

# 6540 Controller Tray

## Initial Setup Guide

EC1787-1-E1, First Edition



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## **Document Description**

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# Step 1 – Preparing for an Installation

Use this guide to install the 6540 control module. Refer to the Initial Setup Guide for your drive modules for instructions on installing them.

Navigation Aid	
<a href="#">“Key Terms”</a>	<a href="#">page 1</a>
<a href="#">“Gathering Items”</a>	<a href="#">page 2</a>
<a href="#">“Things to Know – Taking a Quick Glance at the Hardware”</a>	<a href="#">page 6</a>

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**CAUTION** **Electrostatic discharge can damage sensitive components** – Touching the module or its components without using a proper ground might damage the equipment. To avoid damage, use proper antistatic protection when handling any components.

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## Key Terms

**Storage System** – A control module and one or more connected drive modules. A storage system includes physical components (such as drives, controllers, fans, and power supplies) and logical components (such as volume groups and volumes).

## Gathering Items

Use [Table 1](#) to verify that you have all the necessary items to install the control module.

Table 1 Necessary Items (1 of 3)

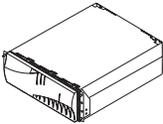
	Item	Included with Control Module
<b>Basic Hardware</b>		
	Support rails and screws	✓
	Fibre Channel switch (optional)	
	Host with Fibre Channel host bus adapters (HBAs)	

Table 1 Necessary Items (2 of 3)

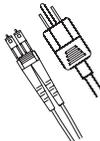
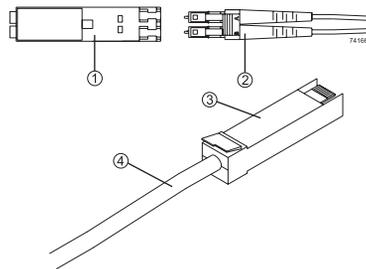
	Item	Included with Control Module
<b>Cables and Connectors</b>		
	<p>Power cords</p> <p>The power cables shipped with the control module are for connection to an external power source (wall plug). Your cabinet might have special power cables that you use instead of the cables shipped with the control module.</p>	✓
	<p>Fiber-optic cables (For connections to the host and within the storage system)</p> <ul style="list-style-type: none"> <li>You must purchase these cables separately.</li> <li>Fiber-optic cables require separate SFP transceivers.</li> </ul>	Fiber-optic versus copper cables (See <a href="#">Figure 1 on page 5</a> )
	<p>Small Form-factor Pluggable (SFP) transceivers</p> <ul style="list-style-type: none"> <li>Provide the connection for fiber-optic cables.</li> <li>Eight are included with control module Four are installed in the host channel ports on each controller.</li> <li>Depending on your connection requirements, you might need to purchase additional SFP transceivers (two per cable).</li> </ul>	✓
	<p>Copper cables (For connections within the storage system)</p> <p>Copper cables do not require separate SFP transceivers. The SFP transceivers are integrated into the cables themselves.</p>	Fiber-optic versus copper cables (See <a href="#">Figure 1 on page 5</a> )
	<p>Ethernet cable</p> <p>Enables out-of-band storage system management. See <a href="#">“Step 2 – Deciding on the Management Method” on page 7.</a></p>	
	<p>Serial cable</p> <p>This cable is used for support only. You do not need to connect it during initial installation.</p>	

Table 1 Necessary Items (3 of 3)

	Item	Included with Control Module
<b>CDs</b>		
	<p>Two CDs</p> <ul style="list-style-type: none"> <li>• Firmware                             <ul style="list-style-type: none"> <li>• Firmware is already installed on controllers</li> <li>• CD files are backup copies</li> </ul> </li> <li>• Software and documentation                             <ul style="list-style-type: none"> <li>• SANtricity Storage Manager software and documentation</li> <li>• To access product documentation, use the documentation map file, doc_launcher.html, located in the “docs” directory.</li> </ul> </li> </ul>	✓
<b>Tools</b>		
	<p>Labels</p> <p>Helps you identify cable connections and allows you to more easily trace cables from one module to another</p>	
	<p>Cart</p> <p>To hold the control module and its components</p>	
	Phillips screwdriver	
	Flat-blade screwdriver	

Use the compatibility matrix to obtain the latest hardware compatibility information and firmware and software requirements.

<http://www.engenio.com/default.aspx?pageId=46>



- Fiber-Optic Connection**
- 1.** Active SFP Transceiver  
(Separate from cable)
  - 2.** Fiber-optic Cable
- Copper Connection**
- 3.** Passive SFP Transceiver  
(Integrated with cable)
  - 4.** Copper Cable

Figure 1 Fiber-optic and Copper Cable with SFP Transceiver

## Things to Know – Taking a Quick Glance at the Hardware

- The top controller, controller A, is inverted from the bottom controller, controller B.
- The top of the control module is the side with labels.

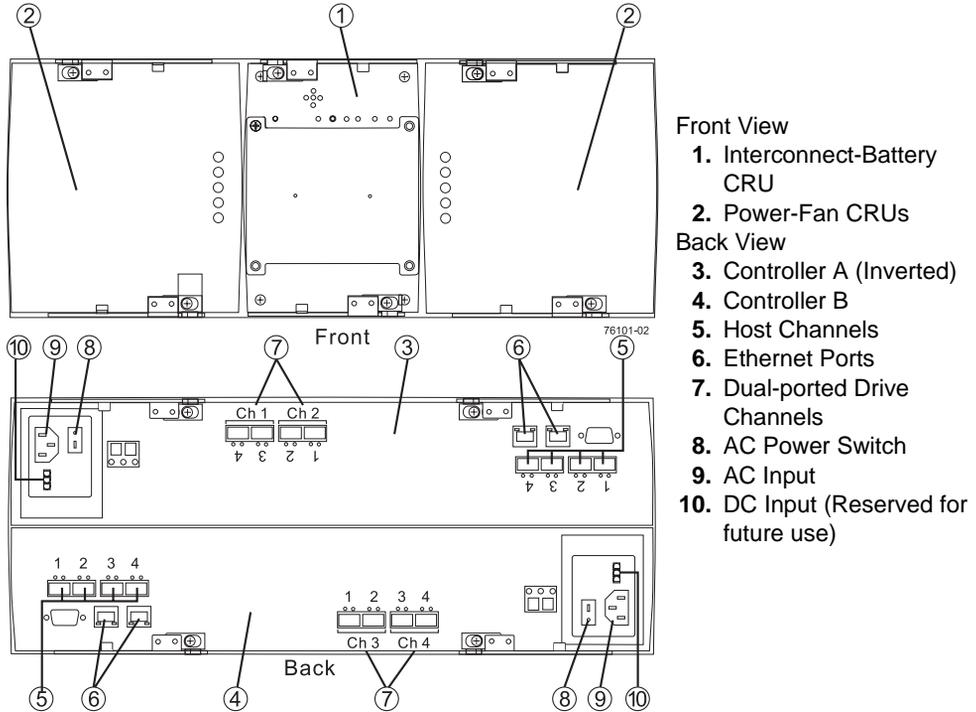


Figure 2 Front View and Back View

## Step 2 – Deciding on the Management Method

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**IMPORTANT** You can manage a storage system using the in-band method, the out-of-band method, or both. You need to know the management method you plan to use before you install the software, connect cables, and use the management software.

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### Key Terms

**In-band Management** – A method in which the controllers are managed from a management station through a host using the I/O connections between the host and the controllers. See [Figure 3 on page 9](#).

**Access Volume** – A special volume used and automatically created by the host-agent software to communicate management requests and event information to or from the management station and storage system (in-band management method).

**Out-of Band Management** – A method in which the controllers are managed directly from a management station through the Ethernet connections on each controller. See [Figure 4 on page 10](#).

**Dynamic Host Configuration Protocol (DHCP) Server** – Software that runs on a server (host) that allows network administrators to manage and automatically assign internet protocol (IP) addresses from a central point. When the controllers start up TCP/IP operations, they broadcast a request for address information. The DHCP server receives the request, assigns an IP address for each controller, and sends the address information back to the controllers along with other required configuration information.

## Steps to Decide – Management Method

- 1 Use the key terms, Figures 3 and 4, and Table 2 on pages 9 through 11 to determine the management method you will use.
- 2 After reading the information in this section, check the management method you will use.

- In-band management method
- Out-of-band management method
- In-band and out-of-band management methods

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**IMPORTANT** If you use the out-of-band management method but do not have a DHCP server, you must manually configure your controllers. See [“Things to Know – Overview of Manually Configuring Your Controllers”](#) on page 12 for details.

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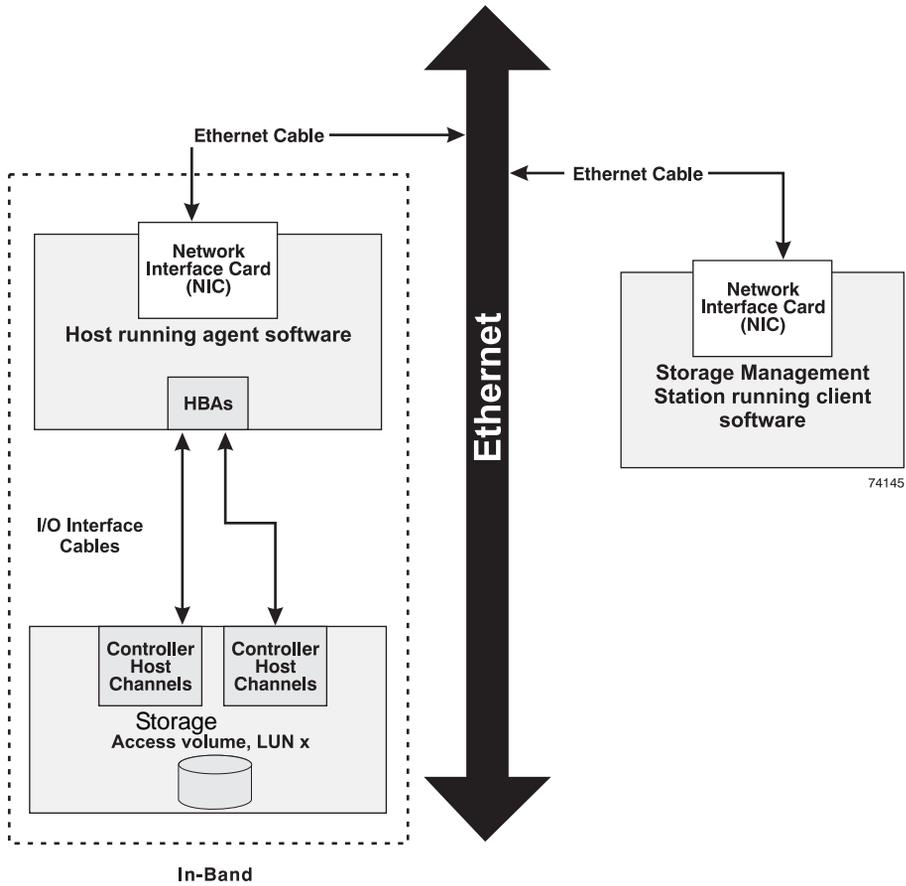


Figure 3 In-Band Management Topology

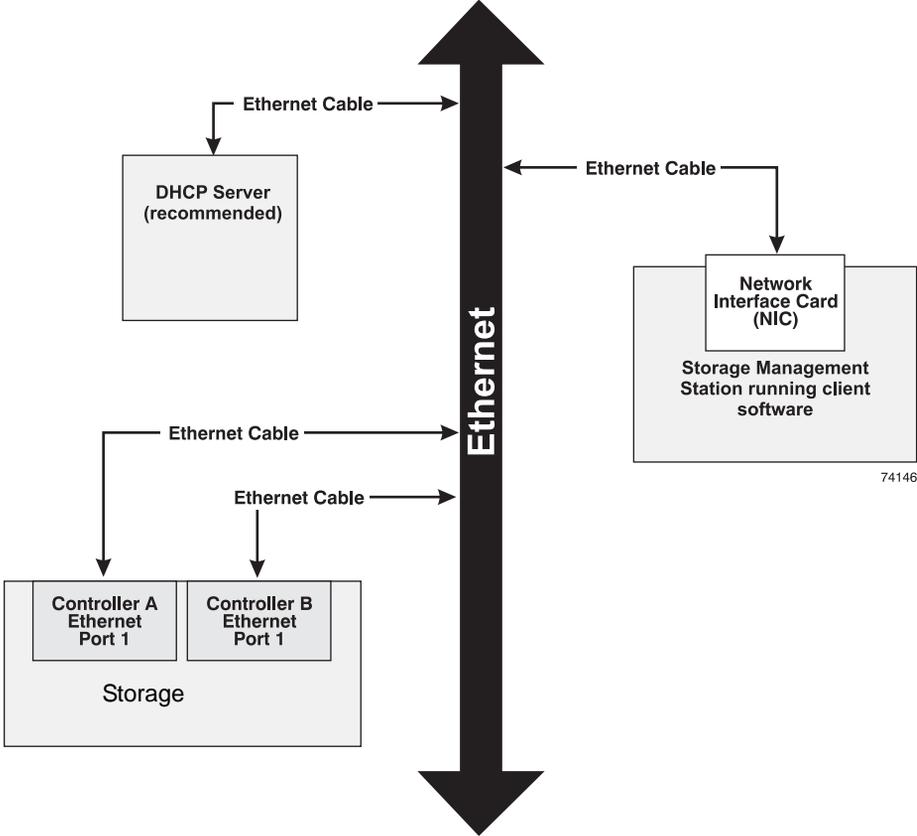


Figure 4 Out-of-Band Management Topology

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**IMPORTANT** If you use the out-of-band management method but do not have a DHCP server, you must manually configure your controllers. See [“Things to Know – Overview of Manually Configuring Your Controllers”](#) on page 12 for details.

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Table 2 In-Band and Out-of-Band Requirements (1 of 2)

<b>Management Method</b>	<b>Requirements</b>	<b>Advantages</b>	<b>Disadvantages</b>
Out-of-Band <i>without</i> a DHCP Server	<ul style="list-style-type: none"> <li>• Connect separate Ethernet cables to each controller.</li> <li>• Manually configure the network settings on the controllers. See the next section, <a href="#">“Things to Know – Overview of Manually Configuring Your Controllers”</a> on page 12, for details.</li> </ul>	Does not use a logical unit number (LUN) on the host.	<ul style="list-style-type: none"> <li>• You must manually configure the network settings on the controllers.</li> <li>• Ethernet cables are needed.</li> </ul>
Out-of-Band <i>with</i> a DHCP Server	<ul style="list-style-type: none"> <li>• Connect separate Ethernet cables to each controller.</li> <li>• Assign either static or dynamic IP addresses to the controllers. It is recommended that you assign static IP addresses.</li> <li>• Check your DHCP server for the IP addresses associated with the Media Access Control (MAC) addresses of the controllers. The MAC address appears on a label on each controller in the form x.xx.xx.xx.xx.xx.</li> </ul> 	<ul style="list-style-type: none"> <li>• No additional manual network configuration is required on the controllers.</li> <li>• By default, the controllers will automatically obtain their IP addresses from the DHCP server after you turn on the control module.</li> <li>• You do not have to install host-agent software.</li> <li>• Does not use a logical unit number (LUN) on the host.</li> </ul>	Ethernet cables are needed.

Table 2 In-Band and Out-of-Band Requirements (2 of 2)

Management Method	Requirements	Advantages	Disadvantages
In-Band	<ul style="list-style-type: none"> <li>• Install host-agent software on at least one of the network-attached hosts. The host-agent software is included with the storage management software.</li> <li>• Requires a special Access volume to communicate. This volume is automatically created.</li> </ul>	<ul style="list-style-type: none"> <li>• No additional manual network configuration is required on the controllers.</li> <li>• No Ethernet cables are needed to connect to the controllers.</li> </ul>	<ul style="list-style-type: none"> <li>• Uses a logical unit number (LUN) on the host.</li> </ul>

## Things to Know – Overview of Manually Configuring Your Controllers

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**IMPORTANT** You need to manually configure your controllers only if you want to use the out-of-band management method *and* you do not have a DHCP server to automatically assign IP addresses for the controllers. If you are using the out-of-band method with a DHCP server or if you are using the in-band method, skip this section and go to [“Step 3 – Installing the Control Module” on page 15.](#)

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If you are going to use the out-of-band method and you do not have a DHCP server, you have two options for manually configuring your controllers:

### **Option 1 – Use the In-Band Management Method Initially (Recommended)**

This option requires that you install the host-agent software on one of the hosts attached to the storage system and then use the in-band method to initially discover the storage system and to manually configure the controllers.

- 1 Complete the steps in the order shown in this Initial Setup Guide.
- 2 Make sure you install the host-agent software in [“Step 7 – Installing the SANtricity Storage Manager Software”](#) on page 51.
- 3 Use the procedure in [“Step 14 – Manually Configuring the Controllers”](#) on page 90.

### **Option 2 – Set Up a Private Network**

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**IMPORTANT** This option is recommended only if the host-agent software is not supported on the host where you need to use the in-band method.

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This option requires you to install the storage management software on a management station (including a laptop) and then to set up a private network to initially discover the storage system and manually configure the controllers.

You either can connect your management station directly into Ethernet port 1 on each controller or use a hub (no Ethernet switches or routers are allowed).

---

**IMPORTANT** If you connect the management station directly to the Ethernet ports on the control module, you must use an Ethernet cross-over cable. This special cable reverses the pin contacts between the two ends of the cable.

---

- 1 Change the IP address on the TCP/IP port on the management station from an automatic assignment to a manual assignment using the default IP address sub-net of the controllers.
  - You must set the IP address for the management station to something other than the controller IP addresses (for example, 192.168.128.100). The default IP addresses for Ethernet port 1 on controller A and controller B are 192.168.128.101 and 192.168.128.102, respectively.
  - Change the sub-net mask to 255.255.255.0, the default.
  - Refer to your operating system documentation for instructions on how to change the network settings on the management station and how to verify that the address has changed.
  - Make note of whether the management station’s IP address is currently obtained automatically or manually. If it is set manually, record the current IP address so that you can revert back to it after you have completed the procedure.
  
- 2 After you have configured your management station, complete the tasks in the order shown in this Initial Setup Guide along with the following considerations.
  - Make sure you connect the Ethernet cables to your management station or hub when instructed to do so in [“Step 6 – Connecting Other Cables” on page 49](#).
  - Use the procedure in [“Step 14 – Manually Configuring the Controllers” on page 90](#).
  - When you have completed [“Step 14 – Manually Configuring the Controllers,”](#) do the following:
    - Disconnect the Ethernet cable from your management station and reconnect the Ethernet cables from the controllers into your regular network.
    - Complete the steps necessary to change the management station’s IP address back to what it was originally.

## Step 3 – Installing the Control Module

Navigation Aid	
<a href="#">“Things to Know – General”</a>	<a href="#">page 15</a>
<a href="#">“Things to Know – Installation Order”</a>	<a href="#">page 15</a>
<a href="#">“For Additional Information”</a>	<a href="#">page 16</a>
<a href="#">“Steps to Install – Control Module”</a>	<a href="#">page 17</a>

### Things to Know – General

- There are no special site preparation requirements for this control module beyond what is normally found in a computer lab environment.
- The power supplies meet standard voltage requirements for both domestic and worldwide operation.

### Things to Know – Installation Order

As you populate the cabinet with modules, begin by placing the control module in the lower portion of the cabinet while still allowing room for drive modules below it ([Figure 5 on page 16](#)).

- Place the first drive module below the control module to keep the weight on the bottom half of the cabinet.
- Place the second drive module above the control module.
- Place the third drive module below the first drive module you added.
- Keep adding drive modules in this manner to keep the them evenly distributed around the control module and to keep the majority of the weight on the bottom half of the cabinet.

Step 3 – Installing the Control Module. . . . .

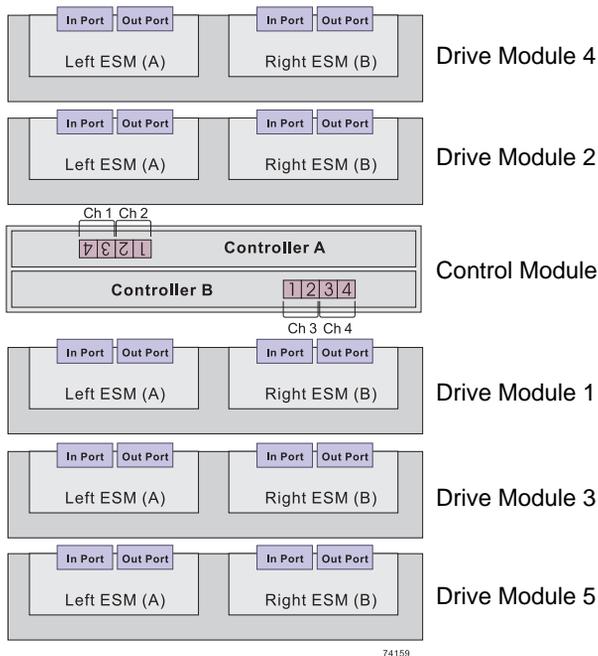


Figure 5 Distribution of the Control Module and Drive Module in the Cabinet

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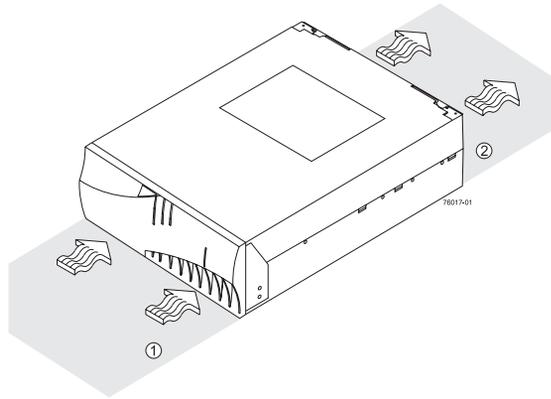
**IMPORTANT** Make sure that the combined power requirements of your modules do not exceed the power capacity of your cabinet.

---

## For Additional Information

Refer to the following documents on the Software and Documentation CD.  
*Storage System Site Preparation Guide*  
*72-Inch Cabinet Installation Guide*

## Steps to Install – Control Module



1. 76-cm (30-in) clearance in front of the cabinet
2. 61-cm (24-in) clearance behind the cabinet

Figure 6 Control Module Airflow and Clearance Requirements



---

### **WARNING** (W09) Risk of bodily injury –



>35 kg (70.5 lbs)

Three persons are required to safely lift the component.

---

- 1 Verify that your cabinet is in the final location. Make sure you meet the clearance requirements (Figure 6).
- 2 Lower the feet on the cabinet to keep it from moving.
- 3 Attach the support rails to the cabinet. For more information, refer to the installation instructions included with your support rails.
  - If you are installing the support rails above an existing module, position the rails directly above the module.

Step 3 – Installing the Control Module. . . . .

- If you are installing the support rails below an existing module, allow 17.8-cm (7.0-in.) clearance for a control module

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**NOTE** The back of the control module contains two controllers. The top of the command module is the side with the labels.

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- 4 With the help of two other people, slide the back of the control module onto the support rails, and make sure that the top mounting holes on the command module align with the support rail holes (Figure 7).

The back of the command module slides into the slots on the rails.

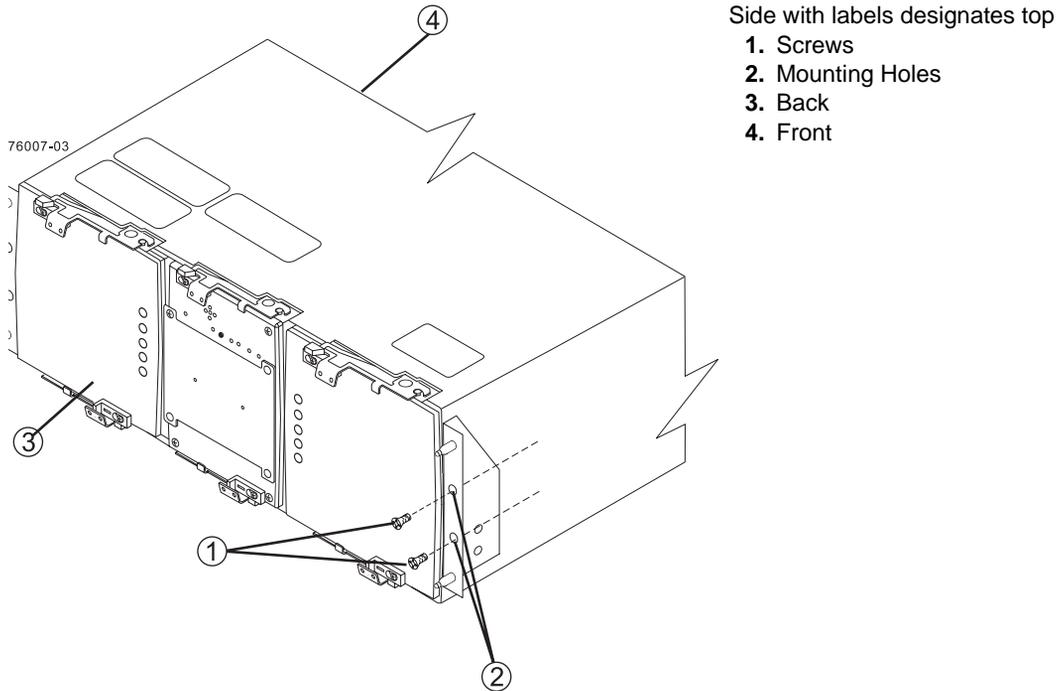


Figure 7 Securing the Control Module to the Cabinet

- 5 Secure screws in the top and bottom mounting holes on each side of the module.
- 6 Place the bezel on the front of the control module.

- 7** If you have not done so already, use [Figure 2 on page 6](#) to review the front and the back of the control module.
- 8** Install the drive modules. (Refer to the applicable drive module Initial Setup Guide.)

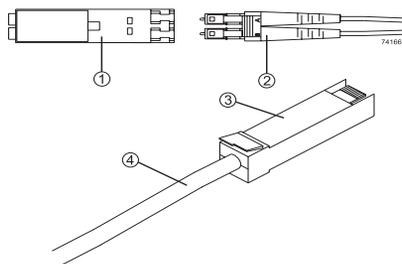
## Step 4 – Connecting the Control Module to Hosts

### Key Terms

**Fabric (Switched) and Direct Topologies** – Topologies that use a switch are called fabric topologies; topologies that do not use a switch are called direct topologies.

**Host Channels** – The paths for the transfer of data between the HBAs in a host and the controllers in the storage system.

**SFP (Small Form-Factor Pluggable) Transceiver** – A module that provides data transfer on the host and drive cables.



#### Fiber-Optic Connection

1. Active SFP Transceiver (Separate from the cable)
2. Fiber-optic Cable

#### Copper Connection

3. Passive SFP Transceiver (Integrated with the cable)
4. Copper cable

Figure 8 Fiber-optic Cable and Copper Cable with SFP Transceiver

## Things to Know

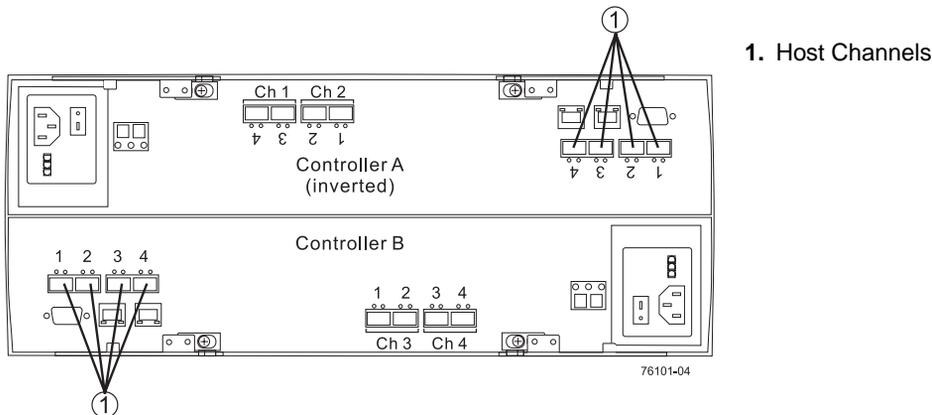


Figure 9 Host Channel Ports on Controllers (Back of Control Module)




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**WARNING (W03) Risk of exposure to laser radiation** – Do not disassemble or remove any part of a Small Form-factor Pluggable (SFP) transceiver because you might be exposed to laser radiation.

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**CAUTION Electrostatic discharge can damage sensitive components** – Touching the control module or its components without using a proper ground might damage the equipment. To avoid damage, use proper antistatic protection when handling any components.

---

- For maximum hardware redundancy, you must install a minimum of two HBAs in each host. Dual-ported HBAs give you two paths into the storage system but do not ensure redundancy if the entire host bus adapter fails.
- Each controller has four host channels.
- Controller A is inverted from controller B, meaning that its host channels are up-side down.
- It is best to start with the first host channel of each controller.

## Steps to Connect – Host Cables

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**NOTE** Start with controller A, and refer to Figures 10 through 12 on pages 23 and 24.

---

- 1 If there is a black, plastic plug in the host channel, remove it.
- 2 Make sure there is an SFP transceiver inserted into the host channel.
- 3 Plug one end of the fiber-optic cable into the SFP transceiver in the host channel.
- 4 Plug the other end of the fiber-optic cable into one of the HBAs in the host (direct topology) or into a switch (fabric topology).
- 5 Affix a label to each end of the cable using the recommended scheme below. A label is very important if you need to disconnect cables to service a controller:
  - Host name and HBA port (if direct topology)
  - Switch name and port (if fabric topology)
  - Controller ID (for example, Controller A)
  - Host channel ID (for example, Host channel 1)

**Example label abbreviation:** Assume that a cable is connected between port 1 in HBA 1 of a host named Engineering and host channel 1 of controller A. A label abbreviation could be as follows:

`Heng-HBA1/P1, CtA-Hch1`

- 6 Repeat these steps for each controller and host channel that you intend to use.

---

**NOTE** If you do not use a host channel, remove the SFP transceiver. You can use this SFP transceiver in a drive channel port or in an ESM on the drive module.

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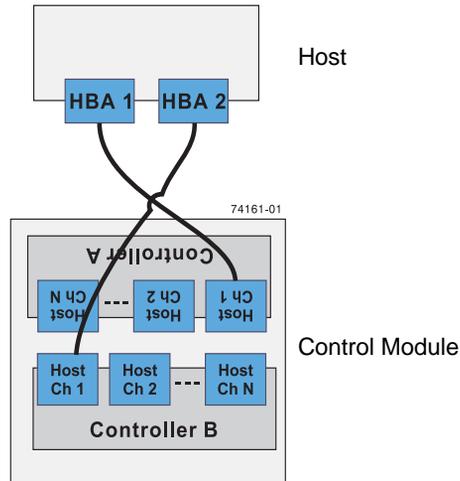


Figure 10 Direct Topology – One Host and a Dual-Controller Control Module

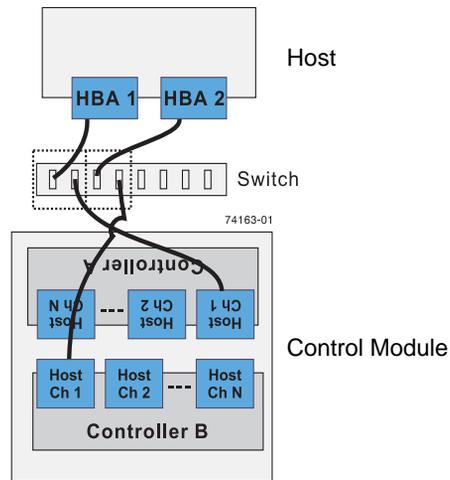


Figure 11 Fabric Topology – One Host and a Dual-Controller Control Module with a Switch

Step 4 – Connecting the Control Module to Hosts .....

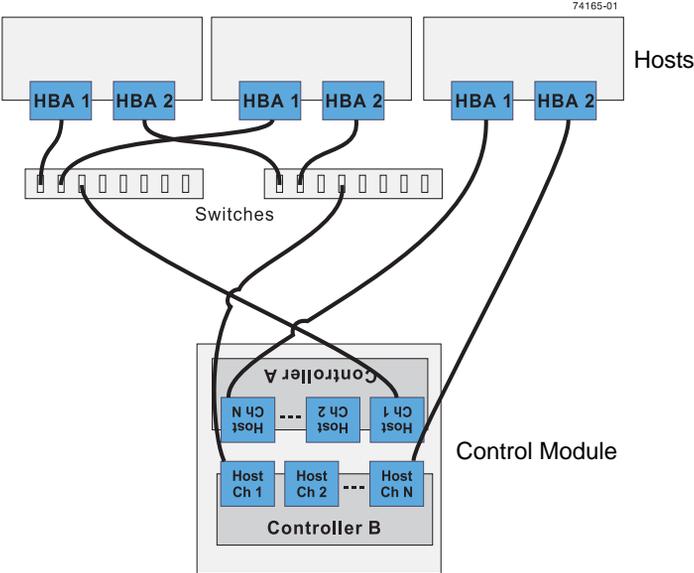


Figure 12 Mixed Topology – Three Hosts and a Dual-Controller Control Module

## Step 5 – Connecting the Control Module to Drive Modules

Navigation Aid	
“Key Terms”	page 25
“Things to Know - Control Module”	page 26
“Things to Know – All Drive Modules”	page 28
“Things to Know – CSM200 Drive Module”	page 28
“Things to Know – Mixed Drive Module Types”	page 29
“Steps to Connect – Drive Module”	page 31

### Key Terms

**Drive Channels** – The paths for the transfer of data between the controllers and the drives in the storage system.

**ESM (Environmental Services Monitor)** – A device in the drive module that monitors the status of the components. It also serves as the connection point to transfer data between the drive module and the control module. Each drive module has two ESMs.

## Things to Know - Control Module

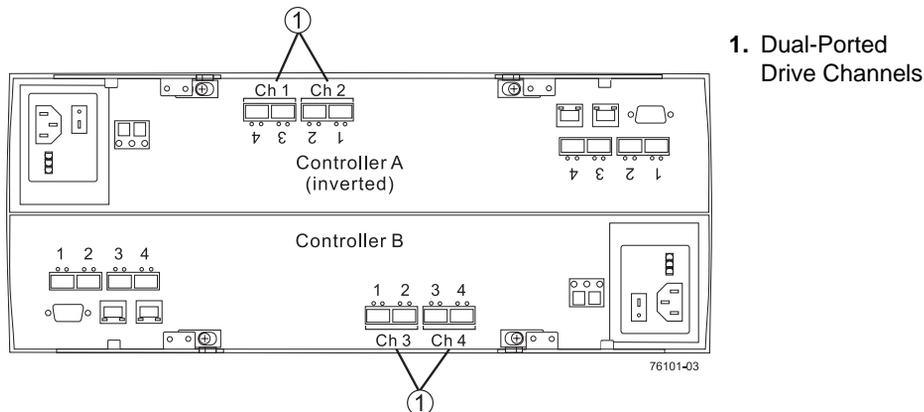


Figure 13 Drive Channel Ports on Controllers (Back of Control Module)



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**WARNING** (W03) **Risk of exposure to laser radiation** – Do not disassemble or remove any part of a Small Form-factor Pluggable (SFP) transceiver because you might be exposed to laser radiation.

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---

**CAUTION** **Electrostatic discharge can damage sensitive components** – Touching the control module or its components without using a proper ground might damage the equipment. To avoid damage, use proper antistatic protection when handling any components.

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- Controller A contains drive channels 1 and 2.
- Controller B contains drive channels 3 and 4.
- Each controller has two dual-port drive channels for a total of 4 drive ports per controller.

- Each drive channel is dual-ported; therefore, there are two channels and four drive ports per controller.
  - If a failure occurred in drive channel 1, channel 3 allows communication with the drives and vice versa.
  - If a failure occurred in drive channel 2, channel 4 allows communication with the drives and vice versa.
- Controller A is inverted from controller B meaning that its drive channels are upside down.

## Things to Know – All Drive Modules

- All drive modules connected to the same drive channel must operate at the same speed.
- Whenever possible, place drive modules of the same type on the same drive channel.

## Things to Know – CSM200 Drive Module

- The ESMs on the CSM200 drive module contain two sets of In and Out ports (labeled 1A/1B and 2A/2B). **Only use ports 1A/1B.** Ports 2A/2B are reserved for future use.
- One ESM is installed right-side up, and the other ESM is installed up-side down. Keep this in mind when connecting cables to this drive module.

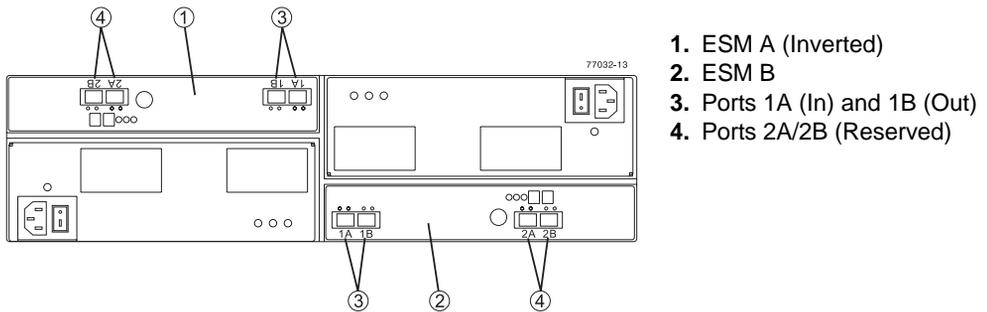


Figure 14 Back View of CSM200 Drive Module

## Things to Know – Mixed Drive Module Types

If you are cabling different types of drive modules to the same control module, follow these rules using [Figure 15 on page 30](#).

### CSM200 Drive Modules

If you connect the CSM200 drive module with any other drive modules listed in this section, you must make sure that the link (data) rate switch on the CSM200 drive module is set to 2 Gb/s.

### FLA300 and CSM200 Drive Modules

- Cluster the FLA300 and CSM200 drive modules all together. You can interleave these modules or keep them together by drive module type. Make sure that you do not interleave any other drive modules types with these modules.
- If these drive modules are clustered together, it does not make any difference which drive module is connected first to the control module.
- Do not connect a single FLA300 or CSM200 drive module on a drive channel unless it is the only FLA300 or CSM200 drive module in the storage system.

### FLA200 Drive Module

- If you have FLA300 drive modules, connect the FLA200 drive modules next on the drive channel after the FLA300 drive modules.
- If you do not have FLA300 drive modules, connect the FLA200 drive modules first on the drive channel (after controller A).

### FLC200 Drive Module

- Connect the FLC200 drive modules so that they are the last drive modules on the drive channel.

Step 5 – Connecting the Control Module to Drive Modules. . . . .

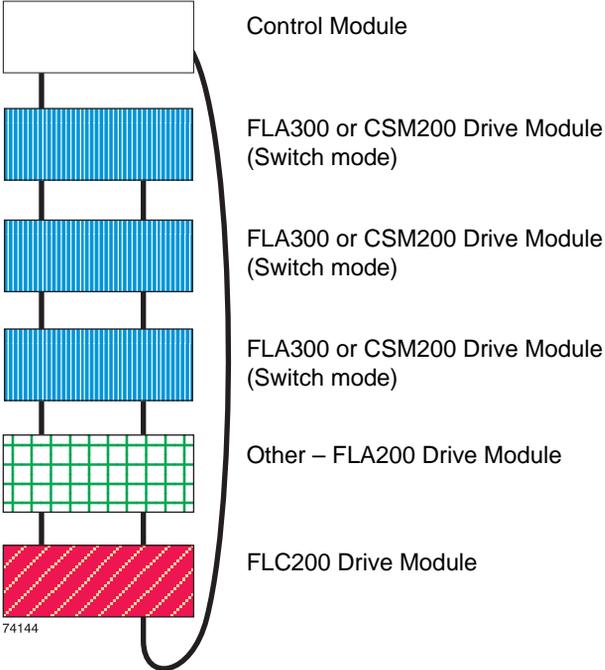


Figure 15 Cabling Topologies for Multiple Drive Module Types

## Steps to Connect – Drive Module

**NOTE** Start with controller A, and refer to the appropriate figures listed below.

Table 3 Find the Applicable Figure

Cabling Configuration	Refer To...
Control Module and One Drive Module	<a href="#">Figure 17 on page 34</a>
Control Module and Two Drive Modules	<a href="#">Figure 18 on page 35</a>
Control Module and Three Drive Modules	<a href="#">Figure 19 on page 36</a>
Control Module and Four Drive Modules	<a href="#">Figure 20 on page 37</a>
Control Module and Five Drive Modules	<a href="#">Figure 21 on page 38</a>
Control Module and Six Drive Modules	<a href="#">Figure 22 on page 39</a>
Control Module and Seven Drive Modules	<a href="#">Figure 23 on page 40</a>
Control Module and Eight Drive Modules	<a href="#">Figure 24 on page 41</a>
Control Module and Nine Drive Modules	<a href="#">Figure 25 on page 42</a>
Control Module and Ten Drive Modules	<a href="#">Figure 26 on page 43</a>
Control Module and Eleven Drive Modules	<a href="#">Figure 27 on page 44</a>
Control Module and Twelve Drive Modules	<a href="#">Figure 28 on page 45</a>

- 1** If there is a black, plastic plug in the drive channel of the controller A, remove it.
- 2** If you are using a fiber-optic cable, insert an SFP transceiver into the drive channel port, and go to [step 3](#). If you are using a copper cable, skip this step, and go to [step 3](#).
- 3** Plug one end of the cable into the drive channel port.
- 4** Plug the other end of the cable into the appropriate In or Out port on the ESM in the drive module as shown in the figures.

Step 5 – Connecting the Control Module to Drive Modules. . . . .

**5** Affix a label to each end of the cable using the recommended scheme below. A label is very important if you need to disconnect cables to service a controller.

- Controller ID (for example, Controller A)
- Drive channel number and port ID (for example, Drive channel 1, Port 4)
- ESM ID (for example, ESM A)
- ESM port ID (for example, In, Out, 1, 2, 1A, or 1B)
- Drive module ID

**Example label abbreviation:** Assume that a cable is connected between drive channel 1, port 4 of controller A to the out port of the left ESM (A) in drive module 1. A label abbreviation could be as follows:

`CtA-Dch1/P4, Dm1-ESM_A(left), Out`

**6** Repeat these steps for each controller and drive channel you intend to use.

---

**NOTE** If you have more than four drive modules connected to the control module, you will need to start connecting cables from one drive module to the next (daisy-chaining) starting with the fifth drive module. Refer to Figures 21 through 28 on pages 38 through 45.

---

The figures on the following pages show drive modules with inverted ESM CRUs with two In port and two Out ports per CRU. [Figure 16](#) shows another type of drive module with side-by-side ESM CRUs with one In port and one Out port per CRU.

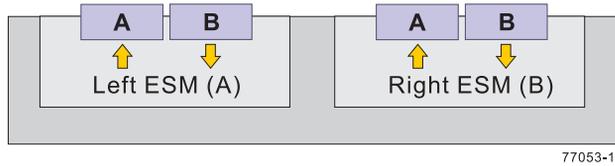


Figure 16 Drive Module with Side-by-Side ESM CRUs

If you are connecting a control module to a drive module with side-by-side ESM CRUs, use [Table 4](#) and [Figure 16](#) as a reference.

Table 4 Applicable Ports

Inverted ESM	Side-by-Side ESM
Port 1A	Port A
Port 1B	Port B

See [Figures 24 through 26](#) on [pages 41 through 43](#) for examples.

Step 5 – Connecting the Control Module to Drive Modules. . . . .

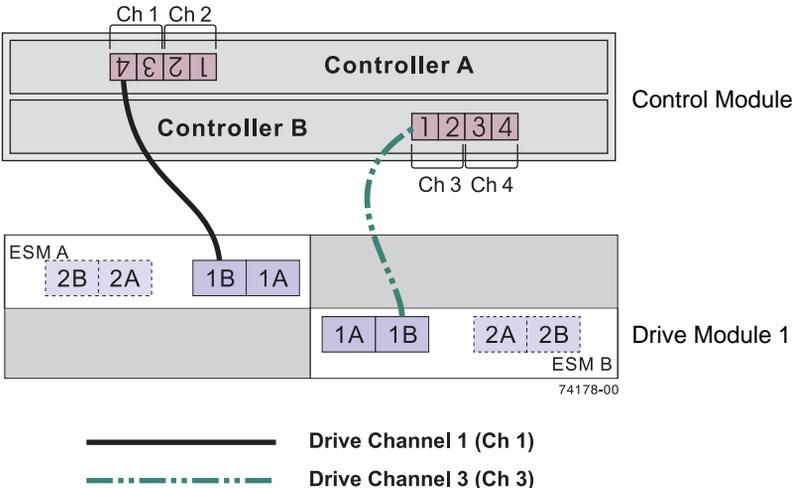


Figure 17 Control Module and One Drive Module

If you have drive modules with only one In port and one Out port per ESM CRU, see [Figure 16 on page 33](#).

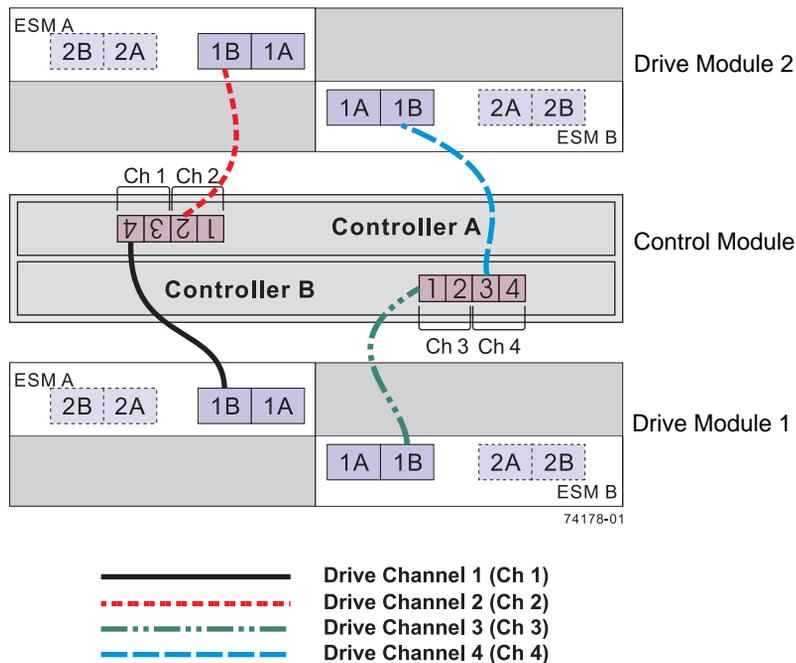


Figure 18 Control Module and Two Drive Modules

If you have drive modules with only one In port and one Out port per ESM CRU, see [Figure 16 on page 33](#).

Step 5 – Connecting the Control Module to Drive Modules. . . . .

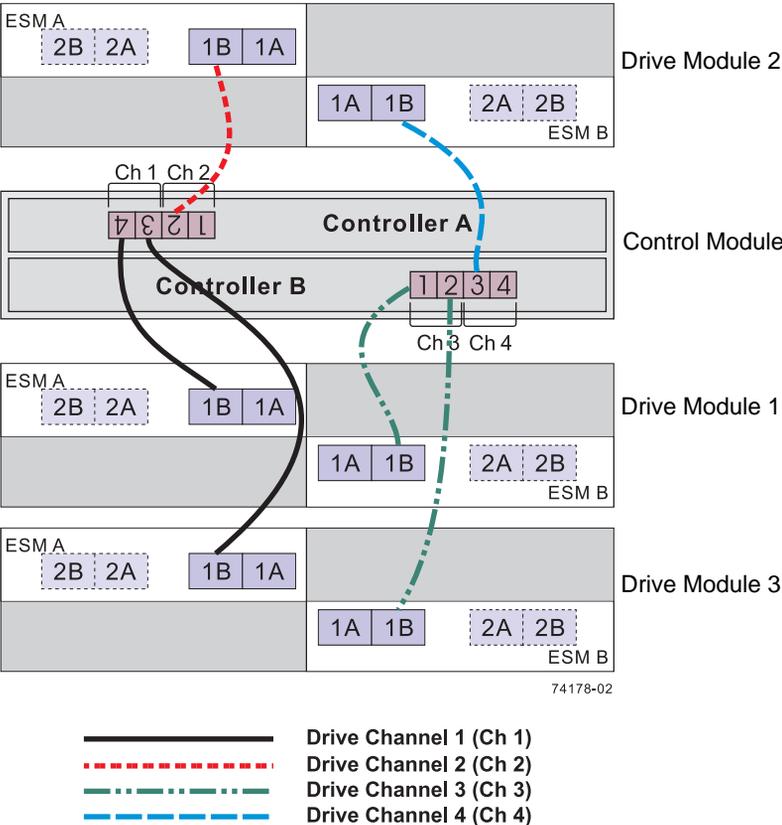
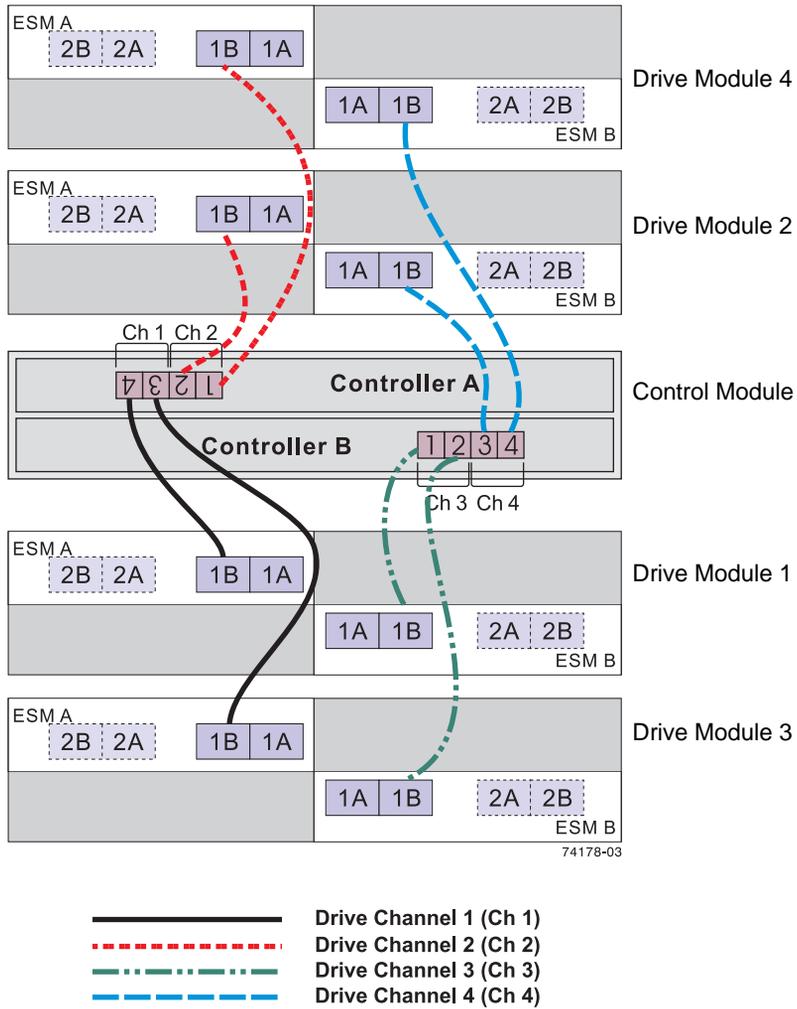


Figure 19 Control Module and Three Drive Modules

If you have drive modules with only one In port and one Out port per ESM CRU, see [Figure 16 on page 33](#).



- Drive Channel 1 (Ch 1)
- - - - Drive Channel 2 (Ch 2)
- ..... Drive Channel 3 (Ch 3)
- - - - Drive Channel 4 (Ch 4)

Figure 20 Control Module and Four Drive Modules

If you have drive modules with only one In port and one Out port per ESM CRU, see [Figure 16 on page 33](#).

Step 5 – Connecting the Control Module to Drive Modules. . . . .

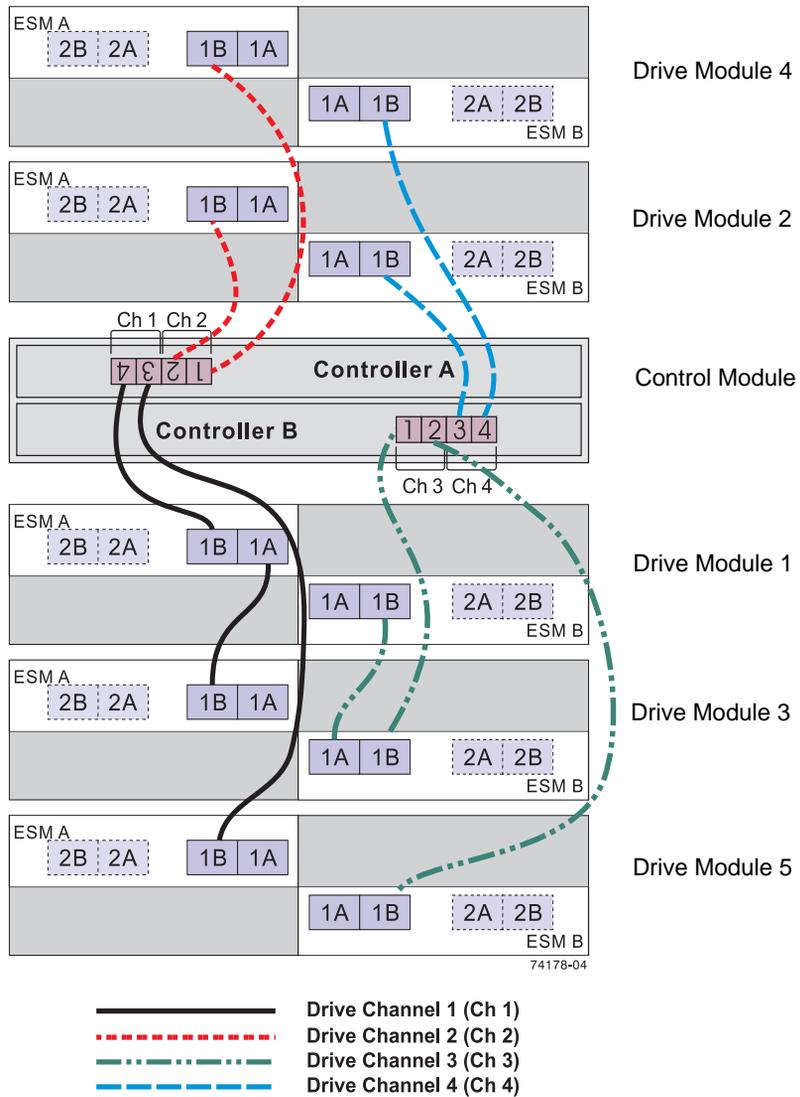


Figure 21 Control Module and Five Drive Modules

If you have drive modules with only one In port and one Out port per ESM CRU, see [Figure 16 on page 33](#).

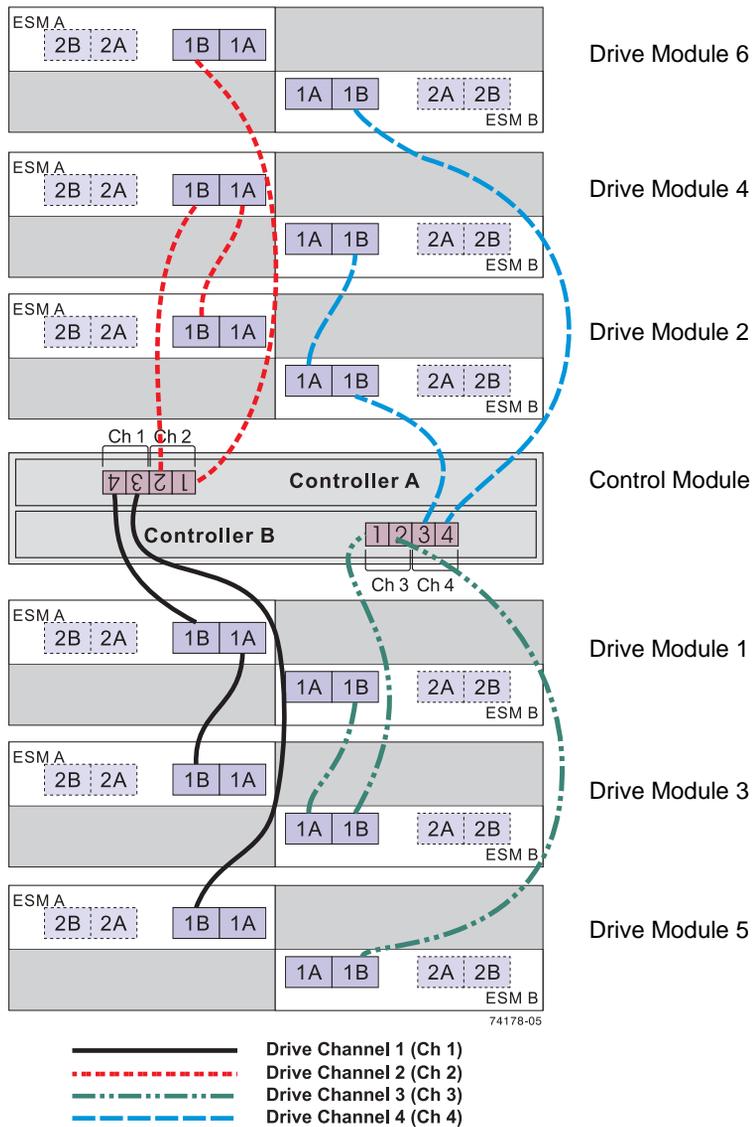


Figure 22 Control Module and Six Drive Modules

If you have drive modules with only one In port and one Out port per ESM CRU, see [Figure 16 on page 33](#).

Step 5 – Connecting the Control Module to Drive Modules. . . . .

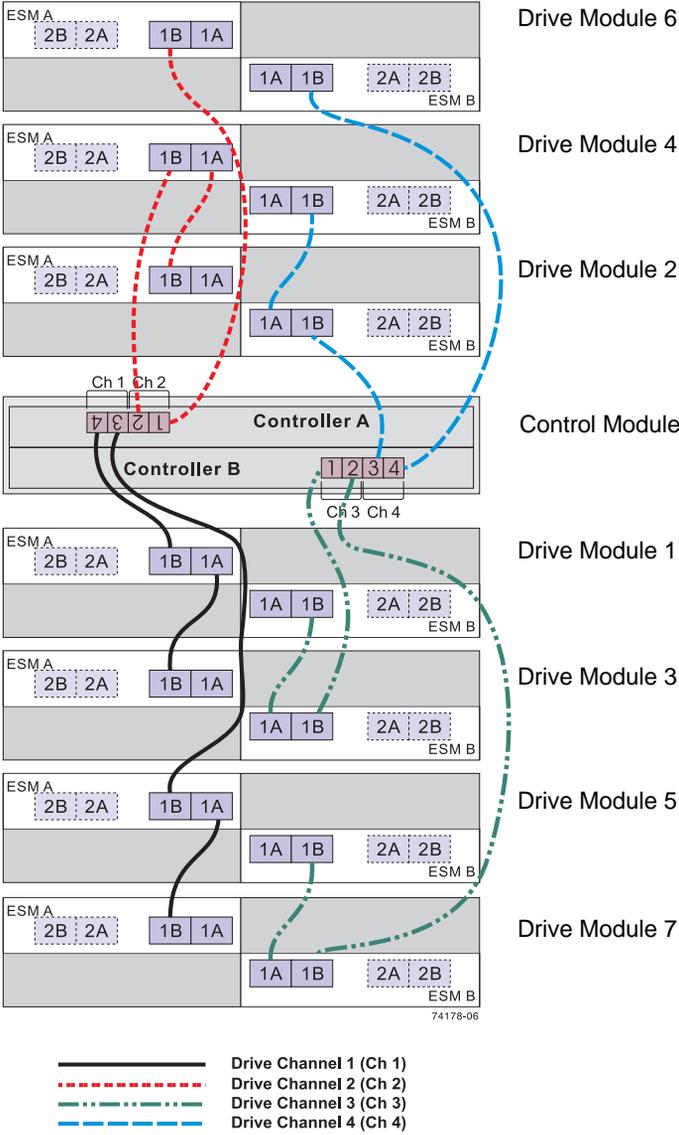


Figure 23 Control Module and Seven Drive Modules

If you have drive modules with only one In port and one Out port per ESM CRU, see [Figure 16 on page 33](#).

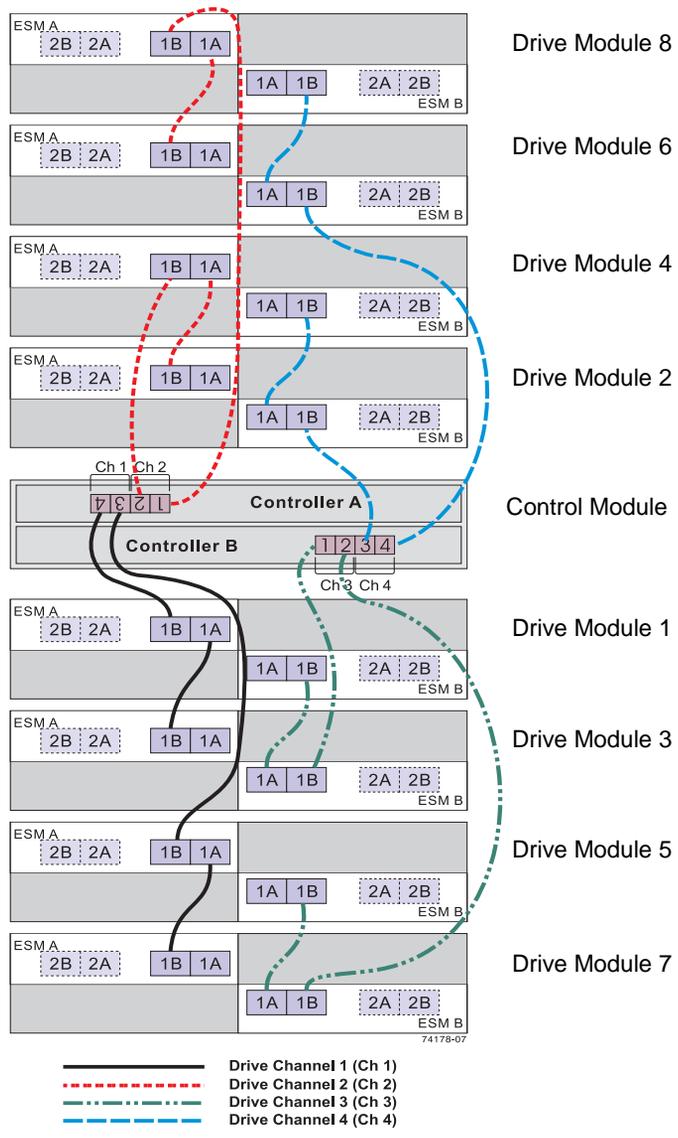


Figure 24 Control Module and Eight Drive Modules

If you have drive modules with only one In port and one Out port per ESM CRU, see [Figure 16 on page 33](#).

Step 5 – Connecting the Control Module to Drive Modules. . . . .

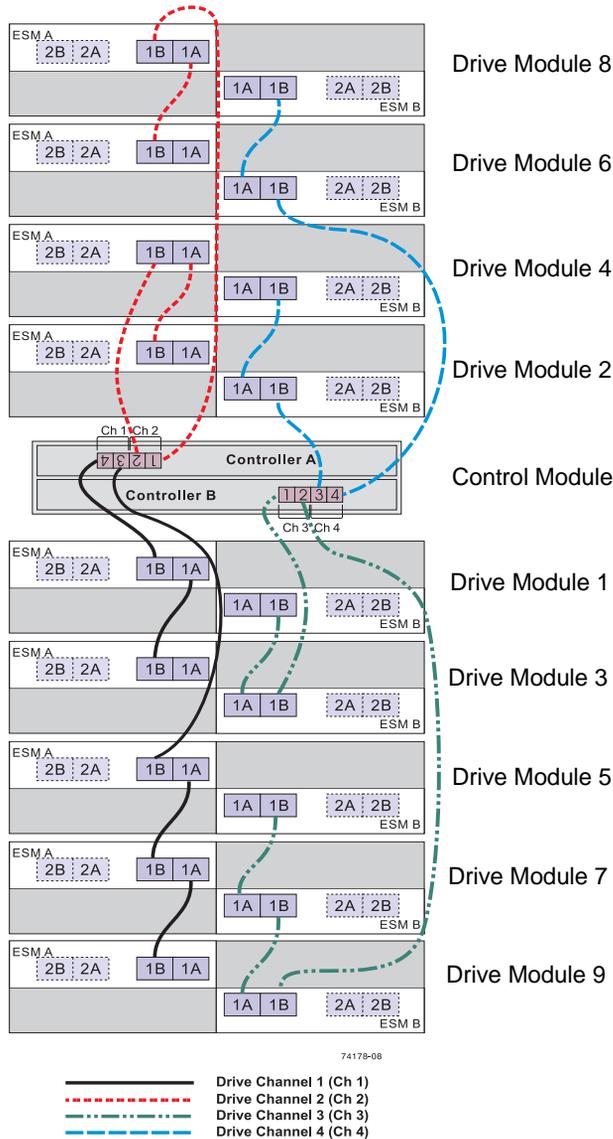


Figure 25 Control Module and Nine Drive Modules

If you have drive modules with only one In port and one Out port per ESM CRU, see [Figure 16 on page 33](#).

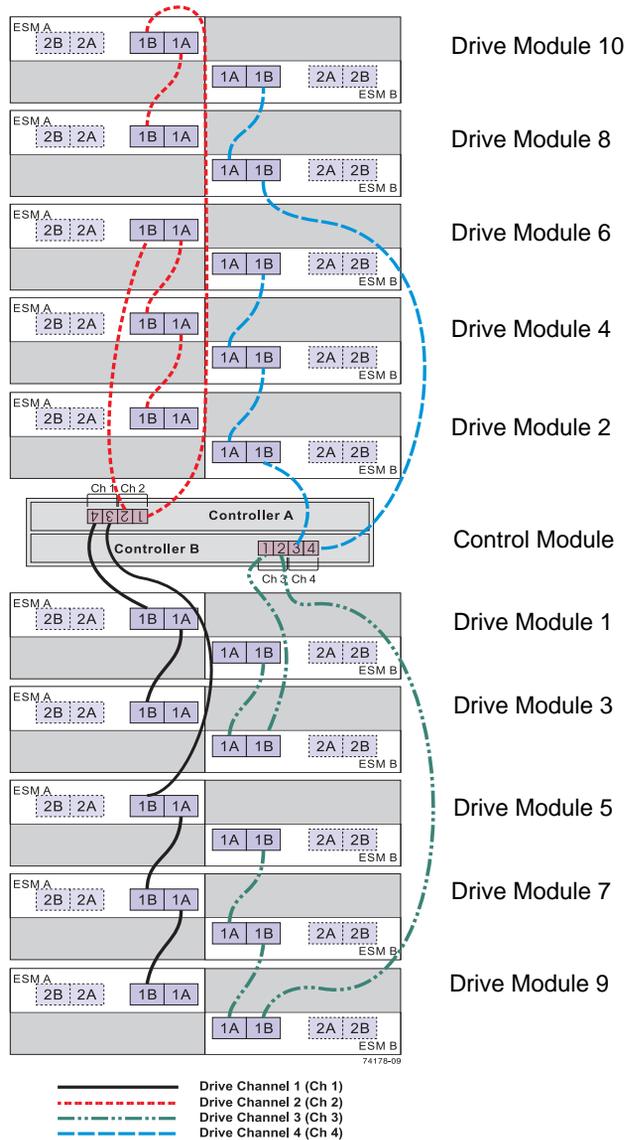


Figure 26 Control Module and Ten Drive Modules

If you have drive modules with only one In port and one Out port per ESM CRU, see [Figure 16 on page 33](#).

Step 5 – Connecting the Control Module to Drive Modules. . . . .

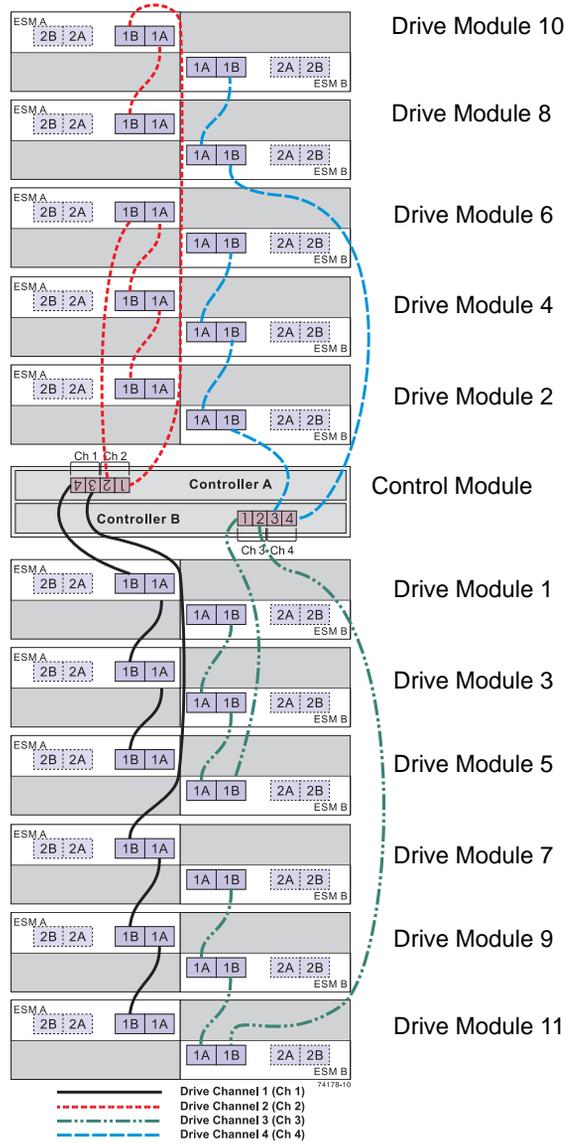


Figure 27 Control Module and Eleven Drive Modules

If you have drive modules with only one In port and one Out port per ESM CRU, see [Figure 16 on page 33](#).



Step 5 – Connecting the Control Module to Drive Modules. . . . .

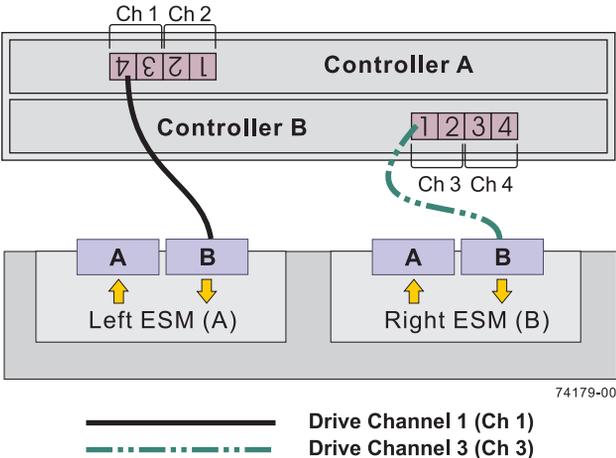


Figure 29 Control Module and One Drive Module with Side-by-Side ESMs

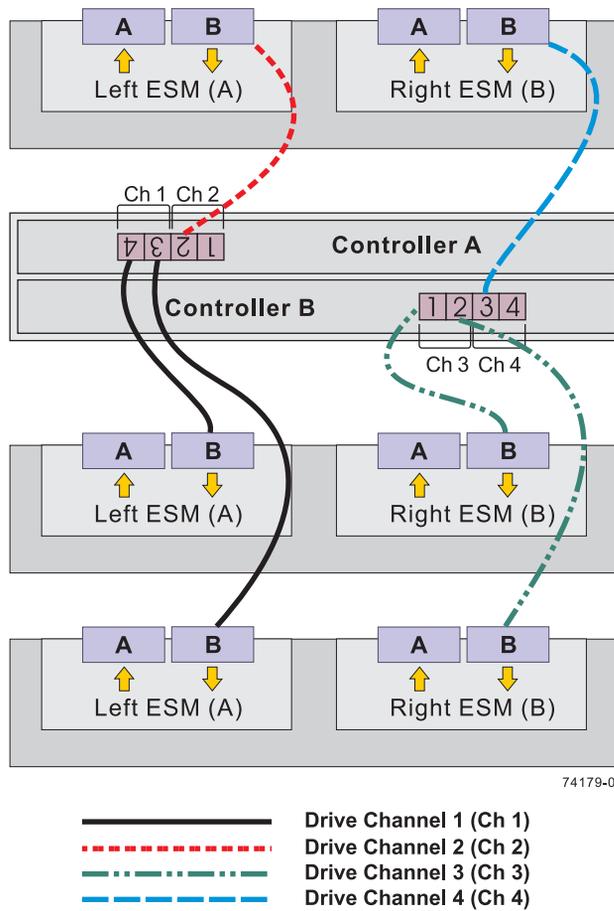


Figure 30 Control Module and Three Drive Modules with Side-by-Side ESMs

Step 5 – Connecting the Control Module to Drive Modules. . . . .

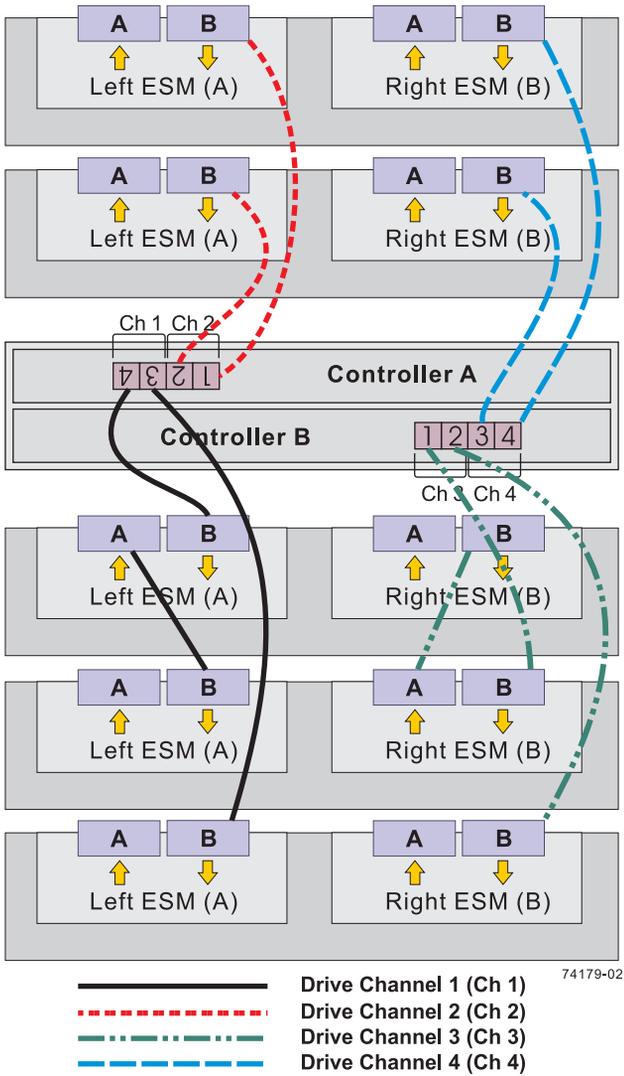


Figure 31 Control Module and Five Drive Modules with Side-by-Side ESMs

## Step 6 – Connecting Other Cables

### Connecting Ethernet Cables

#### Things to Know

- You need to connect an Ethernet cable to each controller only if you are going to use the out-of-band management method to configure and monitor the storage system. See [“Step 2 – Deciding on the Management Method” on page 7](#) for more details.
- Ethernet port 2 on each controller is reserved for technical support access.
- In limited situations where the storage management station is connected directly to the control module, you must use an Ethernet cross-over cable. An Ethernet cross-over cable is a special cable that reverses the pin contacts between the two ends of the cable.

---

**CAUTION Risk of security breach** – If you use the out-of-band management method (see [step 1](#) below), connect the Ethernet ports on the control module to a private network segment behind a firewall. If the Ethernet connection is not protected by a firewall, your storage system might be at risk of being accessed from outside of your network.

---

#### Steps to Connect – Ethernet Cables

- 1 Are you going to use the out-of-band management method?
  - **Yes** – Connect one end of an Ethernet cable into Ethernet port 1 on each controller. Connect the other end to the appropriate network connection. Go to [“Connecting Power Cables” on page 50](#).
  - **No** – Go to [“Connecting Power Cables” on page 50](#).

## Connecting Power Cables

### Things to Know

- For each AC power connector on the control module, make sure you use a separate power source in the cabinet. Connecting to independent power sources maintains power redundancy.
- The power cords shipped with the control module can be used with typical outlets used in the destination country, such as a wall receptacle or uninterruptible power supply (UPS). They are not intended for use in a rackmount cabinet.

---

**IMPORTANT** Make sure you do not turn on power to the control module or the connected drive modules until this guide instructs you to do so. For the proper procedure for turning on the power, see [“Step 10 – Turning on the Power and Checking for Problems”](#) on page 76.

---

### Steps to Connect – Power Cables

- 1 Make sure all of the power switches on the control module and the connected drive modules are turned off.
- 2 Connect a cabinet power ladder cable to the AC power connector on controller A and controller B.
- 3 If applicable, connect a power cable to each connected drive module.
- 4 If you have not already done so, connect the primary power cables from the cabinet to the external power source.

## Step 7 – Installing the SANtricity Storage Manager Software

Navigation Aid	
“Key Terms”	page 51
“Things to Know – All Operating Systems”	page 52
“Things to Know – Specific Operating Systems”	page 52
“Things to Know – System Requirements”	page 53
“Steps to Install – Software”	page 56
“Linux – Manually Installing RDAC”	page 62

### Key Terms

**RDAC** – A driver that manages the I/O data connection for storage systems with redundant controllers. If a component fails along the connections, causing the host to lose communication with a controller, the driver automatically reroutes all I/O operations to the other controller in the control module.

**Management Station** – A computer, running storage management software, used to add, monitor, and manage the storage systems on a network.

**Monitor** – A software package that monitors the storage system and reports critical events.

**Host** – A computer that is attached to the storage system and accesses various volumes on the storage system through its HBA host ports.

## Things to Know – All Operating Systems

- This guide documents the use of an installation wizard to install the SANtricity Storage Manager software. The separate native installation packages are supplied on the Software and Documentation CD in the native directory.
- For the Windows 2000 and 2003 Server, Linux, and Solaris operating systems, the storage management software supports using the storage system as a boot device. For assistance with setting up this configuration, contact Customer and Technical Support.

## Things to Know – Specific Operating Systems

- **Solaris:** The VERITAS Volume Manager Dynamic Multi Pathing (DMP) driver and RDAC are not supported in the same system. If you are using the VERITAS Volume Manager, you must select either DMP driver or RDAC, but not both.
- **IRIX:** The SANtricity Storage Manager software has not been certified for use within a cluster environment for IRIX. It is recommended that you install the storage management software on IRIX operating systems within a non-cluster environment only.
- **Windows XP:**
  - Supports the SANtricity Storage Manager Client package only
  - Other storage management software packages are not available on Windows XP (including failover driver)
  - Systems can be used only as storage management stations
- **Windows 2000 and Windows 2003 Server:** When RDAC is not installed, the Install Complete window displays an error message stating that the installation is finished and that there are some warnings. The message suggests looking at the installation log for details. The installation log contains a warning that a Win32 exception can be found. This is normal and expected behavior. The installation was successful.

## Things to Know – System Requirements

Tables 5 and 6 on pages 53 through 55 describe the operating system specifications and memory and disk space requirements.

Table 5 Operating System Version or Edition Requirements (1 of 2)

Operating System	System and Version or Edition
Windows XP	x86-based system Pentium or greater CPU or equivalent (233-MHz minimum) Professional 8.2 or later (32-bit only) <b>NOTE</b> Storage management station only
Windows 2000	x86-based system IA64 Pentium or Pentium-equivalent CPU (133-MHz or faster) Server Edition, Advanced Server Edition, SP 4 Professional with Service Pack 3 (Storage management station only)
Windows 2003	x86-based system IA64 Pentium or Pentium-equivalent CPU (233-MHz or faster) Standard Edition Enterprise Edition (32-bit and 64-bit)
Linux	x86 (32 and 64) AMD IA64 Red Hat Advanced Server 2.1, 3.0, 4.0 SuSE Linux Enterprise Server 8, 9 <b>NOTE</b> Professional is for storage management stations only
HP-UX	HP 9000 Series with 180-MHz or faster B.11.00, B.11.11, B.11.23 PA-RISC only – 11.0, 11.11, and B.11.23 AI64 B.11.23

Table 5 Operating System Version or Edition Requirements (2 of 2)

Operating System	System and Version or Edition
AIX	IBM RS/6000 <ul style="list-style-type: none"> <li>• 43P 375-MHz Power PC processor (minimum)</li> <li>• 44P 333-MHz Power 3-II 64-bit processor, model 170 or faster (recommended)</li> </ul> 5.2, 5.3
IRIX	RISC-based system with 64-bit MIPS R12000 (180 MHz or faster) 6.5.26, 6.5.27, or 6.5.28
Solaris	SPARC-based system (S20 processor, minimum) 2.7, 2.8, or 2.9 Solaris 7 <ul style="list-style-type: none"> <li>• 106541-30 kernel patch</li> <li>• 108376-44 (or later) OpenWindows patch</li> </ul> Solaris 8 patch 108528-27 Solaris 9 patch 12233-11 Solaris 10
NetWare	6.5, SP 1.1, SP 2, SP 3 (OES)

Table 6 Temporary Disk Space Requirements

<b>Operating System</b>	<b>Available Temporary Disk Space</b>	<b>Other Requirements</b> <b>NOTE</b> The minimum RAM requirement is 512 MB.
Windows XP	255-MB	
Windows 2000	255-MB	
Windows 2003	291-MB	
Linux	390-MB	
HP-UX	582-MB	
AIX	525-MB	For version 5.x, the Java runtime environment requires these base level files sets, or later:  x11.adt.lib 5.x x11.adt.motif 5.x bos.adt.include 5.x bos.adt.prof 5.x
IRIX	384-MB	256-MB system swap area
Solaris	540-MB	

## Steps to Install – Software

---

**IMPORTANT** Make sure you have the proper administrator or superuser privileges to install the software.

---

- 1 Insert the SANtricity Storage Manager Software and Documentation CD in the CD-ROM drive.
- 2 Open the install folder.
- 3 Launch the installer.
  - **Windows systems** – Double-click the executable file. In general, the executable file begins with SMIA followed by the operating system name, such as SMIA-WS32.exe
  - **UNIX systems** – At the command prompt, type the appropriate command to start the installer, and press Enter. For example, type a command similar to the following command. In this command, *<CD name.bin>* is the name of the installer CD, such as SMIA-LINUX.bin.

```
sh <CD name.bin>
```

**NOTE** If necessary, set the display environment in order to issue the command.

- 4 Use the information on pages 57 through 61 and the on-screen instructions to install the software.

## Software Packages

**Client** – This package contains the graphical user interface for managing the storage system. It also contains an optional monitor service used to send alerts when there is a critical problem with the storage system.

**Utilities** – This package contains utilities that allow the operating system to recognize the volumes you create on the storage system and to view the operating system-specific device names for each volume.

**Agent** – This package contains software that allows a management station to communicate with the controllers in the storage system over the I/O path of a host (see in-band management description on [page 7](#)).

**Fail-over Driver** – This package contains the multi-path driver used to manage the I/O paths into the controllers in the storage system. If there is a problem on the path or a failure of one of the controllers, the driver automatically re-routes the request from the hosts to the other controller in the storage system.

**Java Access Bridge (JAB)** – This package contains accessibility software that enables Windows-based assistive technology to access and interact with the client application.

---

**NOTE** Use [Figure 32](#) and [Tables 7](#) through [9](#) on the pages that follow to determine what software should be installed on each machine.

---

---

**IMPORTANT** You must install the utilities and the failover driver on each host attached to the storage system.

---

---

**IMPORTANT** During the client installation, you will be asked whether you want to start the monitor. Start the monitor on only one host that runs continuously. If you start the monitor on more than one host, you will receive duplicate alert notifications about problems with the storage system.

---

Step 7 – Installing the SANtricity Storage Manager Software . . . . .

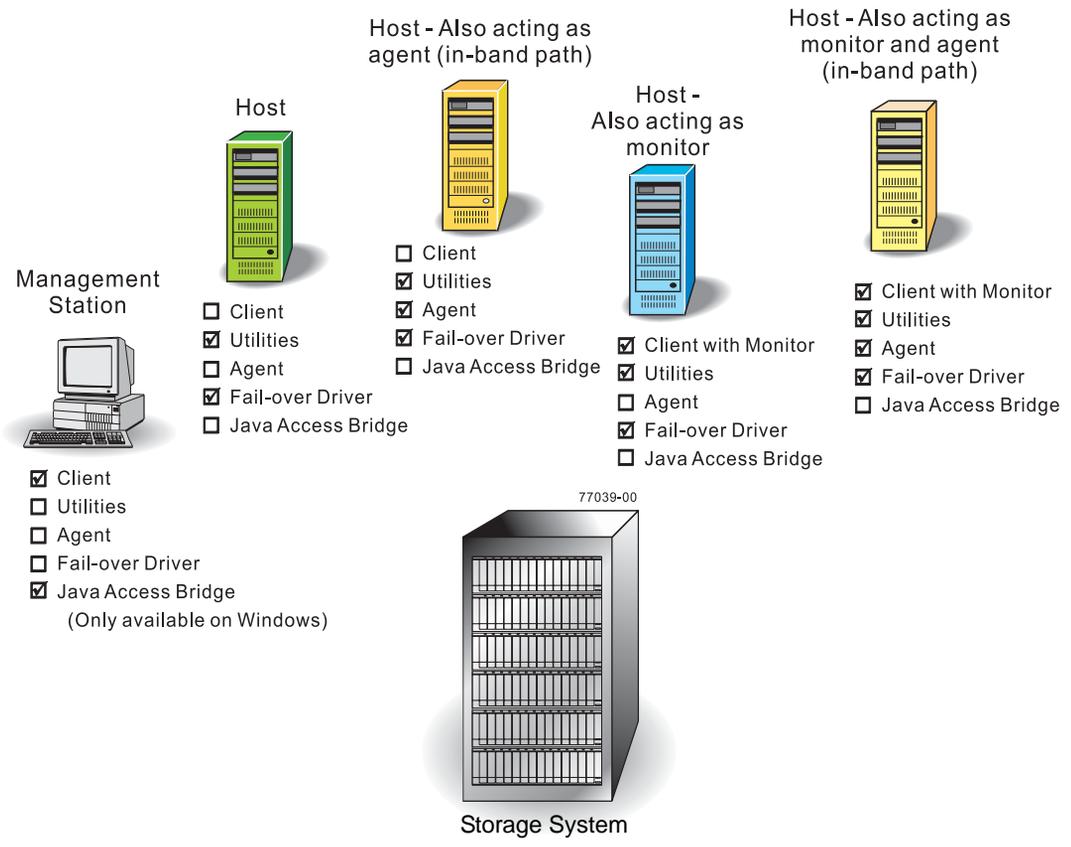


Figure 32 Software Configurations

Table 7 Different Machines and Required Software (1 of 2)

Machine	Minimum Software Required	Installation Package (Choose one) (Refer to Tables 8 and 9)	Notes
Management Station	Client	<ul style="list-style-type: none"> <li>• Typical Installation</li> <li>• Management Station</li> <li>• Custom</li> </ul>	<ul style="list-style-type: none"> <li>• Click No to the prompt, <b>Automatically start Monitor?</b></li> <li>• You will need to choose <b>Custom</b> if you want to install the Java Access Bridge software.</li> </ul>
Host	<ul style="list-style-type: none"> <li>• Utilities</li> <li>• Failover driver</li> </ul>	<ul style="list-style-type: none"> <li>• Typical Installation</li> <li>• Host</li> <li>• Custom</li> </ul>	<ul style="list-style-type: none"> <li>• Click No to the prompt, <b>Automatically start Monitor?</b></li> <li>• Be aware that some operating systems require the manual installation of the RDAC failover driver.</li> </ul>
Host – also acting as... <ul style="list-style-type: none"> <li>• An agent for the in-band management method</li> </ul>	<ul style="list-style-type: none"> <li>• Utilities</li> <li>• Agent</li> <li>• Failover driver</li> </ul>	<ul style="list-style-type: none"> <li>• Typical Installation</li> <li>• Host</li> <li>• Custom</li> </ul>	Click No to the prompt, <b>Automatically start Monitor?</b>
Host – also acting as... <ul style="list-style-type: none"> <li>• A monitor for sending critical alerts</li> </ul>	<ul style="list-style-type: none"> <li>• Client</li> <li>• Utilities</li> <li>• Failover driver</li> </ul>	<ul style="list-style-type: none"> <li>• Typical Installation</li> <li>• Custom</li> </ul>	<ul style="list-style-type: none"> <li>• Click Yes to the prompt, <b>Automatically start Monitor?</b></li> <li>• Start the monitor on only one host that will run continuously.</li> </ul>

Step 7 – Installing the SANtricity Storage Manager Software . . . . .

Table 7 Different Machines and Required Software (2 of 2)

Machine	Minimum Software Required	Installation Package (Choose one) (Refer to Tables 8 and 9)	Notes
Host – also acting as... <ul style="list-style-type: none"> <li>• An agent for the in-band management method</li> <li>• A monitor for sending critical alerts</li> </ul>	<ul style="list-style-type: none"> <li>• Client</li> <li>• Utilities</li> <li>• Agent</li> <li>• Failover driver</li> </ul>	<ul style="list-style-type: none"> <li>• Typical Installation</li> <li>• Custom</li> </ul>	<ul style="list-style-type: none"> <li>• Click Yes to the prompt, <b>Automatically start Monitor?</b></li> <li>• Start the monitor on only one host that will run continuously.</li> </ul>

Table 8 Install Wizard Selections

	Client	Utilities	Agent	Failover	JAB <sup>a</sup>
Typical Installation	X	X	X	X	
Management Station	X				
Host Station		X	X	X	
Custom (you select the packages)	X	X	X	X	X

a. Java Access Bridge – Enables Windows-based assistive technology to access and interact with the application.

Table 9 Software Packages Supported on Each Operating System

	<b>Windows XP</b>	<b>Windows 2000 Server</b>	<b>Windows 2003 Server</b>	<b>Linux</b>	<b>Solaris</b>	<b>HP-UX</b>	<b>AIX</b>	<b>IRIX</b>
Client	X	X	X	X	X	X	X	X
Utilities		X	X	X	X	X	X	X
Agent		X	X	X	X	X	X	X
Failover		X	X	Manual <sup>a</sup>	X			
JAB	X	X	X					

a. See [“Linux – Manually Installing RDAC”](#) on page 62.

## Linux – Manually Installing RDAC

- 1 Make sure the HBA driver is loaded before you install RDAC. The HBA driver must be a non-failover driver. If there are mixed HBAs, make sure only one supported model of HBA is connected to the storage systems.
- 2 While in the install directory, type the following command at the command prompt, and press Enter. In this command, *<rdac-package-name>* is the name of the RDAC package.

```
tar -zxvf <rdac-package-name>.tar.gz
```

The source files uncompress into the `linuxrdac` directory.

- 3 To change to the directory where the RDAC source was untarred, type the following command, and press Enter.

```
cd linuxrdac
```

---

**IMPORTANT** For further details on installing RDAC, refer to the `Readme.txt` file in the `linuxrdac` directory.

---

- 4 To clean the directory, type the following command, and press Enter.
- 5 To compile the modules, type the following command, and press Enter.

```
make clean
```

```
make
```

- 6 To install RDAC, type the following command, and press Enter.

```
make install
```

- 7 After the `make install` is completed, modify your bootloader configuration file. For further information on modifying the bootloader configuration, refer to the output from the `make install` command for Linux RDAC.
- 8 Read the `Readme.txt` file in the `linuxrdac` directory to complete the RDAC installation process.

## Step 8 – Configuring Fibre Channel Switches

### Things to Know

---

**IMPORTANT** Most of the switches, as shipped from the vendor, will require an update to their firmware to work correctly with the storage system.

---

- The switches certified for use with the storage system are as follows:  
     Brocade, Cisco, McData, and QLogic
- If required, make the appropriate configuration changes for *each* switch connected to the storage system.
- Refer to the switch's documentation for details on how to install the switches and how to use the switch's supplied configuration utilities.

### Steps to Configure – Fibre Channel Switches

- 1 Install your switch according to the vendor's documentation.
- 2 Use the certified compatibility matrix at the web site <http://www.engenio.com/default.aspx?pageId=46> to obtain the following information:
  - The latest hardware compatibility information
  - The models of the switches that are supported
  - The firmware and software requirements for the switches
- 3 Update the switch's firmware by accessing it from the appropriate switch vendor's web site. This might require that you cycle power on the switch.

Step 8 – Configuring Fibre Channel Switches. . . . .

- 4 Find your switch in [Table 10](#) to see whether there are further configuration changes you need to make. Use your switch’s configuration utility to make the changes.

Table 10 Supported Switch Vendors

Switch Vendor	Configuration Changes Required?	Go To...
Brocade	Yes Change the In-Order Delivery (IOD) option to ON.	Make the change and then go to <a href="#">“Step 9 – Configuring Host Bus Adapters (HBAs)”</a> on page 65
Cisco	Yes Change the In-Order Delivery (IOD) option to ON.	Make the change and then go to <a href="#">“Step 9 – Configuring Host Bus Adapters (HBAs)”</a> on page 65
McData	No	<a href="#">“Step 9 – Configuring Host Bus Adapters (HBAs)”</a> on page 65.
QLogic	No	<a href="#">“Step 9 – Configuring Host Bus Adapters (HBAs)”</a> on page 65

## Step 9 – Configuring Host Bus Adapters (HBAs)

Navigation Aid	
<a href="#">“Key Terms”</a>	<a href="#">page 65</a>
<a href="#">“Things to Know – All HBAs”</a>	<a href="#">page 65</a>
<a href="#">“Steps to Configure – All HBAs”</a>	<a href="#">page 66</a>

### Key Terms

**HBA Host Port** – The physical connection points on the HBAs in the host for the I/O (Fibre Channel) cables. The connection can be between either (1) the host and your storage system (called a direct topology), or (2) the host and a switch (called a fabric topology).

**HBA Host Port Worldwide Name** – A 16-character unique name that is provided for each port on the HBA.

### Things to Know – All HBAs

---

**IMPORTANT** Most of the HBAs, as shipped from the vendor, will require updated firmware and software drivers to work correctly with the storage system.

---

- The HBAs certified for use with the storage system are as follows:  
Emulex, Hewlett Packard (HP), IBM, and QLogic
- For maximum hardware redundancy, you must install a minimum of two HBAs in each host. Dual-ported HBAs provide two paths into the storage system but do not ensure redundancy if the entire HBA fails.
- If required, make the appropriate configuration changes for *each* HBA connected to the storage system.

- Refer to the HBAs documentation for details on how to install the HBA and how to use the supplied configuration utilities.
- For each host that is going to access volumes on this storage system, you must obtain the worldwide port name for each physical host port on the HBAs installed in the hosts (you will be given instructions on how to obtain them in this step). You will need these worldwide port names when you configure your hosts in “Step 19 – Defining Hosts” on page 98.

## Steps to Configure – All HBAs

- 1 Install your HBA according to the vendor's documentation.
- 2 Use the certified compatibility matrix at the web site <http://www.engenio.com/default.aspx?pageId=46> to obtain the following information:
  - The latest hardware compatibility information
  - The models of the HBAs that are supported
  - The firmware and driver requirements for the HBAs
- 3 Update the HBA's firmware and driver by accessing them at the HBA vendor's web site. This might require that you cycle power on the host containing the HBA.

---

**IMPORTANT** Steps 4 through 7 are general steps to obtain the worldwide port name from the HBA's BIOS utility. The actual prompts and screens will vary depending on the vendor of the HBA. Also, some HBAs have software utilities that you can use to obtain the worldwide port name instead of having to use the BIOS utility.

---

- 4 Reboot or start your host.
- 5 While it is booting, look for the prompt to access the HBA's BIOS utility.
- 6 Select each HBA to view its host port worldwide name.
- 7 Record the following information for each host and associated HBAs connected to the storage system (see example in Table 11). You will use this information in “Step 19 – Defining Hosts” on page 98.

- Name of each host
- Associated HBAs
- Worldwide port name of each HBA host port

Table 11 Example of Recording HBA Worldwide Port Names

Host Name	Associated HBAs	Worldwide Port Names
ICTENGINEERING	Vendor x, Model y (dual-ported)	<ul style="list-style-type: none"> <li>• 37:38:39:30:31:32:33:32</li> <li>• 37:38:39:30:31:32:33:33</li> </ul>
	Vendor a, Model y (dual-ported)	<ul style="list-style-type: none"> <li>• 42:38:39:30:31:32:33:42</li> <li>• 42:38:39:30:31:32:33:44</li> </ul>
ICTFINANCE	Vendor a, Model b (single-ported)	• 57:38:39:30:31:32:33:52
	Vendor a, Model b (single-ported)	• 57:38:39:30:31:32:33:53

**8** Find your HBA in [Table 12](#) to see whether you need to make any further configuration changes.

Table 12 Supported HBA Vendors (1 of 2)

HBA Vendor	Configuration Changes Required?	Go To...
Emulex	Yes	<p><b>Linux</b></p> <ul style="list-style-type: none"> <li>• <a href="#">“Steps to Change – Emulex HBA Driver (Linux)” on page 69</a></li> </ul> <p><b>Solaris</b></p> <ul style="list-style-type: none"> <li>• <a href="#">“Steps to Change – Emulex HBA Driver (Solaris)” on page 69</a></li> </ul> <p><b>Windows 2000/2003 Server</b></p> <ul style="list-style-type: none"> <li>• <a href="#">“Steps to Change – Emulex HBA Driver (Windows 2000/2003 Server)” on page 70</a></li> </ul>

Table 12 Supported HBA Vendors (2 of 2)

HBA Vendor	Configuration Changes Required?	Go To...
Hewlett Packard (HP)	<p>Yes</p> <ul style="list-style-type: none"> <li>• The <i>only</i> factory default setting you must change is the IO timeout value.</li> <li>• You must change the IO timeout value for each block device (volume) you create on the storage system.</li> <li>• Because you must first create the volumes, use the instructions on changing the IO timeout value in <a href="#">“Step 20 – Configuring Storage”</a> on page 105</li> </ul>	<p><a href="#">“Step 10 – Turning on the Power and Checking for Problems”</a> on page 76</p>
IBM	<p>No</p>	<p><a href="#">“Step 10 – Turning on the Power and Checking for Problems”</a> on page 76</p>
QLogic	<p>Yes</p> <p><b>NOTE</b> The 2312 is not a QLogic HBA model. It is the chip on the 2342 model.</p>	<p><b>Linux</b></p> <ul style="list-style-type: none"> <li>• <a href="#">“Steps to Change – QLogic HBA (BIOS Settings)”</a> on page 71</li> </ul> <p><b>NetWare</b></p> <ul style="list-style-type: none"> <li>• <a href="#">“Steps to Change – QLogic HBA (BIOS Settings)”</a> on page 71</li> <li>• <a href="#">“Steps to Change – QLogic HBA (NetWare)”</a> on page 73</li> </ul> <p><b>Solaris</b></p> <ul style="list-style-type: none"> <li>• <a href="#">“Steps to Change – QLogic HBA (Solaris)”</a> on page 74</li> </ul> <p><b>Windows 2000/2003 Server</b></p> <ul style="list-style-type: none"> <li>• <a href="#">“Steps to Change – QLogic HBA (BIOS Settings)”</a> on page 71</li> <li>• <a href="#">“Steps to Change – QLogic HBA (Windows 2000/2003 Server)”</a> on page 75</li> </ul>

## Steps to Change – Emulex HBA Driver (Linux)

---

**NOTE** The following applies to Red Hat Linux Advanced Server 3/4 and SuSE Linux Enterprise Server 8/9 (7.2.4 driver and above).

---

- 1 Use Emulex's configuration utility to change the following values:
  - Linkdown-tmo = 60
  - Nodev-tmo = 60
- 2 Go to [“Step 10 – Turning on the Power and Checking for Problems”](#) on page 76.

## Steps to Change – Emulex HBA Driver (Solaris)

- 1 Change the following values in the /kernel/drv/lpfc.conf configuration file:
  - No-device-delay = 0
  - Network-on = 0
  - Linkdown-tmo = 60
  - Nodev-tmo =60
- 2 Go to [“Step 10 – Turning on the Power and Checking for Problems”](#) on page 76.

## Steps to Change – Emulex HBA Driver (Windows 2000/2003 Server)

- 1 Click **Start** >> **Run** on your operating system.
- 2 Enter **regedit**, and click **OK** to start the Registry Editor.
- 3 Use [Table 13](#) to change the various registry values. Double-click on the value to change it.

---

**IMPORTANT** Registry Editor is an advanced tool for changing settings. If you make an error in the registry, your computer might not function properly. Make sure you back up (export) your registry before starting this procedure. Refer to the online help on your host for details.

---

Table 13 Registry Value Changes for Emulex HBAs (Windows 2000/2003 Server) (1 of 2)

Registry Values	Windows 2000 Server	Windows 2003 Server
HKEY_LOCAL_MACHINE >> System >> CurrentControlSet >> Services >> LPXNDS >> Parameters >> Device		
MaximumSGList (REG_DWORD)		0xff
HKEY_LOCAL_MACHINE >> System >> CurrentControlSet >> Services >> LPXNDS >> Parameters >> Device under the DriverParameter variable		
<b>NOTE</b> DriverParameter is of type REG_SZ. Add the following parameters to the DriverParameter string. Do NOT create a separate key for each of the parameters.		
EnableDPC		1
NodeTimeOut		60
HlinkTimeOut		60
ResetFF		1
SimulateDevice		1
HKEY_LOCAL_MACHINE >> SYSTEM >> CurrentControlSet >> Services >> rdacdisk >> parameters		
DisableLunRebalance (REG_DWORD)		0x03
<i>Only applies to Cluster configuration.</i>		

Table 13 Registry Value Changes for Emulex HBAs (Windows 2000/2003 Server) (2 of 2)

Registry Values	Windows 2000 Server	Windows 2003 Server
InquiryWaitTime (REG_DWORD)	0x258	
SingleScanTask (REG_DWORD) <i>Only used with RDAC driver version 9.00.XX.</i>	0x1	
HKEY_LOCAL_MACHINE >> System >> CurrentControlSet >> Services >> Disk		
TimeOutValue (REG_DWORD)	0x78	

- 4 Go to [“Step 10 – Turning on the Power and Checking for Problems”](#) on page 76.

### Steps to Change – QLogic HBA (BIOS Settings)

---

**IMPORTANT** You only need to perform this procedure if your operating system is Linux, NetWare, or Windows 2000/2003 Server. If your operating system is Solaris, go to [“Steps to Change – QLogic HBA \(Solaris\)”](#) on page 74.

---



---

**IMPORTANT** Instead of using the BIOS utility, you can use the software utility supplied with the QLogic HBA.

---

- 1 Reboot or start your host.
- 2 While it is booting, look for the prompt and press **Alt-Q** to access the BIOS utility.
- 3 Select an HBA to view its settings.
- 4 Select Configuration Settings and make the appropriate changes using [Table 14](#) on page 72.

Table 14 BIOS Settings for QLogic HBAs

Setting	Linux	NetWare	Windows 2000/2003 Server
<b>Host Adapter Settings</b>			
Loop Reset Delay	8		
Adapter Hard Loop ID - (only recommended for arbitrated loop topology).	Enabled		
Hard Loop ID (only recommended for arbitrated loop topology).	Any unique number - typically set to 20, 21, or 22.		
<b>Advance Adapter Settings</b>			
Execution Throttle	255		
LUNs per Target <b>NOTE</b> 0 activates maximum LUN support.	0	32	0
Enable Target Reset	Yes		
Login Retry Count	30		
Port Down Retry Count	35	70	70
Link Down Timeout	60		
<b>Extended Firmware Settings</b>			
Fibre Channel Tape Support	Disabled		
Fibre Channel Confirm	Disabled		
Data Rate	2		

- 5 Save the changes.
- 6 Repeat this procedure for each QLogic HBA in each host.
- 7 Reboot your host.
- 8 Depending on your operating system, go to one of the following steps:
  - **Linux** – [“Step 10 – Turning on the Power and Checking for Problems” on page 76.](#)

- **NetWare** – “[Steps to Change – QLogic HBA \(NetWare\)](#)” on page 73.
- **Windows 2000/2003 Server** – “[Steps to Change – QLogic HBA \(Windows 2000/2003 Server\)](#)” on page 75.

### **Steps to Change – QLogic HBA (NetWare)**

- 1** Copy LSIMPE.CDM to the C:\NWSERVER directory on the host running NetWare. You might have to get an updated .cdm file from your storage vendor.
- 2** Edit the STARTUP.NCF file in the C:\NWSERVER\ directory as follows:
  - Add SET MULTI-PATH SUPPORT= ON and LOAD LSIMPE.CDM *before* the load of the QLogic HAM driver.
  - Add the Asynchronous Event Notification (AEN) keyword to the line “LOAD SCSIHD.CDM”  
The line should read LOAD SCSIHD.CDM AEN
  - Disable the QLogic failover driver by adding /allpaths and /portnames when loading the QLogic HAM drivers. For example, the line should read  
LOAD QL2300.HAM SLOT=201 /LUNS/XRETRY=120 /XTIMEOUT=150  
/ALLPATHS /PORTNAMES
- 3** Reboot the host.
- 4** Go to “[Step 10 – Turning on the Power and Checking for Problems](#)” on page 76.

## Steps to Change – QLogic HBA (Solaris)

- 1 Change the following values in the `/kernel/drv/qla2300.conf` configuration file:
  - Execution throttle = 255
  - Login retry count = 30
  - Enable adapter hard loop ID = 1 (Only recommended for arbitrated loop topology)
  - Adapter hard loop ID = Typically set to 20, 21, or 22. (Only recommended for arbitrated loop topology. Must be unique for each HBA.)
  - Enable target reset = 1
  - Reset delay = 8
  - Port down retry count = 70
  - Maximum LUNs per target = 0 (0 activates maximum LUN support)
  - Fibre Channel tape support = 0
- 2 Go to [“Step 10 – Turning on the Power and Checking for Problems”](#) on page 76.

## Steps to Change – QLogic HBA (Windows 2000/2003 Server)

- 1 Click **Start >> Run** on your operating system.
- 2 Enter **regedit**, and click **OK** to start the Registry Editor.
- 3 Use the [Table 15](#) to change the various registry values. Double-click on the value to change it.

---

**IMPORTANT** Registry Editor is an advanced tool for changing settings. If you make an error in the registry, your computer might not function properly. Make sure you back up (export) your registry before starting this procedure. Refer to the online help on your host for details.

---

Table 15 Registry Value Changes for QLogic HBAs (Windows 2000/2003 Server)

Setting	Windows 2000/2003 Server
HKEY_LOCAL_MACHINE >> System >> CurrentControlSet >> Services >> QL2300 >> Parameters >> Device	
MaximumSGList (REG_DWORD)	0xff
HKEY_LOCAL_MACHINE >> System >> CurrentControlSet >> Services >> QL2300 >> Parameters >> Device under the DriverParameter variable	
<b>NOTE</b> DriverParameter is of type REG_SZ. Add the following parameters to the DriverParameter string. Do NOT create a separate key for each of the parameters.	
BusChange	0
HKEY_LOCAL_MACHINE >> SYSTEM >> CurrentControlSet >> Services >> rdacdisk >> parameters	
DisableLunRebalance (REG_DWORD) <i>Only applies to Cluster configuration.</i>	0x03
HKEY_LOCAL_MACHINE >> System >> CurrentControlSet >> Services >> Disk	
TimeOutValue (REG_DWORD)	0x78

- 4 Go to [“Step 10 – Turning on the Power and Checking for Problems”](#) on page 76.

## Step 10 – Turning on the Power and Checking for Problems

### Steps to Turn on the Power and Check for Problems – Storage System

---

**IMPORTANT** You must turn on the power to all connected drive modules before you turn on the control module. Performing this action ensures that the controllers recognize each attached drive module.

---

---

**IMPORTANT** While the modules power on, the lights on the front and the back of the modules turn on and off intermittently.

---

- 1 Turn on both power switches on each drive module attached to the control module. Depending on your configuration, it can take several minutes for each drive module to power on.

---

**IMPORTANT** Wait 30 seconds after turning on the drive modules before you go to [step 2](#) to turn on the control module.

---

- 2 Turn on both power switches on the back of the control module. Depending on your configuration, it can take several minutes for the control module to power on.
- 3 Check the lights on the front and the back of the control module and the attached drive modules ([Table 16 on page 77](#)). If applicable, refer to the drive module Initial Setup Guide to identify the functions for the drive module lights.
- 4 If you see any amber lights, make a note of their location.

Table 16 Lights on the Control Module (1 of 2)

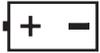
Light	Symbol	Location (CRUs)	Function
Power		Power-fan Interconnect-battery	<ul style="list-style-type: none"> <li>• On – CRU has power</li> <li>• Off – CRU does not have power</li> </ul> <p><b>NOTE</b> The controller CRUs do not have a power light. They receive their power from the power supplies inside the power-fan CRUs.</p>
Battery Charging		Power-fan Interconnect-battery	<ul style="list-style-type: none"> <li>• On – Battery charged and ready</li> <li>• Off – Battery faulted or discharged</li> <li>• Blinking – Battery charging</li> </ul>
Battery Needs Attention		Power-fan Interconnect-battery	On – Problem with battery
Service Action Allowed		Power-fan Controller Interconnect-battery	On – OK to remove CRU See <a href="#">“Service Action Allowed Light” on page 79.</a>
Service Action Required (Fault)		Power-fan Controller Interconnect-battery	On – Problem with CRU
Locate		Interconnect-battery	Assists in locating CRU
Host Channel Speed		Controller	<p>Indicates speed of host channel</p> <ul style="list-style-type: none"> <li>• Left light on – 1 Gb/s</li> <li>• Right light on – 2 Gb/s</li> <li>• Left and right lights on – 4 Gb/s</li> </ul>

Table 16 Lights on the Control Module (2 of 2)

Light	Symbol	Location (CRUs)	Function
Drive Port Bypass		Controller	Indicates if port has been bypassed
Drive Channel Speed		Controller	Indicates speed of drive channel <ul style="list-style-type: none"> <li>• Right light on – 2 Gb/s</li> <li>• Left and right lights on – 4 Gb/s</li> </ul>
Cache Active		Controller	Indicates the activity of the cache <ul style="list-style-type: none"> <li>• Blinking – Data is in cache</li> <li>• Off – No data is in cache</li> </ul>
Tray ID Numeric Display/ Diagnostic Display.		Controller	Indicates the ID of the tray or a diagnostic code

## Service Action Allowed Light

Each controller, power-fan, and interconnect-battery CRU has a Service Action Allowed light. The Service Action Allowed light lets you know when you can remove a component safely.

---

**CAUTION** **Potential loss of data access** – Never remove a controller, power-fan, or interconnect-battery CRU unless the Service Action Allowed light is turned on.

---

If a controller CRU or a power-fan CRU fails and must be replaced, the Service Action Required (Fault) light on that CRU turns on to indicate that service action is required. The Service Action Allowed light will also turn on if it is safe to remove the CRU. If there are data availability dependencies or other conditions that dictate that a CRU should not be removed, the Service Action Allowed light will remain off.

The Service Action Allowed light automatically turns on or off as conditions change. In most cases, the Service Action Allowed light turns on when the Service Action Required (Fault) light is turned on for a CRU.

---

**IMPORTANT** If the Service Action Required (Fault) light is turned on but the Service Action Allowed light is turned off for a particular CRU, you might have to service another CRU first. Check your storage management software to determine the action you should take.

---

## Step 11 – Starting SANtricity Storage Manager

### For Additional Information

*SANtricity Storage Manager Concepts Guide for Version 9.1x  
Enterprise Management Window and Array Management Window Online Help*

### Steps to Start – SANtricity Storage Manager

- 1 Start the SANtricity Storage Manager.
  - **Windows systems** – Select **Start >> Programs >> SANtricity Storage Manager Client**.
  - **UNIX systems** – At the prompt, type the following command, and press Enter.  

```
SMclient
```
- 2 Use the following section to become familiar with the Enterprise Management Window and Array Management Window.
- 3 After you have completed reviewing the information about the main windows, go to [“Step 12 – Adding the Storage System” on page 85](#).

.....Enterprise Management Window (EMW) and Array Management Window (AMW)

## Enterprise Management Window (EMW) and Array Management Window (AMW)

The EMW and AMW are the two main windows you use to manage your storage system. Use [Table 17](#) and [Figures 33](#) and [34](#) on pages [82](#) through [84](#) for a brief review of each window.

---

**NOTE** The title at the top of each window identifies its type: Enterprise Management or Array Management.

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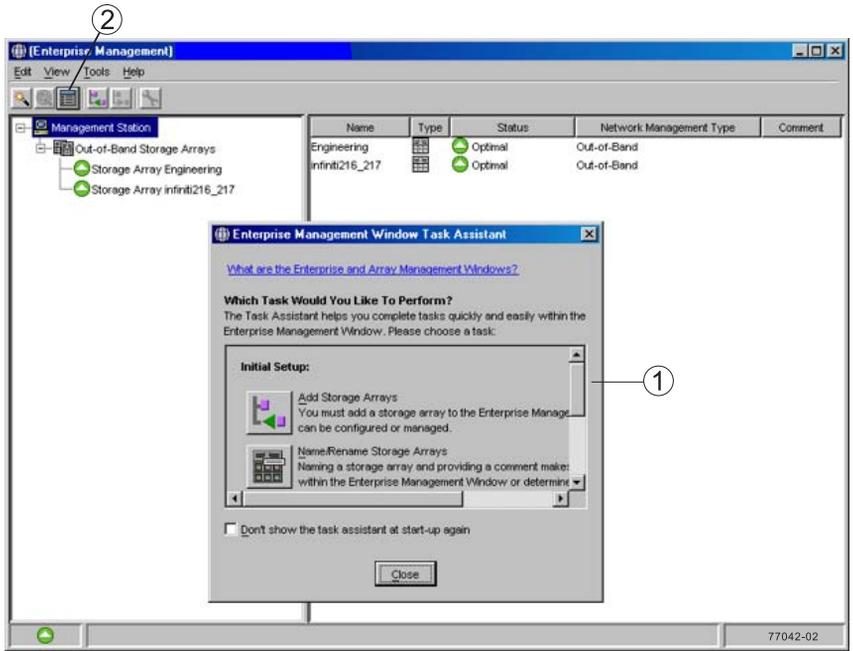
**NOTE** If no storage systems are currently displayed in the EMW, you will get a dialog asking whether to add the storage systems automatically or manually. Ignore this dialog for this particular step. Also, you will not be able to launch an AMW until you have added a storage system. You will be provided instructions on adding a storage system and launching an AMW in subsequent steps.

---

Table 17 EMW and AMW Overview

User Interface	Description
Enterprise Management Window (EMW)	<ul style="list-style-type: none"> <li>• It is the main window you see when you first start SANtricity Storage Manager.</li> <li>• It provides you with a view of all of the storage systems in your management domain.</li> <li>• It allows you to add and remove storage systems, set alert notifications (email and SNMP), and perform other high-level configuration functions.</li> <li>• It provides a high-level status of the health of each storage system.</li> <li>• It allows you to manage and configure an individual storage system by launching an AMW.</li> </ul>
Array Management Window (AMW)	<ul style="list-style-type: none"> <li>• It provides you with all of the functions to configure, maintain, and troubleshoot an individual storage system.</li> <li>• You launch an AMW from the EMW to manage an individual storage system.</li> <li>• You can have multiple AMWs displayed at the same time (one for each storage system you want to manage).</li> <li>• You can launch an AMW from the EMW by either:                             <ul style="list-style-type: none"> <li>• Clicking <b>Manage a Storage System</b> from the Task Assistant dialog.</li> <li>• Highlighting a specific storage system and clicking <b>Tools &gt;&gt; Manage Storage System</b>.</li> <li>• Double-clicking a specific storage system.</li> </ul> </li> </ul>
Task Assistant (EMW and AMW)	<ul style="list-style-type: none"> <li>• When you first start either the EMW or AMW, a Task Assistant dialog is displayed.</li> <li>• The Task Assistant dialog gives you quick access to common setup tasks.</li> <li>• If you close the Task Assistant dialog, you can access it again by clicking the Task Assistant icon on the toolbar or by clicking <b>View &gt;&gt; Task Assistant</b>.</li> </ul>

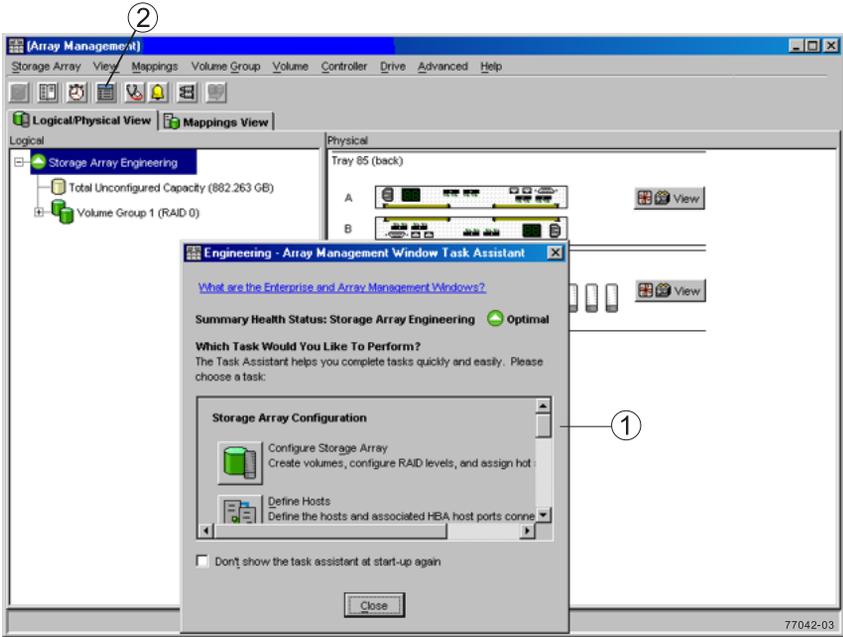
.....Enterprise Management Window (EMW) and Array Management Window (AMW)



1. Task Assistant
2. Task Assistant  
Toolbar Button

Figure 33 EMW with Task Assistant

Step 11 – Starting SANtricity Storage Manager .....



- 1. Task Assistant
- 2. Task Assistant Toolbar Button

Figure 34 AMW with Task Assistant

## Step 12 – Adding the Storage System

### Things to Know

- Make sure you have connected all appropriate cables.
- Make sure you have turned on the storage system (control module and connected drive modules).
- Make sure you have installed the appropriate storage management software and have decided on the management methods you are going to use to communicate with the storage system. (See “[Step 2 – Deciding on the Management Method](#)” on [page 7](#).)

### Steps to Add – Storage System

- 1 From the Enterprise Management Window (EMW) Task Assistant, click **Add Storage Systems**. If you do not see the Task Assistant, select **View >> Task Assistant**.

---

**NOTE** If no storage systems are currently displayed in the EMW, you will get a dialog asking whether to add the storage systems automatically or manually. Go to [step 2](#).

---

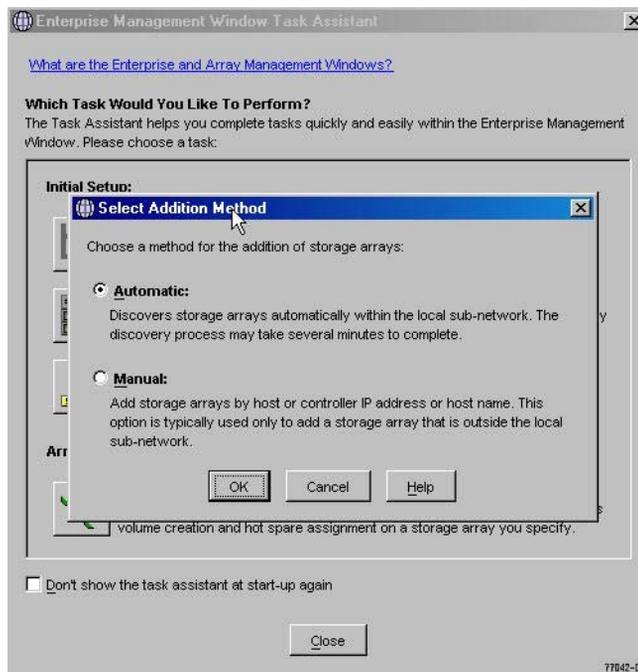


Figure 35 Select Addition Method Dialog

- 2 Choose the **Automatic Method**, and click **OK**.
- 3 In the confirmation dialog, click **OK** to begin the automatic discovery.

This process will find all storage systems on the local sub-network. It might take several minutes to complete the process.
- 4 Do you see the storage system in the EMW?
  - **Yes** – Go to [“Step 13 – Naming the Storage System”](#) on page 88.
  - **No** – Complete steps 5 through 7 (the storage system might reside outside of the local sub-network).
- 5 Click **Add Storage Systems** from the Task Assistant dialog. If you do not see the Task Assistant, select **View >> Task Assistant**.
- 6 Choose the **Manual Method**, and click **OK**.

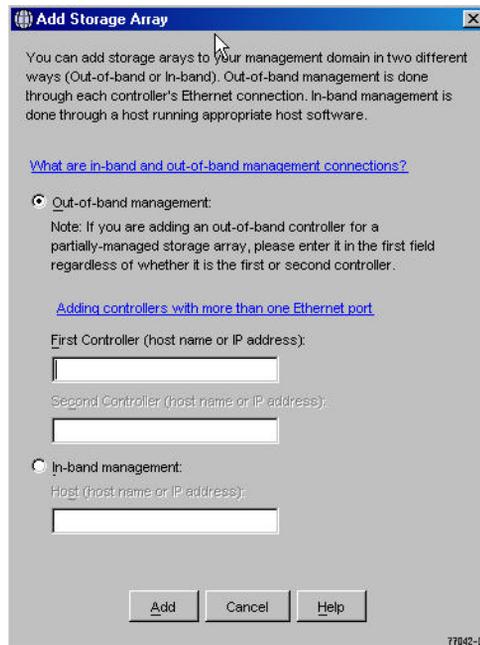


Figure 36 Add Storage System Dialog

- 7 Manually enter the IP addresses of the controllers (out-of-band management method) or the IP address of the host running the host-agent software (in-band management method), and click **Add**.

The storage system should display in the EMW.

## Step 13 – Naming the Storage System

### Things to Know

- A name can consist of letters, numbers, and the special characters underscore (\_), dash (-), and pound sign (#). No other special characters are allowed.
- When you have named a storage system, the prefix “Storage System” is automatically added to the name. For example, if you named the storage system “Engineering,” it displays as “Storage System Engineering.”
- When you first discover a storage system or manually add it, the storage system will have a default name of “unnamed.”

### Steps to Name – Storage System

- 1 From the Enterprise Management Window (EMW) Task Assistant, click **Name/Rename Storage Systems**. If you do not see the Task Assistant, select **View >> Task Assistant**.

The Name/Rename dialog is displayed.

- 2 Use the following procedure in [Table 18](#). Click Help for more information.

Table 18 Naming Storage Systems

Number of Unnamed Storage Systems	Action to Take
More than one	<ol style="list-style-type: none"> <li>1 Highlight one of the unnamed storage system, and click Locate.</li> <li>2 Find the physical storage system to make sure you correlate it to the particular storage system listed.</li> <li>3 Repeat for each unnamed storage system.</li> <li>4 Go to <a href="#">step 3</a>.</li> </ol>
One	Go to <a href="#">step 3</a> .

- 3 Highlight an unnamed storage system in the top portion of the dialog.

The current name and any comment for the storage system is displayed in the bottom portion of the dialog.

- 4 Change the name of the storage system and add a comment (such as its location).

- If you are going to name other storage systems, click **Apply** to make the change and to keep the dialog open.
- If you are not going to name any other storage systems, click **OK** to make the change and to close the dialog.

## Step 14 – Manually Configuring the Controllers

### Things to Know

---

**IMPORTANT** You only need to perform this step if you want to use the out-of-band management method *and* you do not have a DHCP server to automatically assign IP addresses for the controllers.

---

- Refer back to “[Step 2 – Deciding on the Management Method](#)” on page 7 to determine if you need to make any configuration changes to the controller.
- In general, Ethernet port 1 on each controller is used for storage management and Ethernet port 2 on each controller is used for Customer and Technical Support.
- You should configure Ethernet port 2 only if a Customer and Technical Support representative asks you to do so.
- You can configure only one of the Ethernet ports on each controller to have a gateway.
- Ethernet ports 1 and 2 must be on different sub-networks.

### Steps to Configure – Controllers

- 1 From the Enterprise Management Window (EMW) Task Assistant, click **Manage Storage System**. If you do not see the Task Assistant, select **View >> Task Assistant**.

The Select Storage Systems dialog is displayed.

- 2 Highlight the storage system you want to manage, and click **OK**.

The associated Array Management Window (AMW) is launched. Close the AMW Task Assistant if it displays.

- 3 Highlight controller A in the physical view of the AMW and select **Controller >> Change >> Network Configuration**.

- 4 Select Ethernet port 1.

- 5** Select the Specify Configuration option.
- 6** Enter in the appropriate network configuration information (IP address, sub-net mask, and gateway). You should obtain this information from your network administrator.
- 7** Select the Controller in Slot B tab, and repeat steps **3** through **6** for controller B.
- 8** Click **OK**.
- 9** Make sure the Ethernet cables from the controllers are connected into your regular network.

## Step 15 – Configuring Email and SNMP Alerts

### Key Terms

**SNMP** – Simple Network Management Protocol

**MIB** – Management Information Base

### Things to Know

- Setting alert destinations allows you to specify addresses for the delivery of email and SNMP trap messages whenever there is a critical problem with the storage system.
- You must have the event monitor running on a machine (a management station or a host) to receive alerts. The machine should be one that runs continuously.

### Steps to Set – Alert Notifications

- 1 From the Enterprise Management Window (EMW) Task Assistant, click **Configure Alerts**. If you do not see the Task Assistant, select **View >> Task Assistant**.

The Select Storage Systems dialog is displayed.

- 2 Indicate on which storage systems you want the alerts to be set, and click **OK**.
  - If you selected the **All Storage Systems** choice, the main Alerts dialog is displayed.
  - If you selected the **Individual Storage System** choice, you must first select the specific storage system and click **OK** before the main Alerts dialog is displayed.
  - If you selected the **Specific Host** choice, you must first select a host and click **OK** before the main Alerts dialog is displayed.

- 3 Specify the alerts you desire using the tabs on the dialog. Use the following information and then click **OK** when you are done setting the alerts.

#### **Mail Server Tab**

- You must specify a mail server and an email sender address if you want to set email alerts. The mail server and sender address are not required if you are setting SNMP alerts.
- The Sender Contact Information is optional. Include the information if you plan to send alerts to a Customer and Technical Support representative; otherwise, delete the fields.

#### **Email Tab**

- Enter the email addresses in standard format, such as xxx@company.com.
- If one of the email alerts you configure is for a Customer and Technical Support representative, make sure you select the **Event + Profile** or **Event + Support** choice in the Information to Send column. This additional information will aid in troubleshooting your storage system. The **Event + Support** choice includes the profile.

#### **SNMP Tab**

- To set up alert notifications using SNMP traps, you must copy and compile a management information base (MIB) file on the designated network management station.
- The SNMP trap destination is the IP address or the host name of a station running an SNMP service. At a minimum, this will be the network management station.

# Step 16 – Resolving Problems

## Steps to Resolve – Problems

If you noted any amber lights during “[Step 10 – Turning on the Power and Checking for Problems](#)” on page 76, there should be a corresponding indication in the main Enterprise Management Window (EMW).

- 1 Check the status of the storage systems in the EMW, and then use the following procedure in [Table 19](#). If the Task Assistant dialog is displayed, close it so that you can see the status.

Table 19 Resolving Problems

Storage System Status	Action to Take
Optimal	There are no problems to resolve. Go to “ <a href="#">Step 17 – Setting a Password</a> .”
Needs Attention	Go to <a href="#">step 2</a> .
Unresponsive	Refer to the EMW online help for the procedure.

- 2 From the Enterprise Management Window (EMW) Task Assistant, click **Manage Storage System**. If you do not see the Task Assistant, select **View >> Task Assistant**.

The Select Storage Systems dialog is displayed.

- 3 Highlight the storage system indicating a Needs Attention condition, and click **OK**.

The associated Array Management Window (AMW) is launched.

- 4 From the AMW Task Assistant, click **Recover From Failure** to launch the Recovery Guru. If you do not see the Task Assistant, select **View >> Task Assistant**.

- 5 Use the Recovery Guru to resolve any problems listed.

- 6** Click Re-check in the Recovery Guru to verify that no more problems exist.
- 7** If more problems exist, refer to Online Help for more information, and then call Customer and Technical Support.

## Step 17 – Setting a Password

### Things to Know

- For increased protection, use a long password with at least 15 alphanumeric characters.
- Passwords are case sensitive.
- You will be asked for a password only when you *first* attempt to change the configuration (such as creating a volume) or when you *first* perform a destructive operation (such as deleting a volume). You must exit both the AMW and EMW to be asked for the password again.
- Any type of view operation does not require a password at any time.
- If you no longer want to have the storage system password protected, enter the current password, and then leave the **New password** and **Confirm password** text boxes blank.

### Steps to Set – Password

- 1** From the Enterprise Management Window (EMW) Task Assistant, click **Manage Storage System**. If you do not see the Task Assistant, select **View >> Task Assistant**.  
The Select Storage Systems dialog is displayed.
- 2** Highlight the storage system for which you want to set a password, and click **OK**.  
The associated Array Management Window (AMW) is launched.
- 3** From the Array Management Window (AMW) Task Assistant, click **Set/Change Password**. You might have to scroll the list. If you do not see the Task Assistant, select **View >> Task Assistant**.
- 4** Follow the on screen instructions. Click the Help button for more information.

## Step 18 – Enabling Premium Features

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**IMPORTANT** If you did not obtain any premium feature key files from your storage vendor, skip this step.

---

### Key Terms

**Premium feature** – A feature that might not be available in the standard configuration of the storage management software.

### Things to Know

You enable a premium feature through a feature key file that you have obtained from your storage vendor.

### Steps to Enable – Premium Features

- 1 From the Enterprise Management Window (EMW) Task Assistant, click **Manage Storage System**. If you do not see the Task Assistant, select **View >> Task Assistant**.

The Select Storage Systems dialog is displayed.

- 2 Highlight the storage system on which you want to enable a premium feature, and click **OK**.

The associated Array Management Window (AMW) is launched. If the Task Assistant dialog is displayed, close it.

- 3 Select **Storage System >> Premium Features >> Enable**.
- 4 Specify the filename of the particular premium feature you want to enable.
- 5 Repeat steps 3 and 4 for each premium feature you want to enable.

## Step 19 – Defining Hosts

Navigation Aid	
<a href="#">“Key Terms”</a>	<a href="#">page 98</a>
<a href="#">“Things to Know – Hosts”</a>	<a href="#">page 99</a>
<a href="#">“Things to Know – Host Groups”</a>	<a href="#">page 99</a>
<a href="#">“Things to Know – Storage Partitions”</a>	<a href="#">page 100</a>
<a href="#">“Steps to Define – Hosts”</a>	<a href="#">page 104</a>

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**IMPORTANT** You must know the worldwide port names of each HBA host port. If you have not already recorded them, refer to the section [“Steps to Configure – All HBAs” on page 66](#) for the instructions to obtain these worldwide port names.

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**IMPORTANT** If you are *not* going to use storage partitions or you do not have this premium feature enabled on your storage system, you can skip the information about [“Things to Know – Host Groups”](#) and [“Things to Know – Storage Partitions”](#) on pages 99 and 100, and go to [“Steps to Define – Hosts” on page 104](#).

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### Key Terms

**Host** – A computer that is attached to the storage system and accesses various volumes on the storage system through its HBA host ports.

**Host Bus Adapter (HBA)** – A physical board that resides in the host and provides for data transfer between the host and the controllers in the storage system over the I/O host interface. Each HBA contains one or more physical ports (see HBA host port).

**HBA Host Port** – The physical connection points on the HBAs in the host for the I/O (Fibre Channel) cables. The connection can be between either (1) the host and your storage system (called a direct topology), or (2) the host and a switch (called a fabric topology).

**HBA Host Port Worldwide Port Name** – A 16-character unique name that is provided for each port on the HBA.

## Things to Know – Hosts

The HBAs in the hosts attached to the storage system are known to the storage management software. However, the software does not know which HBAs are associated with which hosts. You will use the following steps to associate each host with its specific HBAs.

## Things to Know – Host Groups

- A host group is a group (cluster) of two or more hosts that will share access, in a storage partition, to specific volumes on the storage system. This is an optional logical entity that you create in the storage management software. You need to create a host group only if you are going to use storage partitions.
- If you need to define a host group, you will have an opportunity to define it through the Define Hosts Wizard described in the following steps.

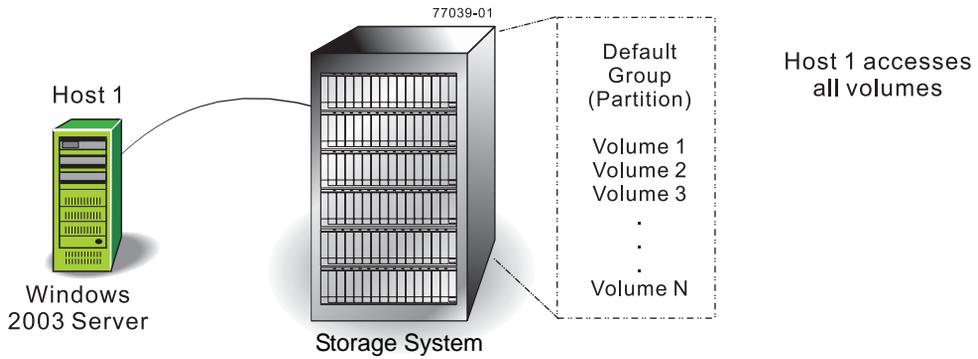
## Things to Know – Storage Partitions

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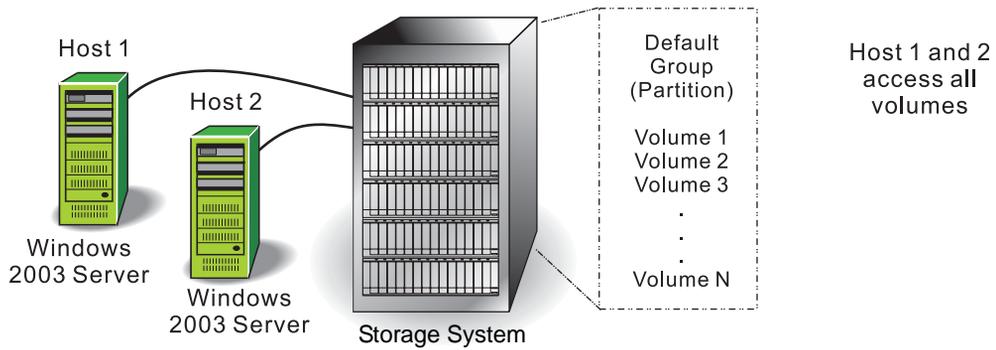
**NOTE** Refer to Figures 37 through 39 on pages 101 through 103.

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- A storage partition is a logical entity consisting of one or more volumes that can be accessed by a single host or can be shared among hosts that are part of a host group. You can think of a storage partition as a virtual storage system. That is, you take the physical storage system and divide it up into multiple virtual storage systems that you can then restrict to be accessible only by certain hosts.
- Storage partitioning is a premium feature. This feature was either already enabled on your storage system at the factory or you have to purchase a feature key file from your storage vendor to enable it.
- You do not create storage partitions in this step, but you must understand them to define your hosts.
- You *do not* need to create storage partitions if...
  - You only have one attached host that will access all the volumes on the storage system.
  - You plan to have all attached hosts share access to all the volumes on the storage system. Note that all of the attached hosts must have the same operating system (homogeneous), and you must have special software on the hosts (such as clustering software) to manage volume sharing and accessibility.
- You *do* need to create storage partitions if...
  - You want certain hosts to access only certain volumes.
  - You have hosts with different operating systems (heterogeneous) attached to the same storage system. You must create a storage partition for each type of host.

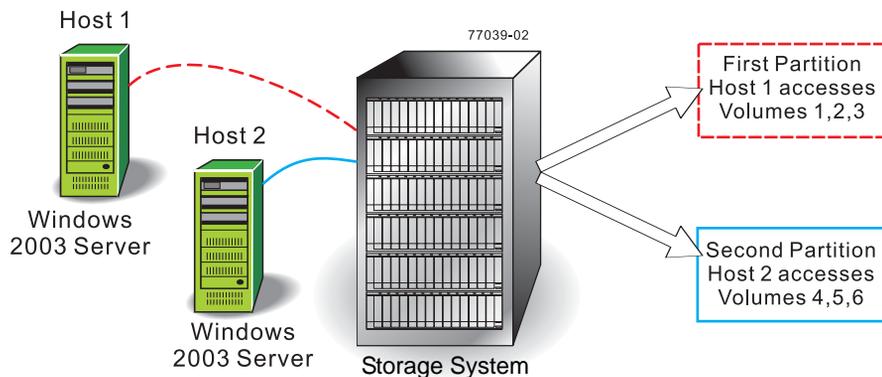


Single host accesses **all** volumes - **no** additional storage partitions needed



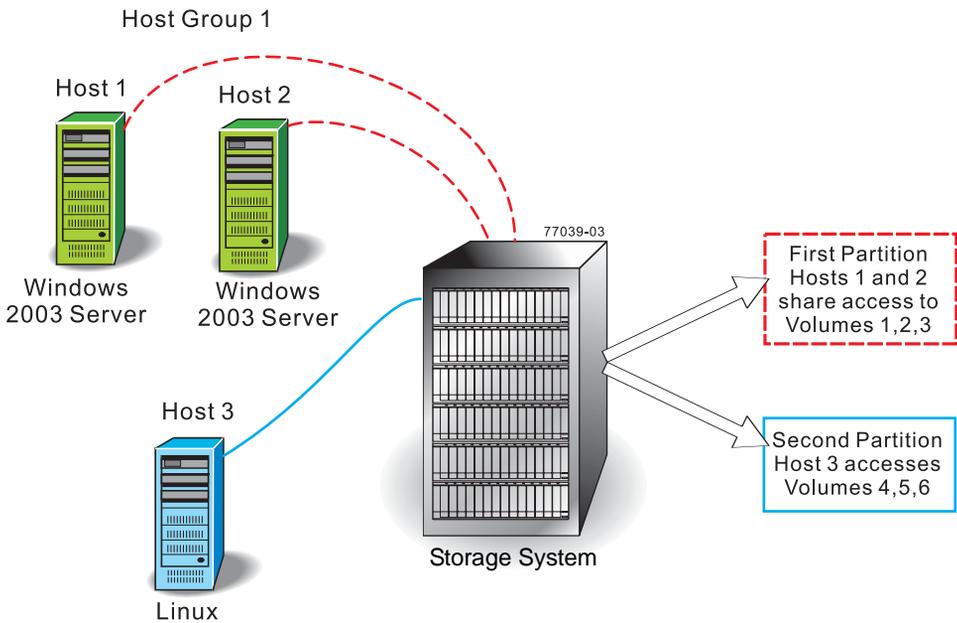
Multiple homogeneous hosts share access to **all** volumes - **no** additional storage partitions needed and no specific host group is needed

Figure 37 Example of No Additional Storage Partitions Required



- Each host needs access to specific volumes.
- Both hosts are the same operating system (homogeneous)
- Storage divided into two logical storage partitions.
- Default group (partition) is not used.

Figure 38 Example of Additional Storage Partitions Required (Homogeneous Hosts)



- Hosts 1 and 2 (Windows 2003) share access to specific volumes through host group 1.
- Heterogeneous hosts (Linux and Windows 2003).
- Host 3 (Linux) accesses specific volumes.
- Storage divided into two logical storage partitions.
- Default group (partition) is not used.

Figure 39 Example of Additional Storage Partitions Required (Heterogeneous Hosts)

## Steps to Define – Hosts

- 1 From the Enterprise Management Window (EMW) Task Assistant, click **Manage Storage System**. If you do not see the Task Assistant, select **View >> Task Assistant**.

The Select Storage Systems dialog is displayed.

- 2 Highlight the storage system on which you want to define a host, and click **OK**.

The associated Array Management Window (AMW) is launched.

- 3 From the AMW Task Assistant, click **Define Hosts**. If you do not see the Task Assistant, select **View >> Task Assistant**.

- 4 Use the on-screen instructions and online help to define your hosts and associate the HBA host ports. This procedure also will, if needed, allow you to define a host group.

## Step 20 – Configuring Storage

Navigation Aid	
“Key Terms”	page 105
“Things to Know – Allocating Capacity”	page 107
“Things to Know – Volume Groups and Volumes”	page 108
“Things to Know – Host-to-Volume Mappings and Storage Partitions”	page 108
“Things to Know – Hot Spare Drives”	page 109
“Steps to Configure – Storage”	page 109

### Key Terms

**Unconfigured capacity** – Capacity available on the unassigned drives in the storage system. The unconfigured capacity is what you use to configure the unassigned drives into volume groups.

**Free capacity** – The remaining capacity (if any) on an existing volume group. You can create additional volumes using any remaining free capacity on a volume group. Free capacity is available in three situations: (1) whenever you do not create a volume that uses all of the volume group's overall available capacity, (2) you delete an existing volume, or (3) you add additional drives to an existing volume group.

**RAID level** – A redundancy protection scheme that describes how the controllers in the storage system will read and write data and redundancy on the drives. The RAID level is an attribute of a volume group. RAID levels supported are 0, 1, 3, 5, and 10 (1+0).

**Volume group** – A set of unassigned drives that you logically group together and assign a RAID level. Each volume group you create provides the overall capacity needed to create one or more volumes.

**Volume** – The logical structure you create for the host to access storage on the storage system. A volume is created from the capacity available on a volume group. A volume, even though it normally consists of multiple physical drives, appears as one logical drive to the host.

**Hot spare drive** – A hot spare drive contains no data and acts as a standby in case a drive fails in a RAID 1, 3, or 5 volume group.

**Storage Partition** – A logical entity consisting of one or more volumes that can be accessed by a single host or can be shared among hosts that are part of a host group. Think of a storage partition as a virtual storage system. That is, you take the physical storage system and divide it up into multiple virtual storage systems that you can then restrict to be accessible only by certain hosts (see Figures 37 through 39 on pages 101 through 103 in “Step 19 – Defining Hosts” for more details).

**Default Group (Partition)** – A standard node in the Mappings View of the storage management software that designates any host groups, hosts, and host ports that you have not assigned into a specific storage partition. If you do not have the Storage Partitions feature enabled or do not divide up your storage into storage partitions, all volumes will be mapped into the default group.

## Things to Know – Allocating Capacity

- You create volumes from either (1) an unconfigured capacity or (2) a free capacity on an existing volume group.
  - If you create a volume from unconfigured capacity, you first specify the parameters for a new volume group (RAID level and capacity for a set of drives) before specifying the parameters for the first volume on the new volume group.
  - If you create a volume from free capacity, you only have to specify the parameters of the volume, because the volume group already exists.
- As you are configuring the capacity on the storage system, make sure you leave some unassigned drives available. You might need to use these drives for the following reasons:
  - To create additional volume groups for new capacity requirements
  - For hot spare drive protection
  - To increase the free capacity on an existing volume group to provide for future capacity needs
  - For additional storage required for certain premium features (such as snapshot volumes)
- If your storage system contains more than one type of drive (such as Fibre Channel and SATA), there will be an unconfigured capacity node associated with each drive type. Drives of different types cannot be mixed within the same volume group.

## Things to Know – Volume Groups and Volumes

- You can create a single volume or multiple volumes per volume group. Normally, you will create more than one volume per volume group to address different data needs or because of limits on the maximum capacity of a single volume.
- The RAID levels supported are 0, 1, 3, 5, and 10 (1 + 0).
  - RAID 0 provides no data redundancy.
  - RAID 10 is not a separate RAID level choice but is supported when you create a RAID 1 volume group consisting of four or more drives.

## Things to Know – Host-to-Volume Mappings and Storage Partitions

- Every volume that you create needs to be mapped to a logical address called a logical unit number (LUN). The host uses this address to access data on the volume.
- When you create a volume manually, you are given two choices for mapping:
  - **Default mapping** – Choose this option if you *do not* intend to use storage partitions. The software will automatically assign a LUN to the volume and make the volume available to all hosts attached to the storage system in the default group (partition).
  - **Map later (assign specific mapping)** – Choose this option if you intend to use storage partitions. You will use the Define Storage Partition Wizard to (1) indicate the host group or host, (2) specify the volumes you want the host group or host to access, and (3) the LUNs to assign to each volume.

## Things to Know – Hot Spare Drives

- The hot spare drive adds another level of redundancy to your storage system. It is highly recommended that you create hot spare drives for each type of drive in your storage system.
- Hot spare drives do *not* provide protection for RAID 0 volume groups because there is no data redundancy on these volume groups.
- A hot spare drive is *not* dedicated to a specific volume group but instead is global, meaning that it will be used for any failed drive in the storage system. The failed drive must be the same drive type and capacity (equal or smaller) as the particular hot spare drive.

## Steps to Configure – Storage

- 1 From the Enterprise Management Window (EMW) Task Assistant, click **Manage Storage System**. If you do not see the Task Assistant, select **View >> Task Assistant**.

The Select Storage Systems dialog is displayed.

- 2 Highlight the storage system on which you want to configure storage, and click **OK**.

The associated Array Management Window (AMW) is launched.

- 3 From the AMW Task Assistant, click **Configure Storage System**. If you do not see the Task Assistant, select **View >> Task Assistant**.

**4** Choose the appropriate configuration method:

- **Automatic configuration** – This method creates volume groups with equal-sized capacity volumes and also automatically assigns appropriate hot spare drive protection.
  - Use this method if you do not have unique capacity requirements for each volume or you want a quick method to configure volume groups, volumes, and hot spare drives.
  - You can choose from a list of suggested configurations or you can create your own custom configuration.
- **Manual configuration** – This method gives you more control over the configuration.
  - **Create individual volumes** – This method creates one volume at a time but gives you more control over the volume group and volume parameters (such as RAID level, volume group and volume capacity, etc.). Use this method if you have unique capacity requirements for most of the volumes you will create and you want more control in specifying various parameters.
  - **Assign hot spare drives** – This method allows you either to have the software automatically assign appropriate hot spare protection (identical to the automatic configuration method described previously) or to manually create a hot spare drive from an unassigned drive that you select.

- 5 Use [Table 20](#), the on-screen instructions, and the online help to create the volume groups, volumes, and hot spare drives.

Table 20 Volume Configuration

Did you choose Automatic or Manual Volume Configuration?	Are you going to use Storage Partitions?	Then...
Automatic	No	<ol style="list-style-type: none"> <li>1 Select <b>View &gt;&gt; Task Assistant</b>, and click <b>Map Additional Volumes</b>.</li> <li>2 Select the default group, and assign each volume a logical unit number (LUN).</li> <li>3 Go to <a href="#">step 6 on page 112</a>.</li> </ol>
	Yes	<ol style="list-style-type: none"> <li>1 Select <b>View &gt;&gt; Task Assistant</b>, and click <b>Create New Storage Partitions</b>.</li> <li>2 Specify the appropriate host or host group, volumes, and LUNs.</li> <li>3 Repeat steps 1 and 2 for each storage partition.</li> <li>4 Go to <a href="#">step 6 on page 112</a>.</li> </ol>
Manual	No	<p>During the volume creation, you should have selected the Default Mapping option so that all volumes are mapped into the default group.</p> <p>Go to <a href="#">step 6 on page 112</a>.</p>
	Yes	<ol style="list-style-type: none"> <li>1 Select <b>View &gt;&gt; Task Assistant</b>, and click <b>Create New Storage Partitions</b>.</li> <li>2 Specify the appropriate host or host group, volumes, and LUNs.</li> <li>3 Repeat steps 1 and 2 for each storage partition.</li> <li>4 Go to <a href="#">step 6 on page 112</a>.</li> </ol>

- 6 After you have created all volumes and mappings, use the appropriate procedures on your hosts to register the volumes and to make them available to your operating system.
  - Depending on your operating system, there are two utilities that are included with the storage management software (`hot_add` and `smdevices`). These utilities help register the volumes with the hosts and also display the appropriate device names for the volumes.
  - You also will need to use specific tools and options provided with your operating system to make the volumes available (that is, assign drive letters, create mount points, etc.). Refer to your host operating system documentation for details.
  - If you are using HP-UX, you must run the following command on each host to change the I/O timeout value to 120 seconds for each block device (volume) that you created on the storage system.

```
pvchange -t 120 /dev/dsk/cxtxdx
```

where `cxtxdx` is the device name of each volume.

**NOTE** If you reboot your host, you must run this command again.

## **Regulatory Compliance Statements**

### **FCC Radio Frequency Interference Statement**

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the Federal Communications Commission (FCC) Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.

LSI Logic Corporation, and Sun Microsystems, Inc. are not responsible for any radio or television interference caused by unauthorized modification of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by LSI Logic and Sun. It is the user's responsibility to correct interference caused by such unauthorized modification, substitution, or attachment.

### **Laser Products Statement**

This equipment uses Small Form-factor Pluggable (SFP) optical transceivers, which are unmodified Class 1 laser products pursuant to 21 CFR, Subchapter J, Section 1040.10. All optical transceivers used with this product are required to be 21 CFR certified Class 1 laser products. For outside the USA, this equipment has been tested and found compliant with Class 1 laser product requirements contained in European Normalization standard EN 60825-1 1994+A11. Class 1 levels of laser radiation are not considered to be hazardous and are considered safe based upon current medical knowledge. This class includes all lasers or laser systems which cannot emit levels of optical radiation above the exposure limits for the eye under any exposure conditions inherent in the design of the laser products.

LSI Logic and Sun are not responsible for any damage or injury caused by unauthorized modification of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by LSI Logic and Sun. It is the user's responsibility to correct interference caused by such unauthorized modification, substitution, or attachment.

*This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.*

*Cet appareil numérique de la classé A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.*

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