



# Sun StorEdge™ 6120 Array Installation Guide

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# Preface

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This document describes how to install a Sun StorEdge™ 6120 array and array high availability (HA) configurations.

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## Before You Read This Book

Before you begin the installation, you should have a general understanding of the Sun StorEdge 6120 array and the type of configuration that you want to install. Be sure to read the *Sun StorEdge 6120 Array Regulatory and Safety Compliance Manual* for important safety information before handling array hardware. See Chapter 1 of this document for specific things to do and be aware of before the installation.

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# How This Book Is Organized

This document is organized in the order of the installation procedures you must follow to ensure a successful Sun StorEdge 6120 array or HA installation. See the Table of Contents in this document for specific information for each chapter.

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# Using UNIX Commands

This document might not contain information on basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices.

See one or more of the following for this information:

- *Solaris Handbook for Sun Peripherals*
- AnswerBook2™ online documentation for the Solaris™ operating system
- Other software documentation that you received with your system

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# Typographic Conventions

Typeface*	Meaning	Examples
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. % You have mail.
<b>AaBbCc123</b>	What you type, when contrasted with on-screen computer output	% <b>su</b> Password:
<i>AaBbCc123</i>	Book titles, new words or terms, words to be emphasized. Replace command-line variables with real names or values.	Read Chapter 6 in the <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be superuser to do this. To delete a file, type <code>rm filename</code> .

\* The settings on your browser might differ from these settings.

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# Shell Prompts

Shell	Prompt
C shell	<i>machine-name%</i>
C shell superuser	<i>machine-name#</i>
Bourne shell and Korn shell	\$
Bourne shell and Korn shell superuser	#
Sun StorEdge 6120 array	:/:

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## Related Documentation

<b>Application</b>	<b>Title</b>	<b>Part Number</b>
Installation and documentation reference	<i>Sun StorEdge 6120 Array Start Here</i>	817-0198
Late-breaking information	<i>Sun StorEdge 6120 Array Release Notes</i>	817-0201
	<i>Storage Automated Diagnostic Environment 2.2 Device Edition Release Notes</i>	817-0823
	<i>Sun StorEdge SAN Foundation 2.2 Release Notes</i>	817-1246
	<i>Sun StorEdge Traffic Manager Software Release Notes</i>	817-0385
Preparation	<i>Sun StorEdge 6120 Array Site Preparation Guide</i>	817-0960
Safety requirements	<i>Sun StorEdge 6120 Array Regulatory and Safety Compliance Manual</i>	817-0961
Install procedures	<i>Sun StorEdge 6120 Array Installation Guide</i>	817-0199
	<i>Sun StorEdge 6000 Family Host Installation Software Guide</i>	817-1739
Overview, service, reference, and CLI administration	<i>Sun StorEdge 6120 Array System Manual</i>	817-0200
Array management and configuration	<i>Sun StorEdge Configuration Service online help</i>	n/a
	<i>Sun StorEdge Configuration Service SCS (1M) man page</i>	n/a
Troubleshooting and diagnostics	<i>Storage Automated Diagnostic Environment 2.2 User's Guide -- Device Edition</i>	817-0822
Cabinet information	<i>Sun StorEdge Expansion Cabinet Installation and Service Manual</i>	805-3067

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Please include the title and part number of your document with your feedback:

*Sun StorEdge 6120 Array Installation Guide*, part number 817-0199-10



# Preparing for the Installation

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This chapter is divided into the following sections:

- “Before You Begin” on page 1
- “Sun StorEdge 6120 Array Overview” on page 2
- “System Requirements” on page 3
- “Tools Required” on page 5
- “Unpacking the Array” on page 6
- “Installation Checklist” on page 7

---

## Before You Begin

Before you install a Sun StorEdge 6120 array or array HA configuration, do the following:

- Read the *Sun StorEdge 6120 Array Release Notes* for late-breaking information that might affect the installation.
- Determine the Sun StorEdge 6120 array configuration and setup that you want to install. For information about supported Sun StorEdge 6120 array configurations, refer to the “Hardware Configuration” section of the *Sun StorEdge 6020 and 6120 Arrays System Manual*.
- Prepare the installation site as described in the *Sun StorEdge 6120 Array Site Preparation Guide*.
- Read the *Sun StorEdge 6120 Array Regulatory and Safety Compliance Manual* for important safety information that you must know before handling array hardware.

- Obtain all the equipment necessary to complete the installation, such as additional cabling or adapters. Refer to the *Sun StorEdge 6020 and 6120 Arrays System Manual* or contact a Sun sales representative to help you determine your configuration needs for additional hardware and software.

After you read this information and determine your configuration, return to this document for step-by-step installation instructions.

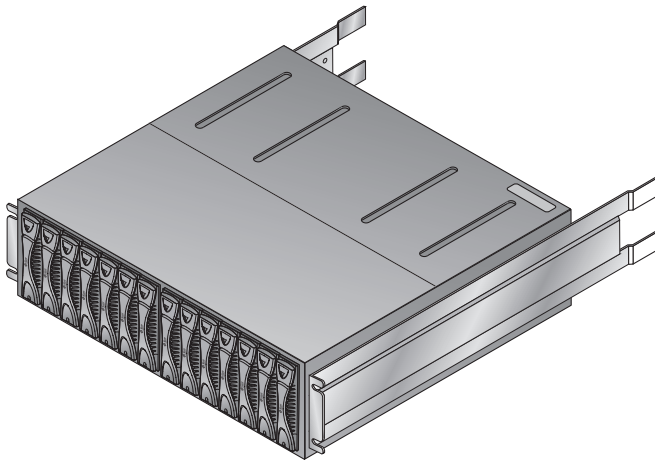
---

## Sun StorEdge 6120 Array Overview

This section contains a brief summary of the Sun StorEdge 6120 array and Sun StorEdge 6120 array HA configurations. For a comprehensive description, refer to the *Sun StorEdge 6020 and 6120 Arrays System Manual*.

### Sun StorEdge 6120 Array

The Sun StorEdge 6120 array is a high-performance, modular, scalable storage device that contains an internal RAID controller and up to 14 disk drives. The array can be installed in a server or expansion cabinet. FIGURE 1-1 shows the Sun StorEdge 6120 array with rackmount brackets.



**FIGURE 1-1** Sun StorEdge 6120 Array with Rackmount Brackets



You can also attach *expansion units*, which are array units that do not contain controllers, to existing Sun StorEdge 6120 arrays that have controllers. The naming convention used in this configuration is “controller x trays” (controller by trays). The Sun StorEdge 6120 array supports the following single-controller configurations:

- **Sun StorEdge 6120 array, 1x1 configuration:** A standalone controller unit (one controller, one tray)
- **Sun StorEdge 6120 array, 1x2 configuration:** One controller unit connected to one expansion unit (one controller, two trays)
- **Sun StorEdge 6120 array, 1x3 configuration:** One controller unit connected to two expansion units (one controller, three trays)

Sun StorEdge 6120 array single-controller configurations are shown in Chapter 4.

## Sun StorEdge 6120 Array HA configuration

The Sun StorEdge 6120 array HA configuration is a fully redundant array configuration in which two controller units are paired using interconnect cables for back-end data and administrative connections.

You can also attach *expansion units*, which are array units that do not contain controllers, to existing Sun StorEdge 6120 array that have controllers. The naming convention used in this configuration is “controller x trays” (controller by trays). The Sun StorEdge 6120 array supports the following HA configurations:

- **Sun StorEdge 6120 array, 2x2 HA configuration:** Two interconnected controller units (two controllers, two trays)
- **Sun StorEdge 6120 array, 2x4 HA configuration:** Two interconnected controller units and two expansion units (two controllers, four trays)
- **Sun StorEdge 6120 array, 2x6 HA configuration:** Two interconnected controller units and four expansion units

Sun StorEdge 6120 array HA configurations are shown in Chapter 4.

---

## System Requirements

Supported array software and systems are detailed in the following sections:

- “Supported Hardware” on page 4
- “Supported Software” on page 4

# Supported Hardware

The following hardware platforms support Sun StorEdge 6120 array and array HA configurations:

- Ultra™ 60 and 80 workstations
- Sun Blade™ 150, 1000, and 2000 workstations
- Sun Enterprise™ 220R, 250, 420R, and 450 servers
- Sun Enterprise 3x00, 4x00, and 6x00 servers
- Sun Enterprise 10000 server
- Sun Fire™ 3800, 4800, 4810, and 6800 servers
- Sun Fire V100, V120, V210, V240, 280R, V880, V1280 servers
- Sun Fire 12000 and 15000 servers
- Sun Fire Lx50 servers
- Netra™ 20 and 120 servers
- Netra t 1100, 1120, 1125, 1200, 1400, and 1405 servers
- Intel Pentium III, IV, IA-64 to 32 CPUs
- HP 9000, rp8XXX, rp5000
- IBM RS6000

# Supported Software

The following software operating environments support the Sun StorEdge 6120 array:

- Solaris 8 operating system, 04/01 release and above
- Solaris 9 operating system, update 1 and above
- Microsoft Windows NT Server 4.0 SP6—single-path and multipath support
- Microsoft Windows 2000 Advanced Server SP3—single-path and multipath support
- HP-UX 11.0 and 11.i— single-path and multipath support
- IBM AIX 4.3.3 (32-bit support) and 5.1 (both 32- and 64-bit support)—single-path and multipath support
- Red Hat Linux 7.2—single-path support

The following software supports the Sun StorEdge 6120 array:

- Sun StorEdge SAN Foundation software, release 4.2<sup>1</sup>
- Sun StorEdge Performance Suite software (QFS 4.0 or higher)
- Sun StorEdge Utilization Suite software (SAM-FS 4.0 or higher)
- Sun StorEdge Availability Suite software

---

1. Software included in the Sun StorEdge 6000 Family Host Installation Software package

- Sun StorEdge Resource Manager software
- Sun StorEdge Enterprise Storage Manager software
- Sun StorEdge Instant Image software, 2.0 or higher
- Sun StorEdge Network Data Replicator software, 2.0 or higher
- Sun StorEdge Traffic Manager software<sup>1</sup>
- Sun StorEdge Configuration Service<sup>1</sup>
- Solaris Volume Manager software
- Sun Cluster 3.0 software (with Solstice DiskSuite™ software)
- Sun Cluster 3.1 software (with Solstice DiskSuite™ software and VERITAS Volume Manager 3.5)
- Sun StorEdge Enterprise Backup Software
- Solstice DiskSuite software, version 4.2 and higher
- Sun StorEdge Data Management Center software, version 3.0 or higher
- Storage Automated Diagnostic Environment 2.2, Device Edition<sup>1</sup>
- VERITAS Volume Replicator x.x (HP-UX 11.0 and 11i, IBM AIX 5.1, Microsoft Windows 2000)
- VERITAS Storage Replicator (Microsoft Windows NT, Microsoft Windows 2000)
- VERITAS File System 3.5
- VERITAS Volume Manager 3.5 with Dynamic Multipathing (DMP) support
- VERITAS Cluster Server 1.3 or higher
- VERITAS NetBackup software, version 3.4 or higher
- Legato NetWorker® software
- Oracle Parallel Server

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## Tools Required

A No. 2 Phillips screwdriver is required for installing the array into a cabinet and for removing and replacing components. No other tools are required.

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# Unpacking the Array



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**Caution** – This procedure requires two people to lift and move the array. Use care to avoid injury. An array can weigh up to 90 pounds (41 kg).

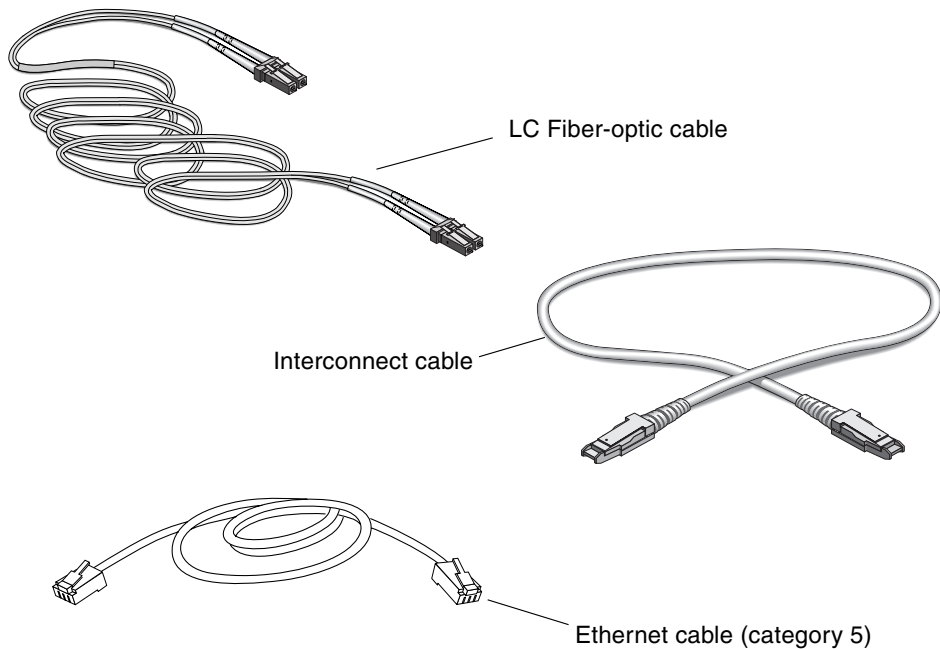
---

## 1. Unpack the array.

The following items are shipped with the array:

- Sun StorEdge 6120 array with rackmount brackets pre-installed
- Product documentation:
  - *Start Here—Installation and Documentation Reference*
  - *Important Safety Information for Sun Hardware Systems*
- One 5m fiber-optic cable
- One category-5 shielded Ethernet cable
- One interconnect cable

The cables are illustrated in FIGURE 1-2.



**FIGURE 1-2** Sun StorEdge 6120 Array Cables

## 2. Unpack the rackmount kit.

The following items are shipped with the rackmount kit:

- Two cabinet rails
- Eight mounting screws for cabinet rails
- Eight mounting screws for the array
- Cabinet trim strips

## 3. Inspect the array for evidence of damage.

If the array is damaged, keep all contents and packing materials for the shipping company's agent to inspect.

## 4. Save the packing materials for future use.

---

# Installation Checklist

To assist your installation have a diagram of the lab and network configuration available. Obtain the information in TABLE 1-1 before installing the array.

**TABLE 1-1** Installation Checklist

Item	Information	Notes
Data host information		Host connected to array by way of Fibre Channel
Management host information		Host connected to array by way of Ethernet/local area network (LAN)
Gateway IP address		Provided by system administrator
Gateway netmask		Provided by system administrator
Array IP address		Provided by system administrator

**TABLE 1-1** Installation Checklist (*Continued*)

<b>Item</b>	<b>Information</b>	<b>Notes</b>
Array name		Can be any name you assign to array master controller unit
Array MAC address		See "Establishing an IP and MAC Address on the Host" on page 10 for MAC address location on array.
root password for array		Defined by system administrator and assigned to array after it is installed

## Preparing the Data Host

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This chapter is divided into the following sections:

- “Installing Host Bus Adapters” on page 9
- “Establishing an IP and MAC Address on the Host” on page 10

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## Installing Host Bus Adapters

The Fibre-Channel connection between the Sun StorEdge 6120 array and the application host requires a host bus adapter (HBA) on the host side. The following HBAs support this Fibre Channel connection:

- 2 Gb HBAs
  - Sun StorEdge 2Gb PCI Single Fibre Channel Network Adapter
  - Sun StorEdge 2Gb PCI Dual Fibre Channel Network Adapter
- 1 Gb HBAs
  - Sun StorEdge PCI Single Fibre Channel Network Adapter
  - Sun StorEdge PCI Dual Fibre Channel Network Adapter
  - Sun StorEdge cPCI Dual Fibre Channel Network Adapter
  - Sun StorEdge Sbus Dual Fibre Channel Network Adapter

You must install all necessary HBAs on the host before you can cable the array. If you are installing a Sun StorEdge 6120 array HA configuration, you must install two host bus adapters, one for each controller unit. To install the HBA, refer to the specific installation instructions for the HBA you are installing, located in the HBA documentation, which can be found on the Sun documentation web site listed in the Preface of this book.

---

# Establishing an IP and MAC Address on the Host

This procedure enables the management host or any host connected on the same LAN to download the assigned array IP address. To enable this feature, you must edit your host file before cabling the array. After you cable the array and power on, the IP address is automatically assigned. Before you begin, make sure you have the following information:

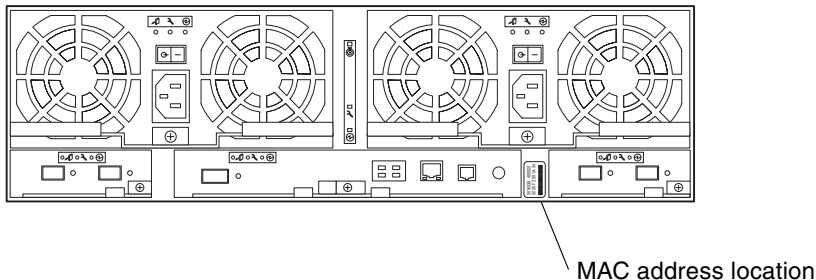
- **MAC address.** A label on the back of the Sun StorEdge 6120 array contains the MAC address and serial number for the array (FIGURE 2-1).
  - The serial number is preceded by “s/n” on the label.
  - The MAC address is the other alphanumeric string on the label.

---

**Note –** The MAC address format includes the colon (:) character between every one or two digits. If the MAC address label on your array does not show the colon characters within the string, insert a colon into the alphanumeric string starting from the right, after every two characters. For example, 0003ba27d15e would be 00:03:ba:27:d1:5e.

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- **IP address.** For this information, contact the person who maintains your network.
- **Array name.** This is the user-assigned name of the array you are installing.



**FIGURE 2-1** MAC Address Location



---

**Note** – If you are installing an HA configuration, you need the MAC address that will be assigned only to the master controller unit (also called *master unit*). In an HA configuration, this is the array that is located on the bottom. In Step 1, enter the MAC address for the master unit. When you install the array in the next section, make sure that the master unit is placed on the bottom of the configuration.

Do *not* use the MAC address of the array that you are placing on the top. In an HA configuration, the array that is placed in a position above the master controller unit is referred to as the *alternate master controller unit*.

---

To set the network IP address for the array:

1. **On a host or server connected to the same subnet as the array, edit the `/etc/ethers` file by adding the MAC address and array name.**

For example:

```
08:00:20:7d:93:7e array-name
```

In this example:

- `08:00:20:7d:93:7e` is the MAC address.
- `array-name` is the name of the array you are installing.

2. **Add the IP address and array name to the `/etc/hosts` file on the data host.**

For example:

```
192.xxx.xxx.xxx array-name
```

In this example, `192.xxx.xxx.xxx` is the assigned IP address.

3. **Verify that the `/etc/nsswitch.conf` file is set to reference the local system files.**

To ensure that the Solaris operating system uses the changes made to the `/etc/ethers` and `/etc/hosts` files, the `host` and `ethers` entries in the `/etc/nsswitch.conf` must be set so that the `files` parameter appears before the `[NOTFOUND=return]` statements. If this is not the case, edit the `/etc/nsswitch.conf` file as follows:

```
hosts: files nis [NOTFOUND=return]
ethers: files nis [NOTFOUND=return]
```

4. Determine whether the reverse address resolution protocol (`rarp`) daemon is running by typing:

```
# ps -eaf | grep rarpd
```

- If the `rarp` daemon is running, you must kill the process and restart it for the host to recognize the changes you just made. To kill the process, type:

```
# kill process ID
```

The process ID was provided in the output of the `ps -eaf | grep rarpd` command.

- If the `rarp` daemon is not running, proceed to the next step.

5. Start the `rarp` daemon in the Solaris operating system by typing:

```
# /usr/sbin/in.rarpd -a &
```

The IP address will automatically download to the array after you install the array and power on.

---

**Note** – In some cases, the array could time out before it receives the `rarp` request through an Ethernet switch. If this happens, the array cannot receive the assigned IP address. If this happens, it could be due to an improper spanning-tree setting of the Ethernet switch. Refer to your switch vendor documentation for information on spanning-tree settings and how to change them. Changing this setting properly will enable the array to receive the `rarp` request before timing out.

---

## Installing an Array in a Cabinet

---

This chapter describes how to install a Sun StorEdge 6120 array in a Sun StorEdge or Sun Fire Expansion Cabinet. It is divided into the following sections:

- “Array Rackmount Kit” on page 13
- “Installation Guidelines” on page 14
- “Cabinet Installation” on page 17

---

### Array Rackmount Kit

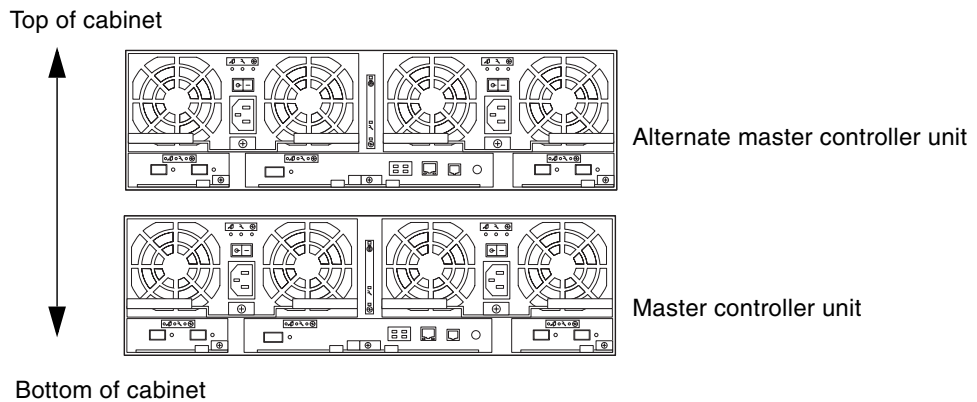
To install the array in a cabinet, you must order the Sun StorEdge 6120 array with the rackmount kit.

The rackmount hardware is 3 rack units (RUs) high. A total of 10 arrays can be installed in an empty Sun StorEdge Expansion Cabinet.

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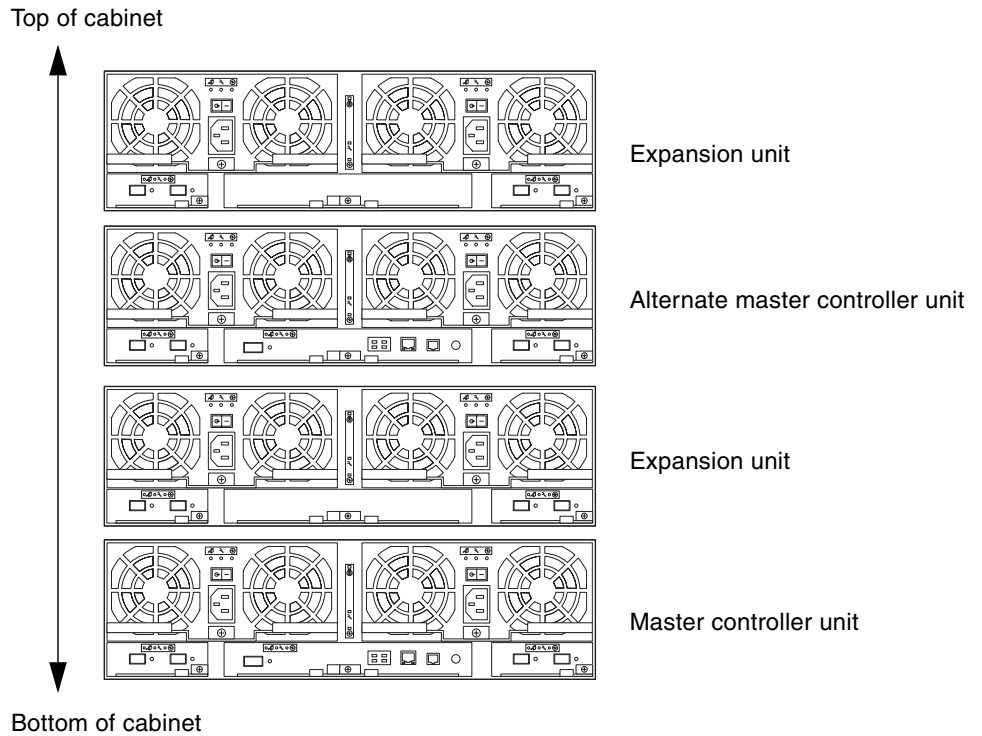
# Installation Guidelines

- Install the array in the first empty slot at the bottom of the cabinet. If you are installing more than one array, continue installing arrays from the bottom up.
- If you are installing a 2x2 HA configuration, install the master controller unit in the lowest empty slot available, and install the alternate master controller unit in the next slot up as shown in FIGURE 3-1. Install all array 2x2 HA configurations in this order.



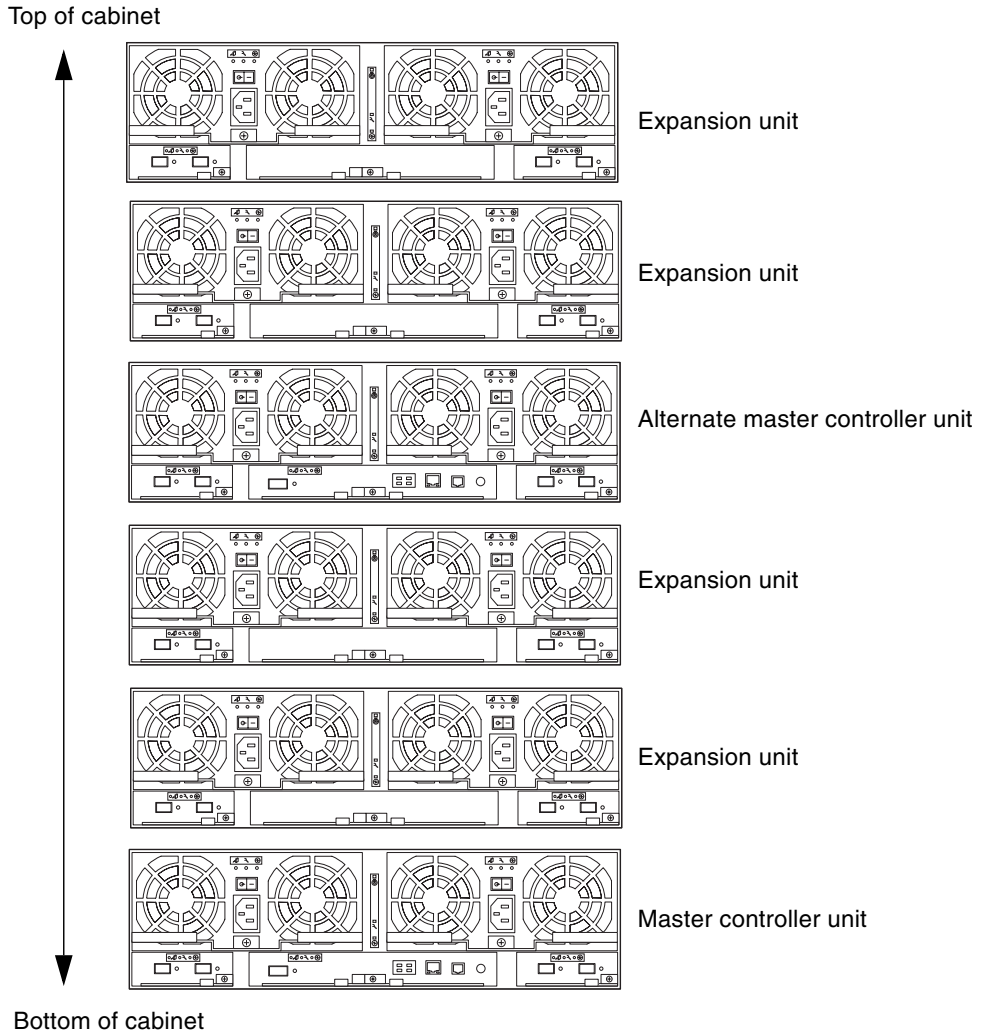
**FIGURE 3-1** Array Positions in a 2x2 HA Configuration

- For array 2x4 HA configurations, install controller units and expansion units in the order shown in FIGURE 3-2.



**FIGURE 3-2** Array Positions in a 2x4 HA Configuration

- For array 2x6 HA configurations, install controller units and expansion units in the order shown in FIGURE 3-3.



**FIGURE 3-3** Array Positions in a 2x6 HA Configuration

- Use two people to lift and slide the array in the cabinet.



**Caution** – This procedure requires two people to lift and move the array. Use care to avoid injury. An array can weigh up to 90 pounds (41 kg)

---

# Cabinet Installation

## **1. Prepare the cabinet for the installation.**

Refer to the cabinet documentation for specific instructions.

**a. Extend the stabilizer legs.**

**b. Stabilize the cabinet as described in the cabinet documentation.**

If the cabinet has casters, make sure the casters are locked to prevent the cabinet from rolling.

**c. Remove or open the top front panel.**

**d. Remove or open the vented rear panel.**

**2. Place the left side rail in the cabinet at the first empty position from the bottom. Align the open-slotted holes at the top of the rail with the open slots in the cabinet (FIGURE 3-4).**

**3. Loosely thread two mounting screws into the top two holes of the cabinet rails.**

Be careful not to select the wrong holes, which would misalign the side rails.

4. Install two mounting screws in the bottom rail holes.

Tighten all screws.

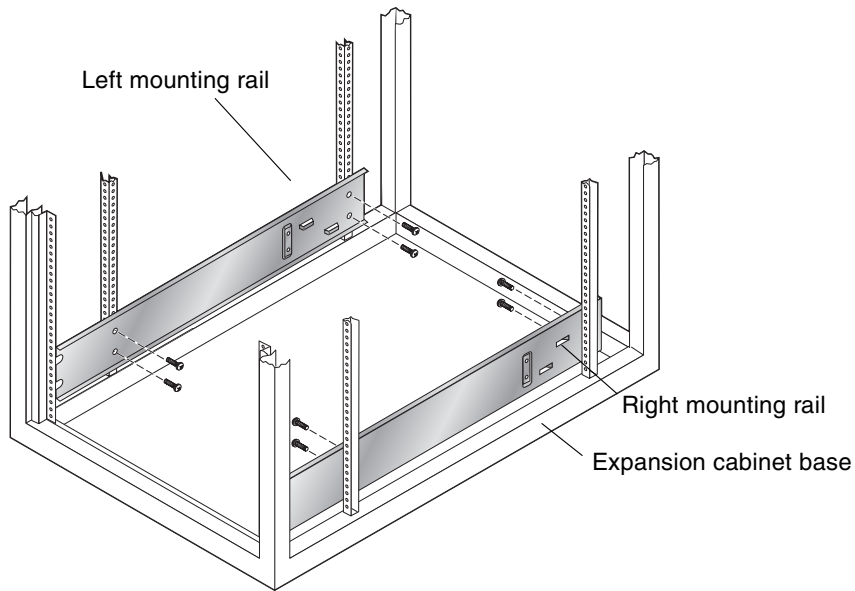


FIGURE 3-4 Attaching a 3-RU Side Rail and Threading the Screws

5. Repeat Step 2 through Step 4 for the right side rail.



---

**Caution** – For Step 6, use two people to lift and move the array. Use care to avoid injury. An array can weigh up to 90 pounds (41 kg)

---



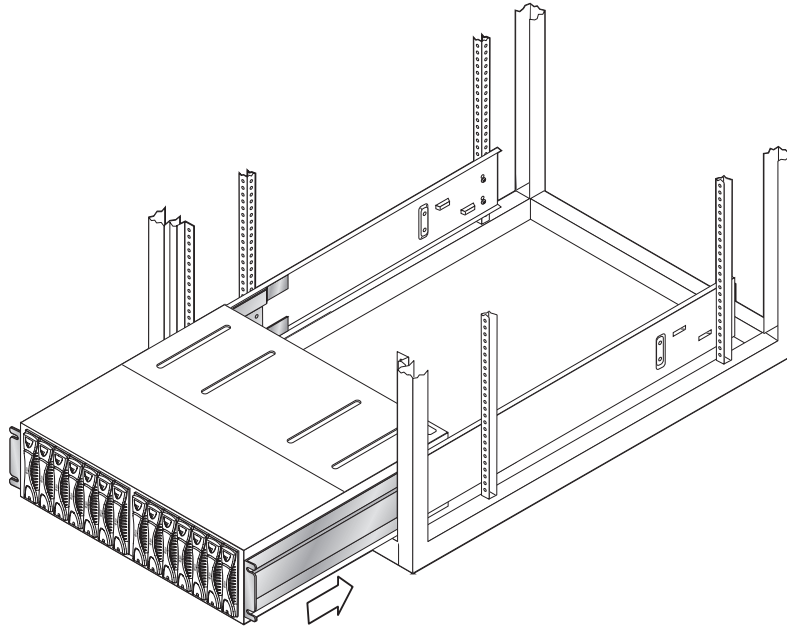
---

**Caution** – The cabinet can become front-heavy while an array is being installed. Unless your cabinet is bolted to the floor, ensure that the stabilizer legs are extended before proceeding. Failure to extend the legs can result in the cabinet tipping forward and injuring personnel.

---



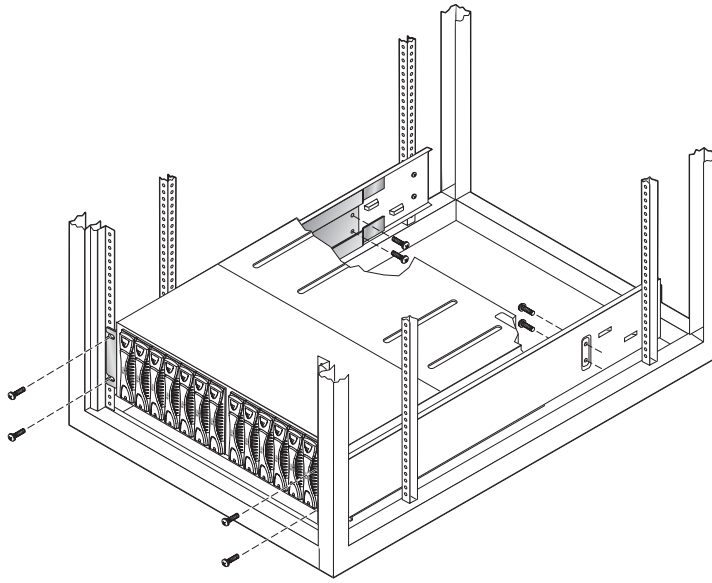
6. Lift the array and align the forked ends of the array brackets with the cabinet side rails (FIGURE 3-5).



**FIGURE 3-5** Sliding the Sun StorEdge 6120 Array in the Cabinet

7. Slide the array all the way into the cabinet until the forked ends of the brackets touch the vertical screw mounting surface of the cabinet rails.  
Make sure the array slides into the cabinet smoothly and that it is correctly installed on the rails before installing the mounting screws.

**8. Insert and tighten the four mounting screws at the front of the array (FIGURE 3-6).**



**FIGURE 3-6** Securing the Array Chassis

**9. Insert and tighten the four mounting screws at the rear of the array (FIGURE 3-6).**

**10. Insert and tighten the two front trim strips on the left and right sides of the array to the front of the cabinet.**

Continue to follow this procedure for each Sun StorEdge 6120 array and expansion unit that you install. Once you have completed installing the array(s), you can cable the arrays as described in Chapter 4.

## Connecting the Cables

---

This chapter describes how to cable a Sun StorEdge 6120 array and array HA configuration to the data and management hosts. It also includes cabling instructions for adding expansion units to the array *administrative domain* or *array system*.

---

**Note** – This chapter is for installing new Sun StorEdge 6120 array units only. To reconfigure existing array units into another configuration, contact your SunService representative.

---



---

**Caution** – In an HA configuration, interconnected arrays must be of the same model type. For example, you can connect two Sun StorEdge 6120 arrays together or a Sun StorEdge 6120 array to a Sun StorEdge 6020 array. You cannot interconnect a Sun StorEdge 6000 family array to a Sun StorEdge T3 or T3+ array.

---



---

**Caution** – For security reasons, connect the array to a private network only.

---

Before you begin, make sure you have all of the required cables and adapters:

- Fiber-optic cable, one per controller unit
- Shielded Ethernet (category 5) interface cable for 10/100BASE-T connection
- Interconnect cables, one pair (HA configurations only)

See FIGURE 1-2 for cable illustrations.

---

**Note** – Two AC power cables are required to supply power to each array. AC power cables are shipped preconfigured in the Sun StorEdge Expansion Cabinet.

---

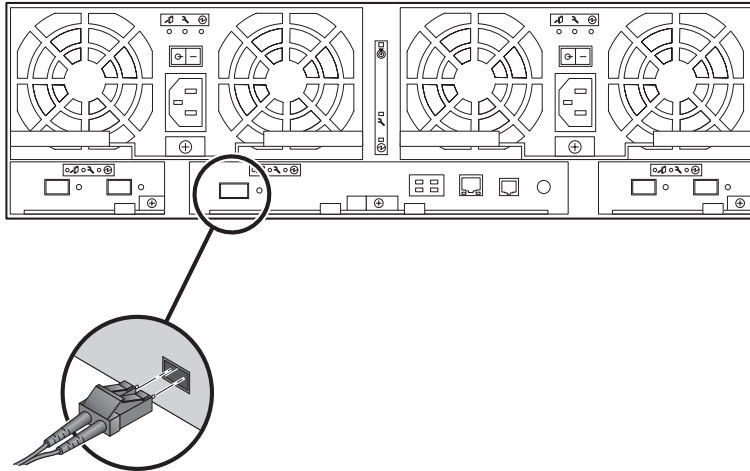
This chapter includes the following sections:

- “Cabling an Array 1x1 Configuration” on page 22
- “Cabling an Array 2x2 HA Configuration” on page 25
- “Cabling to the Expansion Units” on page 27

---

## Cabling an Array 1x1 Configuration

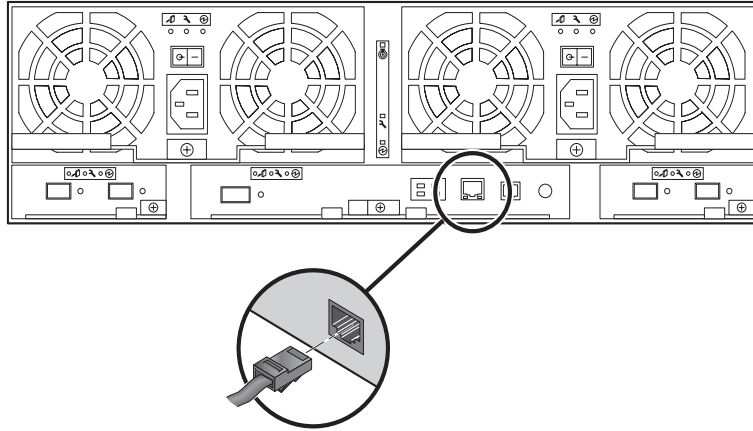
1. Connect the fiber-optic cable to the HBA on the data host.
2. Connect the other end of the fiber-optic cable to the FC-AL connector on the controller card at the back of the master (bottom) unit.



**FIGURE 4-1** Connecting the Fiber-Optic Cable

3. Connect one end of the Ethernet cable to the Ethernet port on the controller card of the master unit (FIGURE 4-2).

Use a category-5 shielded Ethernet cable.



**FIGURE 4-2** Connecting the Ethernet Cable

4. Connect the other end of the Ethernet cable to a network hub or router.

---

**Note** – You must use a shielded Ethernet interface cable to comply with regulatory emissions requirements.

---

5. Make sure the power switches on the power and cooling units are in the Off (-) position.
6. Connect the two power cables in the cabinet to the two power and cooling units on the back of the master unit (FIGURE 4-3).

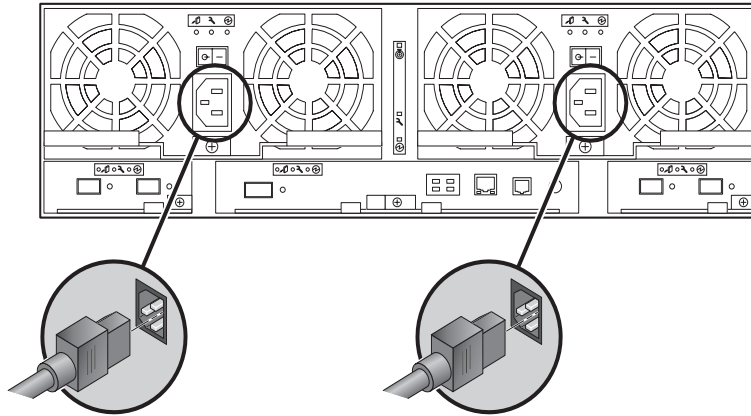
The other end of the AC power cables are connected to separate power sequencers.



---

**Caution** – Do *not* power on the unit yet.

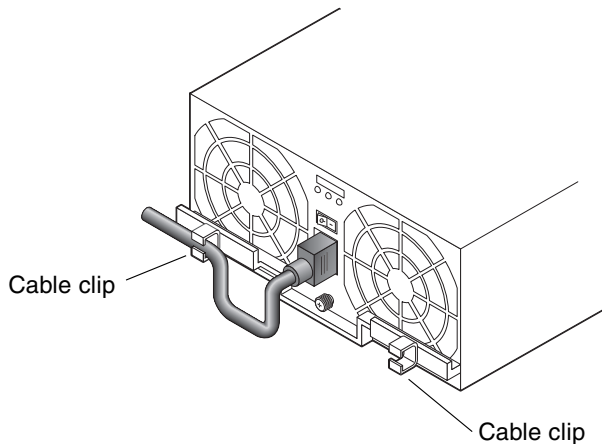
---



**FIGURE 4-3** Connecting the Power Cables

**7. Route the power cable on the power and cooling unit through the cable clip on the latch handle (FIGURE 4-4).**

Route the cable to the outermost edge of the array; that is, if you are facing the back of the array, route the cable on the left power and cooling unit through the left cable clip. To route the cable on the right power and cooling unit, attach it to the right cable clip.



**FIGURE 4-4** Routing the Power Cable

- If you are installing one or more expansion units to the array, proceed to “Cabling to the Expansion Units” on page 27 for instructions.

- If this is a standalone Sun StorEdge 6120 array, go to Chapter 5 for information about powering on.

A fully cabled 1x1 configuration is shown in FIGURE 4-5.

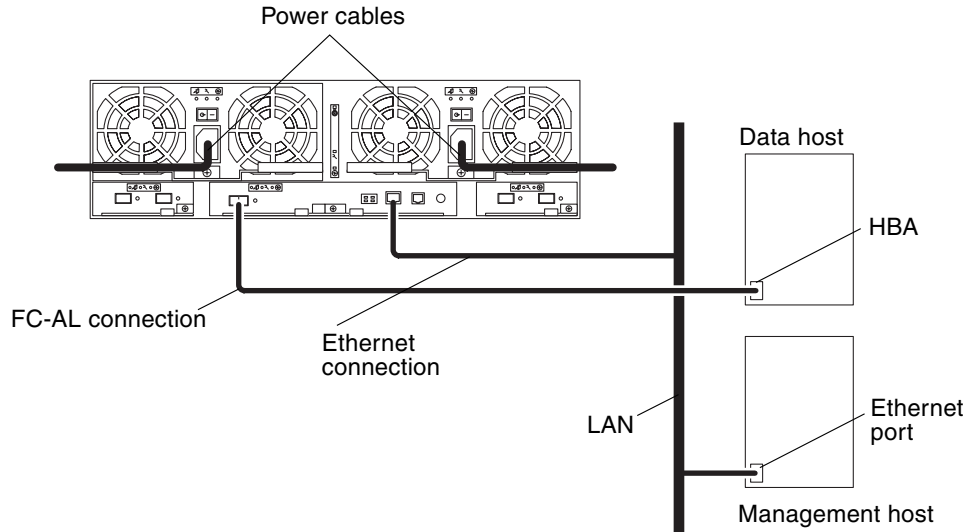
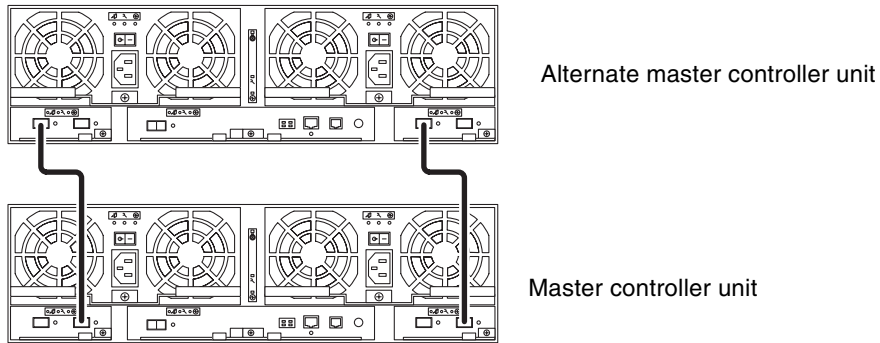


FIGURE 4-5 Sun StorEdge 6120 Array, 1x1 Configuration

## Cabling an Array 2x2 HA Configuration

1. Cable the master controller unit by following Step 1 through Step 5 of “Cabling an Array 1x1 Configuration” on page 22.
2. Cable the alternate master controller unit by repeating Step 1 through Step 5  
The Ethernet cable from the alternate master controller unit must connect to a separate hub or router than the one connected to the master controller unit.
3. Connect the two interconnect cables to the interconnect cards of the master controller unit and alternate master controller unit exactly as shown in FIGURE 4-6.  
Make sure you connect the cables to the correct interconnect card connectors exactly as shown in the figure. This cable connection determines the master and alternate master relationship.

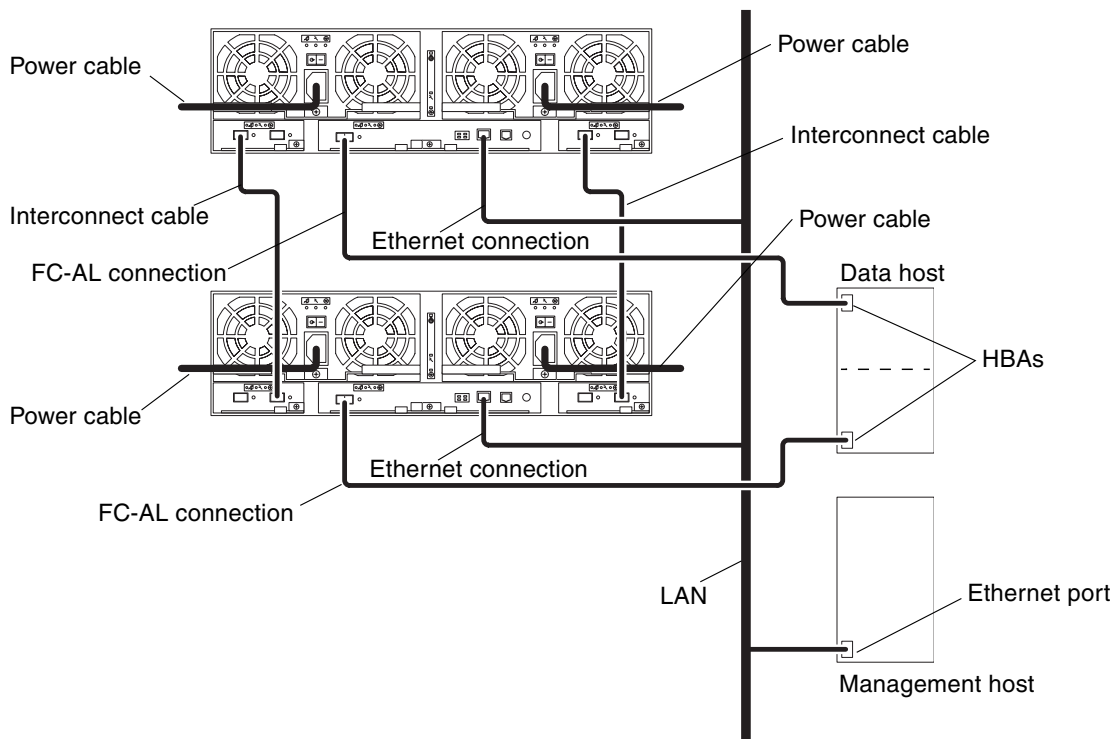


**FIGURE 4-6** Interconnect Cabling, 2x2 HA Configuration

- If you are installing expansion units to the array HA configuration, proceed to “Cabling to the Expansion Units” on page 27 for instructions.
- If you are ready to apply power to the array HA configuration, go to Chapter 5 for information about powering on.

A fully cabled 2x2 HA configuration is shown in FIGURE 4-7.





**FIGURE 4-7** Sun StorEdge 6120 Array, 2x2 HA Configuration

## Cabling to the Expansion Units

This section illustrates how to cable the array expansion units to configure the following types of array systems:

- “1x2 Configuration” on page 28
- “1x3 Configuration” on page 29
- “2x4 HA Configuration” on page 30
- “2x6 HA Configuration” on page 32

# 1x2 Configuration

To cable a Sun StorEdge 6120 array 1x2 configuration:

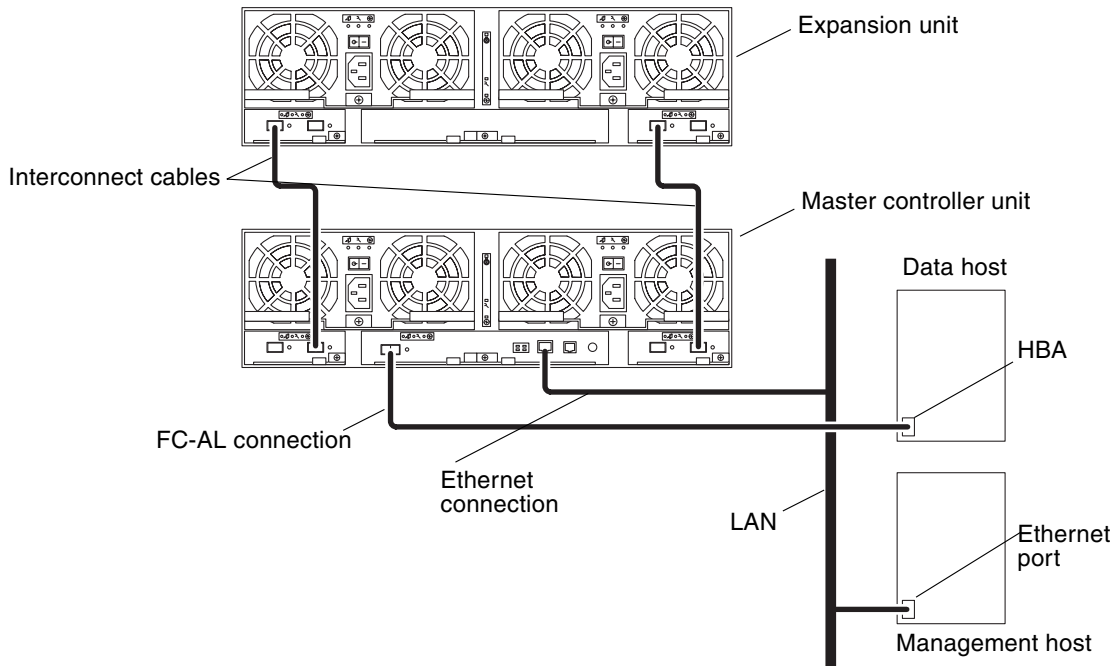
1. Cable a 1x1 configuration as described in “Cabling an Array 1x1 Configuration” on page 22.

---

**Note** – Do not power on the array configuration until you have connected the expansion unit.

---

2. Connect the power cables to the expansion unit.  
See FIGURE 4-3 for power cable connector locations.
3. Connect the interconnect cables from the master controller unit to the expansion unit exactly as shown in FIGURE 4-8.



**FIGURE 4-8** Sun StorEdge 6120 Array, 1x2 Configuration

After you cable the array system, proceed to Chapter 5 to power on the configuration.

# 1x3 Configuration

To cable a Sun StorEdge 6120 array 1x3 configuration:

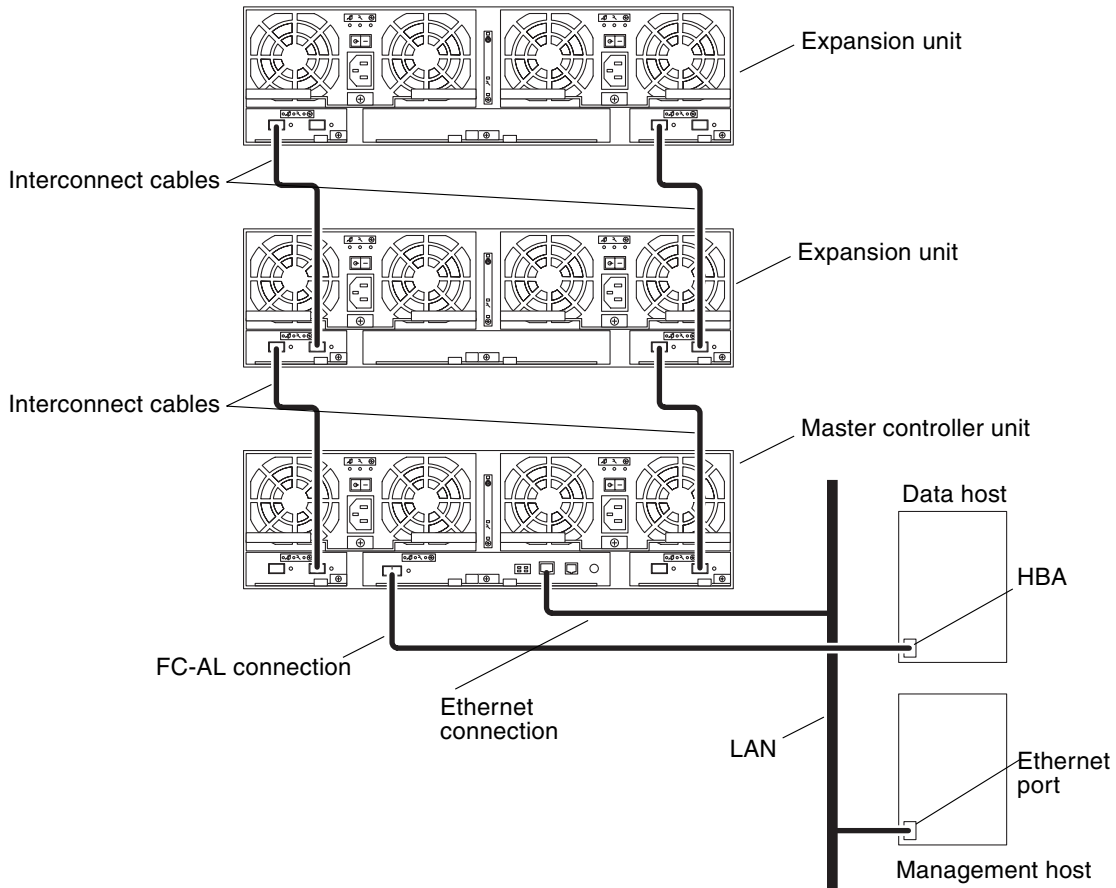
1. **Cable a 1x1 configuration as described in “Cabling an Array 1x1 Configuration” on page 22.**

---

**Note** – Do not power on the array configuration until you have connected the expansion units.

---

2. **Connect the power cables to the expansion units.**  
See FIGURE 4-3 for power cable connector locations.
3. **Connect the interconnect cables from the master controller unit to the expansion units exactly as shown in FIGURE 4-9.**



**FIGURE 4-9** Sun StorEdge 6120 Array, 1x3 Configuration

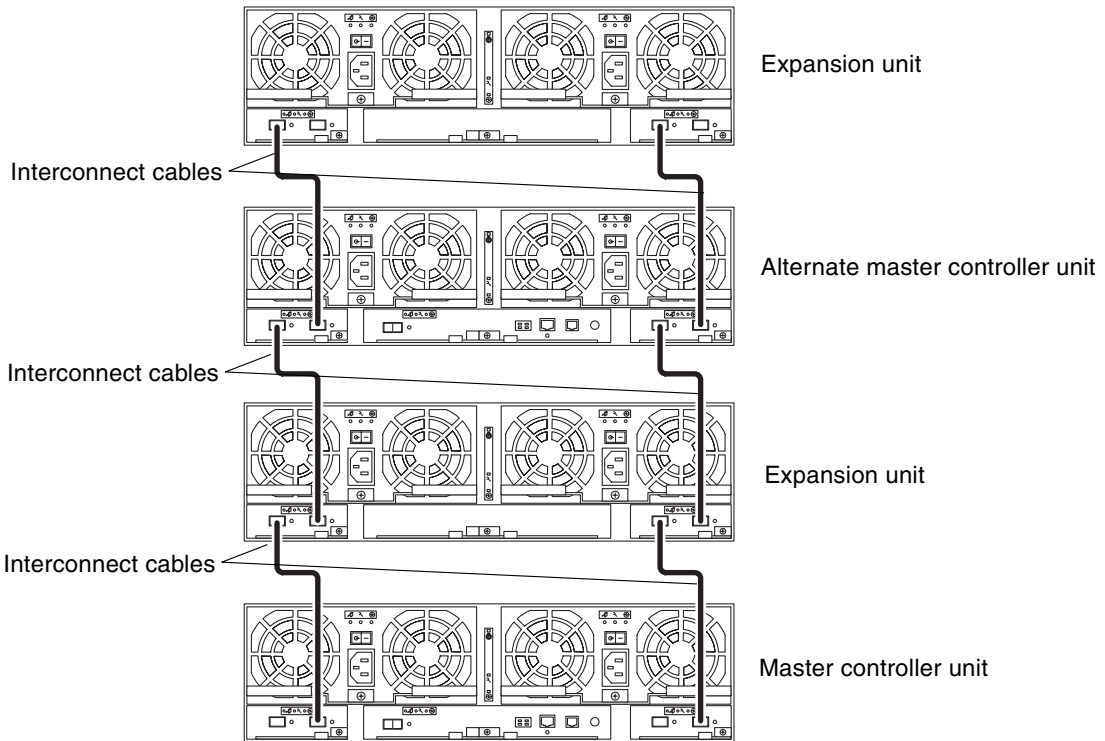
After you cable the array system, proceed to Chapter 5 to power on the configuration.

## 2x4 HA Configuration

To cable a Sun StorEdge 6120 array 2x4 HA configuration:

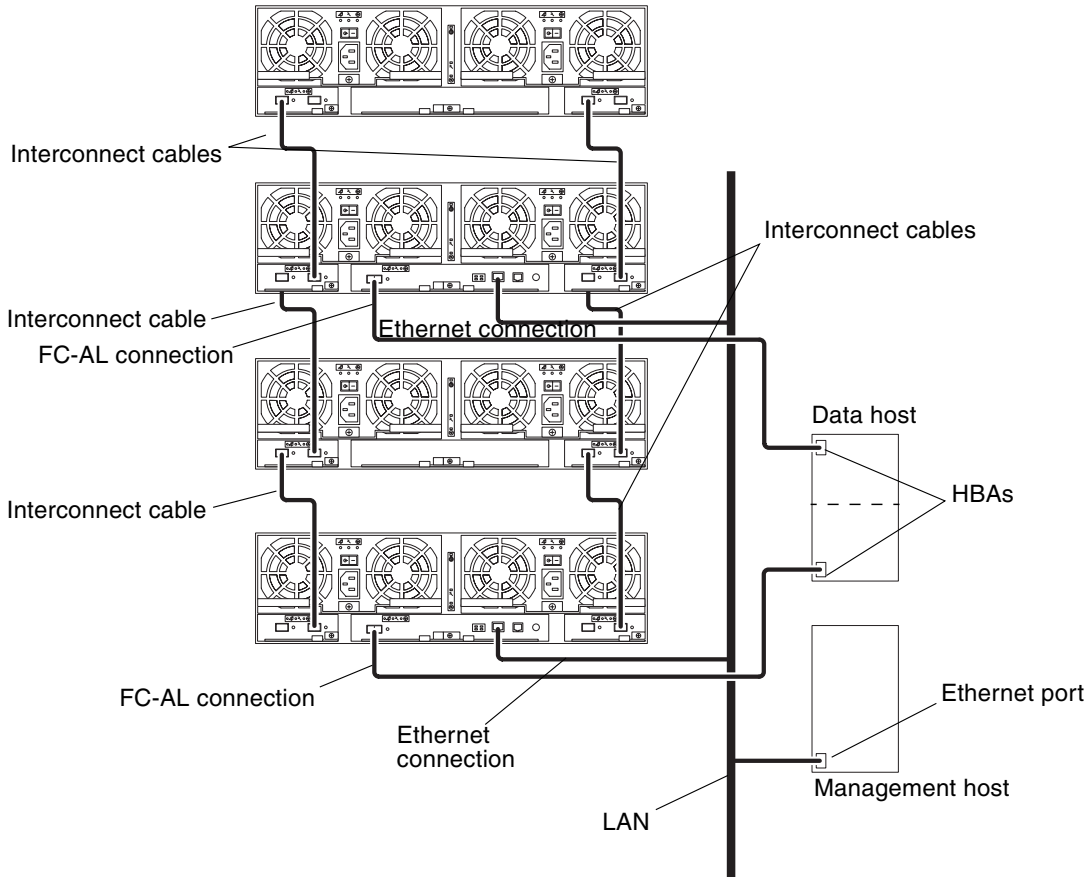
1. Follow Step 1 and Step 2 of “Cabling an Array 2x2 HA Configuration” on page 25. Do not install the interconnect cables yet.
2. Connect the power cables to the expansion units. See FIGURE 4-3 for power cable connector locations.

3. Connect the interconnect cables from the master controller unit to the expansion unit directly above it exactly as shown in FIGURE 4-10.
4. Connect the interconnect cables from the first expansion unit (on top of the master controller unit) to the alternate master controller unit directly above it exactly as shown (FIGURE 4-10).
5. Connect the interconnect cables from the alternate master controller unit to the second expansion unit that is directly above it exactly as shown (FIGURE 4-10).



**FIGURE 4-10** Interconnect Cabling for a 2x4 HA Configuration

A fully configured array 2x4 HA configuration is shown in FIGURE 4-11.



**FIGURE 4-11** Sun StorEdge 6120 Array, 2x4 HA Configuration

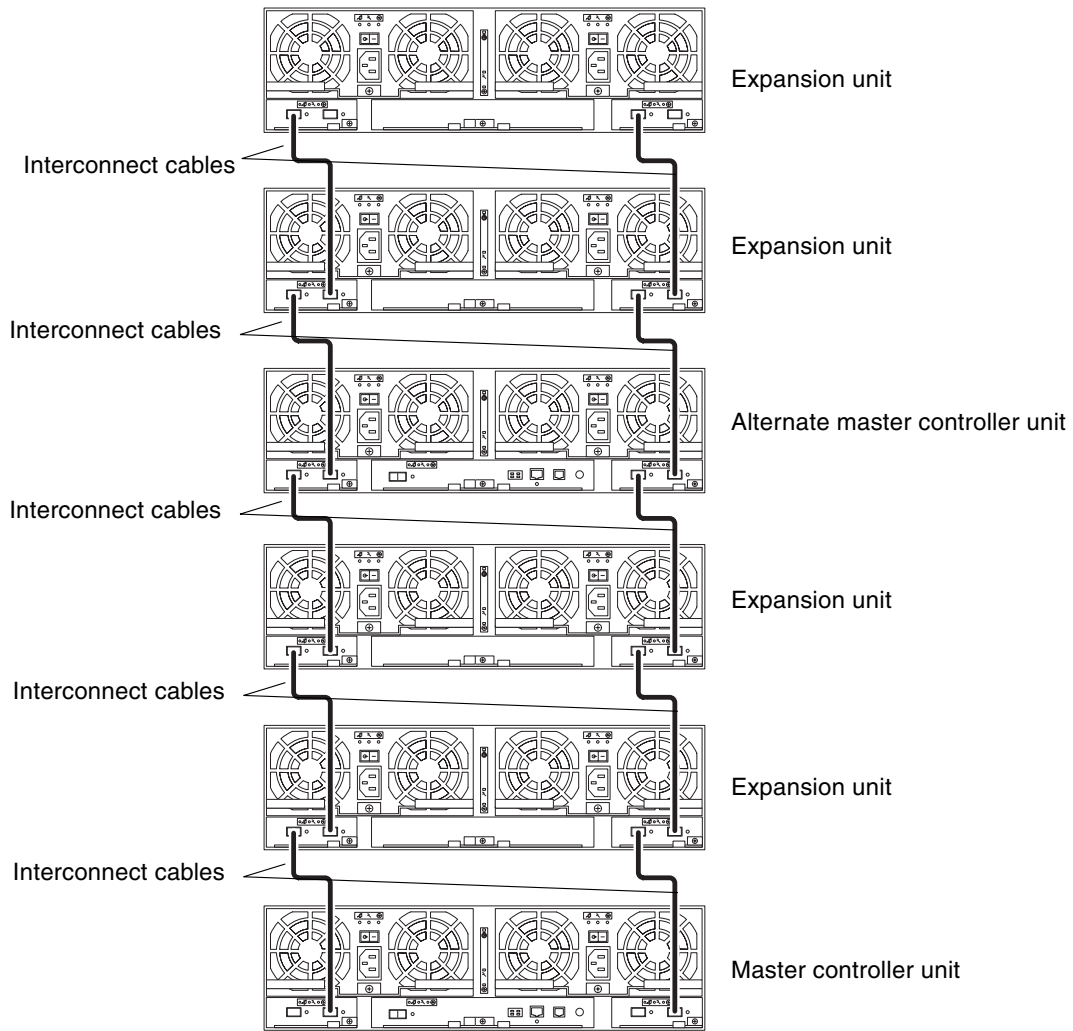
**6. Proceed to Chapter 5 to power on the array system.**

## 2x6 HA Configuration

To create a Sun StorEdge 6120 array 2x6 HA configuration:

- 1. Follow Step 1 and Step 2 of “Cabling an Array 2x2 HA Configuration” on page 25.**  
Do not install the interconnect cables yet.
- 2. Connect the power cables to the expansion units.**  
See FIGURE 4-3 for power cable connector locations.

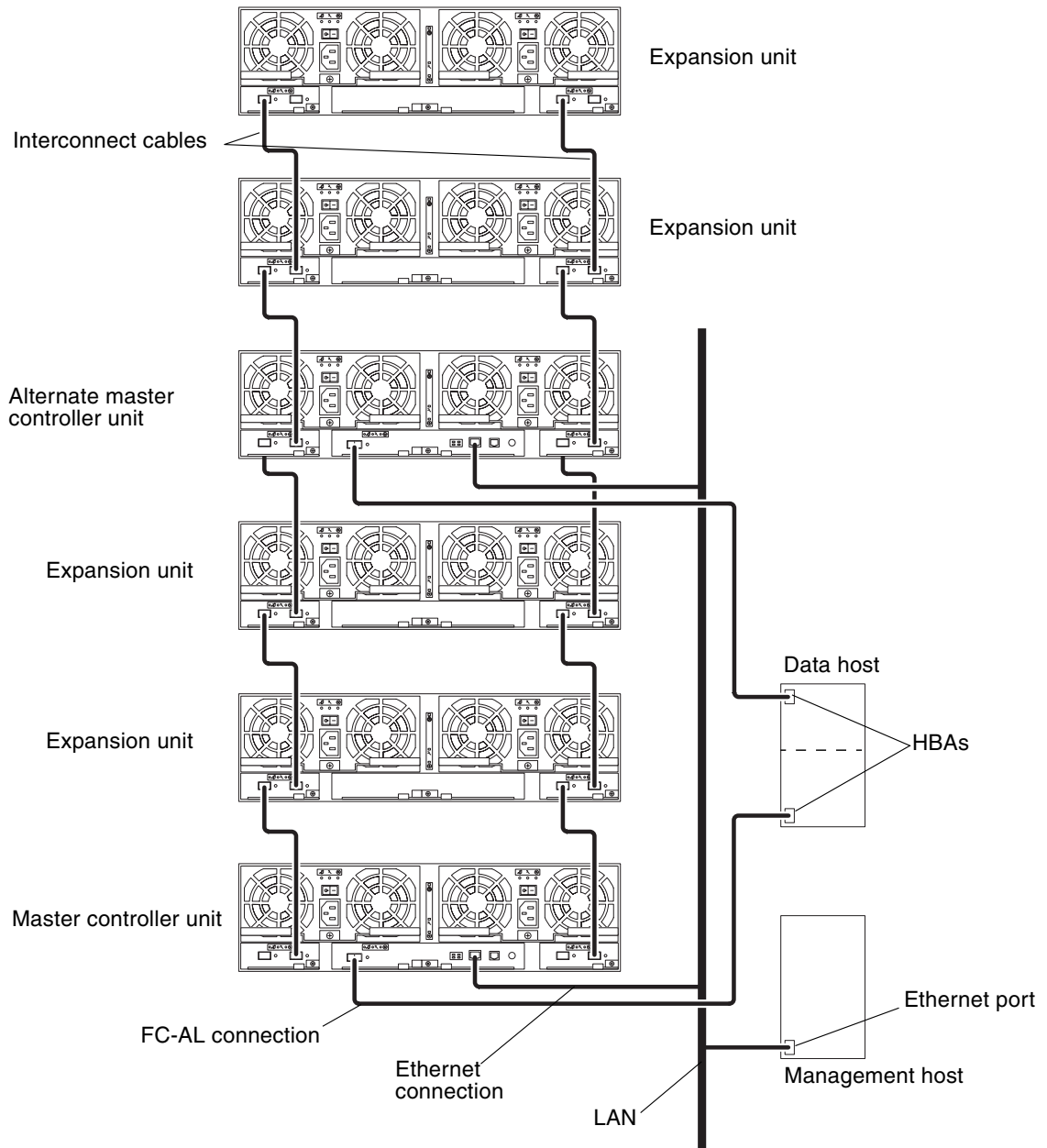
3. **Connect the interconnect cables from the master controller unit to the expansion unit directly above it exactly as shown in FIGURE 4-12.**
4. **Connect the interconnect cables from the first expansion unit (on top of the master controller unit) to the next expansion unit directly above it, exactly as shown (FIGURE 4-12).**
5. **Connect the interconnect cables from the second expansion unit to the alternate master controller unit directly above it, exactly as shown (FIGURE 4-12).**
6. **Connect the interconnect cables from the alternate master controller unit to the third expansion unit directly above it, exactly as shown (FIGURE 4-12).**
7. **Connect the last set of interconnect cables from the third expansion unit to the fourth expansion unit directly above it, exactly as shown (FIGURE 4-12).**



**FIGURE 4-12** Interconnect Cabling for a 2x6 HA Configuration

A fully configured array 2x6 HA configuration is shown in FIGURE 4-13.





**FIGURE 4-13** Sun StorEdge 6120 Array, 2x6 HA Configuration

**8. Proceed to Chapter 5 to power on the array system.**



## Powering On

---

This chapter describes how to power on the array and verify that the unit is receiving power. This chapter is organized as follows:

- “Powering On” on page 37

---

## Powering On

---

**Note** – Make sure that you have edited the `/etc/ethers` file on the connected host with the array MAC address, and have added the IP address to the `/etc/hosts` file before powering on for the first time. See “Establishing an IP and MAC Address on the Host” on page 10.

---

To power on and verify that the array is receiving power:

- 1. Power on the expansion cabinet power sequencers if power has not yet been supplied.**

Expansion cabinet power sequencers must be connected to separate power sources to ensure redundancy.

- 2. Verify that AC power is present on each power and cooling unit.**

When AC power is present, the Service Indicator Standard (SIS) LEDs on each power and cooling unit flash, and the fans start to turn.

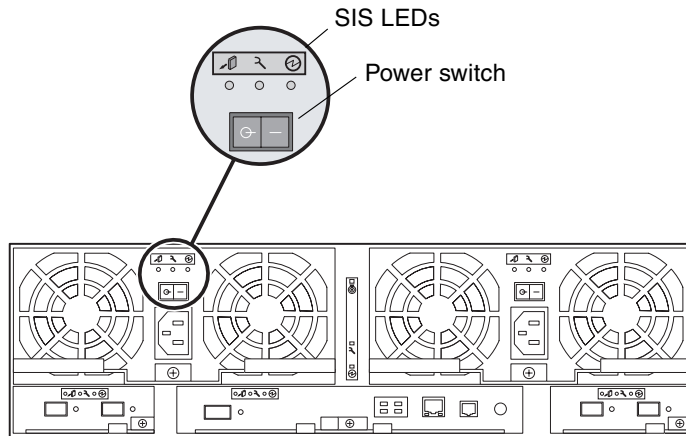
---

**Note** – If any of the SIS LEDs on the power and cooling units do not light, this indicates a service issue. Refer to the “Servicing the Array” chapter in the *Sun StorEdge 6020 and 6120 Arrays System Manual* for detailed LED information.

---

**3. Press the power switch on each power and cooling unit to the On position.**

When the arrays are fully powered on, the SIS LEDs on the power and cooling units are green.



**FIGURE 5-1** Power and Cooling Unit SIS LEDs and Power Switch Location

**4. Check the LEDs at the front and back of the each array to ensure that all components are receiving power and are functional.**

While the drives are spinning up, the LEDs will blink. It might take several minutes for the array to boot, after which all LEDs should be solid green, indicating that the unit is receiving power and there is no drive activity. For more information on the LEDs and how to interpret them, refer to the service chapter in the *Sun StorEdge 6020 and 6120 Arrays System Manual*.

---

**Note** – The batteries in the power and cooling units recharge after you power on the unit. While the batteries are recharging, write-behind cache is disabled.

---

Proceed to Chapter 6 for information about installing the array management software.

---

**Note** – The array rarely needs to be powered off. If you do need to remove power from the array, halt the data path activity between the host and the array and type shutdown from a Telnet session. Complete the power off sequence by pressing the power switch on each power and cooling unit to the off position. This procedure powers off the array and all arrays connected to it.

---

# Sun StorEdge 6000 Family Host Installation Software

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After you have installed the Sun StorEdge 6120 array hardware and powered on the arrays, you are ready to install the Sun StorEdge 6000 Family Host Installation Software and configure the Sun StorEdge 6120 array.

The host-based software contains the following software tools:

- Sun StorEdge Configuration Service software to create and manage storage pools and volumes on the array
- Storage Automated Diagnostics Environment for array diagnostics and troubleshooting
- Sun StorEdge SAN Foundation software, release 4.2
- Sun StorEdge Traffic Manager software to enable multipathing for HA configurations

This chapter is divided into the following sections:

- “Software Installation” on page 39
- “Setting Up the Array” on page 40
- “Creating Storage Pools and Volumes on the Array Disk Space” on page 40

---

## Software Installation

To install the software, refer to the *Sun StorEdge 6000 Family Host Installation Software Guide* that ships with the software CD. The Sun StorEdge 6000 Family Host software package can also be retrieved from the Sun Download Center web site:

<http://www.sun.com/download>

The *Sun StorEdge 6000 Family Host Installation Software Guide* contains an overview of the software and provides detailed procedures to install it and set up the array on the network.

---

## Setting Up the Array

Follow the instructions in the *Sun StorEdge 6000 Family Host Installation Software Guide* to set up the array initially and set a `root` password.



---

**Caution** – Make sure to assign a `root` password to the array when you first login. If you do not assign a `root` password, you will not be able to configure and manage the array using the Sun StorEdge Configuration Service software.

---

---

## Creating Storage Pools and Volumes on the Array Disk Space

After you install the Sun StorEdge Configuration Service software and set up the array on your network using the instructions in the *Sun StorEdge 6000 Family Host Installation Software Guide*, you can configure the array disk space using either the Sun StorEdge Configuration Service command-line interface or web browser user interface (UI). Use the Sun StorEdge Configuration Service software to configure the cache size setting, create storage pools and volumes, assign volumes, and perform many other software related tasks.

To configure your array, refer to the “Getting Started” page of the Sun StorEdge Configuration Service online help. Click on the Getting Started section in the online help directory and follow the steps to ensure a successful array configuration.

The terminology used in the Sun StorEdge Configuration Service is defined in TABLE 6-1.

**TABLE 6-1** Sun StorEdge Configuration Service Software Terminology

<b>Term</b>	<b>Definition</b>
Controller tray	A tray with a RAID controller card. The controller tray is the smallest possible storage array configuration. The architecture integrates disks, data cache, hardware RAID, power, cooling, uninterrupted power supply (UPS), diagnostic capabilities, and administration into a versatile, standalone component. The controller tray includes external connections to a data host (or switch), and to a management network.
Expansion unit	A tray without an installed RAID controller card.
Extent	A set of disk blocks with logical consecutive addresses. Extents can be smaller or larger than physical disks. Storage arrays with RAID allow you to combine several disks together into a larger virtual disk. Although the underlying disks are separate extents, the resulting virtual disk is addressed from zero up to its new size; so this virtual disk is also an extent. A volume manager provides a similar capability of merging extents from disks into larger virtual extents.
Quality of service	Quality of service refers to the objective of obtaining a desired level of system behavior achieved by using system tunables within a storage array. RAID level, number of hot spare disks, multipath access, and disk speed are some of the factors that influence quality of service. Quality of service can be very specific (no single point of failure, must use RAID 1, must have at least one hot spare) or very general (any storage will do).
RAID group	A set of disks in which part of the physical storage capacity is used to store redundant information about user data stored on the remainder of the storage capacity. The redundant information enables regeneration of user data in the event that one of the array's member disks or the access path to it fails. Although it does not conform to this definition, disk striping is often referred to as RAID (RAID Level 0).
Storage array	A storage system containing multiple disk drives, designed to provide performance, high availability, serviceability, or other benefits. Disk arrays may provide mechanisms to create virtual extents of volumes, such as RAID groups. The physical and logical elements of the storage array are managed as a group. A storage array must contain at least one tray with a RAID controller. A Sun StorEdge 6120 storage array is one or more Sun StorEdge 6120 trays (with at least one tray being a controller tray), managed together as a single entity.

**TABLE 6-1** Sun StorEdge Configuration Service Software Terminology (Continued)

Term	Definition
Storage pool	A collection of storage extents with the same quality of service.
Tray	Refers to a single Sun StorEdge 6120 or 6020 enclosure. If one is referring to multiple trays connected together, that new entity would be referred to as a storage array (see definition in this table).
Volume	A volume is a virtual disk into which a file system, DBMS, or other application can place data. A volume may be a single physical disk or a virtual disk mapped from one or more underlying extents. Applications that use volumes do not need to be aware of their underlying physical structure. Software or firmware handles the mapping of virtual addresses to physical addresses.

---

**Note** – After you have completed configuring the array using the Sun StorEdge Configuration Service software, return to this document to set up the host so that the host can see the newly configured disks. To set up your host, go to the next chapter in this document for your particular host platform.

---



# Connecting to Servers Running the Solaris Operating System

---

This chapter contains procedures that are performed on the host system for the array. Have the documentation for the host available to assist you in completing these tasks.

- “Verifying the Data Host Connection” on page 44
- “Establishing Logical Volumes on the Data Host” on page 45
- “Establishing Multipathing on the Data Host” on page 45

---

## Verifying the Data Host Connection

After the physical connection between the host and the array has been established and after you have created the array system storage pools, you can use a utility, such as the `format (1M)` command in the Solaris operating system, to verify the existence of a volume on the array. For example:

```
# format
Searching for disks...done

AVAILABLE DISK SELECTIONS:
   0. c0t10d0 <SUN18G cyl 7506 alt 2 hd 19 sec 248>
      /sbus@3,0/SUNW,fas@3,8800000/sd@a,0
   1. c0t11d0 <SUN18G cyl 7506 alt 2 hd 19 sec 248>
      /sbus@3,0/SUNW,fas@3,8800000/sd@b,0
   2. c17t60003BA27D4DF0003E776B4F000C9850d0 <SUN-T4-0300 cyl
25205 alt 2 hd 13 sec 128>
      /scsi_vhci/ssd@g60003ba27d4df0003e776b4f000c9850
   3. c17t60003BA27D4DF0003E776B8700019897d0 <SUN-T4-0300 cyl
25205 alt 2 hd 13 sec 128>
      /scsi_vhci/ssd@g60003ba27d4df0003e776b8700019897
   4. c17t60003BA27D4DF0003E776BBF000B6358d0 <SUN-T4-0300 cyl
25205 alt 2 hd 13 sec 128>0
Specify disk (enter its number):
```

In this example, device number 2 is the array, as identified by the SUN-T4-0300 label.

---

**Note** – If you are creating new volumes or changing the volume configuration, you must first manually rewrite the label of the previous volume using the `autoconfigure` option of the `format (1M)` utility. Refer to the `format (1M)` man page for more information.

---

---

## Establishing Logical Volumes on the Data Host

Using the `format (1M)` utility within the Solaris operating system, you can view the disk space available on the array from the host. At this point in the installation process, you can use this disk space as you would any physical disk. This includes performing operations such as installing a file system, using the device as a raw device, or partitioning the device. Refer to the data host documentation for more information on establishing logical volumes.

---

## Establishing Multipathing on the Data Host

This task applies only to Sun StorEdge 6120 array HA configurations.

In an HA configuration, controller caches are mirrored so that, if one controller fails, no data is lost. Any data that is in the cache of the failed controller, but is not yet written to disk, is preserved in the cache of the partner controller and is written to disk by means of one of the back-end Fibre Channel (FC) loops connecting the two units.

The back-end Fibre Channel loops are used to maintain host access to the disks of the unit with the failed controller (or any failure in the host data path to that controller). This requires the use of a host-based alternate pathing mechanism such as the Dynamic Multi-Pathing (DMP) feature of VERITAS Volume Manager or Sun StorEdge Traffic Manager software. When a failure occurs in the host data path, the multipathing mechanism reroutes data to the other array controller in the configuration. The controller then redirects the data across one of the back-end loops to the disks of the other controller, thus maintaining data availability to the host application.

For more information and for instructions on installing and configuring multipathing software on the host, refer to the documentation for the multipathing software tool selected.

The array default setting for multipathing support is set to `mpxio`, which enables multipathing support for Sun StorEdge Traffic Manager software and other multipathing tools. To change this multipathing setting, use the Sun StorEdge Configuration Service software and refer to the configuration tool's online help for

assistance. You can also use the array Telnet command-line interface (CLI) to change multipathing settings. Refer to the *Sun StorEdge 6020 and 6120 Arrays System Manual* for the CLI procedure.

---

**Note** – After multipathing support is enabled and the host is rebooted, from the host side you will see two paths available to the same volume: a primary path and an alternate path. This means that if you are using the `format (1M)` utility in the Solaris operating system, you will see two paths for each volume.

---

## Connecting to Servers Running Microsoft Windows Environments

---

**Note** – See [www.sunsolve.sun.com](http://www.sunsolve.sun.com) and the *Sun StorEdge 6120 Array Release Notes* for software requirements for the host.

---

This chapter contains information about the software used to connect servers running Microsoft Windows environments to the Sun StorEdge 6120 array. The tasks in this chapter require the use of a laptop or server terminal.

This chapter contains the following sections:

- “Connecting to a Microsoft Windows NT Operating Environment” on page 47
- “Connecting to a Microsoft Windows 2000 Operating Environment” on page 48

---

### Connecting to a Microsoft Windows NT Operating Environment

This section contains the following sections:

- “Connecting a Sun StorEdge 6120 Array to a Microsoft Windows NT Server” on page 48
- “Setting Up Newly Created LUNs” on page 48

## Connecting a Sun StorEdge 6120 Array to a Microsoft Windows NT Server

The Sun StorEdge 6120 array supports Microsoft Windows NT 4.0, Service Pack 6 or greater in either single-path or multipath configurations. Multipath configurations require Sun StorEdge Traffic Manager 3.0 software for the Enterprise Edition of Microsoft Windows NT. Refer to the *Sun StorEdge Traffic Manager 3.0 Installation and User's Guide for Microsoft Windows 2000 and Windows NT* for detailed instructions about setting up the device driver on the server.

## Setting Up Newly Created LUNs

- **Configure and partition disks using the Disk Administrator for Microsoft Windows NT.**

Refer to the Microsoft Windows NT documentation for information.

---

## Connecting to a Microsoft Windows 2000 Operating Environment

This section contains the following sections:

- “Connecting a Sun StorEdge 6120 Array to a Microsoft Windows 2000 Operating Environment” on page 48
- “Setting Up Newly Created LUNs” on page 49

## Connecting a Sun StorEdge 6120 Array to a Microsoft Windows 2000 Operating Environment

The Sun StorEdge 6120 array supports Microsoft Windows 2000 Server and Microsoft Windows 2000 Advanced Server, Service Pack 3 or greater in multipath configurations using Sun StorEdge Traffic Manager 3.0 failover drivers for Microsoft Windows 2000. Refer to the *Sun StorEdge Traffic Manager 3.0 Installation and User's Guide for Microsoft Windows 2000 and Windows NT* for detailed instructions about setting up the device driver on the server.

## Setting Up Newly Created LUNs

- **Configure and partition disks using the Disk Administrator for Microsoft Windows 2000.**

Refer to the Microsoft Windows 2000 documentation for information.





# Connecting to Servers Running the Hewlett Packard HP-UX Operating System

---

**Note** – See [www.sunsolve.sun.com](http://www.sunsolve.sun.com) and the *Sun StorEdge 6120 Array Release Notes* for software requirements for the host.

---

This chapter contains the software information about connecting servers running the Hewlett Packard HP-UX operating system to the Sun StorEdge 6120 array. The tasks in this chapter require the use of a laptop or server terminal.

This chapter contains the following sections:

- “Connecting a Sun StorEdge 6120 Array to an HP-UX Server” on page 51
- “Setting Up Newly Created LUNs” on page 52

---

## Connecting a Sun StorEdge 6120 Array to an HP-UX Server

The Sun StorEdge 6120 array supports the HP-UX Level 11.0 and 11.i in multipath configurations using Sun StorEdge Traffic Manager 3.0 failover drivers for HP-UX.

See the *Sun StorEdge Traffic Manager 3.0 Installation and User’s Guide for the Hewlett Packard HP-UX Operating System* for detailed instructions on setting up the device driver on the server.

---

# Setting Up Newly Created LUNs

- **Configure and partition disks using the Disk Administrator for HP-UX.**

See the *Sun StorEdge Traffic Manager 3.0 Installation and User's Guide for the Hewlett Packard HP-UX Operating System*.

## Connecting to Servers Running the IBM AIX Operating System

---

**Note** – See [www.sunsolve.sun.com](http://www.sunsolve.sun.com) and the *Sun StorEdge 6120 Array Release Notes* for software requirements for the host.

---

This chapter contains the software information about connecting servers running the IBM AIX operating system to the Sun StorEdge 6120 array. The tasks in this chapter require the use of a laptop or server terminal.

This chapter contains the following sections:

- “Connecting a Sun StorEdge 6120 Array to an IBM-AIX Server” on page 53
- “Setting Up Newly Created LUNs” on page 54

---

## Connecting a Sun StorEdge 6120 Array to an IBM-AIX Server

The Sun StorEdge 6120 array supports IBM AIX Version 4.3.3 and 5.1L in multipath configurations using Sun StorEdge Traffic Manager 3.0 failover drivers for IBM AIX.

See the *Sun StorEdge Traffic Manager 3.0 Installation and User's Guide for the IBM AIX Operating System* for detailed information about setting up the device driver on the server.

---

# Setting Up Newly Created LUNs

- **Configure and partition disks using the Disk Administrator for IBM AIX.**

See the *Sun StorEdge Traffic Manager 3.0 Installation and User's Guide for the IBM AIX Operating System*.

# Connecting to Servers Running the Red Hat LINUX 7.2 Operating Environment

---

---

**Note** – See [www.sunsolve.sun.com](http://www.sunsolve.sun.com) for the software requirements for the host.

---

This chapter contains the instructions for connecting servers running Red Hat Linux 7.2, Kernel 2.4.7-10 to hosts connected to Sun StorEdge 6120 arrays.

---

**Note** – Kernel 2.4.7-10SMP is unstable for use with Sun StorEdge 6120 arrays.

---

The following tools are required to perform the tasks in this chapter:

- Laptop or server terminal

This chapter contains the following sections:

- “Connecting a Sun StorEdge 6120 Array to a Red Hat Linux Server” on page 56
- “Setting Up Red Hat Linux 7.2 Servers for MultiLUN Support” on page 56
- “Attaching Sun StorEdge 6120 Arrays to Red Hat Linux 7.2 Servers” on page 59
- “Setting Up Sun StorEdge 6120 Array HWWN Permissions” on page 60
- “Detecting Sun StorEdge 6120 Array Volume Slices” on page 61

---

# Connecting a Sun StorEdge 6120 Array to a Red Hat Linux Server

The Sun StorEdge 6120 array supports Red Hat Linux 7.2, Kernel 2.4.7-10 with multiLUN supported in single-path configuration.

The rules for setting up Red Hat Linux servers for a dedicated Hard Zone with the Sun StorEdge 6120 array are:

- Each Red Hat Linux 7.2 server must be set to a switch F port
- Each array must be set to a switch F port.
- Two Hard Zones must be created containing the associated Red Hat Linux 7.2 servers and Sun StorEdge 6120 array ports: one for connections to each array master controller unit and one for connections to the alternate master controller unit.
- Multiple Red Hat Linux 7.2 servers with one initiator per server are allowed.
- Multiple Sun StorEdge 6120 arrays per server are allowed.
- Qlogic 1 Gb 2200F HBAs and Qlogic 2 Gb 2310 and 2342 HBAs are allowed.

To connect Red Hat Linux servers to Sun StorEdge 6120 array:

1. **Set up Red Hat Linux 7.2 servers for multiLUN support.**
2. **Connect the Red Hat Linux server to the available ports.**
3. **Detect the Sun StorEdge 6120 array volume slices.**

---

## Setting Up Red Hat Linux 7.2 Servers for MultiLUN Support

Sun StorEdge 6120 arrays support up to 64 LUNs. The following steps configure the server to be able to see all the LUNs.

1. **Install Red Hat Linux 7.2 with Kernel 2.4.7-10.**

---

**Note** – Kernel 2.4.7-10SMP is unstable for use with the Sun StorEdge 6120 array.

---

2. After the installation is complete, reboot the system and select CTRL Q to enter the Qlogic firmware setup menu.
3. For each HBA, configure advanced settings Maximum LUNs setting to be 0-63 LUNs.
4. Save the settings and select the option to reboot the system.
5. Edit /etc/modules.conf to remove any entries of alias scsi\_hostadapter qla2x00 and add an entry of options scsi\_mod max\_scsi\_luns=64.
6. Use the following command to create a new initrd:

```
# cd /boot;/sbin/mkinitrd initrd-2.4.7-10ml.img 2.4.7-10
```

7. Update lilo or grub boot loader to use this initrd as the default during booting.
  - a. For lilo, you must modify the /etc/lilo.conf file. The following is an example of the lilo.conf file with the changes added:

```
prompt
timeout=50
default=linux
boot=/dev/sda3
map=/boot/map
install=/boot/boot.b
message=/boot/message
linear

image=/boot/vmlinuz-2.4.7-10enterprise
label=linux
initrd=/boot/initrd-2.4.7-10enterprise.img
read-only
root=/dev/sda3
image=/boot/vmlinuz-2.4.7-10enterprise
label=T4linux
initrd=/boot/initrd-2.4.7-10ML.img
read-only
root=/dev/sda3
```

**You must run lilo after you change this file. This sets the new parameters and will allow you to boot into the alternate image. As before, you will either select the new image or need to change the default to boot the correct image.**

- b. For `grub`, `cd` to `/boot/grub/` and **edit** `grub.conf` file. Add a line in the `grub.conf` file that points the ramdisk loader to the new image file. For example:

```
initrd /boot/initrd-2.4.7-10ML.img
```

The following example shows the `grub.conf` file with the modification included:

```
# grub.conf generated by anaconda
#
# Note that you do not have to rerun grub after making changes to
this file
# NOTICE: You do not have a /boot partition. This means that
#     all kernel and initrd paths are relative to /, eg.
#     root (hd0,2)
#     kernel/boot/vmlinuz-version ro root=/dev/sda3
#     initrd/boot/initrd-version.img
# boot=/dev/sda3
default=0
timeout=10
# splashimage=(hd0,2)/boot/grub/splash.xpm.gz
splashimage=(hd0,2)/boot/grub/dellsplash.xpm.gz #by paw-splash
title Red Hat Linux (2.4.7-10enterprise)
    root(hd0,2)
    kernel /boot/vmlinuz-2.4.7-10enterprise ro root=/dev/sda3
    initrd /boot/initrd-2.4.7-10enterprise.img

# Added T4 support.
title Red Hat Linux (T4Support 2.4.7-10enterprise)
    root(hd0,2)
    kernel /boot/vmlinuz-2.4.7-10enterprise ro root=/dev/sda3
    initrd /boot/initrd-2.4.7-10ML.img
```

8. Reboot the server to enable the new `initrd`.
9. check to see if the `qla2x00` driver is loaded. The following command should not find any `qla2x00` entries when unloaded:

```
# lsmod | grep qla2x00
```



10. If the `qla2x00` driver is not loaded, load the driver by issuing the following command:

```
# modprobe qla2x00
```

11. Verify the `qla2x00` driver is now loaded. For example:

```
# lsmod | grep qla2x00
qla2x00          298624      0  (unused)
scsi_mod         95664       4  (qla2x00 iscsi sym53c8xx sd_mod)
```

12. Obtain the HBA port WWN or HWWN for each Qlogic HBA by using the following example:

```
# cat `ls /proc/scsi/qla2x00/[0-9]*` | grep port
scsi-qla0-adapter-port=2100001234567890f;
scsi-qla1-adapter-port=210000abcdef01234;
```

The HWWNs returned are used in the next section to configure the Sun StorEdge 6020 arrays.

At this point, the server is able to attach to the Sun StorEdge 6120 arrays.

---

## Attaching Sun StorEdge 6120 Arrays to Red Hat Linux 7.2 Servers

Because Red Hat Linux 7.2 only supports single-path access, selecting the proper system port may be necessary to be able to see the LUNs. During a cold boot, the volume groups in an array system are assigned based on the array location. For example, in an array 2x6 HA configuration (two controllers units and four expansion units), the top 1 to 3 array's volume groups are assigned to the top controller and the bottom 1 to 3 array's volume groups are assigned to the bottom controller. Because volume slices failover as an entire volume group, the Red Hat Linux 7.2 server should be assigned based on the default path.

# Sun StorEdge 6120 Array Failback Procedure

By default, the Sun StorEdge 6120 arrays have multipathing support (`sys mp_support`) setting set to `mpxio`, which allows the use of the Sun StorEdge Multipathing Software for operating systems other than Red Hat Linux 7.2.

In the case of volume group failover, the root cause of the failover will need to be corrected, the volume group will need to be failed back, and the Red Hat Linux 7.2 servers will need to recover from the I/O interruption.

The Sun StorEdge 6120 array volume groups can be failed back using one of the following three methods:

- Use Sun StorEdge Multipathing Software to restore the default path to another volume slice in the volume group.
- Disable and enable the alternate master controller in the array. This controller failure causes all volume groups to failover to the remaining controller.
- Reboot the array to reset the volume group ownership back to the default settings.

After the volume slices are back to the default active path, the following steps show an example of how to restore I/O activity:

1. **Stop applications using volume slices.**
2. **Unmount volume slice partitions.**
3. **File system check volume slice partitions.**
4. **Mount volume slice partitions.**
5. **Start applications using volume slices.**

---

## Setting Up Sun StorEdge 6120 Array HWWN Permissions

Sun StorEdge 6120 arrays support LUN Masking through HWWN Permissions.

The following steps are an overview of setting up LUN masking through HWWN permissions.

1. **Create a HWWN group to manage the HWWNs for the Red Hat Linux 7.2 server. For example:**

```
# 6120:/: hwwn add linuxhost wwn  
2100001234567890;hwwn add linuxhost wwn 210000abcdef01234
```

2. **Assign HWWN Group, WWN, or default permissions to the volslices to be assigned to the Red Hat Linux 7.2 servers.**

Sun StorEdge 6120 arrays support Sparse LUN configurations. With Sparse LUN support, only the LUNs to be initialized by a server need to have permission to the server. Red Hat Linux 7.2, as shipped, does not recognize the arrays as having Sparse LUN support. There are four ways around this scenario:

- Dedicate a given array to a single server. Thus, all volume slices can have exclusive permission to a single server's HWWN group.
- Dedicate lower volume slices 0-*n* to a single Red Hat Linux 7.2 server and the remaining slices to other servers running operating systems, such as Solaris, able to detect the Sparse LUN arrays.
- Add overlapping permissions to multiple Red Hat Linux 7.2 hosts to volume slices 0-*n*.
- Recompile the Linux Kernel 2.4.7-10 SCSI module with Sparse LUN support for Sun StorEdge 6120 arrays.

---

## Detecting Sun StorEdge 6120 Array Volume Slices

The array volumes are now ready to be detected by the Red Hat Linux 7.2 servers. The following steps are examples of detecting the arrays:

1. **Reboot the Red Hat Linux server.**

The reboot must be done to make the recently configured LUNs visible to the server.

2. **Load/Rescan the Qlogic HBAs. For example:**

```
# modprobe qla2x00
```

**3. View the devices discovered, array system volume slices 0, 1, and 2. For example:**

```
# cat /proc/scsi/scsi
Attached devices:
...
Host: scsi4 Channel: 00 Id: 00 Lun: 00
  Vendor: SUN      Model: T4              Rev: 0300
  Type:   Direct-Access          ANSI SCSI  revision: 03
Host: scsi4 Channel: 00 Id: 00 Lun: 01
  Vendor: SUN      Model: T4              Rev: 0300
  Type:   Direct-Access          ANSI SCSI  revision: 03
Host: scsi4 Channel: 00 Id: 00 Lun: 02
  Vendor: SUN      Model: T4              Rev: 0300
  Type:   Direct-Access          ANSI SCSI  revision: 03
```

**4. List the drive(s) by /dev/sd\* naming. For example:**

```
# sfdisk -s
```

**5. Format the drive(s), assuming 1 internal disk. For example:**

```
# sfdisk /dev/sdb
```

```
...
```

**6. Use the drives with the naming assigned in Step 5.**

Subsequent reboots will require the `modprobe qla2x00` command prior to using the drives.

# Glossary

---

---

## A

**administrative domain**

Interconnected controller units that share common administration through a master controller. See also “storage array.”

**alternate master controller unit**

Also called “alternate master unit,” the secondary array unit in a partner group that provides failover capability from the master controller unit.

---

## C

**command-line interface (CLI)**

The interface between the Sun StorEdge 6120 array’s pSOS operating system and the user in which the user types commands to administer the array.

**controller tray or controller unit**

A tray with a RAID controller card. The controller tray is the smallest possible storage array configuration.

---

## D

### **Dynamic Multi-Pathing (DMP)**

A VERITAS Volume Manager feature that provides a dual-path mechanism for rerouting data in the event of a controller failover.

---

## E

### **expansion unit**

A Sun StorEdge 6120 tray without a controller card. It must be connected to a controller unit to be operational.

### **extent**

A set of disk blocks with logical consecutive addresses. Extents can be smaller or larger than physical disks.

---

## F

### **Fibre Channel Arbitrated Loop (FC-AL)**

A 100-Mbyte/s serial channel that enables connection of multiple devices (disk drives and controllers).

### **field-replaceable unit (FRU)**

A component that is easily removed and replaced by a field service engineer or a system administrator.

---

## H

### **high-availability (HA) configuration**

A fully redundant array configuration in which two controller units are paired using interconnect cables for back-end data and administrative connections.

### **host bus adapter (HBA)**

An adapter that resides on the host.

---

## I

- input/output operations per second (IOPS)** A performance measurement of the transaction rate.
- interconnect cable** An FC-AL cable with a unique switched-loop architecture that is used to interconnect multiple Sun StorEdge 6120 arrays.
- interconnect card** An array component that contains the interface circuitry and two connectors for interconnecting multiple Sun StorEdge 6120 arrays.

---

## L

- light-emitting diode (LED)** A device that converts electrical energy into light that is used to display activity.
- logical unit number (LUN)** One or more drives that can be grouped into a unit; also called a volume.

---

## M

- master controller unit** Also called a “master unit,” the main controller unit in an HA configuration configuration.
- media access control (MAC) address** A unique address that identifies a storage location or a device.

---

## P

- power and cooling unit (PCU)** A FRU component in the Sun StorEdge 6120 array. It contains a power supply, cooling fans, and an integrated UPS battery. There are two power and cooling units in a Sun StorEdge 6120 array.

---

## Q

**quality of service** Quality of service refers to the objective of obtaining a desired level of system behavior achieved by using system tunables within a storage array. RAID level, number of hot spare disks, multipath access, and disk speed are some of the factors that influence quality of service.

---

## R

**RAID group** A set of disks in which part of the physical storage capacity is used to store redundant information about user data stored on the remainder of the storage capacity.

**read caching** Data stored for future retrieval, to reduce disk I/O as much as possible.

**redundant array of independent disks (RAID)** A configuration in which multiple drives are combined into a single virtual drive to improve performance and reliability.

**reliability, availability, serviceability (RAS)** A term to describe product features that include high availability, easily serviced components, and dependability.

**reverse address resolution protocol (RARP)** A utility in the Solaris operating environment that enables automatic assignment of the array IP address from the host.

---

## S

**storage array** A storage system containing multiple disk drives, designed to provide performance, high availability, serviceability, or other benefits. Disk arrays may provide mechanisms to create virtual extents of volumes, such as RAID groups. The physical and logical elements of the storage array are managed as a group. A storage array must contain at least one tray with a RAID controller.

**storage pool** A collection of storage extents with the same quality of service.



---

## T

**tray** Refers to a single Sun StorEdge 6120 or 6020 array. If one is referring to multiple trays connected together, that new entity would be referred to as a storage array.

---

## V

**volume** A volume is a virtual disk into which a file system or application can place data. A volume may be a single physical disk or a virtual disk mapped from one or more underlying extents.

---

## W

**world wide name (WWN)** A number used to identify array volumes in both the array system and Solaris operating environment.



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