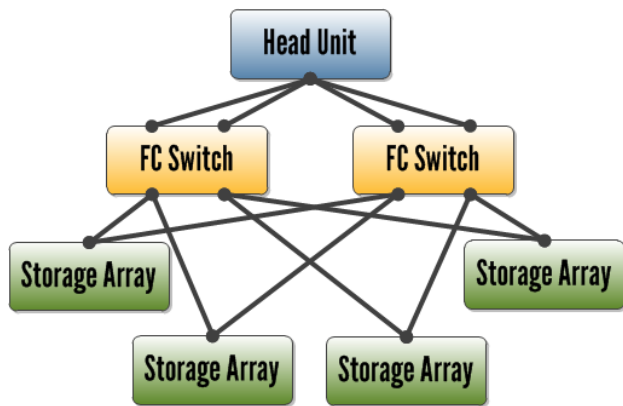


Figure 9: One Head Unit + Four Storage Arrays

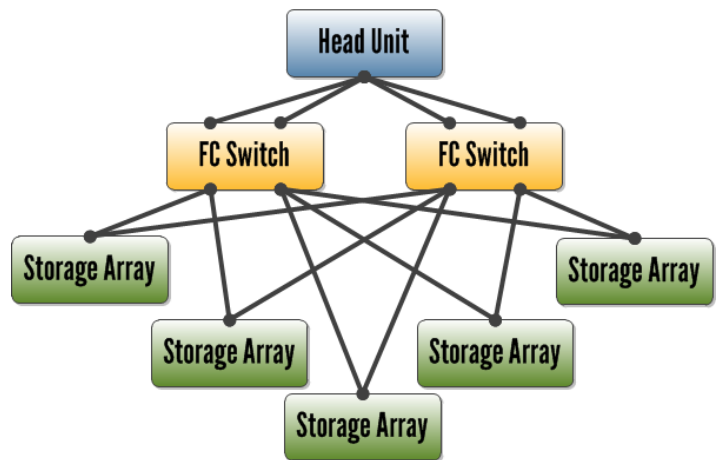


Figure 10: One Head Unit + Five Storage Arrays

**IMPORTANT** Although this high-density solution uses storage-area network (SAN) hardware, standard SAN topology cannot be used with Symantec Security Analytics. **Under no circumstances should different head units write to the same storage array.** Security Analytics's unique, proprietary file system requires that each head unit write to its own dedicated set of disks.

### Shared Fibre Channel Switches

In the example below, the head units and their respective storage arrays are sharing the same redundant Fibre Channel switches, but the head units and their storage arrays can "see" only each other because of the switch zoning.

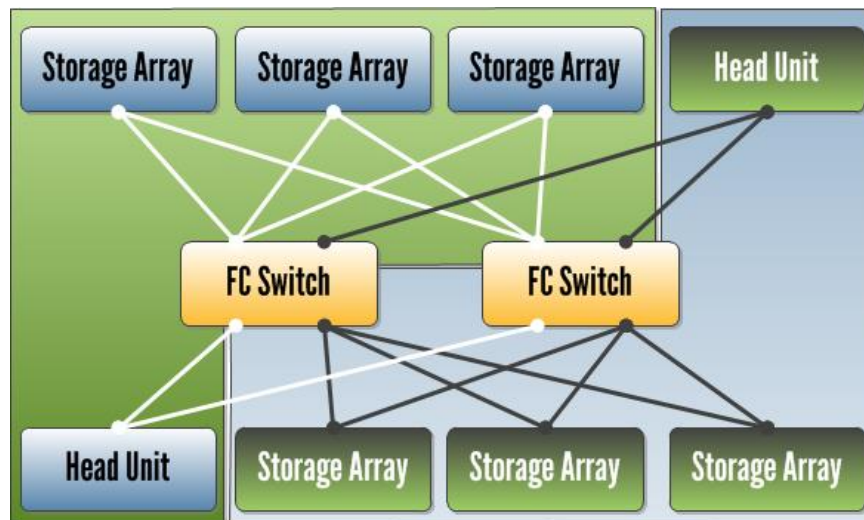


Figure 11: Two head units and their respective storage arrays, sharing redundant Fibre Channel switches.

### 3. About this Procedure

This procedure uses the "in band" method to configure Security Analytics E5660 300T Intelligent Storage Arrays. With in-band management, the management ports on the storage array *are not used*—instead, the head unit issues commands to the storage arrays over the same Fibre Channel connections that the head unit uses to communicate with its storage arrays during operation.

As a result, Symantec recommends that you not deploy SANtricity (if at all) until after you have completed this procedure.

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**WARNING** This procedure must be followed with exactness; otherwise, the configuration script in Step 7 on page 44 may fail, and resetting the hardware and software to a "clean" state is a complicated, time-consuming procedure that requires intervention from Security Analytics Support.

Script failure may result from any of the following:

- **Unsupported hardware**—Consult the approved bills of material (BoMs) for the head units and storage arrays on the [Security Analytics documentation site](#) by selecting **Hardware Guide** for document type.
    - **Wrong Fibre Channel card**—Use only the model that is specified in the BOM: Emulex® LPe16002B, dual-port 16Gb low-profile HBA.
    - **Damaged hard drive**—Do not run the script if one or more of the hard drives is damaged. You must replace all damaged drives before running the script.
    - **Unequal hard drive capacities**—Do not run the script if an array contains hard drives of mixed size: for example, 4TB mixed with 6TB. This procedure assumes 6TB drives.
  - **Unsupported software**—Security Analytics 7.2.3 and later has the proper SMcli components and Light-Pulse Fibre Channel drivers; earlier versions do not.
  - **Errors in switch-zone assignments**—Every Fibre Channel port on the head unit(s) and storage array(s) must be in the proper zone before running the script. Use the Switch Zone Worksheet on page 60 to aid in configuring the switch zones.
  - **Unlicensed switch ports**—Verify that your Fibre Channel switches have the proper number of licenses for the needed ports. Consult the Fibre Channel Switch Sizing Guide on page 6 to see how many ports to use.
-

### 3.1. Terminology

The following usage appears in this document:

- Head Unit—A Security Analytics 10G-HD Appliance (Dell PowerEdge R630-HD) or Security Analytics SA-S500-30-FA that writes to one or more storage arrays
- Storage Array—A Security Analytics E5660 300T Intelligent Storage Array (NetApp E5660 Storage System)
- WWN—World-wide name; a hexadecimal number that is unique to every network component or network interface. Also known as WWID, host port identifier, or MAC address.

## 4. Prepare the Hardware

Before discovering and configuring the storage array(s), perform these steps.

---

**IMPORTANT** After racking the hardware, do NOT attempt to connect the head units to the storage arrays or to the Fibre Channel switches except as directed in this document.

---

### 4.1. Set Up the Storage Array

No configuration should have been performed on the Security Analytics E5660 300T Intelligent Storage Array. The *Quick-Start Guide* that was included with a Symantec-sourced storage array ([Security Analytics E5660 300T Intelligent Storage Array Quick-Start Guide](#)) instructs the user to perform a variety of tasks. At minimum, the following should be done before you continue this procedure:

- 4.1.1. Install the empty enclosure in the rack, preferably in the lowest position. The rack should support the weight of the fully populated storage array, which is 242.7 lb (109.2 kg).
- 4.1.2. Install all 60 disks in the drawers and verify that they are all seated properly.
- 4.1.3. Connect each of the enclosure's two power supplies to different 200 V-to-240 V input sources. Each power supply draws 7–10 amps.

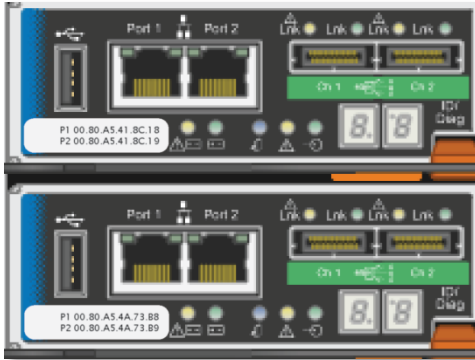
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**IMPORTANT**

- Do not power on the storage array until instructed, later in this procedure.
- Do not connect the management ports to a network at this time.

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**Note** Take a photo of the ID stickers on the backs of the storage arrays, for use later in the procedure.



## 4.2. Set Up the Head Unit

Any Security Analytics 10G-HD appliance that was ordered through Symantec or Blue Coat should have the Blue Coat or Symantec branding on the bezel as well as the following tasks performed at the factory prior to shipment:

- All eight internal hard drives configured as a single RAID 5 array.
- Security Analytics 7.2.3 or later installed.

- IMPORTANT**
- If the head unit is an R630-HD that was purchased directly from Dell, consult "Appendix B: Initial Head-Unit Configuration" in the [Security Analytics High-Density Storage Configuration Guide for Dell Hardware](#) to configure the head unit **before continuing the procedure**.
  - If the head unit is running Security Analytics 7.2.2 or earlier, upgrade to version 7.2.3 or later **before continuing the procedure**. Versions 7.2.3 and later have the valid Light-Pulse Fibre Channel (LPFC) drivers and SMcli components for the head unit to detect and configure the storage array.

This document assumes that the user has accessed the Security Analytics web UI at least once to complete the *Initial Configuration* page, which means:

- The IPv4 and/or IPv6 address and gateway for `eth0` are set. (Default IP: `192.168.20.20`)
- At least one DNS server is configured.
- The system time is correct.
- The `admin` and `root` passwords have been changed from the default.
- The system has been licensed.

- Note**
- If you want to change the head unit's hostname, select **Settings > Network** in the web UI. The hostname must not exceed 30 characters. Changing the hostname will cause the head unit to reboot.
  - At this point in the procedure, the Security Analytics software is unaware of any indexing or capture drives; the head unit is therefore unable to perform capture or indexing. This is expected behavior.

**IMPORTANT** Do not connect the head unit to a network at this time.

### 4.3. Optional—Enable Disk Encryption

With disk encryption enabled, the data on a hard drive that is physically removed from an enclosure cannot be read unless the encryption key is provided.

- IMPORTANT**
- Enabling disk encryption is optional but highly recommended.
  - If you choose not to encrypt your disks during this procedure but intend to encrypt them later, remember that whenever you initiate encryption you destroy all of the data that you may have captured.
  - There is no disk-encryption procedure for disks on the SA-S500.

To enable disk encryption, you must specify an identifier and a passphrase for the head unit (Dell-based head units only), as well as an enclosure password and passphrase for the arrays.

- IMPORTANT**
- There is no backup option when you create any of these security keys. If you lose the security keys you will lose all encrypted data.
  - Follow standard key-maintenance practices by manually recording the keys, and by keeping a copy of that information in a separate, secure location.

4.3.1. For each head unit, decide on an identifier and its corresponding passphrase. You must supply both values to decrypt data on drives that are removed from the head unit:

Identifier 1 _____	Passphrase 1 _____
Identifier 2 _____	Passphrase 2 _____
Identifier 3 _____	Passphrase 3 _____
Identifier 4 _____	Passphrase 4 _____

- 4.3.2. Connect to the head unit over a console connection, such as the iDRAC interface or other terminal emulator. You cannot perform this operation over an SSH connection.
- 4.3.3. Reboot the head unit. While the system boots, watch for the following 8-bit menu items and then press Ctrl+R:

```

F2 = System Setup
Lifecycle Controller disabled
F11 = Boot Manager
F12 = PXE Boot

Initializing Intel(R) Boot Agent GE v.1.5.73
PXE 2.1 Build 092 (WfM 2.0)

PowerEdge Expandable RAID Controller BIOS
Copyright (c) 2015 Avago Corporation
Press <Ctrl><R> to Run Configuration Utility
HA -0 (Bus 2 Dev 0) PERC H730P Mini
FW package: 25.3.0-0016
    
```

- 4.3.4. The *Virtual Disk Management* screen is displayed. Press F2.

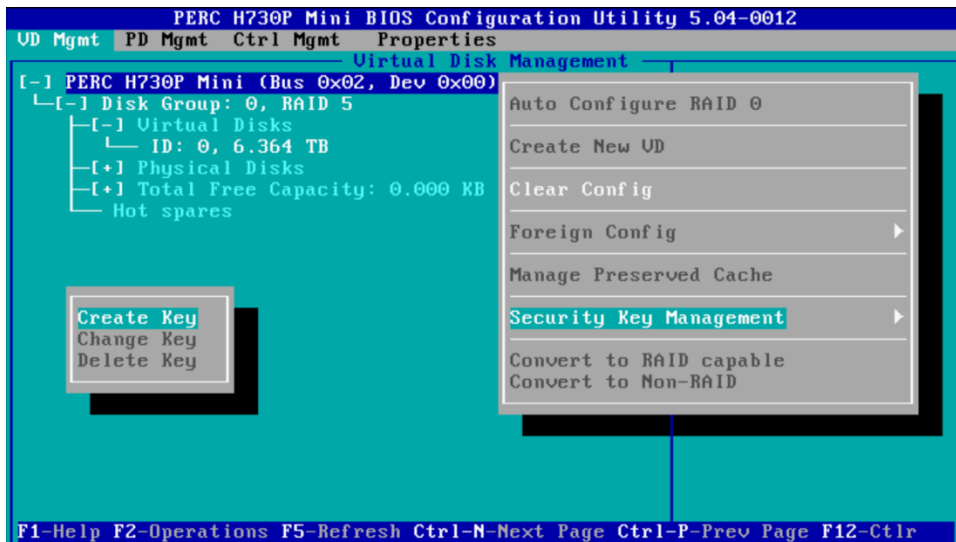


Figure 12: Creating a Security Key

- 4.3.5. Select Security Key Management and press Enter.
- 4.3.6. Select Create Key and press Enter to open the *Create Security Key* dialog.

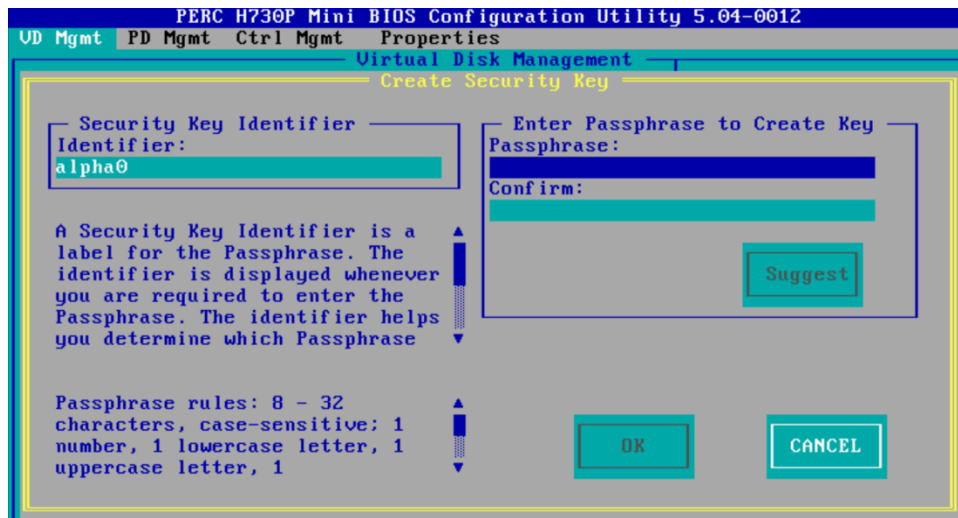


Figure 13: Specifying the Security Key Identifier and Passphrase

- 4.3.7. For the Security Key Identifier, enter the identifier for the security key from Step 4.3.1.
- 4.3.8. Enter the passphrase twice. The passphrase will be legible in both fields.
- 4.3.9. Select OK and press Enter to return to the *Virtual Disk Management* screen.
- 4.3.10. Press the Esc key to exit the BIOS configuration utility, and then press Ctrl+Alt+Delete to reboot.
- 4.3.11. For use later in the procedure—Decide on a password and a passphrase for the storage arrays (one password/passphrase combination for each head unit's arrays). The password is the management password to change settings on the arrays, and with the passphrase it decrypts data on disks that are removed from the array enclosure.

Password 1 _____	Passphrase 1 _____
Password 2 _____	Passphrase 2 _____
Password 3 _____	Passphrase 3 _____
Password 4 _____	Passphrase 4 _____



## 4.4. Determine the Configuration Type

Answer these questions about your deployment:

4.4.1. How many storage arrays per head unit?

1 or 2—Direct connection is recommended; using Fibre Channel switches is optional.

More than 2—You *must* connect the storage arrays to the head unit through Fibre Channel switches.

4.4.2. Are you connecting through Fibre Channel switches?

Yes—Skip to *Step 6: Fibre Channel Switch Setup* on page 24.

No—Continue to *Step 5: Direct-Connect Setup*.

## 5. Direct-Connect Setup

Follow these steps if you have one or two storage arrays per head unit and you are not connecting them to the head unit through Fibre Channel switches, as shown in the figures below:

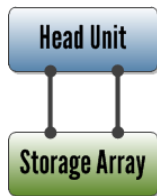


Figure 14: One Head Unit + One Storage Array

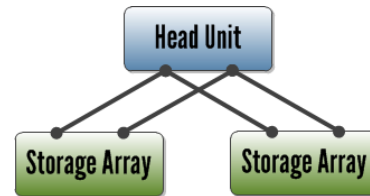
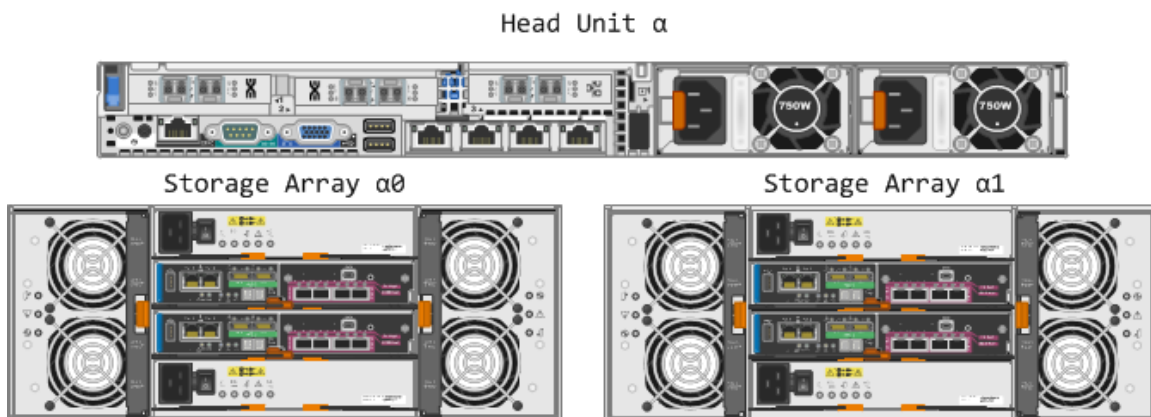


Figure 15: One Head Unit + Two Storage Arrays

**IMPORTANT** Prior to performing these steps, power down all head units and storage arrays.

### 5.1. Component Designation

For the examples in this procedure, each head unit and its respective storage arrays have a logical designator. The first head unit is designated  $\alpha$  (alpha) and its storage arrays are  $\alpha 0$ ,  $\alpha 1$ ; the second head unit is designated  $\beta$  (beta) and its storage arrays are  $\beta 0$ ,  $\beta 1$ .



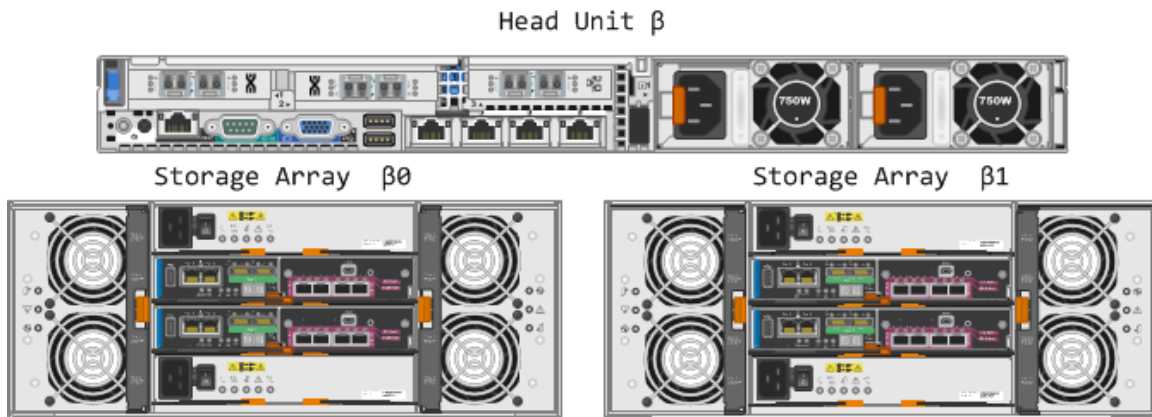


Figure 16: Logical Designators for Head Units Alpha (α) and Beta (β) and Their Respective Storage Arrays

## 5.2. Connect the Arrays to the Head Unit

Connect the storage units to the head unit, using the Fibre Channel cables that you supplied.

**Note** A properly inserted Fibre Channel cable will "click" into place.

### One Storage Array

Connect one port on each HBA to one of the two RAID controller modules, as shown in Figure 17:

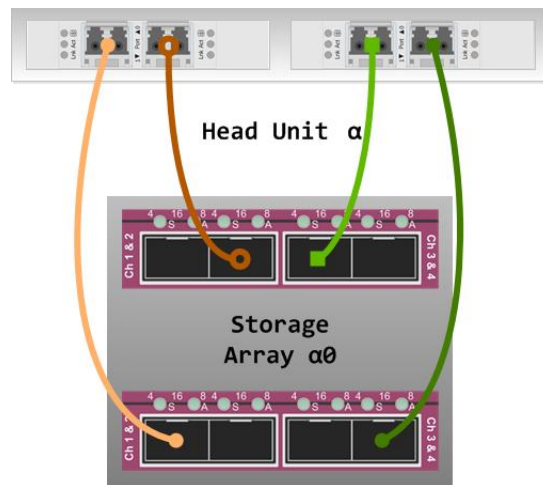


Figure 17: Fully Redundant Point-to-Point Connections Between the Head Unit and One Storage Array. It is not important which of the four ports on the HICs is used as long as each HBA on the head unit is connected to both HICs.

### Two Storage Arrays

For two storage arrays, each HBA on the head unit should be connected to both storage arrays, to either the top or bottom HIC, as shown in Figure 18.

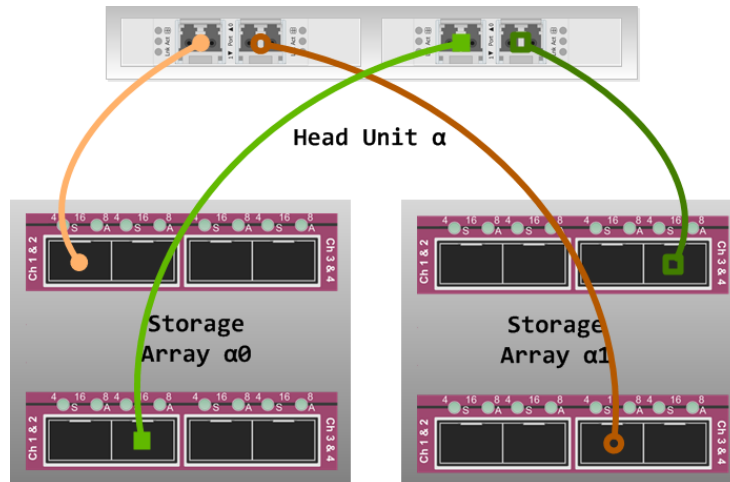


Figure 18: Point-to-Point Connections Between the Head Unit and Two Storage Arrays. This cabling schema is not redundant and therefore is vulnerable to failure.

## 5.3. Perform Initial Configuration on a Storage Array

5.3.1. Power on the head unit and ONE of the storage array(s).

**IMPORTANT** Configure only one storage array at a time to avoid confusion.

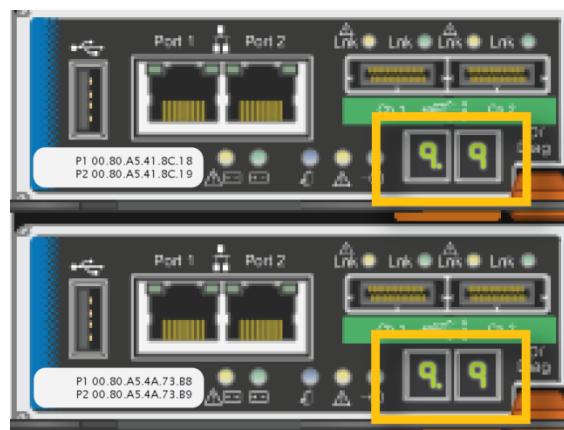


Figure 19: Status LEDs on Both Controllers

- 5.3.2. Wait until the status LEDs on both controllers show 99, which means that the storage array has finished booting. Log in to the head unit and run auto discovery:

```
[root@hostname ~]# SMcli -A localhost
```

```
Starting auto discovery.
.....
Auto Discovery operation successful.
SMcli completed successfully.
```

- 5.3.3. Auto discovery creates a discovery database on the head unit. Run `-d` (display) to see the database contents. Use `-v` to display the state of the storage array and use `-w` to display the array's WWN:

```
[root@hostname ~]# SMcli -d -v -w
```

- 5.3.4. You should see an entry that is similar to the following:

```
Unnamed <WWN> <ip_address> <ip_address> <ip_address> <ip_address> <ip_address>
localhost.localdomain localhost6.localdomain6 Needs Attention
```

- 5.3.5. `Unnamed` is the default name of an unconfigured storage array, and its default state is `Needs Attention`. The `WWN` is a 32-digit hexadecimal identifier for the storage array that contains the digits from one of the stickers on the back of the array, as shown in Figure 20.

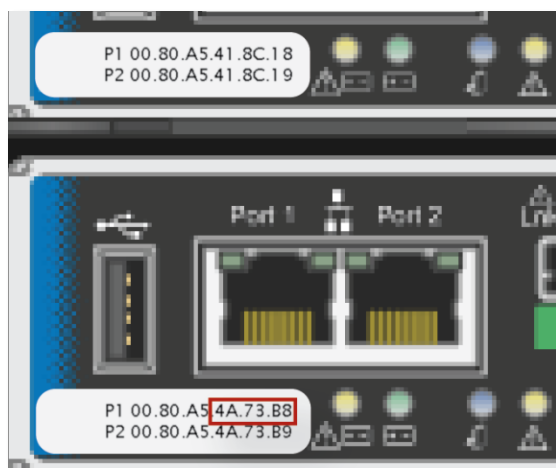


Figure 20: Six Digits That Match the WWN of the Array

```
Unnamed 60080a50004a73b80000000055c8175c <ip_address> <ip_address> <ip_address>
<ip_address> localhost.localdomain localhost6.localdomain6 Needs Attention
```

5.3.6. Provide a name for the storage array:

```
[root@hostname ~]# SMcli -n Unnamed -c 'set storageArray
userLabel="alpha0";'
```

5.3.7. Display the discovery database again:

```
[root@hostname ~]# SMcli -d
```

5.3.8. You should see an entry for `alpha0`:

```
alpha0 <ip_address> <ip_address> <ip_address> <ip_address> <ip_address>
localhost.localdomain localhost6.localdomain6 Needs Attention
```

**Note** If you still see an `Unnamed` entry, or any other entry besides `alpha0`, delete it from the discovery file, and then run discovery again:

```
[root@hostname ~]# SMcli -X -n <name to delete>
[root@hostname ~]# SMcli -A localhost
[root@hostname ~]# SMcli -d
```

5.3.9. View the drive statuses for `alpha0`:

```
[root@hostname ~]# SMcli -n alpha0 -c 'show allDrives summary;' | more
```

TRAY,	DRAWER,	SLOT	STATUS	CAPACITY	MEDIA TYPE	INTERFACE TYPE	CURRENT DATA RATE
99,	1,	1	Optimal	5,589.029 GB	Hard Disk Drive	SAS	6 Gbps
99,	1,	2	Optimal	5,589.029 GB	Hard Disk Drive	SAS	6 Gbps
99,	1,	3	Optimal	5,589.029 GB	Hard Disk Drive	SAS	6 Gbps
99,	1,	4	Optimal	5,589.029 GB	Hard Disk Drive	SAS	6 Gbps
99,	1,	5	Optimal	5,589.029 GB	Hard Disk Drive	SAS	6 Gbps
...							
99,	5,	7	Optimal	5,589.029 GB	Hard Disk Drive	SAS	6 Gbps
99,	5,	8	Optimal	5,589.029 GB	Hard Disk Drive	SAS	6 Gbps
99,	5,	9	Optimal	5,589.029 GB	Hard Disk Drive	SAS	6 Gbps
99,	5,	10	Optimal	5,589.029 GB	Hard Disk Drive	SAS	6 Gbps
99,	5,	11	Optimal	5,589.029 GB	Hard Disk Drive	SAS	6 Gbps
99,	5,	12	Optimal	5,589.029 GB	Hard Disk Drive	SAS	6 Gbps

5.3.10. Are all of the disks in [Optimal](#) condition?

Yes—Continue the procedure.	No— <b>STOP</b> . <hr/> <p>You cannot "work around" damaged disks: Security Analytics requires that the number of disks be identical across all disk groups (virtual drives).</p> <ul style="list-style-type: none"><li>• Consult <i>Troubleshooting Tools</i> on page 53.</li><li>• Repair or replace the damaged disks.</li><li>• When all disks are in <a href="#">Optimal</a> condition, you can continue the procedure.</li></ul>
-----------------------------	---

## 5.3.11. Are you connecting a second storage array to the head unit?

Yes—Repeat Steps 5.3.1 through 5.3.11 for the second storage array.	No—Go to <i>Step 7: Run the Array-Configuration Script</i> on page 44.
---	--

## 6. Fibre Channel Switch Setup

Follow these steps if you are connecting your storage arrays to the head unit via redundant Fibre Channel switches, as shown in the figures below:

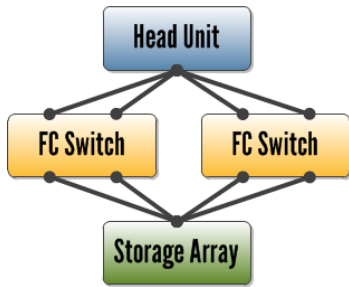


Figure 21: One Head Unit + One Storage Array

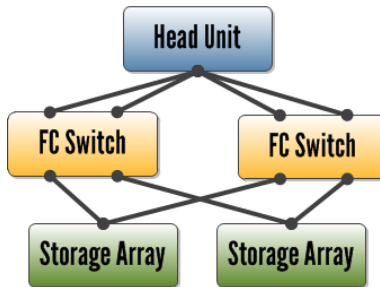


Figure 22: One Head Unit + Two Storage Arrays

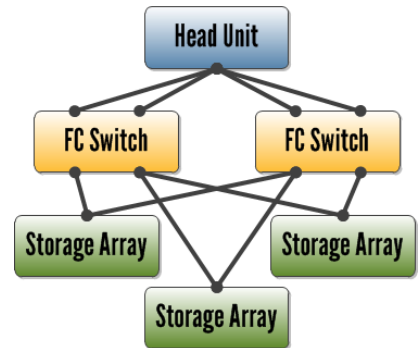


Figure 23: One Head Unit + Three Storage Arrays

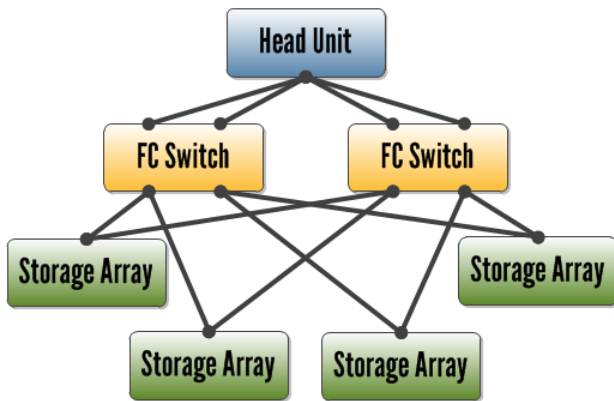


Figure 24: One Head Unit + Four Storage Arrays

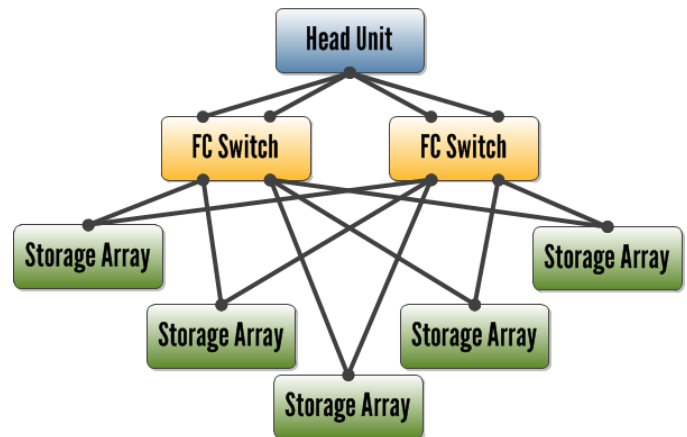


Figure 25: One Head Unit + Five Storage Arrays



## 6.1. Configure the Fibre Channel Switches

- 6.1.1. Consult the switch vendor's documentation to set the IP address and hostname.
- 6.1.2. Verify that the switch topology is switched-fabric, not arbitrated-loop.

---

**Note** This procedure assumes that the Fibre Channel switches are not part of a larger switch fabric; however, if your organization requires that they be interconnected with other switches, ensure that the switch zones for the head units and their respective storage arrays are not shared with other Fibre Channel traffic.

---

- 6.1.3. Verify that the requisite number of switch ports are licensed and activated. Consult the *Fibre Channel Switch Sizing Guide* on page 6 for the number of switch ports to activate.
- 6.1.4. Verify that the speed on the switch ports permits at least 16 Gbps.
- 6.1.5. If you have not already done so, insert the SFP+ transceivers in the activated ports.

## 6.2. Designate the Components

This document shows how to set up two head units with two storage arrays each, connected through shared Fibre Channel switches. For different configurations, extrapolate the instructions to apply to different numbers of head units and storage arrays.

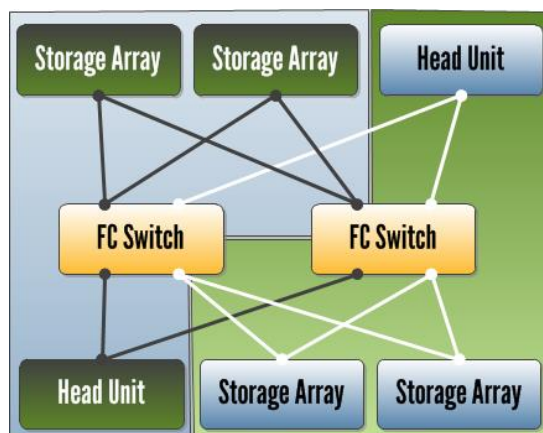


Figure 26: This document demonstrates how to set up this configuration: 2 head units with 2 storage arrays each, sharing Fibre Channel switches.

To avoid improperly connecting storage arrays to head units, provide each head unit and its respective storage arrays with logical designators. In this document, the first head unit is designated  $\alpha$  (alpha) and its storage arrays are  $\alpha 0$ ,  $\alpha 1$ ,  $\alpha 2$ , etc. The second head unit is designated  $\beta$  (beta) and its storage arrays are  $\beta 0$ ,  $\beta 1$ ,  $\beta 2$ , etc. The next head units would be designated  $\gamma$  (gamma),  $\delta$  (delta),  $\epsilon$  (epsilon), and so on.

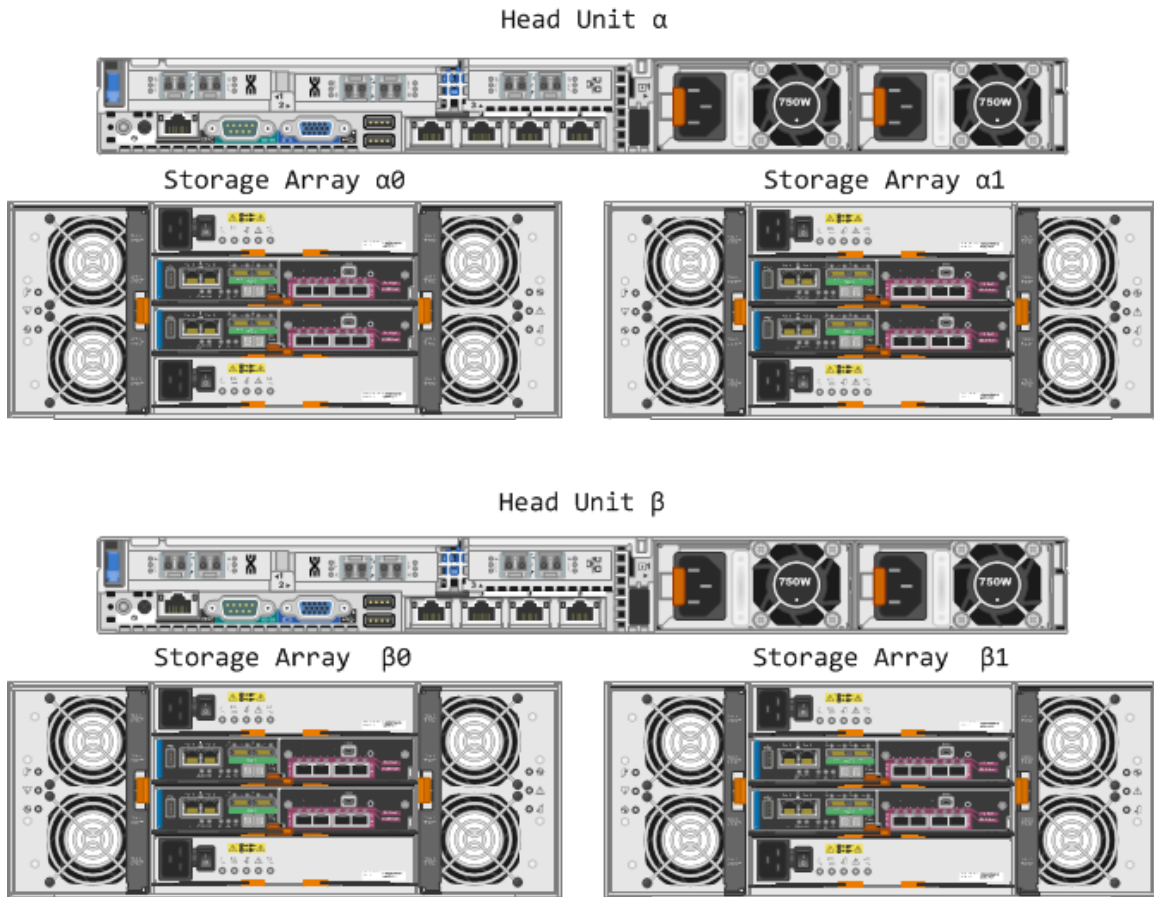


Figure 27: Logical Designators for Head Units Alpha ( $\alpha$ ) and Beta ( $\beta$ ) and Their Respective Storage Arrays

The firmware for the storage arrays designates the host interface cards (HICs) as A and B.

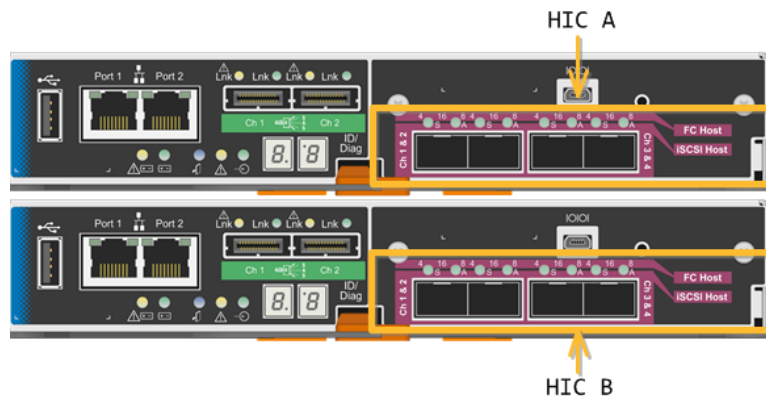


Figure 28: Logical Designators for the HICs on a Storage Array

The designators for two HBAs and their respective HICs are shown below.

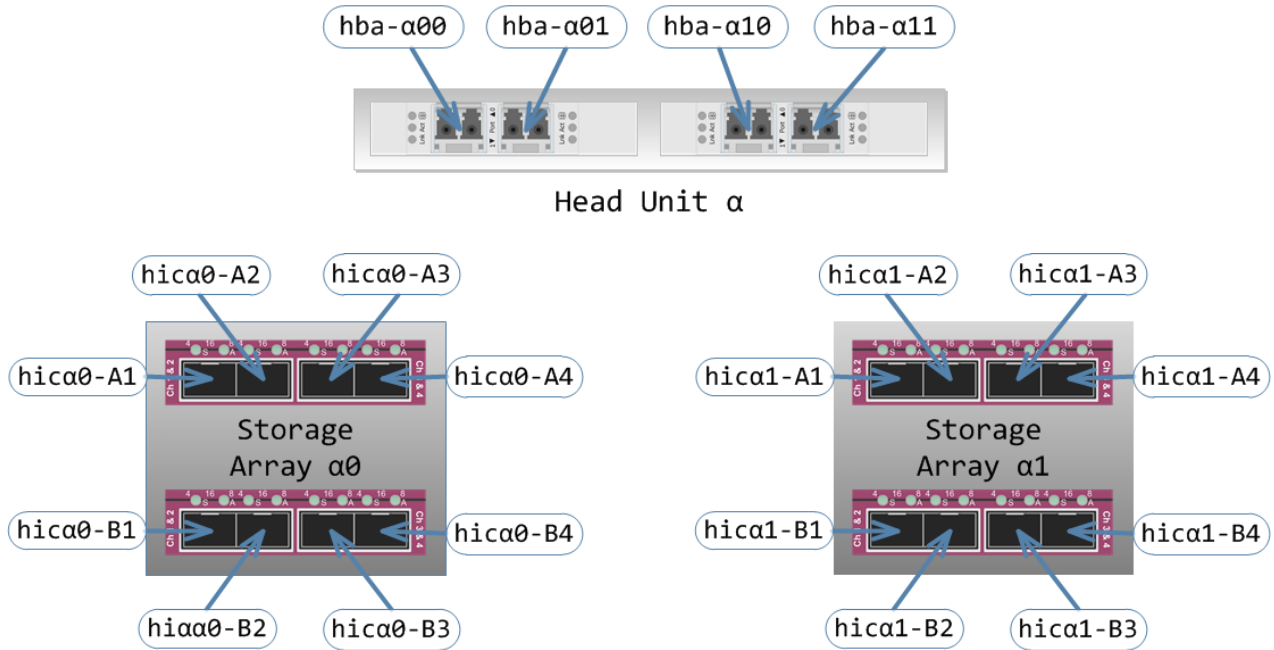


Figure 29: Logical Designators for the HBA Ports on Head Unit  $\alpha$  and the HIC Ports on Storage Arrays  $\alpha0$  and  $\alpha1$

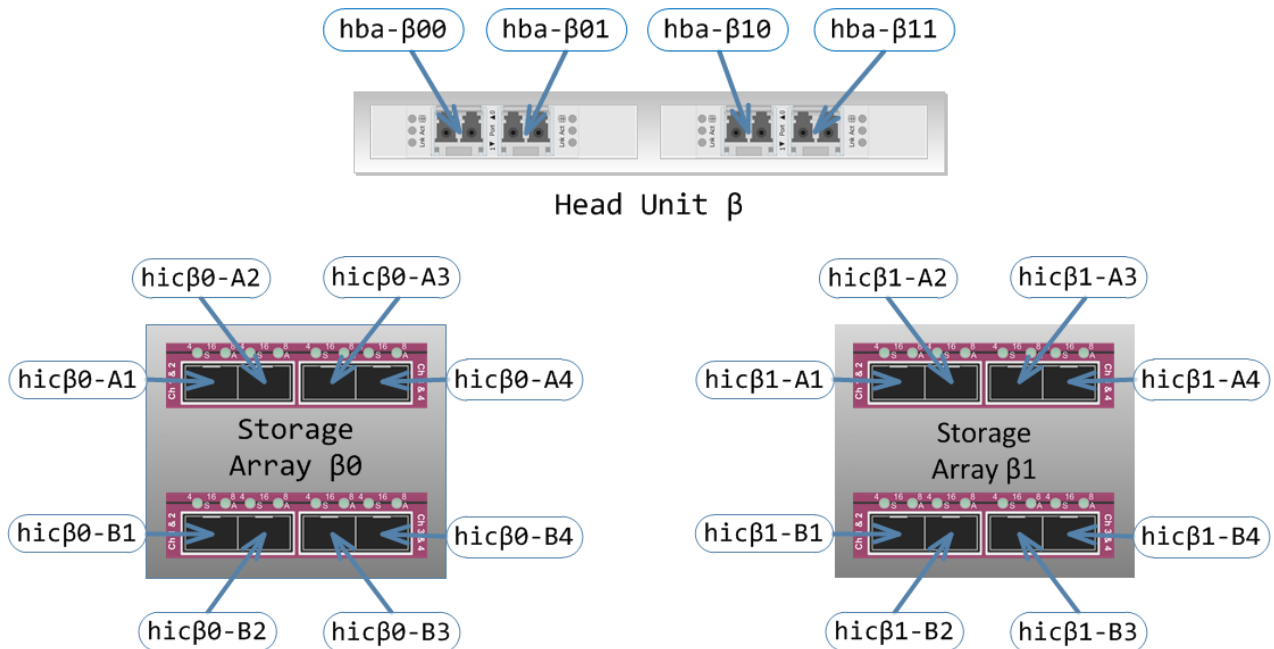


Figure 30: Logical Designators for the HBA Ports on Head Unit  $\beta$  and the HIC Ports on Storage Arrays  $\beta0$  and  $\beta1$

### 6.3. Print the Switch Zone Worksheets

For each head unit, print one copy of the *Switch Zone Worksheet* on pages 60–61. Where there is an underscore     on the worksheet, write the designator for the head unit:  $\alpha$  (alpha) on the first worksheet,  $\beta$  (beta) on the second,  $\gamma$  (gamma) on the third, and so on. The Zone Alias column provides a written-out name for the zone, which will be used when setting up the switch zones.

Head Unit $\alpha$ Hostname _____			
Switch	Zone Alias	Designator	Host Port Identifier (WWN)
Y	00 $\alpha$ 00 $\alpha$ alpha	hba- $\alpha$ 00	: : : : : :
		hic $\alpha$ 0-A1	: : : : : :
		hic $\alpha$ 0-B1	: : : : : :
		hic $\alpha$ 1-A1	: : : : : :

### 6.4. Obtain the WWNs for All Fibre Channel Ports

Also known as host port identifiers or media access control (MAC) addresses, you will need to annotate the WWN for each Fibre Channel port on the head unit(s) and the storage array(s).

#### Head Unit

Follow these instructions to get a list of the WWNs on a head unit.

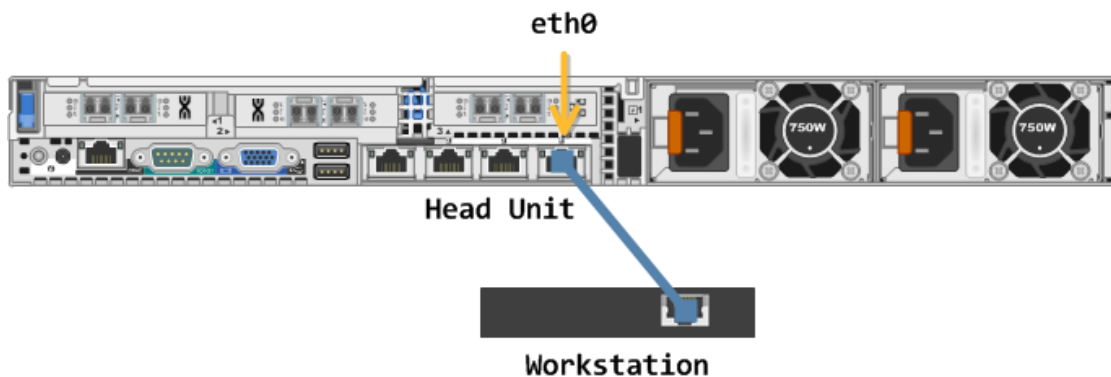


Figure 31: Connect directly to eth0 on the head unit.

6.4.1. Power on the head unit, connect to it over SSH or a console, and log in as `root`.

**IMPORTANT** Do not connect the workstation to the head unit through a network at this time; it is important that the head units and arrays be isolated from other network components.

6.4.2. The CLI prompt displays the hostname for the head unit:

```
[root@hostname ~]#
```

6.4.3. Notate the hostname on the *Switch Zone Worksheet*.

Head Unit <u>α</u> Hostname <u>&lt;hostname&gt;</u>								
Switch	Zone Alias	Designator	Host Port Identifier (WWN)					
Y	00 <u>α</u> 00 <u>α</u> alpha	hba- <u>α</u> 00	:	:	:	:	:	:
		hic <u>α</u> 0-A1	:	:	:	:	:	:
		hic <u>α</u> 0-B1	:	:	:	:	:	:
		hic <u>α</u> 0-A1	:	:	:	:	:	:

6.4.4. Using one Fibre Channel cable, connect the first HBA port on the head unit to any HIC port on the storage array.

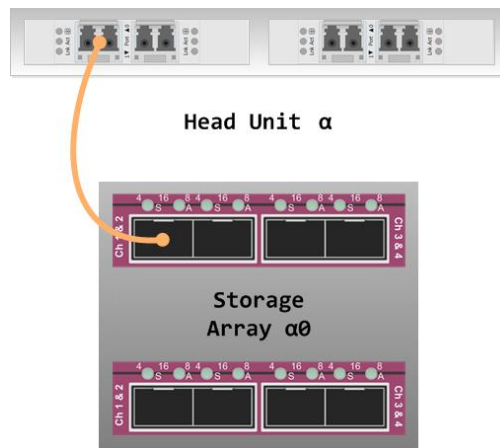


Figure 32: One HBA Port on the Head Unit Connected to a HIC Port on the Storage Array

**IMPORTANT** Configure only one storage array at a time so that your switch-zone definitions are accurate.

6.4.5. Power on the storage array.

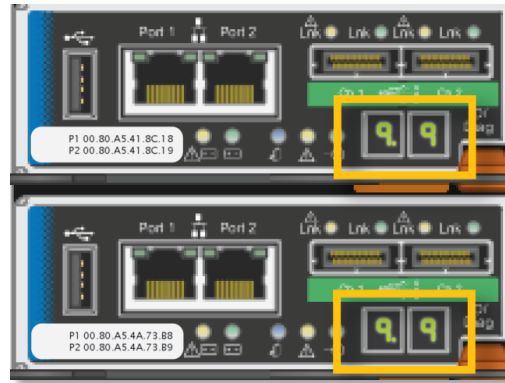


Figure 33: Status LEDs on Both Controllers

6.4.6. Wait until the status LEDs on both controllers show 99, which means that the storage array has finished booting.

6.4.7. Get a list of Fibre Channel interfaces on the head unit:

```
[root@hostname ~]# ls /sys/class/fc_host
```

The result will be similar to the following:

```
host12 host13 host14 host15
```

6.4.8. Determine the status of the Fibre Channel interfaces:

```
[root@hostname ~]# cat /sys/class/fc_host/host1[2-5]/port_state
```

```
Offline
Offline
Online
Offline
```

6.4.9. The online interface is host14, the leftmost HBA port on the head unit (hba-a00); host12 is therefore hba-a10.

6.4.10. Get the WWNs:

```
cat /sys/class/fc_host/host1[2-5]/port_name
```

```
0x10000090fafafac2
0x10000090fafafac3
0x10000090fafafa4a
0x10000090fafafa4b
```

The shaded digits identify the ports as Emulex LPe16002B Fibre Channel HBA ports.

6.4.11. On the *Switch Zone Worksheet*, notate each WWN in its own zone. For example, if the identifiers shown in Step 6.4.10 were on Head Unit **α**, they would be entered as follows:

Head Unit <b>α</b> Hostname <u>&lt;hostname&gt;</u>			
Switch	Zone Alias	Designator	Host Port Identifier (WWN)
Y	00 <b>α</b> 00 <b>alpha</b>	hba- <b>α</b> 00	10 : 00 : 00 : 90 : fa : fa : fa : 4a
		...	...
Z	01 <b>α</b> 01 <b>alpha</b>	hba- <b>α</b> 01	10 : 00 : 00 : 90 : fa : fa : fa : 4b
		...	...
Y	10 <b>α</b> 10 <b>alpha</b>	hba- <b>α</b> 10	10 : 00 : 00 : 90 : fa : fa : fa : c2
		...	...
Z	11 <b>α</b> 11 <b>alpha</b>	hba- <b>α</b> 11	10 : 00 : 00 : 90 : fa : fa : fa : c3
		...	...

### Storage Arrays

Follow these steps to obtain the host port identifiers (WWNs) for the HICs on each storage array.

**IMPORTANT** To ensure that you do not accidentally discover other storage arrays, do not connect the management ports on the storage array to a network.

6.4.12. On the head unit run auto discovery:

```
[root@hostname ~]# SMcli -A
```

```
Starting auto discovery.
.....
Auto Discovery operation successful.
SMcli completed successfully.
```

6.4.13. Auto discovery creates a discovery database on the head unit. Run `-d` (display) to see the database contents. Use `-v` to display the state of the storage array and `-w` to display the array's WWN:

```
[root@hostname ~]# SMcli -d -v -w
```

6.4.14. You should see an entry that is similar to the following:

```
Unnamed <WWN> <ip_address> <ip_address> <ip_address> <ip_address> <ip_address>
localhost.localdomain localhost6.localdomain6 Needs Attention
```

6.4.15. `Unnamed` is the default name of an unconfigured storage array, and its default state is `Needs Attention`. The `WWN` is a 32-digit hexadecimal identifier for the storage array that contains the digits from one of the stickers on the back of the array, as shown in Figure 34.

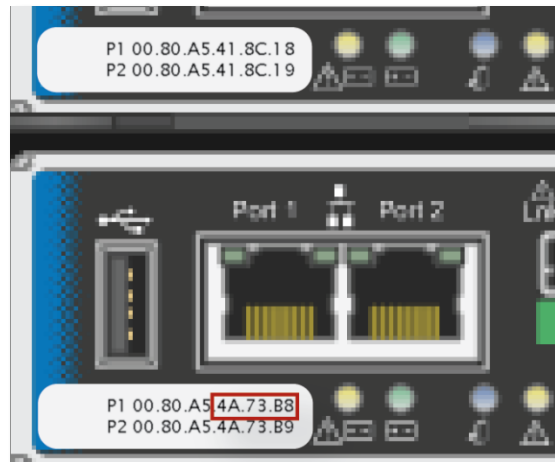


Figure 34: Six Digits That Match the WWN of the Array

```
Unnamed 60080a50004a73b80000000055c8175c <ip_address> <ip_address> <ip_address>
<ip_address> localhost.localdomain localhost6.localdomain6 Needs Attention
```

6.4.16. Provide a name for the storage array:

```
[root@hostname ~]# SMcli -n Unnamed -c 'set storageArray
userLabel="alpha0";'
```

6.4.17. Display the discovery database again:

```
[root@hostname ~]# SMcli -d
```

6.4.18. You should see a new entry for `alpha0`:

```
alpha0 <ip_address> <ip_address> <ip_address> <ip_address> <ip_address>
localhost.localdomain localhost6.localdomain6 Needs Attention
```



**Note** If you still see the `Unnamed` entry, or any other entry besides `alpha0`, delete it from the discovery file, and then run discovery again:

```
[root@hostname ~]# SMcli -X -n <name to delete>
[root@hostname ~]# SMcli -A localhost
[root@hostname ~]# SMcli -d
```

6.4.19. View the disk-drive status for `alpha0`:

```
[root@hostname ~]# SMcli -n alpha0 -c 'show allDrives summary;' | more
```

TRAY,	DRAWER,	SLOT	STATUS	CAPACITY	MEDIA TYPE	INTERFACE TYPE	CURRENT DATA RATE
99,	1,	1	Optimal	5,589.029 GB	Hard Disk Drive	SAS	6 Gbps
99,	1,	2	Optimal	5,589.029 GB	Hard Disk Drive	SAS	6 Gbps
99,	1,	3	Optimal	5,589.029 GB	Hard Disk Drive	SAS	6 Gbps
99,	1,	4	Optimal	5,589.029 GB	Hard Disk Drive	SAS	6 Gbps
99,	1,	5	Optimal	5,589.029 GB	Hard Disk Drive	SAS	6 Gbps
...							
99,	5,	7	Optimal	5,589.029 GB	Hard Disk Drive	SAS	6 Gbps
99,	5,	8	Optimal	5,589.029 GB	Hard Disk Drive	SAS	6 Gbps
99,	5,	9	Optimal	5,589.029 GB	Hard Disk Drive	SAS	6 Gbps
99,	5,	10	Optimal	5,589.029 GB	Hard Disk Drive	SAS	6 Gbps
99,	5,	11	Optimal	5,589.029 GB	Hard Disk Drive	SAS	6 Gbps
99,	5,	12	Optimal	5,589.029 GB	Hard Disk Drive	SAS	6 Gbps

6.4.20. Are all of the disks in `Optimal` condition?

<p>Yes—Continue the procedure.</p>	<p>No—<b>STOP</b>.</p> <hr style="border: 1px solid red;"/> <p>You cannot "work around" damaged disks: Security Analytics requires that the number of disks be identical across all disk groups (virtual drives).</p> <ul style="list-style-type: none"> <li>• Repair or replace the damaged disks.</li> <li>• Consult <i>Troubleshooting Tools</i> on page 53.</li> <li>• When all disks are in <code>Optimal</code> condition, you can continue the procedure.</li> </ul>
------------------------------------	---

6.4.21. View the controller information for Controller A on `alpha0`:

```
[root@hostname ~]# SMcli -n alpha0 -c 'show controller [a];' | more
```

6.4.22. The readout for Controller A displays all information about the controller and ports:

```
Controller in Tray 99, Slot A

Status:                               Online

Current configuration
  Firmware version:                    08.30.01.00
  Appware version:                     08.30.01.00
  Bootware version:                    08.30.01.00
  NVSRAM version:                      N5600-830834-D01
...

```

6.4.23. Page through the readout until you get to the host interface entries for Controller A:

```
...
Host interface:                        Fibre
Host Interface Card(HIC):              1
Channel:                               1
Port:                                  1
Current ID:                            Not applicable/0xFFFFFFFF
Preferred ID:                           0/0xEF
NL-Port ID:                             0x000000
Maximum data rate:                      16 Gbps
Current data rate:                       16 Gbps
Data rate control:                       Auto
Link status:                             Up
Topology:                                Point-to-Point
World-wide port identifier:              20:12:00:80:e5:e5:e5:e5
World-wide node identifier:              20:02:00:80:e5:e5:e5:e5
Part type:                               QL-EP8324                revision 2
Data Assurance (DA) capable:            Yes
...

```

6.4.24. Notate the [World-wide port identifier](#) (WWN or host port ID) on the *Switch Zone Worksheet*.

Head Unit <u>α</u> Hostname <u>&lt;hostname&gt;</u>			
Switch	Zone Alias	Designator	Host Port Identifier (WWN)
Y	00 <u>α</u> 00 <u>alpha</u>	hba- <u>α</u> 00	10 : 00 : 00 : 90 : fa : fa : fa : 4a
		hicc <u>α</u> 0-A1	20 : 12 : 00 : 80 : e5 : e5 : e5 : e5

6.4.25. For the next host interface entry—Port 2—notate the WWN in the [hiccα0-A2](#) row in the next switch zone, not in the [hiccα0-B1](#) row.

Head Unit <u>α</u> Hostname <u>&lt;hostname&gt;</u>			
Switch	Zone	Designator	Host Port Identifier (WWN)
Y	00 <u>α</u> 00 <u>alpha</u>	hba- <u>α</u> 00	10 : 00 : 00 : 90 : fa : fa : fa : 4a
		hicc <u>α</u> 0-A1	20 : 12 : 00 : 80 : e5 : e5 : e5 : e5
		hicc <u>α</u> 0-B1	
		...	...
Z	01 <u>α</u> 01 <u>alpha</u>	hba- <u>α</u> 01	10 : 00 : 00 : 90 : fa : fa : fa : 4b
		hicc <u>α</u> 0-A2	20 : 22 : 00 : 80 : e5 : e5 : e5 : e5
		hicc <u>α</u> 0-B2	

6.4.26. Continue to notate the next two WWNs as [hiccα0-A3](#) and [hiccα0-A4](#).

6.4.27. View the information for Controller B:

```
[root@hostname ~]# SMcli -n alpha0 -c 'show controller [b];' | more
```

6.4.28. Page down to the host interface entries for Controller B and notate the WWNs as [hiccα0-B1](#), [hiccα0-B2](#), [hiccα0-B3](#), and [hiccα0-B4](#), respectively.

6.4.29. When you have finished, the *Switch Zone Worksheet* should look similar to the following—each switch zone with three WWNs: one HBA port on the head unit, one HIC port on Controller A, and one HIC port on Controller B:

Head Unit <u>α</u> Hostname <u>&lt;hostname&gt;</u>			
Switch	Zone	Designator	Host Port Identifier
Y	00 <u>α</u> 00 <u>α</u> alpha	hba- <u>α</u> 00	10 : 00 : 00 : 90 : fa : fa : fa : 4a
		hic <u>α</u> 0-A1	20 : 12 : 00 : 80 : e5 : e5 : e5 : e5
		hic <u>α</u> 0-B1	20 : 13 : 00 : 80 : e5 : e5 : e5 : e5
		...	...
Z	01 <u>α</u> 01 <u>α</u> alpha	hba- <u>α</u> 01	10 : 00 : 00 : 90 : fa : fa : fa : 4b
		hic <u>α</u> 0-A2	20 : 22 : 00 : 80 : e5 : e5 : e5 : e5
		hic <u>α</u> 0-B2	20 : 23 : 00 : 80 : e5 : e5 : e5 : e5
		...	...
Y	10 <u>α</u> 10 <u>α</u> alpha	hba- <u>α</u> 10	10 : 00 : 00 : 90 : fa : fa : fa : 4c
		hic <u>α</u> 0-A3	20 : 32 : 00 : 80 : e5 : e5 : e5 : e5
		hic <u>α</u> 0-B3	20 : 33 : 00 : 80 : e5 : e5 : e5 : e5
		...	...
Z	11 <u>α</u> 11 <u>α</u> alpha	hba- <u>α</u> 11	10 : 00 : 00 : 90 : fa : fa : fa : 4d
		hic <u>α</u> 0-A4	20 : 42 : 00 : 80 : e5 : e5 : e5 : e5
		hic <u>α</u> 0-B4	20 : 43 : 00 : 80 : e5 : e5 : e5 : e5
		...	...

6.4.30. Power down the storage array and disconnect the Fibre Channel cable.

6.4.31. For other storage arrays that will be connected to Head Unit α, repeat Steps 6.4.4 through 6.4.30 (omitting the steps to find the host port identifiers for the head unit) to notate the WWNs in their respective rows on the worksheet: hicα1-A1, hicα1-A2, hicα1-A3, hicα1-A4, and so on.

6.4.32. For Head Unit β, repeat all of *Step 6.4: Obtain the WWNs for All Fibre Channel Ports*, using the *Switch Zone Worksheet* for Head Unit β. Repeat as necessary for all head units.

## 6.5. Set Up the Fibre Channel Switch Zones

This section contains commands for Brocade 6500-series Fibre Channel switches. To configure switches from other vendors consult their respective documentation.

While configuring the switches, follow these guidelines:

- The Fibre Channel topology must be switched-fabric, not arbitrated loop.
- Use two switches for redundancy.
- Use the world-wide name (WWN) zoning method, such that the WWNs of the devices are assigned to the zones instead of assigning switch ports to the zones.
- Each host port on a head unit must be in a different zone, and each HBA must be connected to both switches. In other words, `hba-α00` and `hba-α01` should connect to different switches, as shown in Figure 35.

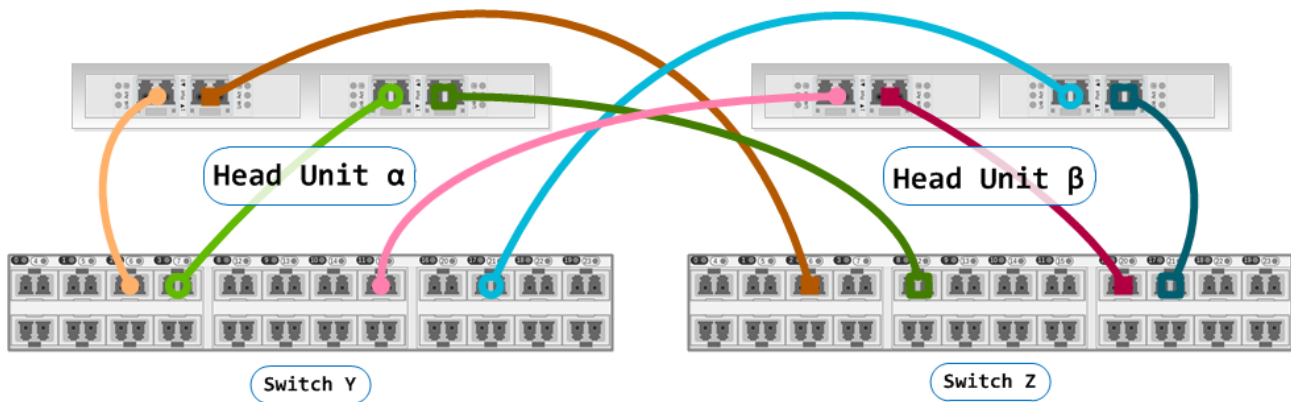


Figure 35: Each port on each HBA is connected to a different switch, thereby providing full redundancy. Do not connect the head units to the Fibre Channel switches until instructed, later in this procedure.

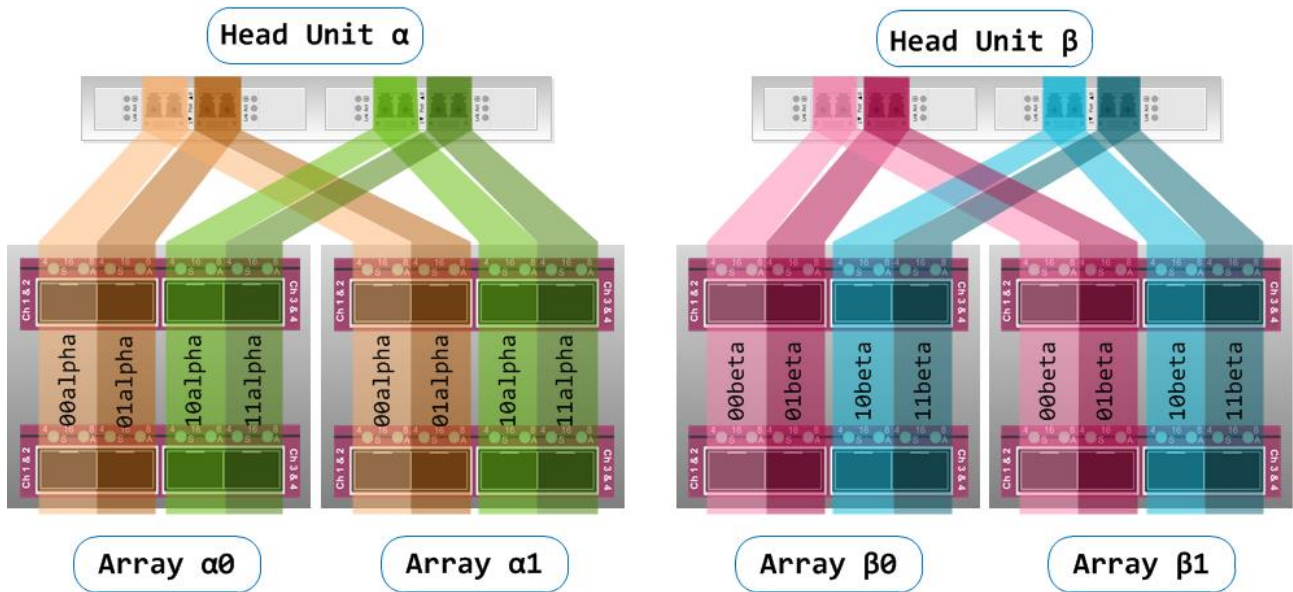


Figure 36: The shaded areas show which HBA and HIC ports correspond to the same zone. There must be one zone per HBA port.

- 6.5.1. Disconnect any head units and storage arrays from the switches.
- 6.5.2. Power on the first switch (Switch Y) and log on to the console interface with administrator credentials.

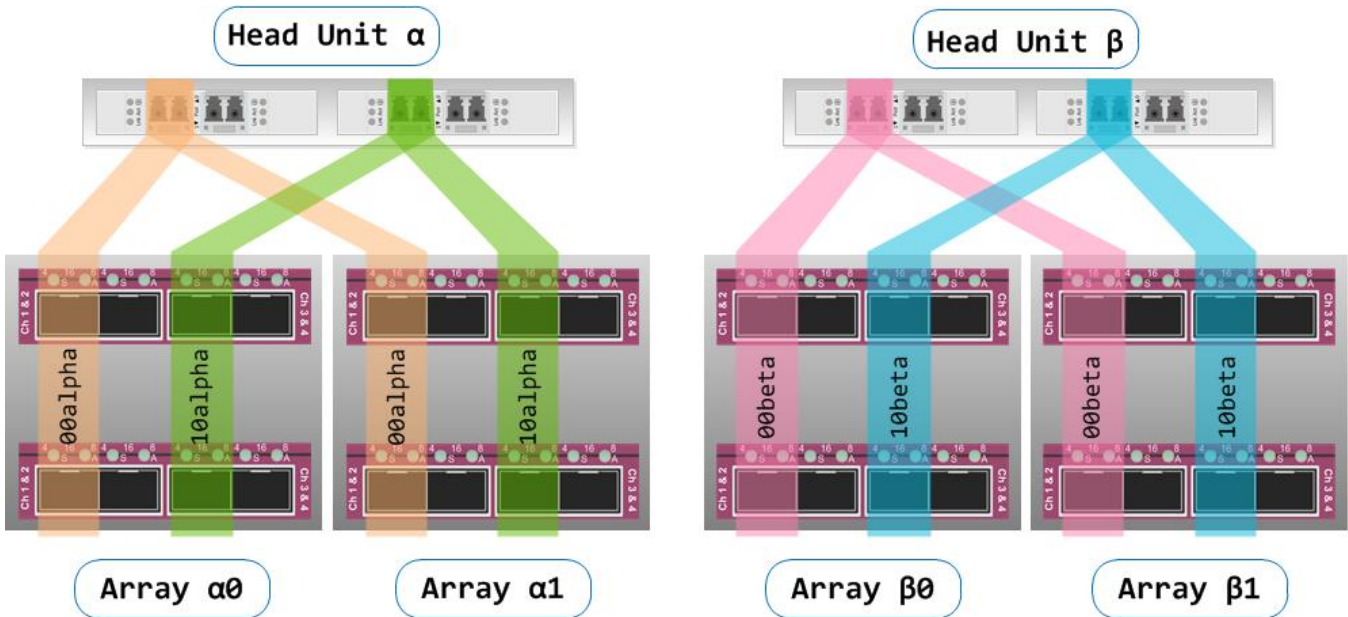


Figure 37: Zones for Switch Y

- 6.5.3. Optional—For ease of management, create aliases for each WWN. (Brocade switches do not permit the first character of an alias to be a digit; only alphanumeric and underscore are valid characters):

```
switch:admin> aliCreate "hba_alpha00", "10:00:00:90:fa:fa:fa:4a"
switch:admin> aliCreate "hicalpha0_A1", "20:12:00:80:e5:e5:e5:e5"
switch:admin> aliCreate "hicalpha0_B1", "20:13:00:80:e5:e5:e5:e5"
switch:admin> aliCreate "hicalpha1_A1", "20:12:00:80:a7:a7:a7:a7"
switch:admin> aliCreate "hicalpha1_B1", "20:13:00:80:a7:a7:a7:a7"
...
switch:admin> cfgSave
```

- 6.5.4. Consult your *Switch Zone Worksheet(s)* to assign the WWNs or WWN aliases to the zones on Switch Y:

```
switch:admin> zonecreate "zone_00alpha", "hba_alpha00; hicalpha0_A1;
hicalpha0_B1; hicalpha1_A1; hicalpha1_B1"
switch:admin> zonecreate "zone_10alpha", "hba_alpha10; hicalpha0_A3;
hicalpha0_B3, hicalpha1_A3; hicalpha1_B3"
switch:admin> zonecreate "zone_00beta", "hba_beta00; hiebeta0_A1;
hicalpha0_B1; hiebeta1_A1; hicalpha1_B1"
switch:admin> zonecreate "zone_10beta", "hba_beta10; hiebeta0_A3;
hicalpha0_B3; hiebeta1_A3; hicalpha1_B3"
switch:admin> cfgSave
```

- 6.5.5. Verify that the zone configuration is correct:

```
switch:admin> zoneShow
```

```
Defined configuration:
zone: zone_00alpha
      hba_alpha00; hicalpha0_A1; hicalpha0_B1
zone: zone_10alpha
      hba_alpha10; hicalpha0_A3; hicalpha0_B3
```

- 6.5.6. Name the zone configuration:

```
switch:admin> cfgCreate "SA_zones", "zone_00alpha; zone01alpha"
```

- 6.5.7. Enable the zone configuration:

```
switch:admin> cfgEnable "SA_zones"
```

6.5.8. Power on and log in to the second switch (Switch Z).

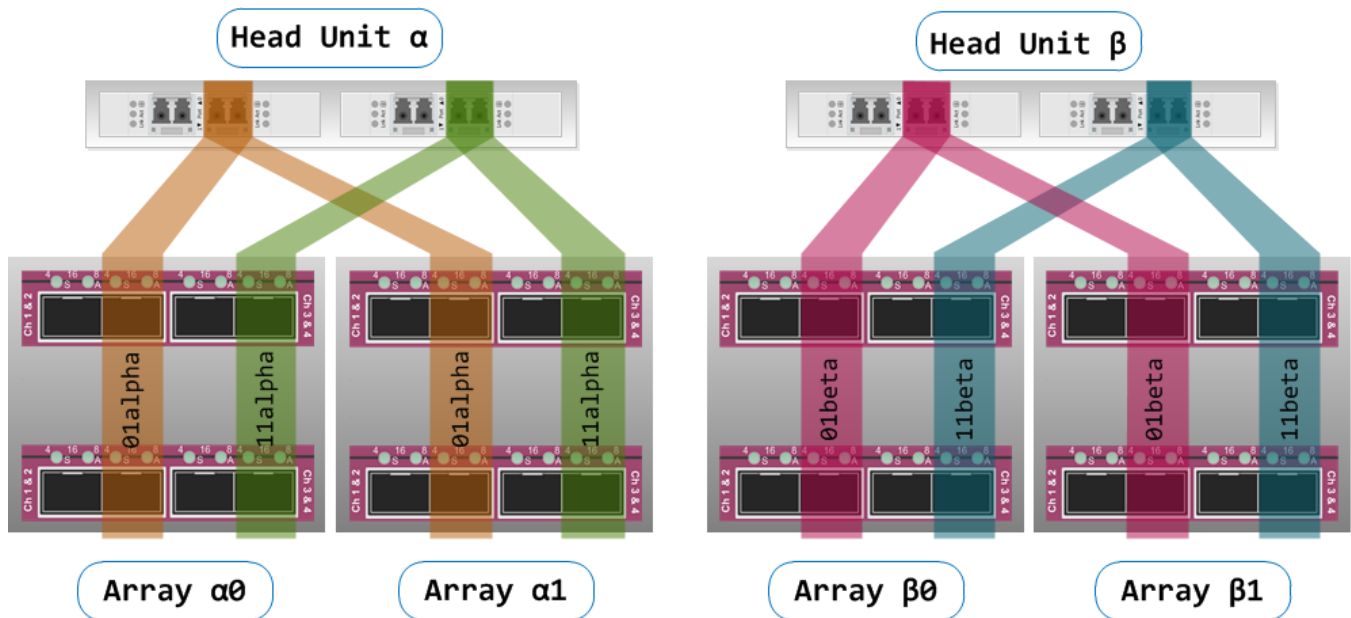


Figure 38: Zones for Switch Z

6.5.9. Optional—For ease of management, create aliases for each WWN:

```
switch:admin> alicreate "hba_alpha01" "10:00:00:90:fa:fa:fa:4b"
switch:admin> alicreate "hicalpha0_A2" "20:22:00:80:e5:e5:e5:e5"
switch:admin> alicreate "hicalpha0_B2" "20:23:00:80:e5:e5:e5:e5"
switch:admin> alicreate "hicalpha1_A2" "20:22:00:80:a7:a7:a7:a7"
switch:admin> alicreate "hicalpha1_B2" "20:23:00:80:a7:a7:a7:a7"
...
switch:admin> cfgSave
```

6.5.10. Consult your *Switch Zone Worksheet(s)* to assign the WWNs or WWN aliases to the zones on Switch Z:

```
switch:admin> zonecreate "zone_01alpha", "hba_alpha01; hicalpha0_A2;
hicalpha0_B2; hicalpha1_A2; hicalpha1_B2"
switch:admin> zonecreate "zone_11alpha", "hba_alpha11; hicalpha0_A4;
hicalpha0_B4, hicalpha1_A4; hicalpha1_B4"
switch:admin> zonecreate "zone_01beta", "hba_beta01; hicalpha0_A2;
hicalpha0_B2; hicalpha1_A2; hicalpha1_B2"
switch:admin> zonecreate "zone_11beta", "hba_beta11; hicalpha0_A4;
hicalpha0_B4; hicalpha1_A4; hicalpha1_B4"
switch:admin> cfgSave
```



6.5.11. Verify that the zone configuration is correct:

```
switch:admin> zoneShow
```

```
Defined configuration:
zone: zone_10alpha
      hba_alpha10; hicalpha0_A2; hicalpha0_B2
zone: zone_11alpha
      hba_alpha11; hicalpha0_A4; hicalpha0_B4
```

6.5.12. Name the zone configuration:

```
switch:admin> cfgCreate "SA_zones", "zone_10alpha; zone11alpha"
```

6.5.13. Enable the zone configuration:

```
switch:admin> cfgEnable "SA_zones"
```

6.5.14. Power down the switches.

Cable the Head Units to the Switches

Using the Fibre Channel cables that you provide, connect the HBAs to the appropriate switch.

**Note** A properly inserted Fibre Channel cable will "click" into place.

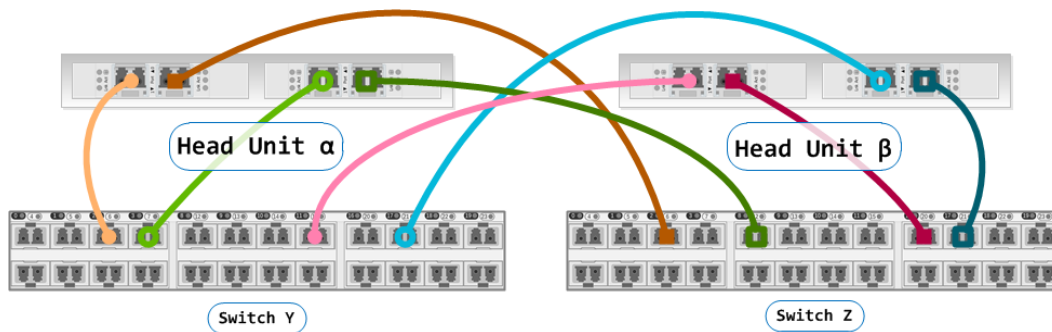


Figure 39: HBA Connections to Switches Y and Z. Because the switch zones are defined by WWN, it is not important which switch port is used.

Cable the Storage Arrays to the Switches

Using the Fibre Channel cables that were included with the storage array, connect the HICs to the appropriate switch.

**Note** A properly inserted Fibre Channel cable will "click" into place.

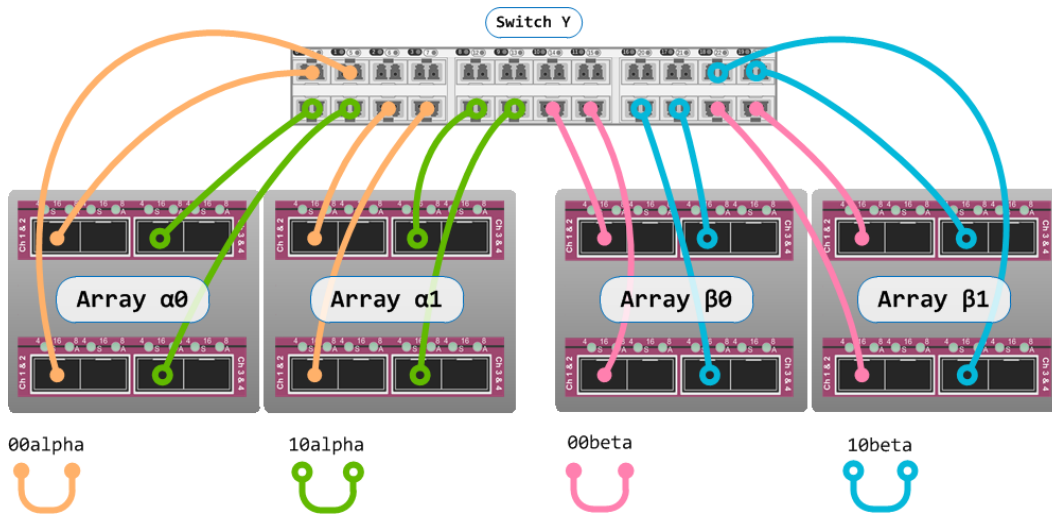


Figure 40: HIC Connections to Switch Y. It is not important which switch port is used.

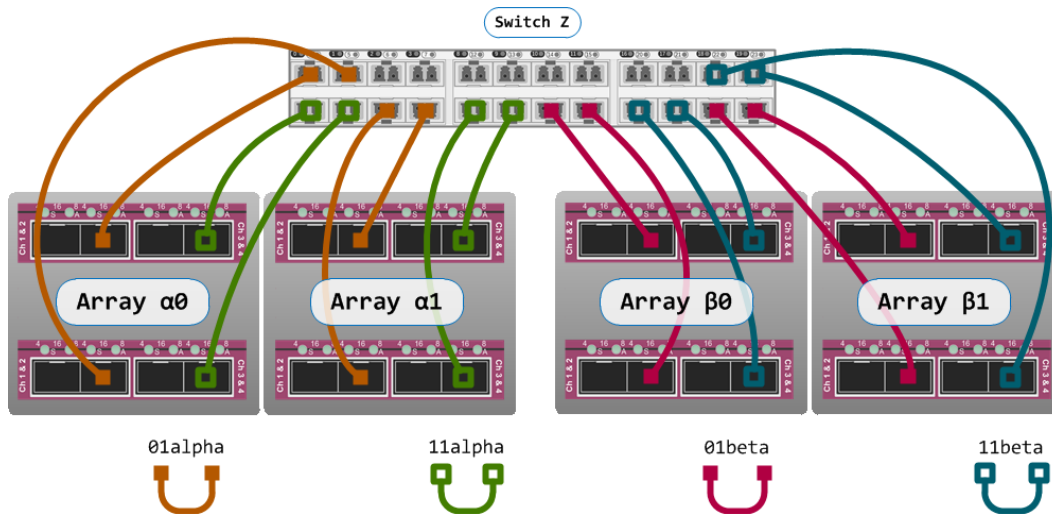


Figure 41: HIC Connections to Switch Z. It is not important which switch port is used.

## 6.6. Validate the Cabling

Using the *Switch Zone Worksheet*, verify that each switch is connected to the correct ports.

- 6.6.1. Log in to the switches with administrator privileges. Verify connectivity between the switch ports and the HBA and HIC ports (This command does not show the zones):

```
switch:admin> switchShow
```

Index	Port	Address	Media	Speed	State	Proto	
0	0	010000	id	N16	Online	FC	F-Port 10:00:00:90:fa:fa:fa:4a
1	1	010100	id	N16	Online	FC	F-Port 10:00:00:90:fa:fa:fa:4b
2	2	010200	id	N16	Online	FC	F-Port 10:00:00:90:fa:fa:fa:4c
3	3	010000	id	N16	Online	FC	F-Port 10:00:00:90:fa:fa:fa:4d
4	4	010100	id	N16	Online	FC	F-Port 20:12:00:80:e5:e5:e5:e5
5	5	010200	id	N16	Online	FC	F-Port 20:13:00:80:e5:e5:e5:e5
6	6	010000	id	N16	Online	FC	F-Port 20:22:00:80:e5:e5:e5:e5
7	7	010100	id	N16	Online	FC	F-Port 20:23:00:80:e5:e5:e5:e5
8	8	010200	id	N16	Online	FC	F-Port 20:32:00:80:e5:e5:e5:e5
9	9	010000	id	N16	Online	FC	F-Port 20:33:00:80:e5:e5:e5:e5
10	10	010100	id	N16	Online	FC	F-Port 20:42:00:80:e5:e5:e5:e5
11	11	010200	id	N16	Online	FC	F-Port 20:43:00:80:e5:e5:e5:e5

6.6.2. For all ports that you are using, the following should be true:

- Speed — 16 Gbps
- State — Online
- The WWN is listed on your *Switch Zone Worksheet* for this switch.

6.6.3. Power down the switches.

## 7. Run the Array-Configuration Script

7.1.1. With all Fibre Channel connections in place, power on all devices in this order:

- Storage Arrays
- Fibre Channel Switches
- Head Units

7.1.2. On the head unit, display the volume allocation:

```
[root@hostname ~]# df -h
```

Filesystem	Size	Used	Avail	Use%	Mounted on
/dev/sda5	4.9G	2.1G	2.6G	46%	/
/dev/sda6	2.0G	371M	1.5G	20%	/gui
/dev/sda4	7.7G	146M	7.2G	2%	/ds
/dev/sda2	68G	1.5G	63G	3%	/var
/dev/sda1	1.5M	13M	1.4G	1%	/boot
tmpfs	127G	168K	127G	1%	/dev/shm
/dev/sda3	6.2T	54M	5.9T	1%	/home

7.1.3. Notice that all of the space is allocated to the system drive. Perform auto discovery and display the results:

```
[root@hostname ~]# SMcli -A localhost
[root@hostname ~]# SMcli -d -v
```

7.1.4. You should see *all* of the storage arrays for the head unit and *only* the storage arrays for the head unit. The first column shows the array names that you assigned previously.

```
alpha0    <ip_address> <ip_address> <ip_address> <ip_address> <ip_address>
localhost.localdomain localhost6.localdomain6 Needs Attention

alpha1    <ip_address> <ip_address> <ip_address> <ip_address> <ip_address>
localhost.localdomain localhost6.localdomain6 Needs Attention
```

### IMPORTANT

If any of the head unit's storage arrays are missing from the display, or if you see storage arrays that do not belong to the head unit:

- Verify that the head unit is not connected to a management network.
- Verify that the storage arrays are not connected to a management network.
- If the storage arrays are directly connected to the head unit, recheck cable connectivity.
- Run [zoneShow](#) on the switches and correct the erroneous zone assignments.

7.1.5. Verify that all of the array components are operating properly:

```
[root@hostname ~]# SMcli -n <array_name> -c "show storageArray
healthStatus;"
```

**IMPORTANT** The output should be `Storage array health status = optimal`. If it is not, address the problems that were identified in the output before continuing.

If the hardware has not been configured correctly before you run the script, the results of the script will be erroneous. You may not be able to recover from the error except by contacting Security Analytics Support. [Review the warning on page 11 before continuing the procedure.](#)

7.1.6. After you have verified that all of the Fibre Channel cabling and switch zoning are correct, run the configuration script. Are you enabling disk encryption for the storage arrays?

Yes—Consult the security keys on page 16 and run this command with the `-p` and `-P` parameters to enable encryption:

```
configure_netapp.py -p <password> -P
<passphrase>
```

No—Run:

```
configure_netapp.py
```

If you choose to encrypt your disks later, you will overwrite any data that you may have captured. Running this script is a destructive process.

```
... <checks performed>
This will overwrite any existing configuration.
Continue (Y/N): y
... <settings applied>
StorageArray alpha0 successfully configured.
... <checks performed>
This will overwrite any existing configuration.
Continue (Y/N): y
... <settings applied>
StorageArray alpha1 successfully configured.
```

7.1.7. Reboot the appliance:

```
[root@hostname ~]# reboot
```

## 8. Verify the Installation

Each array should have been configured with six volumes and two hot spares as follows:

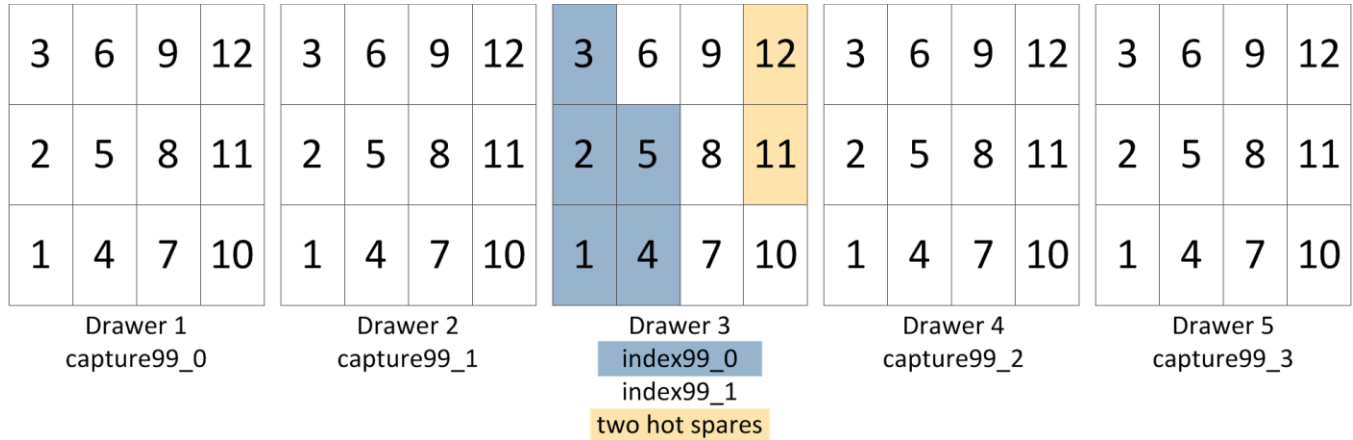


Figure 42: Volume configuration on each array.

Volume Name	Capacity	Drawer	Disks
capture99_0	59.979 TB	1	1-12
capture99_1	59.979 TB	2	1-12
capture99_2	59.979 TB	4	1-12
capture99_3	59.979 TB	5	1-12
index99_0	21.810 TB	3	1-5
index99_1	21.810 TB	3	6-10

8.1.1. On each array, verify that the script executed properly:

```
[root@hostname ~]# SMcli -n alpha0 -c 'show storageArray longRunningOperations;'
```

LOGICAL DEVICES	OPERATION	STATUS	TIME REMAINING
index99_0	Initialization	1% Completed	61 hr, 42 min
capture99_0	Initialization	1% Completed	61 hr, 53 min
capture99_2	Initialization	1% Completed	62 hr, 28 min
index99_1	Initialization	1% Completed	34 hr, 8 min
capture99_1	Initialization	1% Completed	61 hr, 34 min
capture99_3	Initialization	1% Completed	63 hr, 29 min

- IMPORTANT**
- All six volumes should be displayed, and all six should be initializing. If any of the volumes are missing, or if **STATUS** shows an error, contact Security Analytics Support.
  - The **TIME REMAINING** value will be unusually high for the first few minutes; later, the actual remaining time will be displayed.

## 9. Reallocate the Drive Space

9.1.1. On the head unit, verify that multipath is set up:

```
[root@hostname ~]# multipath -ll | more
```

```
[root@hostname ~]# multipath -ll
360080e5000432c18000027bf58b8960a dm-6 NETAPP,INF-01-00
size=22T features='3 queue_if_no_path pg_init_retries 50' hwhandler='1 rdac' wp=rw
|+- policy='round-robin 0' prio=4 status=active
| |- 11:0:0:10 sdc 8:32 active ready running
| `-- 13:0:0:10 sdq 65:0 active ready running
`-+- policy='round-robin 0' prio=0 status=enabled
| |- 12:0:0:10 sdj 8:144 active ghost running
| `-- 14:0:0:10 sdx 65:112 active ghost running
360080e50004376b80000258d58b899f6 dm-1 NETAPP,INF-01-00
size=22T features='3 queue_if_no_path pg_init_retries 50' hwhandler='1 rdac' wp=rw
|+- policy='round-robin 0' prio=4 status=active
| |- 12:0:0:11 sdk 8:160 active ready running
| `-- 14:0:0:11 sdy 65:128 active ready running
`-+- policy='round-robin 0' prio=0 status=enabled
| |- 11:0:0:11 sdd 8:48 active ghost running
| `-- 13:0:0:11 sdr 65:16 active ghost running
...
360080e50004376b80000259158b89a01 dm-9 NETAPP,INF-01-00
size=60T features='3 queue_if_no_path pg_init_retries 50' hwhandler='1 rdac' wp=rw
|+- policy='round-robin 0' prio=4 status=active
| |- 12:0:0:13 sdm 8:192 active ready running
| `-- 14:0:0:13 sdaa 65:160 active ready running
`-+- policy='round-robin 0' prio=0 status=enabled
| |- 11:0:0:13 sdf 8:80 active ghost running
| `-- 13:0:0:13 sdt 65:48 active ghost running
360080e5000432c18000027c358b8961b dm-11 NETAPP,INF-01-00
size=60T features='3 queue_if_no_path pg_init_retries 50' hwhandler='1 rdac' wp=rw
|+- policy='round-robin 0' prio=4 status=active
| |- 11:0:0:12 sde 8:64 active ready running
| `-- 13:0:0:12 sds 65:32 active ready running
`-+- policy='round-robin 0' prio=0 status=enabled
| |- 12:0:0:12 sdl 8:176 active ghost running
| `-- 14:0:0:12 sdz 65:144 active ghost running
```

Figure 43: A successful `multipathd` readout for two arrays shows twelve DM volumes and their respective SD volumes.

9.1.2. For each array you should see six DM volumes with their respective multipath SD volumes. These volume numbers are assigned by Security Analytics software: the actual DM- and SD-volume numbering for your setup may be different.

- Path States:
  - active | ready—Path is able to handle I/O requests.
  - shaky—Path is up but temporarily not available for normal operations.
  - faulty | failed—Path is unable to handle I/O requests.
  - ghost—Path is a passive path on an active/passive controller.

9.1.3. If your readout does not look similar to Figure 43, wait a few minutes, and then restart the multipath daemon:

```
[root@hostname ~]# service multipathd restart
```

---

**Note** After you restart the multipath daemon the volume numbers may change. This is expected behavior.

---

## 9.2. Record DM Volume Numbers

Make a note of which DM volumes are 22T and 60T:

Size	Head Unit $\alpha$	Head Unit $\beta$	Function
22T	dm-	dm-	Index
22T	dm-	dm-	Index
22T	dm-	dm-	Index
22T	dm-	dm-	Index
60T	dm-	dm-	Capture
60T	dm-	dm-	Capture
60T	dm-	dm-	Capture
60T	dm-	dm-	Capture
60T	dm-	dm-	Capture
60T	dm-	dm-	Capture
60T	dm-	dm-	Capture
60T	dm-	dm-	Capture



## 9.3. Define the Capture and Index Drives

9.3.1. Use one of the following methods to allocate the volumes among the capture and index drives:

- Insert the USB drive into the head unit, reboot, specify the USB drive as a one-time boot device, and then follow the instructions on the console to install (not upgrade) Security Analytics software. This method overwrites all settings, including the license and IP address. Upon installation the software automatically recognizes the capture and index drives.
- Manually define the drives, which does not overwrite settings. Consult the table on page 48 to see which DMs are capture drives and which are index.

Delete the default configuration files first, and then define the drives. Define the capture drive before defining the index drive:

```
[root@hostname ~]# rm -f etc/solera/config/capture-config
[root@hostname ~]# rm -f etc/solera/config/index-config
[root@hostname ~]# build-ds-capture dm-4 dm-5 dm-3 dm-2 dm-9 dm-10
dm-8 dm-11
[root@hostname ~]# build-ds-index -M dm-0 dm-1 dm-6 dm-7
[root@hostname ~]# reboot
```

9.3.2. After the head unit has rebooted, check the volume allocation:

```
[root@hostname ~]# df -h
```

Filesystem	Size	Used	Avail	Use%	Mounted on
/dev/sda5	4.9G	2.1G	2.5G	46%	/
/dev/sda6	2.0G	490M	1.4G	27%	/gui
/dev/sda4	7.7G	1.9G	5.5G	26%	/ds
/dev/sda2	68G	4.8G	60G	8%	/var
/dev/sda1	1.5G	60M	1.4G	5%	/boot
tmpfs	127G	78M	127G	1%	/dev/shm
/dev/mapper/360080e5000432c180000335a58d15f0bp1	480T	480T	0	100%	/pfs
/dev/mapper/360080e5000432c180000335658d15efbp1	11T	472G	9.9T	5%	/var/lib/solera/meta1
/dev/mapper/360080e50004376b80000318158d1631cp1	11T	482G	9.9T	5%	/var/lib/solera/meta2
/dev/mapper/360080e500029f9ac0000572c58bef84bp1	11T	527G	9.9T	5%	/var/lib/solera/meta3
/dev/mapper/360080e500029f540000061cd58bee8aep1	11T	476G	9.9T	5%	/var/lib/solera/meta4
/dev/mapper/360080e5000432c180000335658d15efbp2	11T	486G	9.9T	5%	/var/lib/solera/meta5
/dev/mapper/360080e50004376b80000318158d1631cp2	11T	470G	9.9T	5%	/var/lib/solera/meta6
/dev/mapper/360080e500029f9ac0000572c58bef84bp2	11T	476G	9.9T	5%	/var/lib/solera/meta7
/dev/mapper/360080e500029f540000061cd58bee8aep2	11T	490G	9.9T	5%	/var/lib/solera/meta8
/dev/sda3	6.2T	3.4G	5.9T	1%	/home
gaugefs	480T	480T	0	100%	/etc/solera/flows

9.3.3. The capture (/pfs) drive is now present, with the index drive divided among eight volumes—four per storage array.

## 10. Next Steps

Open the web UI and select Settings > Help > *[language]* to access the Help Files. For further assistance with your system, consult:

- Security Analytics Support: [support.symantec.com/en\\_US/contact-support.html](https://support.symantec.com/en_US/contact-support.html)
- Security Analytics Documentation: [support.symantec.com/content/unifiedweb/en\\_US/Documentation.html?prodRefKey=1145515](https://support.symantec.com/content/unifiedweb/en_US/Documentation.html?prodRefKey=1145515)

### 10.1. Optional—Install and Deploy SANtricity

You may want to use the SANtricity management utility to maintain your storage arrays.

10.1.1. Log in to [support.symantec.com](https://support.symantec.com).

10.1.2. Select Downloads > Network Protection (Blue Coat) Downloads.

10.1.3. In the *My Products* list, click Security Analytics.

10.1.4. In the *Product Lines* list, click SANtricity for Security Analytics 7.2.3+.

10.1.5. Under *Description*, click SA\_SANtricity to download the software.

10.1.6. Install SANtricity on a management workstation (Linux or Windows). For installation and operation instructions, go to <http://mysupport.netapp.com/documentation/productlibrary/index.html?productID=61197>.

10.1.7. Connect the storage array Ethernet ports A1 and B1 to the management network.

10.1.8. Follow the instructions in the SANtricity documentation to discover the arrays and configure their IP addresses.

## 10.2. Optional—Change the Storage-Array Hostnames

For ease of management and support, the storage-array hostnames should be related to the head unit hostname in such a way that future administrators and support staff can easily identify the relationships. For example, if storage arrays `alpha0`, `alpha1`, and `alpha2` are connected to head unit `237west88`, the relationship between the devices is not readily evident in the names.

Symantec recommends that you change the storage array hostnames to include the head unit's hostname and part of the storage array's WWN.

10.2.1. Run auto discovery, display the results, and then rename the storage arrays:

```
[root@hostname ~]# SMcli -A localhost
[root@hostname ~]# SMcli -d -w
```

```
alpha0  60080a50004a73b80000000055c8175c  <ip_address>  <ip_address>  <ip_address>
<ip_address>  localhost.localdomain  localhost6.localdomain6
alpha1  60080a50004a22c30000000092ab1a3d  <ip_address>  <ip_address>  <ip_address>
<ip_address>  localhost.localdomain  localhost6.localdomain6
alpha2  60080a50004a0a5f00000000d1ee8231  <ip_address>  <ip_address>  <ip_address>
<ip_address>  localhost.localdomain  localhost6.localdomain6
```

```
[root@hostname ~]# SMcli -n alpha0 -c 'set storageArray
userLabel="237west88_4a73b8";'
[root@hostname ~]# SMcli -n alpha1 -c 'set storageArray
userLabel="237west88_4a22c3";'
[root@hostname ~]# SMcli -n alpha2 -c 'set storageArray
userLabel="237west88_4a0a5f";'
```

10.2.2. Display the discovery database again:

```
[root@hostname ~]# SMcli -d -w
```

10.2.3. If you still see entries under the previous names, delete them from the discovery file, and then run discovery again to verify:

```
[root@hostname ~]# SMcli -X -n <name to delete>
[root@hostname ~]# SMcli -A localhost
[root@hostname ~]# SMcli -d -w
```

## Appendix A: Troubleshooting Tools

Use the following tools to aid in troubleshooting the setup.

### Storage Array Commands

**SMcli -A localhost**

Performs auto discovery of local NetApp storage arrays.

**SMcli -d [-v -w]**

Displays the contents of the discovery database. Use **-v** to show the storage array status and **-w** to show the WWN.

**SMcli -X -n <name>**

Deletes an entry from the discovery database.

**SMcli -n <array\_name> -c 'set storageArray userLabel="<new\_name>";'**

Changes the name of the storage array.

**SMcli -n <array\_name> -c 'show storageArray longRunningOperations;'**

Displays disk-initialization progress.

```
LOGICAL DEVICES OPERATION STATUS TIME REMAINING
index99_0 Initialization 1% Completed 21 hr, 12 min
capture99_0 Initialization 1% Completed 21 hr, 33 min
capture99_2 Initialization 1% Completed 22 hr, 58 min
...
```

**SMcli -n <array\_name> -c 'show allDrives summary;'**

Displays the status of each hard drive in all drawers.

```
TRAY, DRAWER, SLOT STATUS CAPACITY MEDIA TYPE INTERFACE TYPE CURRENT DATA RATE
99, 1, 1 Optimal 5,589.029 GB Hard Disk Drive SAS 6 Gbps
99, 1, 2 Optimal 5,589.029 GB Hard Disk Drive SAS 6 Gbps
99, 1, 3 Optimal 5,589.029 GB Hard Disk Drive SAS 6 Gbps
99, 1, 4 Optimal 5,589.029 GB Hard Disk Drive SAS 6 Gbps
99, 1, 5 Optimal 5,589.029 GB Hard Disk Drive SAS 6 Gbps
...
99, 5, 7 Optimal 5,589.029 GB Hard Disk Drive SAS 6 Gbps
99, 5, 8 Optimal 5,589.029 GB Hard Disk Drive SAS 6 Gbps
99, 5, 9 Optimal 5,589.029 GB Hard Disk Drive SAS 6 Gbps
99, 5, 10 Optimal 5,589.029 GB Hard Disk Drive SAS 6 Gbps
99, 5, 11 Optimal 5,589.029 GB Hard Disk Drive SAS 6 Gbps
99, 5, 12 Optimal 5,589.029 GB Hard Disk Drive SAS 6 Gbps
```

```
SMcli -n <array_name> -c 'show storageArray healthStatus;'
```

Displays the health of the enclosure.

```
The following failures have been found:
Volume(s) Not On Preferred Path
Storage array: <array_name>
Preferred owner: Controller in slot A
Current owner: Controller in slot B
Affected volume group: capture99_0
  Volume(s): capture99_0
Affected volume group: capture99_2
  Volume(s): capture99_2
Affected volume group: index99_0
  Volume(s): index99_0
Power-Fan Canister - No Power Input
Component reporting problem: Power supply canister (Top)
  Status: No power input
  Location: Controller/Drive tray 99
Component requiring service: Power supply canister (Top)
  Service action (removal) allowed: No
  Service action LED on component: Yes
  Subcomponent affected: Power supply (99)
```

```
SMcli -n <array_name> -c 'show controller {[a] | [b]}';'
```

Displays all controller and port information for Controller A or Controller B, including detailed information on the HIC ports.

Controller in Tray 99, Slot A

```
Status:                               Online

Current configuration
  Firmware version:                     08.30.01.00
  Appware version:                       08.30.01.00
  Bootware version:                      08.30.01.00
  NVSRAM version:                        N5600-830834-D01
Pending configuration
  Firmware version:                       None
  Appware version:                         None
  Bootware version:                       None
  NVSRAM version:                         None
  Transferred on:                         None
Model name:                              5600
Board ID:                                  5600
Manufacturer Submodel ID:                 244
Product ID:                               INF-01-00
Revision:                                  0830
Replacement part number:                  E-X561202A-R6
Part number:                              111-02820
Serial number:                            SV51111323
Vendor:                                    NETAPP
Date of manufacture:                      2/28/15
Trunking supported:                       No

Data Cache
  Total present:                          10240 MB
  Total used:                              8192 MB
Data Cache Module
  Status:                                  Optimal
  Location:                                Controller A, Slot 1
  Capacity:                                4,096 MB
  Replacement Part number:                 Not Available
  Manufacturer Part Number:                SG572128LSI28EP2SQ
  Part Number:                             Not Available
  Serial number:                           112001221
  Manufacturer:                            Smart Modular
  Date of manufacture:                     12/2/15
  Shared:                                   Yes
  Revision Code:                           0x00 0x11
```

...

```
SMcli -n <array_name> -c 'show allDrives;'
```

Displays the same information as [show allDrives summary](#) as well as details on each disk.

```

DETAILS
Drive at Tray 99, Drawer 1, Slot 1

Status:                Optimal

Mode:                  Assigned
Raw capacity:          5,589.029 GB
Usable capacity:       5,583.529 GB
World-wide identifier: 50:00:c5:00:84:f9:f7:1f:00:00:00:00:00:00:00:00
Associated volume group: capture99_0

Port      Channel
0         4, 5
1         3

Media type:            Hard Disk Drive
Interface type:       Serial Attached SCSI (SAS)
Drive path redundancy: OK

Drive capabilities:   Data Assurance (DA), FIPS Compliant

Security capable:     Yes, FIPS Compliant (FIPS 140 - 2)
Secure:              No
Read/write accessible: Yes
Drive security key identifier: None

Data Assurance (DA) capable: Yes

Speed:                7,200 RPM
Current data rate:    6 Gbps
Logical sector size:  512 bytes
Physical sector size: 4096 bytes
Product ID:          ST6000NM0104
Drive firmware version: NE03
Serial number:       Z4D3RFX0000R6264PFV
Manufacturer:        SEAGATE
Date of manufacture: February 5, 2016
    
```



SMcli -n <array\_name> -c 'show volumeGroup [<volume\_name>];'

Use the volume names from *Step 8: Verify the Installation* on page 46.

```

Name:                index99_0

Status:              Optimal
Capacity:            21.810 TB
Current owner:       Controller in slot A

Quality of Service (QoS) Attributes

RAID level:          5
Drive media type:    Hard Disk Drive
Drive interface type: Serial Attached SCSI (SAS)
Tray loss protection: No
Drawer Loss Protection: No
Data Assurance (DA) capable: Yes
DA enabled volume present: Yes

Total Volumes:      1
Standard volumes:   1
Repository volumes: 0
Free Capacity:      0.000 MB

Associated drives - present (in piece order)
Total drives present: 5
All FIPS compliant drives: Yes

Tray   Drawer  Slot
99     3         1
99     3         2
99     3         3
99     3         4
99     3         5
    
```

## Head Unit Commands

```
ls /sys/class/fc_host
```

Displays the host numbers for the HBA ports on the head unit.

```
cat /sys/class/fc_host/host1[x-N]/port_state
```

Displays the status of all HBA ports on the head unit. [Online](#) means that the port has an active Fibre Channel connection.

```
cat /sys/class/fc_host/host1[x-N]/speed
```

Displays the maximum supported speed for all HBA ports. Only [16 Gbit](#) is supported.

```
configure_netapp.py --?
```

Displays available options for the script.

`fdisk -l /dev/dm*`

Lists file-system partitions.

```
[root@DSAEBB ~]# fdisk -l /dev/dm*

Disk /dev/dm-0: 23981.0 GB, 23981075726336 bytes
255 heads, 63 sectors/track, 2915533 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes
Disk identifier: 0x00000000

Disk /dev/dm-0 doesn't contain a valid partition table

Disk /dev/dm-10: 65947.9 GB, 65947958247424 bytes
255 heads, 63 sectors/track, 8017715 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes
Disk identifier: 0x00000000

Disk /dev/dm-10 doesn't contain a valid partition table

Disk /dev/dm-11: 65947.9 GB, 65947958247424 bytes
255 heads, 63 sectors/track, 8017715 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes
Disk identifier: 0x00000000

Disk /dev/dm-11 doesn't contain a valid partition table
```

`lsmod`

Lists currently loaded modules. If the `lpfc` entries are not present, it might indicate that the wrong Fibre Channel HBA card is installed.

```
[root@DSAEBB ~]# lsmod
Module              Size  Used by
hwmon_vid           3044  0
tun                  18511  0
autofs4              27949  2
...
dm_region_hash      6739  1 dm_mirror
dm_log               8240  2 dm_mirror,dm_region_hash
dm_round_robin       2148  12
scsi_dh_rdac         7105  28
dm_multipath         16506  7 dm_round_robin
scsi_dh               4978  2 scsi_dh_rdac,dm_multipath
joydev               8949  0
lpfc                 620592  50
mperf                1083  0
scsi_transport_fc    43890  1 lpfc
crc_t10dif           1244  1 lpfc
microcode            11788  0
```

## Appendix B: Switch Zone Worksheet

Use this worksheet if you will be connecting head units to storage arrays through Fibre Channel switches. For each head unit, print one copy of this table (two pages). The table supports up to five storage arrays per head unit.

		Head Unit ____ Hostname _____	
Switch	Zone, Alias	Designator	Host Port Identifier (WWN)
Y	00__ 00_____	hba-__00	: : : : : : :
		hic__0-A1	: : : : : : :
		hic__0-B1	: : : : : : :
		hic__1-A1	: : : : : : :
		hic__1-B1	: : : : : : :
		hic__2-A1	: : : : : : :
		hic__2-B1	: : : : : : :
		hic__3-A1	: : : : : : :
		hic__3-B1	: : : : : : :
		hic__4-A1	: : : : : : :
		hic__4-B1	: : : : : : :
		Z	01__ 01_____
hic__0-A2	: : : : : : :		
hic__0-B2	: : : : : : :		
hic__1-A2	: : : : : : :		
hic__1-B2	: : : : : : :		
hic__2-A2	: : : : : : :		
hic__2-B2	: : : : : : :		
hic__3-A2	: : : : : : :		
hic__3-B2	: : : : : : :		
hic__4-A2	: : : : : : :		
hic__4-B2	: : : : : : :		

Head Unit ____ Hostname _____			
Switch	Zone, Alias	Designator	Host Port Identifier (WWN)
Y	10__ 10_____	hba-__10	: : : : : : :
		hic__0-A3	: : : : : : :
		hic__0-B3	: : : : : : :
		hic__1-A3	: : : : : : :
		hic__1-B3	: : : : : : :
		hic__2-A3	: : : : : : :
		hic__2-B3	: : : : : : :
		hic__3-A3	: : : : : : :
		hic__3-B3	: : : : : : :
		hic__4-A3	: : : : : : :
		hic__4-B3	: : : : : : :
		Z	11__ 11_____
hic__0-A4	: : : : : : :		
hic__0-B4	: : : : : : :		
hic__1-A4	: : : : : : :		
hic__1-B4	: : : : : : :		
hic__2-A4	: : : : : : :		
hic__2-B4	: : : : : : :		
hic__3-A4	: : : : : : :		
hic__3-B4	: : : : : : :		
hic__4-A4	: : : : : : :		
hic__4-B4	: : : : : : :		