Sun StorageTek™ 6540 Array Hardware Installation Guide

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Contents

Figures

Tables

Preface

The *Sun StorageTek 6540 Array Hardware Installation Guide* introduces the array and provides information on installing the array and associated hardware components, setting the link rate, and powering on an array.

Before You Read This Book

Before you begin to install the Sun StorageTek 6540 Array, you must have already prepared the site as described in these books:

- *Sun StorageTek 6540 Array Regulatory and Safety Compliance Manual*
- *Sun StorageTek 6540 Array Site Preparation Guide*

Refer to "Accessing Sun Documentation" on page xviii for information on obtaining these documents.

How This Book Is Organized

Chapter 1 provides an overview of the Sun StorageTek 6540 Array, management software, and installation process.

Chapter 2 provides detailed information on attaching rails in a cabinet, inserting trays into a cabinet, and cabling the 6540 components.

Chapter 3 describes how to connect the management host and data hosts to enable access to the array.

Chapter 4 describes how to verify the link rate and also describes powering the array on and off.

Chapter 5 provides information on data host, HBAs, and other software.

Chapter 6 describes how to configure IP addressing for the controllers.

Appendix A describes configuring a DHCP server.

Using UNIX Commands

This document does not contain information on basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices. Refer to the following for this information:

■ Software documentation that you received with your system

■ Solaris™ Operating System documentation, which is at `http://docs.sun.com`

Typographic Conventions

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

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

Related Documentation

Application	Title	Part Number
Site planning information	*Sun StorageTek 6540 Array Site Preparation Guide*	819-6524-*nn*
Late-breaking information not included in the information set	*Sun StorageTek 6540 Array Release Notes*	819-6521-*nn*
Software installation instructions	*Sun StorageTek Common Array Manager Software Installation Guide*	819-7035-*nn*
Quick reference information for the CLI	*Sun StorageTek 6130, 6140, and 6540 Arrays sscs(1M) CLI Quick Reference*	819-7038-*nn*
Regulatory and safety information	*Sun StorageTek 6540 Array Regulatory and Safety Compliance Manual*	819-6520-*nn*
Sun Rack 1000-38 information	*Sun Rack Service Manual*	816-6387-*nn*

Accessing Sun Documentation

You can obtain Sun network storage documentation at:

http://www.sun.com/products-n-solutions/hardware/docs/Network_Storage_Solutions

You can also view, print, or purchase a broad selection of other Sun documentation, including localized versions, at:

http://www.sun.com/documentation

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http://www.sun.com/hwdocs/feedback

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

Sun StorageTek 6540 Array Hardware Installation Guide, part number 819-6461-12.

Overview

This chapter provides an overview of the Sun StorageTek 6540 Array. It contains the following sections:

- "Sun StorageTek 6540 Array" on page 1
- "Overview of the Installation Process" on page 21

Sun StorageTek 6540 Array

The Sun StorageTek 6540 Array is a high-performance, enterprise-class, full 4-Gigabit per second (Gb/s) Fibre Channel (FC) solution that combines outstanding performance with the highest reliability, availability, flexibility, and manageability.

The Sun StorageTek 6540 Array is mounted in a Sun Rack 1000-38 cabinet, which is fully prepared to be fitted with up to 11 expansion trays. The 6540 Array is scalable from a base configuration of one dual RAID controller tray and one expansion tray to a maximum configuration of one dual RAID controller tray and 11 expansion trays in one cabinet (see FIGURE 1-6) or up to 14 expansion trays across two cabinets.

The 6540 Array can be shipped as independent components or in a fully-racked and cabled environment. This section contains an overview of the Sun StorageTek 6540 Array hardware and software.

Data hosts

Ethernet out-of-band
Redundant Fibre Channel

Host 1

Host 2

FC switch

Expansion trays

Host 3

Host 4

FC switch

Controller tray

Host 5

Expansion trays

Local
management host

Remote
management host
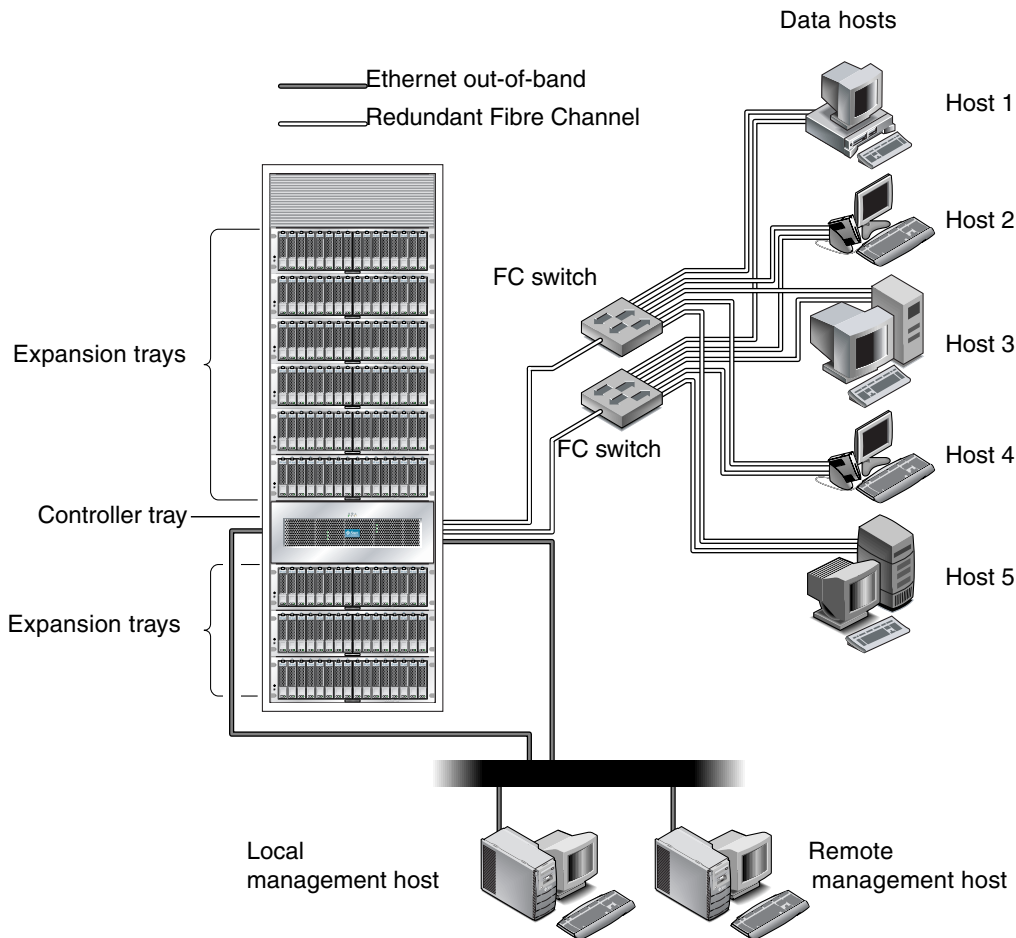
FIGURE 1-1   Sun StorageTek 6540 Array Product Overview

Hardware Overview

Each expansion tray can contain 5 to 16 disk drives, allowing the array to support up to 224 Fibre Channel (FC) or Serial Advanced Technology Attachment (SATA) disk drives.

This section describes the main components of the Sun StorageTek 6540 Array controller and expansion trays.

Sun Rack 1000-38 Cabinet

The Sun Rack 1000-38 cabinet is 39.4 inches (1000 mm) deep, 23.5 inches (59.7 cm) wide, and 74 inches (188 cm) tall. The cabinet has an empty weight of 360 pounds (163.3 kilograms) and a fully loaded weight of 1625 pounds (737 kilograms). The cabinet includes the Sun Power Distribution System (PDS), which provides a high-current, sequenced power system. The cabinet front and rear doors give you immediate access to hardware, cabling, and LEDs. The vertical cable management bracket and the cable management arms keep the cables organized for easy tracing and mobility.

The Sun PDS resides in the cabinet frame but does not occupy space that otherwise would be used for expansion trays. The PDS consists of two independently powered sequencers and two power outlet strips, each with 24 outlets. Therefore, it provides 48 outlets, in ten separate switched and two unswitched zones. Four 20-amp circuits are required to power the four power cords to the rack. Each circuit must provide 180 to 264 VAC at 47 to 63 Hz.

Controller Tray Components

The 6540 controller tray contains two redundant array of independent disks (RAID) controllers, which operate independently and provide failover capability for the data and management paths. The controller tray is configured for FC connections to disk drives and trays, and provides RAID functionality and caching.

The controller tray has two power supply and fan compartments, and a battery backup compartment in which batteries are housed to retain cache memory in the event of a power failure. The backup batteries are accessed from a removable panel in the interconnection module.

TABLE 1-1 summarizes the controller tray configuration.

TABLE 1-1   Sun StorageTek 6540 Array Controller Tray

Description	Quantity
FC RAID controllers	2
Ethernet ports for management host connections	4 (2 per controller)
4/2/1 Gbps FC host ports with SFPs	8 (4 per controller)
4/2/1 Gbps FC expansion ports	4 (2 per controller)
Power supply/fan assemblies	2
Battery backup compartments	2

Fibre Channel RAID Controllers

The SCSI RAID controllers communicate using the FC protocol to provide RAID and caching functionality. Each controller is hot-swappable. A battery that is housed in the controller tray interconnection module enables the controller to retain cache memory in the event of a power failure.

Power Supply Units

The power supplies provide hot-swappable, redundant power and cooling to the controller tray. Each power supply gets its power from an AC cord that is plugged into a RAID controller. The fans within the power supply are powered from the controller tray interconnection module. This regulates the environment so that the loss of AC or DC power from a single power supply does not affect the power to either set of fans.

Interconnection Module

The interconnection module is a hot-swappable unit that provides redundant connections between the two RAID controllers. If a power supply were to fail, the redundant connection through the interconnection module would continue to supply power to both controllers from the remaining power supply.

Although hot-swappable, the interconnection module itself is not redundant. If it is removed, the system will not go off line, but system performance will be impacted.

Write cache mirroring and access to redundant loops on the back end are accomplished through the interconnection module. If the interconnection module is removed, the system switches cache to write-through mode and fails over all volumes to one controller. That controller continues to have access to all disk drives and continues to service I/O using half of the backend loops.

The system remains in this mode until the interconnection module is replaced, at which time the system automatically reverts back to normal operations.

Battery Backup

Battery backups supply power to the cache of both RAID controllers. A single controller tray battery pack is capable of supplying enough power to maintain data in cache for up to seven days.

Every system is shipped with redundant battery packs, which can support and maintain up to 4 Gbytes of cache memory per controller (8 Gbytes per system) for up to seven days, or up to 8 Gbytes of cache per controller (16 Gbytes per system) for up to three days. A single battery pack is capable of supporting and maintaining up to 2 Gbytes of cache per controller (4 Gbytes per system) for up to seven days.

Controller Tray LEDs

FIGURE 1-2 shows the LEDs and components at the front of the controller tray with the bezel on.
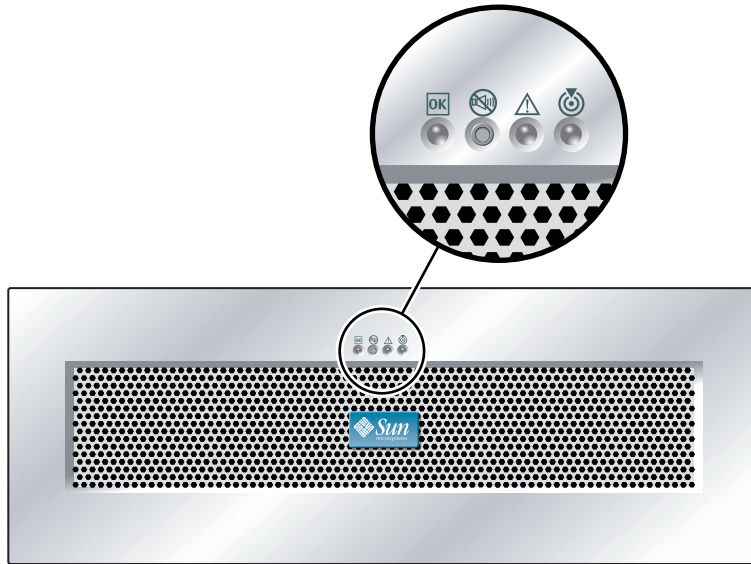
FIGURE 1-2   Controller Tray (Front View)

FIGURE 1-3 shows the location of the power cooling units and the battery compartments at the front of the controller tray with the bezel off.

Note – A tray LED icon may not be visible unless the LED is illuminated.
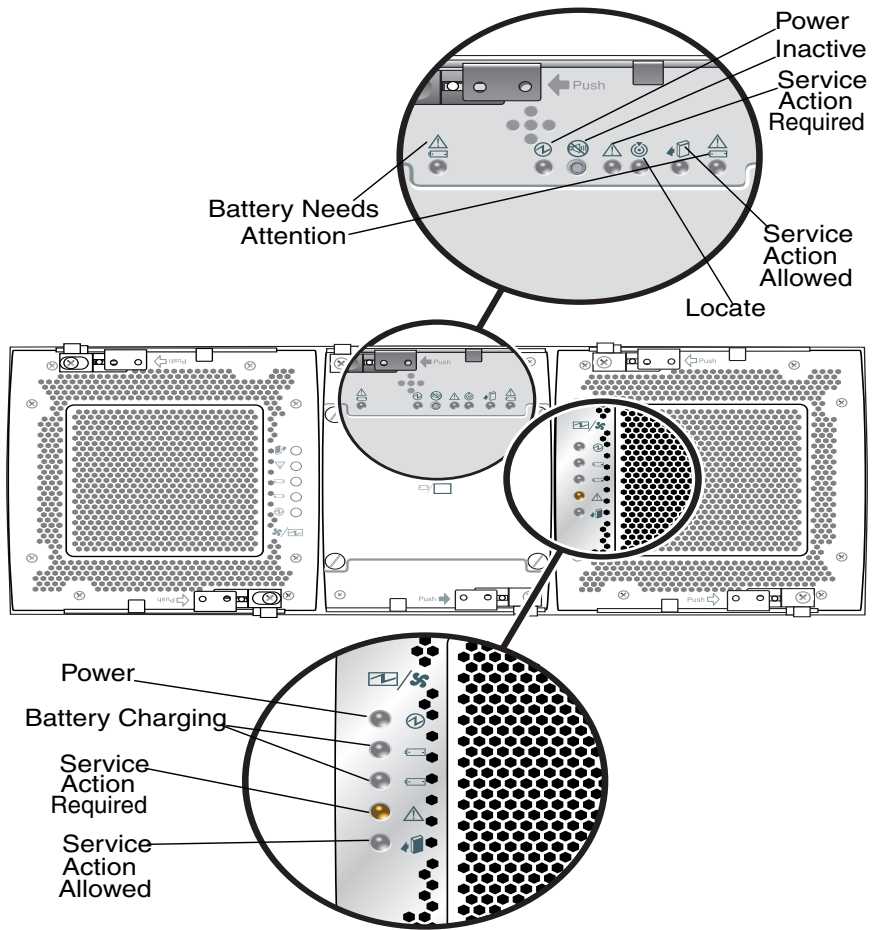
FIGURE 1-3 Power Cooling Units and Battery Backup Compartment LEDs

Labels in upper callout: Power, Inactive, Service Action Required, Battery Needs Attention, Service Action Allowed, Locate

Labels in lower callout: Power, Battery Charging, Service Action Required, Service Action Allowed

TABLE 1-2 describes the LEDs on the power cooling units and the battery interconnection unit.

TABLE 1-2   Controller Tray LEDs (Front)

LED/Indicator	Description
Service Action Allowed	Steady blue indicates that service action can be taken on the power supply without adverse consequences. Off indicates that the power supply is engaged and service should not be implemented.
Service Action Required	Steady amber indicates that the power supply requires service. Off indicates that the battery does not require service.
Battery Status	Power Cooling Units: Steady green indicates that the battery is fully charged. A slow blink indicates that the battery is charging. Off indicates that the battery is discharged or off. Battery Interconnect Unit: Amber indicates that the battery is missing or has failed. Off indicates status is normal.
OK/Power	Steady green indicates that power is applied to the tray and the tray is functioning normally. Off indicates that power is not applied to the tray. Flash indicates that normal activity is in progress.
Alarm Cancel button	Reserved for canceling audio alarm. This function is not currently supported. Use the management software to review alarms and events.
DC	On indicates that the correct DC power is being supplied from the controller power supply.
AC	On indicates that AC power is being supplied to the controller power supply.

FIGURE 1-4 shows the ports at the back of the controller tray.
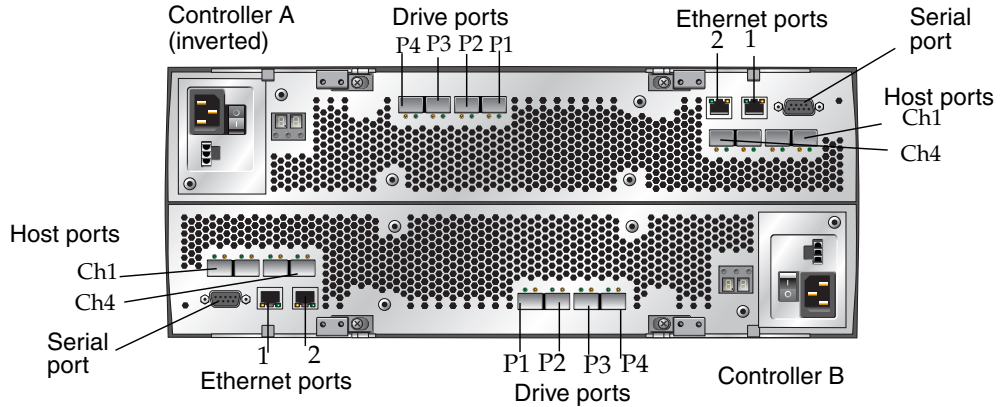
FIGURE 1-4 Controller Tray Ports (Back)

TABLE 1-3 describes the controller tray ports. All Controller A ports are inverted from the Controller B ports.

TABLE 1-3 Controller Tray Ports (Back)

Ports	Description
Host ports (Ch1 - Ch4)	Four 4-, 2-, or 1-Gbit/second FC ports with Small Form-factor Pluggable (SFP) transceivers. Host port Ch4 is reserved for remote replication if you are licensed for remote replication and it is activated; otherwise, host port Ch4 is available for use.
Ethernet ports (1 and 2)	RJ-45 Ethernet ports. Ethernet port 1 is used for out-of-band management of the RAID controller. An internal Ethernet device provides 10 Mbit/second and 100 Mbit/second full-duplex connectivity. Ethernet port 2 has limited functionality and is reserved for future use.
Drive ports (P1, P2, P3, P4)	Four connections to the two 4-, 2-, or 1-Gbit FC ports that are used to connect to the expansion tray drives.
Serial port	Port that allows terminal access for display or configuration of the controller IP addresses. Also, allows you to clear the local array password.

FIGURE 1-5 shows the controller tray LEDs and indicators.
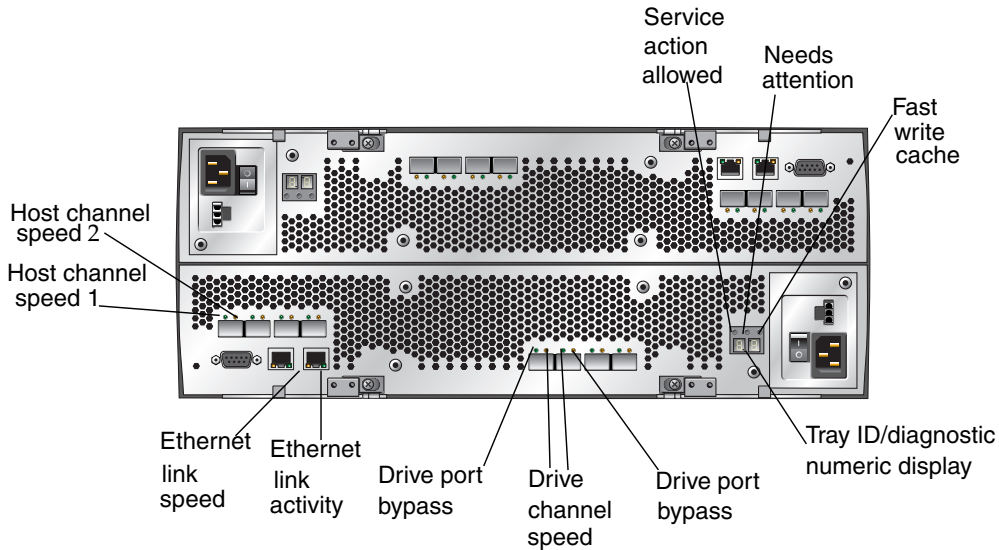
FIGURE 1-5 Controller Tray LEDs and Indicators (Back View)

TABLE 1-4 describes the LEDs and indicators at the back of the controller tray. All Controller A LEDS are inverted from the Controller B LEDs.

TABLE 1-4 Controller Tray LEDs and Indicators (Back)

LED/Indicator	Description
DC	On indicates that the correct DC power is being supplied from the controller power supply.
Service Action Required	Steady amber indicates that the power supply requires service. Off indicates that the power supply does not require service.
AC	On indicates that AC power is being supplied to the controller power supply.

TABLE 1-4 Controller Tray LEDs and Indicators (Back) *(Continued)*

LED/Indicator	Description
ID/Diag display	Seven-segment readouts indicate the ID of the tray. Also provides diagnostic information, such as the number 85, which indicates all is well. Contact Sun Customer Service for additional information.
Cache Active	Steady green indicates that data is in the cache. Off indicates that all data has been written to disk and the cache is empty.
Service Action Allowed	Steady blue indicates that service action can be taken on the controller without adverse consequences. Off indicates that the controller is engaged and service action should not be implemented.
Controller Indicators	
Host Port Rate	The combined display indicates the host port link rate for the tray: • LED 1 On, LED 2 On – 4 Gbits/second • LED 1 Off, LED 2 On – 2 Gbits/second • LED 1 On, LED 2 Off – 1 Gbits/second
Expansion Port Rate	The combined display indicates the expansion port link rate for the tray: • LED 4 On, LED 2 Off – 4 Gbits/second • LED 4 Off, LED 2 On – 2 Gbits/second The LEDs display as follows: W X Y Z Each pair of drive ports (ports 1 and 2 are one pair, and ports 3 and 4 are the other pair) W and Z LEDs indicate whether or not the port is by-passed (amber); the X and Y LEDs indicate the speed of this pair of drive ports. If the Y LED is the only one lit, it represents 2Gb/sec. If both X and Y are lit, it represents 4Gb/sec.

TABLE 1-4   Controller Tray LEDs and Indicators (Back) *(Continued)*

LED/Indicator	Description
Expansion Port Bypass	Steady amber indicates that no valid device is detected and that the drive port is bypassed. Off indicates that there is no SFP transceiver installed or that the port is enabled.
Ethernet Link Activity	Steady green indicates that there is an active connection. Off indicates that there is not an active connection.
Ethernet Link Speed	Steady green indicates that there is a 100BaseTX connection to the port. Off (when the Ethernet Status LED is on) indicates that there is a 10BaseT connection to the Ethernet port.

Controller LED Status Codes

The following is a list of the status codes and descriptions that may display on the numerical LEDs on the controller.

FF – ESM/IOM Boot Diagnostic executing

88 – This ESM/IOM is being held in Reset by the other ESM/IOM

AA – ESM/IOM-A application is booting up

bb – ESM/IOM-B application is booting up

L0 – Mismatched ESM/IOM types

L2 – Persistent memory errors

L3 – Persistent hardware errors

L9 – Over Temperature

H1 – SFP Speed Mismatch (2 Gb/s SFP installed when operating at 4 Gb/s)

H2 – Invalid/Incomplete Configuration

H3 – Maximum Reboot Attempts Exceeded

H4 – Cannot Communicate with Other ESM/IOM

H5 – Midplane Harness Failure

H6 – Firmware Failure

H7 – Current Enclosure Fibre Channel Rate Different than Rate Switch

H8 – SFP(s) Present in Currently Unsupported slot (2A or 2B)

Controller FRU Handle Can Be Hazardous

Caution – Be careful using the FRU handle on the controller tray. It can snap shut when pushed hard during reinsertion, pinning fingers between the tray and handle edges.

Sharp Edges on Chassis

Caution – On both the controller and expansion trays, the rear of the chassis has very sharp edges.

Expansion Tray

An expansion tray (Common Storage Module 200 also known as CSM2) is directly attached by an FC loop to a controller tray and cannot operate independently. The expansion trays are connected to the RAID controllers in a controller tray using the drive port connections.

Should you need multiple expansion trays in a configuration, you can connect them together using FC cables. You can add up to 14 expansion trays (four sets of three or four expansion trays per set) to each controller tray.

Expansion trays are built from a 3 RU chassis and include power supplies and disk drives. Each expansion tray has two Fibre Channel Arbitrated Loop (FCAL) switch cards, one for each back-end loop.

In addition, each expansion tray is connected to the tray above and the tray below it by two FC cables. The FCAL switch performs trunking operations, which increases performance by opening multiple threads through the switch at one time.

Refer to "Installing and Cabling Trays" on page 23 for details on expansion tray cabling.

TABLE 1-5 describes the expansion tray configuration.

TABLE 1-5   Sun StorageTek 6540 Array Expansion Tray

Description		Quantity
FC or SATA II disk drives	FC hard disk drives: 73G10K, 73G15K, 146G10K, 146G15K, 300G10K	5-16 4-, 2-, or 1-Gbit/second drives.
	SATA II hard disk drives: 500G7.2K	5-16 3-Gbit/second drives with circuitry to support operation in either a 4-, 2-, or 1-Gbit/second environment.
Drive expansion ports		One pair per controller. Ports 2A and 2B are disabled, reserved for future use.
Power supply/fan assemblies		2

FIGURE 1-6 shows the ports and components at the back of the expansion tray.
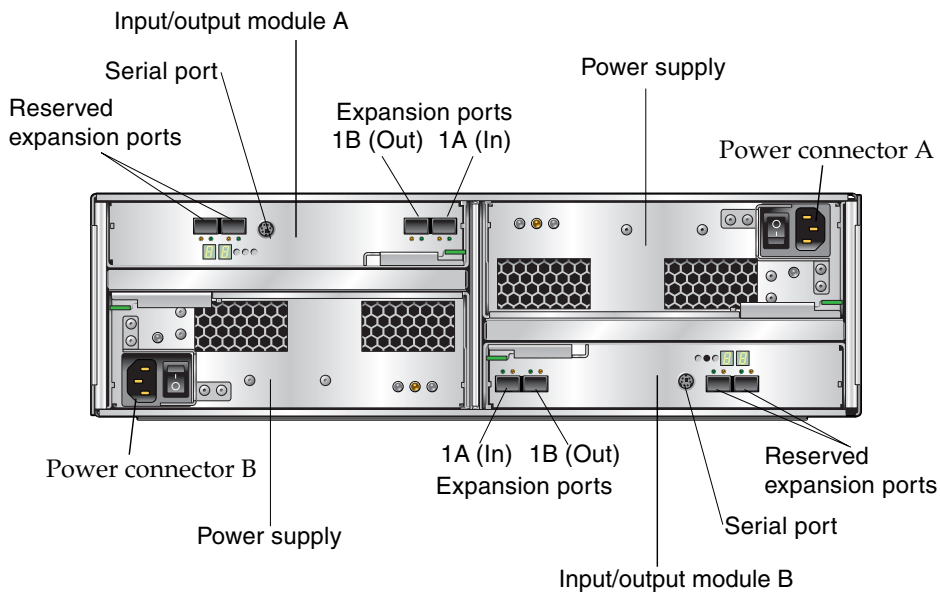
FIGURE 1-6   Expansion Tray Ports and Components (Back)

TABLE 1-6 describes the ports and components at the back of the expansion tray.

TABLE 1-6   Expansion Tray Ports and Components (Back)

Ports/Components	Description
Expansion ports 1A (In), 1B (Out)	Two 4-, 2-, or 1-Gbit/second FC ports used to connect to a controller tray and additional expansion trays.
Power supplies	For each expansion tray, two power supplies that provide redundant power to the tray. If one power supply fails, the tray is powered by the remaining power supply.
Reserved expansion ports	Reserved for future use.

FIGURE 1-7 shows the LEDs at the back of the expansion tray.
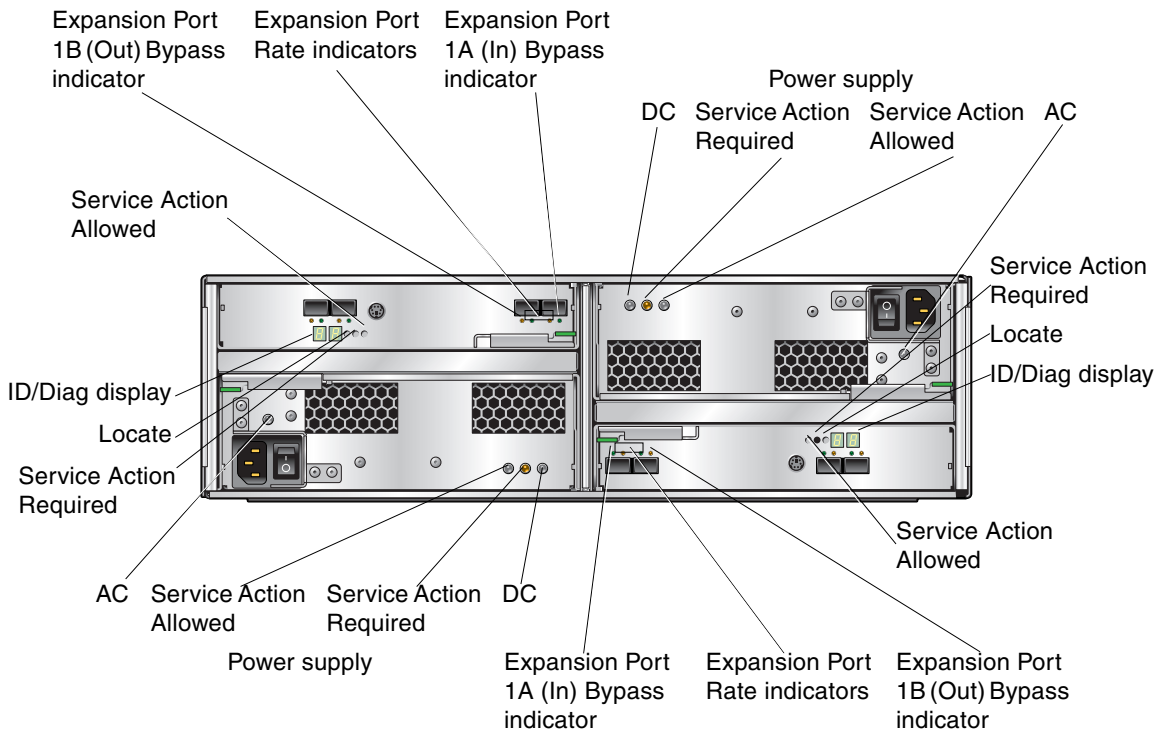
FIGURE 1-7   Expansion Tray LEDs and Indicators (Back)

TABLE 1-7 describes the LEDs and indicators at the back of the expansion tray.

TABLE 1-7 Expansion Tray LEDs and Indicators (Back)

LED/Indicator	Description
Power Supply LEDs	
DC	On indicates that the correct DC power is being supplied from the controller power supply.
Service Action Required	Steady amber indicates that the power supply requires service. Off indicates that the power supply does not require service.
Service Action Allowed	Steady blue indicates that service action can be taken on the power supply without adverse consequences. Off indicates that the power supply is engaged and service action should not be implemented.
AC	On indicates that AC power is being supplied to the controller power supply.
Expansion Tray LEDs	
ID/Diag display	Seven-segment readouts indicate the ID of the tray. Also provides diagnostic information, such as the number 85, which indicates all is well. Contact Sun Customer Service for additional information.
Locate	Steady white indicates that the controller has been identified.
Service Action Required	Steady amber indicates that the controller requires service. Off indicates that the controller does not require service.

TABLE 1-7 Expansion Tray LEDs and Indicators (Back) *(Continued)*

LED/Indicator	Description
Service Action Allowed	Steady blue indicates that service action can be taken on the controller without adverse consequences. Off indicates that the controller is engaged and service action should not be implemented.
Expansion Tray Indicators	
Expansion Port Rate **4** **2**	The combined display indicates the expansion port link rate for the tray: • LED 4 On, LED 2 Off – 4 Gbits/second • LED 4 Off, LED 2 On – 2 Gbits/second The LEDs display as follows: W X Y Z For each pair of drive ports (ports 1 and 2 are one pair, and ports 3 and 4 are the other pair) W and Z LEDs indicate whether or not the port is by-passed (amber); the X and Y LEDs indicate the speed of this pair of drive ports. If the Y LED is the only one lit, it represents 2Gb/sec. If both X and Y are lit, it represents 4Gb/sec.
Expansion Port Bypass	Steady amber indicates that no valid device is detected and that the drive port is bypassed. Off indicates that there is no SFP installed or that the port is enabled.

Software Overview

The Sun StorageTek 6540 Array is managed by the Sun StorageTek Common Array Manager software. This software delivered on CD and consists of the tools described in the following topics:

■ "Management Software" on page 18
■ "Remote CLI Client" on page 19

You specify the functionality you require, and the CD installs the necessary software.

Management Software

The web-based management software is the primary interface for configuring, managing, monitoring, and diagnosing the array. The management software consists of a suite of tools that you install on an external management host. The management host can be a Sun system running the Solaris 8, 9, or 10 Operating System (OS), or an x86 or x64 system running Solaris, or Windows 2000, 2003, or XP.

The management software enables the storage administrator to manage the array from any system with a web browser that is on the same network as the management host. For a list of supported browsers, see the release notes.

The management software enables monitoring and diagnostic tasks on the array. You can configure the software to monitor on a 24-hour basis, collecting information that enhances the reliability, availability, and serviceability (RAS) of the array.

The management software records alerts and notifications, which you can monitor by displaying the log file. It also automates the transmission of alerts, which can be sent to an email address, to a pager, or to diagnostic software running on a management host on the network.

Finally, the management software enables you to run diagnostic tests to troubleshoot problems and access Service Advisor for instruction on replacing field-replaceable units (FRUs).

Service Advisor and Field-Replaceable Units

Field-replaceable units (FRUs) can be replaced by Sun field engineers or by Sun-trained customer administrators. To see a list of the hardware components that can be replaced at the customer site refer to Service Advisor in the Sun StorageTek Common Array Manager software.

The Service Advisor also provides information and procedures for replacing array components.

Remote CLI Client

You can also manage and configure storage for the array using the remote command-line interface (CLI) client. The CLI provides the same control and monitoring capability as the web browser, and it is also scriptable for running frequently performed tasks.

The remote CLI client is available for Solaris operating system (OS) and several other operating systems. See the release notes for a list of supported operating system platforms. For more information about the CLI commands, see the `sscs` man page.

Remote management software is installed on the management host automatically.

Data Host Software

The array data host software controls the data path between the data host and the array. The data host software consists of the following tools:

- Sun StorageTek SAN Foundation Software for managing the data path I/O connections between data hosts and the array. This software includes drivers and utilities that enable Solaris data hosts to connect to, monitor, and transfer data in a storage area network (SAN).
- Sun StorageTek Traffic Manager software, which provides multipathing functionality and the ability to reliably communicate with the array's storage.

Data host software enables Solaris 8, Solaris 9, and Solaris 10 workstations and Windows XP and NT operating systems to communicate with the array.

You can obtain the data host software from Sun's Download Center. Refer to the *Sun StorageTek 6540 Array Release Notes* (part number 819-6521-*nn*) for additional data host software information.

Sun StorageTek 6540 Shipping Kit

Following is a list of the current 6540 shipping kit. In case of any changes, refer to the *Sun StorageTek 6450 Array Release Notes (819-6521-nn)* for the latest list.

Sun StorageTek Common Array Manager CD

Sun StorageTek 6450 Array Hardware Installation Guide (819-6461-*nn*)

Sun StorageTek Common Array Manager Software Installation Guide (819-7035-*nn*)

Sun StorageTek 6130, 6140, and 6540 Arrays sscs(1M) CLI Quick Reference (819-7038-*nn*)

Important Safety Information for Sun Hardware Systems (816-7190-*nn*)

Software License Agreement (819-0764-*nn*)

Next Generation Rail Shipping Kit

Following is a list of the current Next Generation Rail shipping kit for the Sun Rack 1000-38. In case of any changes, refer to the *Sun StorageTek 6450 Array Release Notes (819-6521-nn)* for the latest list.

Wrench for the pallet tie down brackets

3 mm, 5 mm, and 6 mm allen wrenches

Deep-head socket wrench, double-ended

#3 Phillips screwdriver bit, 1/4-inch, 50 mm

M6x12mm screws

10-32x1/2-inch screws

4-40x3/16-inch Phillips screws

M5 Plastic cage nuts

#10 washers

10-32 lock nuts

Door hinge pin

Velcro tie wrap

Sun Rack Service Manual (816-6387-nn)

Sun Rack Safety and Regulatory Compliance Information (816-7885-nn)

Overview of the Installation Process

Before you install the 6540 Array, you must do the following:

- Read the *Sun StorageTek 6540 Array Release Notes* for any late-breaking information related to the installation of the array.
- Prepare the site as described in these books:
  - *Sun StorageTek 6540 Array Regulatory and Safety Compliance Manual*
  - *Sun StorageTek 6540 Array Site Preparation Guide*

The following checklist (TABLE 1-8) outlines all of the tasks required for installing the Sun StorageTek 6540 Array and tells you where you can find detailed procedures. To ensure a successful installation, perform the tasks in the order in which they are presented, according to your situation, either individual components or a fully-racked environment.

TABLE 1-8 Sun StorageTek 6540 Array Installation Checklist

Step	Installation Task	Where to Find Procedure
1.	Unpack the cabinet and move it into position.	Unpacking guide attached to the outside of the shipping carton
2.	Attach the power cables to the power source.	"Connecting the Power Cables" on page 84
3.	Connect the Ethernet port to your network.	Refer to "Connecting the Management Host" on page 85
4.	Connect the management host.	"Connecting the Management Host" on page 85
5.	Attach the host interface cables.	"Connecting Data Hosts" on page 88
6.	Verify the link rate for each tray.	"Verifying the Link Rate and Powering On the Array" on page 95
7.	Turn on the power.	"Powering On the Array" on page 97
8.	Configure IP addresses for both array controllers using the serial console port, as necessary.	"Configuring Static IP Addressing" on page 111
9.	Install the management host software on host systems.	*Sun StorageTek Common Array Manager Software Installation Guide*

Next Steps

Now you are ready to install rails in a rack, install trays in the rack, and cable the trays, as described in Chapter 2.

Installing and Cabling Trays

This appendix provides information for the Sun StorageTek 6540 Array as a standalone system and a factory default system that is fully racked and cabled.

Use the procedures in this appendix to install trays in a cabinet. The number of trays you need to install depends on your overall storage requirements. You can install one controller tray and up to 14 expansion trays. The maximum configuration would require a second cabinet, as the cabinets can hold 11 trays only.

This chapter describes the process of installing the Sun StorageTek 6540 Array. It contains the following sections:

- "Preparing for the Installation" on page 24
- "Attaching the Expansion Tray Rails to a Cabinet" on page 49
- "Installing a Controller Tray in a Cabinet" on page 44
- "Installing an Expansion Tray in a Cabinet" on page 63
- "Intertray Cabling" on page 68

The installation procedures in the following section requires the following items:

- #2 Phillips screwdriver (minimum 4-inch length recommended)
- #3 Phillips screwdriver (minimum 4-inch length recommended)
- Antistatic protection

Caution – Electrostatic discharge can damage sensitive components. Touching the array or its components without using a proper ground might damage the equipment. To avoid damage, use proper antistatic protection before handling any components.

Preparing for the Installation

Use the following procedures to prepare for installation:

- "Adding Expansion Modules Best Practices" on page 24
- "Preparing the Universal Rail Kit for the Expansion Trays" on page 25
- "Preparing the Tray" on page 29
- "Preparing the Cabinet" on page 30
- "Tray Groups and Balancing Expansion Trays" on page 30

Adding Expansion Modules Best Practices

Only Sun Service should install expansion modules with data. See the Sun StorageTek Common Array Manager 5.1.3 or higher for more information about supported expansion modules by array.

When you add a new CSM200 expansion module to an existing array in a production or active environment, it is best practice to cable and add the trays while the RAID controller module is powered on, in order to avoid a variety of issues including those listed below.

Before connecting any replacement drive or additional expansion module to an existing functioning array, it is best practice to contact Sun Microsystems Support Services. One reason for this is to avoid issues related to DACstore, the configuration and status database maintained by the array firmware, that stores its information on each of the disk drives.

Contact Sun Microsystems Support Services promptly upon experiencing any of the following symptoms:

- loss of management or data access
- inability to apply feature licenses
- inability to upgrade array firmware
- incorrect component details in the management tool
- host operating system reports the wrong product identifier
- array registration or discovery fails to complete
- persistent or unrecoverable multipathing failover

Note – Because corrective actions for a DACstore issue may require a configuration restoration, it is important to maintain a current image of the configuration. It is always a best practice to maintain recoverable backups of your data.

Preparing the Universal Rail Kit for the Expansion Trays

Use the universal rail kit to mount the Sun StorageTek 6540 expansion trays in any of the following cabinets:

- Any standard Sun cabinet, such as the Sun Rack 900/1000 cabinet
- Any 19-inch wide, 4-post, EIA-compatible rack or cabinet with a front-to-back depth between vertical cabinet rails of 24 to 36 inches (with threaded or unthreaded cabinet rails)
- The Sun StorEdge Expansion cabinet
- The Sun Fire cabinet

Unpacking the Universal Rail Kit

Unpack the universal rail kit and check the contents.

The universal rail kit (part number 594-2489-02) contains the following items:

- Left main rail (part number 341-2069-01) and extender rail (part number 341-2071-01)
- Right main rail (part number 341-2070-01) and extender rail (part number 341-2072-01)

Note – Typically, the main and extender pieces of both the left and right rails are shipped pre-assembled.

- Twelve 10-32 panhead screws
- Eight metric M panhead screws
- Four 8-32 panhead screws
- Two 6-32 flathead screws
- Two cabinet rail adapter plates (used for unthreaded cabinet rails only)

Required Hardware by Cabinet/Rack Type

The mounting hardware required for each rack or cabinet type is listed in the following table:

Type	Quantity	Use
Sun Rack 900/1000		
10-32 panhead screw	8	Assemble main and extender sections of left and right rails (Typically, left and right rails are shipped pre-assembled)
8-32 panhead screw	4	Mount left and right rails to front of cabinet rails
Metric M6 panhead screw	4	Mount left and right rails to back of cabinet rails
Metric M6 panhead screw	4	Secure front of tray to left and right cabinet rails
6-32 flathead screw	2	Secure back of tray to left and right side rails
Sun StorEdge Expansion cabinet		
10-32 panhead screw	8	Assemble main and extender sections of left and right rails (Typically, left and right rails are shipped pre-assembled)
10-32 panhead screw	8	Mount left and right rails to inner mount points at front and back of cabinet
8-32 panhead screw	4	Mount left and right rails to front cabinet rails
10-32 panhead screw	4	Secure front of tray to left and right cabinet rails
6-32 flathead screw	2	Secure back of tray to left and right side rails
19-inch wide, 4-post EIA-compatible cabinet with 10-32 threaded cabinet rails		
10-32 panhead screw	8	Assemble main and extender sections of left and right rails (Typically, left and right rails are shipped pre-assembled)
8-32 panhead screw	4	Mount left and right rails to front cabinet rails
10-32 panhead screw	4	Mount left and right rails to back cabinet rails
10-32 panhead screw	4	Secure front of tray to left and right cabinet rails
6-32 flathead screw	2	Secure back of tray to left and right side rails
19-inch wide, 4-post EIA-compatible cabinet with M5 or 12-24 threaded cabinet rails*		
10-32 panhead screw	8	Assemble main and extender sections of left and right rails (Typically, left and right rails are shipped pre-assembled)
8-32 panhead screw	4	Mount left and right rails to front cabinet rails
6-32 flathead screw	2	Secure back of tray to left and right side rails

Type	Quantity	Use
19-inch wide, 4-post EIA-compatible cabinet with unthreaded cabinet rails**		
10-32 panhead screw	8	Assemble main and extender sections of left and right rails (Typically, left and right rails are shipped pre-assembled)
Cabinet rail adapter plate	2	Snap into left and right front cabinet rails to allow you to secure the front of the array to the left and right cabinet rails
10-32 panhead screw	4	Secure the front of the array to the adapter plates on the left and front cabinet rails
6-32 flathead screw	2	Secure back of tray to left and right side rails

*For cabinet installations with M5 or 12-24 threaded cabinet rails, the following screws are not supplied. You must acquire these to match the threading requirements of your cabinet rails:

- Four screws to secure the left and right rails to the back cabinet rail
- Four screws to secure the front of the tray to the left and right front cabinet rails

**For cabinet installations with unthreaded cabinet rails, the following hardware is not supplied. You must acquire these to match the requirements of your cabinet rails:

- Four cage nuts to snap over the rail mounting holes in the left and right front cabinet rails
- Four screws that match the cage nuts to secure the left and right rails to the left and right front cabinet rails
- Two cage nuts to snap over the rail mounting holes in the left and right back cabinet rails
- Two screws that match the cage nuts to secure the left and right rails to the back cabinet rail

Loosening the Controller Tray Rail Adjustment Screws

Use the #2 Phillips screwdriver to loosen the two rail adjustment screws on each rail to allow adjustment of each rail length (FIGURE 2-1).

FIGURE 2-1   Loosening the Rail Screws to Adjust the Controller Tray Rail Length

Loosening the Expansion Tray Rail Adjustment Screws

Use the #2 Phillips screwdriver to loosen the four rail adjustment screws on each rail to allow adjustment of each rail length (FIGURE 2-2).
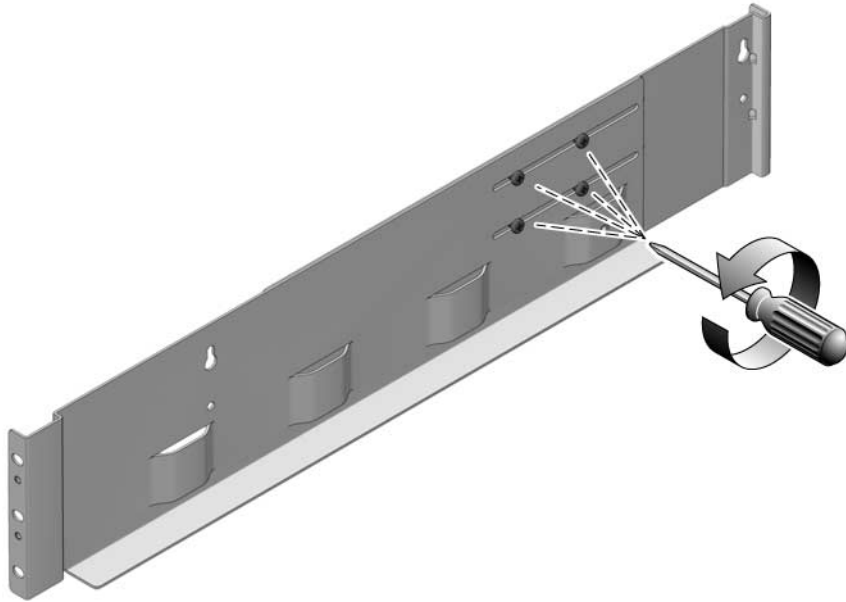
FIGURE 2-2   Loosening the Rail Screws to Adjust the Expansion Tray Rail Length

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Note – The expansion tray rails are preconfigured to adjust to cabinet rail depths of between 26.18 inches (664.97 mm) and 28.93 inches (734.82 mm). For cabinet rail depths outside of this range, remove and reposition the four rail adjustment screws (FIGURE 2-2) to support your required rail length.

Preparing the Tray

Caution – Two people are needed to lift and move the tray. Use care to avoid injury. An expansion tray can weigh up to 41 pounds (18.6 kg). Do not lift the front of the tray; this can cause damage to the drives.

---

1. **Unpack the tray.**

2. **Check the contents of the box for the following items:**

   - Sun StorageTek 6540 Array trays (controller or expansion)
   - Ship kit for the controller tray
     - Sun StorageTek 6540 Host Installation Software CD
     - *Sun StorageTek 6540 Array Hardware Installation Guide*

- *Sun StorageTek Common Array Manager Software Installation Guide*
- *Accessing Documentation* guide
- Ship kit for each expansion tray
  - Two 2-meter FC cables
  - *Accessing Documentation* guide

Preparing the Cabinet

Select the cabinet in which you will be installing the array. Be sure the cabinet is installed as described in the installation instructions provided with it.

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

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

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

4. **Remove or open the vented back panel.**

Tray Groups and Balancing Expansion Trays

The 6540 is comprised of a controller tray and up to 14 expansion trays. The expansion trays are divided into four tray groups. A tray group is defined as the one to four trays that share the same two connections to the controller tray. They can also be identified by their tray ID's most significant digit ("Tray Groups Are Defined Using Tray IDs" on page 35).

Each controller in the Sun StorageTek 6540 array has four expansion ports. For optimal reliability, availability, and serviceability, you should divide expansion trays evenly among the four expansion channels, resulting in tray groupings. Tray groups enable load balancing to provide optimum system performance. TABLE 2-2 identifies the tray groupings depending on the number of expansion trays in the system.

The 6540 has two controllers with four drive channels each. For redundancy, the expansion channels are divided both logically and physically. The physical divisions are based on the ASICs on the controllers and are called Drive Channels 1 to 4. The logical divisions are based on their connections to tray groups.

Physical Division of Trays in a Cabinet

To understand the physical division of the controller port drive associations, consider the following:

- Controller A, ports 3 and 4, are defined as Channel 1.
- Controller A, ports 1 and 2, are defined as Channel 2.
- Controller B, ports 1 and 2, are defined as Channel 3.
- Controller B, ports 3 and 4, are defined as Channel 4.

The required placement of the controller tray and the expansion trays in the cabinet facilitates cabling the trays in the required groups. TABLE 2-1 shows the required location of each tray in the main cabinet.

TABLE 2-1   Location of Trays in the Main Cabinet

Tray	Slot Location in Main Cabinet	U Size of Tray
Expansion tray 1	1	3
Expansion tray 5	2	3
Expansion tray 9	3	3
Controller tray	4	4
Expansion tray 2	5	3
Expansion tray 6	5	3
Expansion tray 10	7	3
Expansion tray 3	8	3
Expansion tray 7	9	3
Expansion tray 11	10	3
Expansion tray 4	11	3
Expansion tray 8	12	3

FIGURE 2-3 shows the physical location of each tray in the cabinet.
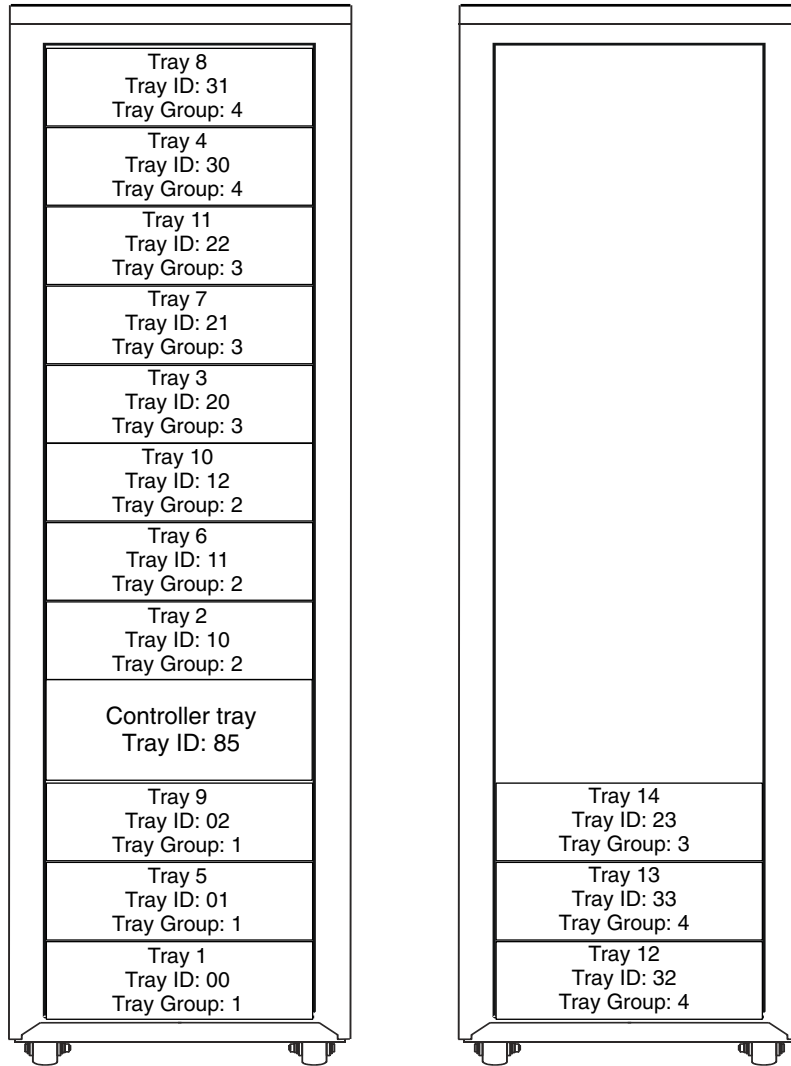
FIGURE 2-3   Physical Location of Each Tray in the Cabinet

Logical Division Among Tray Groups for Balancing

To understand the tray balancing among tray groups that establishes the logical divisions, TABLE 2-2 identifies the expansion trays that are included in each group. Refer to "Intertray Cabling" on page 68 for additional information.

TABLE 2-2 Expansion Tray Groups

Number of Expansion Trays	Expansion Trays In the Group			
	Group 1	Group 2	Group 3	Group 4
Up to 4	1	2	3	4
Up to 8	1, 5	2, 6	3, 7	4, 8
Up to 11	1, 5, 9	2, 6, 10	3, 7, 11	4, 8
Up to 14	1, 5, 9	2, 6, 10	3, 7, 11, 14	4, 8, 12, 13

FIGURE 2-4 shows the allocation of tray groups within a cabinet.
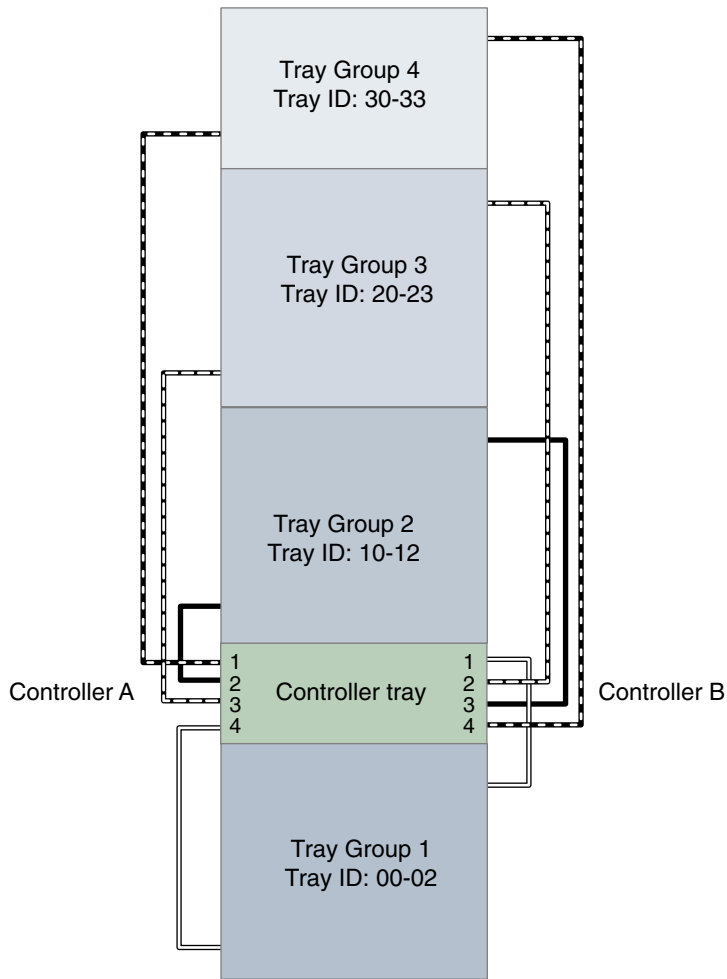
FIGURE 2-4   6540 Array Tray Groups

The resulting association between the controller ports and the drive ports and tray groups follows:

- Controller A port 4 and Controller B port 1 are connected to tray group 00.
- Controller A port 3 and Controller B port 2 support the same tray group 20.
- Controller A port 2 and Controller B port 3 support the same tray group 10.
- Controller A port 1 and Controller B port 4 support the same tray group 30.

Cabling from Controller A's side is done from the bottom-up whereas the cabling from Controller B's side is done from the top-down.

Tray Groups Are Defined Using Tray IDs

Tray groups are associated with tray IDs, as follows:

- Trays with IDs 0x comprise the first tray group or 00
- Trays with IDs 1x comprise the second tray group or 10
- Trays with IDs 2x comprise the third tray group or 20
- Trays with IDs 3x comprise the fourth tray group or 30

FIGURE 2-5 shows the intratray cabling within a tray group.

Tray X3

Tray X2

Tray X1

Tray X0

1B   1A

1A   1B

Controller A connects to
the first tray in this group

Controller B connects to
the last tray in this group
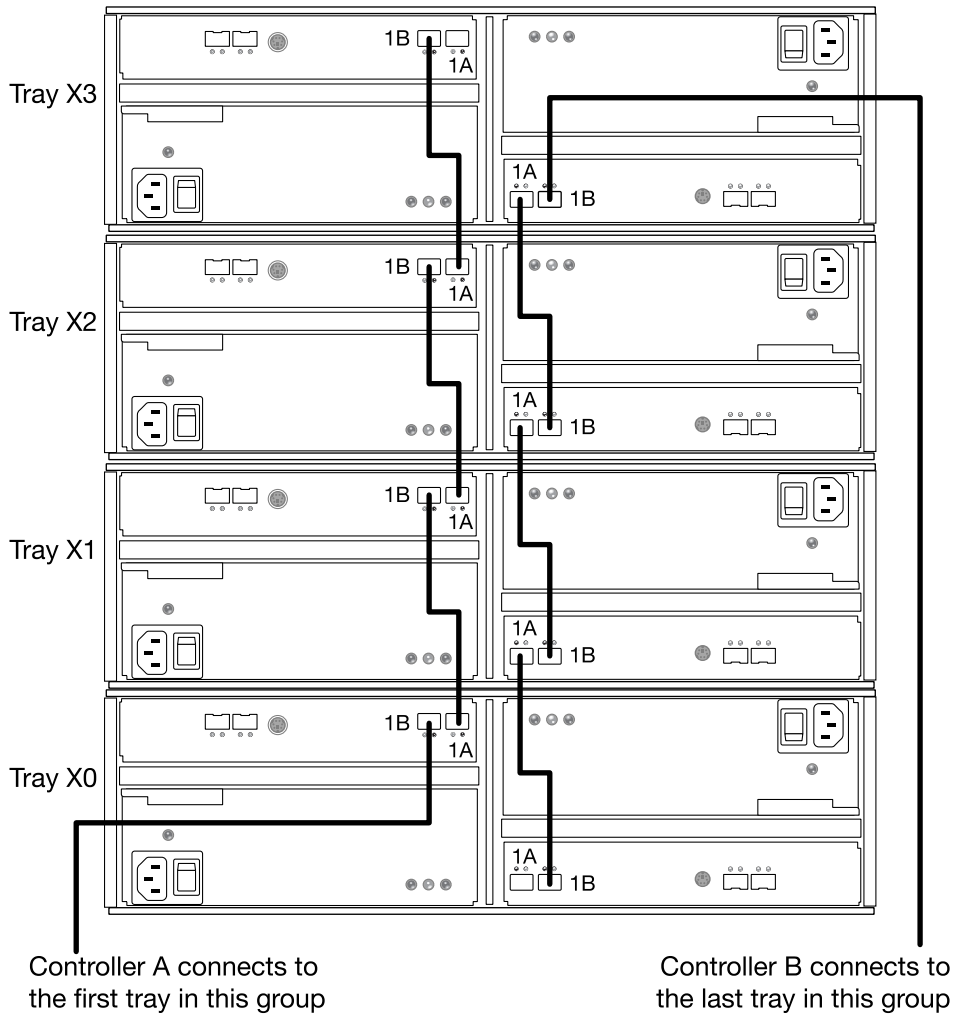
FIGURE 2-5   Intratray Cabling Within a Tray Group

Attaching the Controller Tray Rails to a Cabinet

The procedure in this section describes how to attach the rails for a standard 19-inch cabinet with threaded cabinet rails. Depending on your cabinet, the specific steps you need to follow may vary.

To attach the rails to a cabinet with threaded cabinet rails:

1. **Follow these steps first for the left rail and then for the right rail:**

   a. **Position the front of the rail directly inside the front cabinet rail** (FIGURE 2-6)**.**

      Make sure that you feed the back rail pin through the appropriate hole.
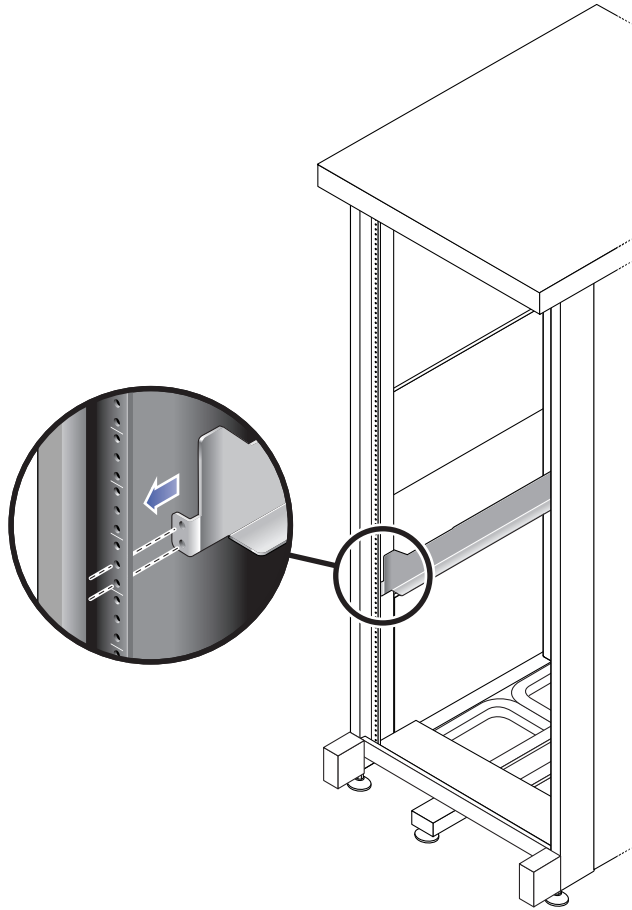
FIGURE 2-6   Positioning the Front of the Left Rail Behind the Left Front Cabinet Rail

b. Use the #2 Phillips screwdriver to insert and tighten the two screws to secure the left rail to the front of the cabinet (FIGURE 2-7)**.**

Put the screws into the bottom two holes only. You will secure the third screw after inserting the tray.

The controller tray requires four standard mounting units (4RU) of vertical space in the cabinet. Each standard mounting unit (U) has three mounting holes in the left and right cabinet rails. Insert the screws into the lowest two holes of the 4RU slot in which the tray is to be mounted.

These screws pass through the cabinet rail holes and screw into threaded holes in the rail. Do not tighten the front screws until you have begun securing the back rail screws.

When first positioning the rails, observe that the top of the rail ear (brace) is 1.25 inches below the top of where the tray will be positioned.
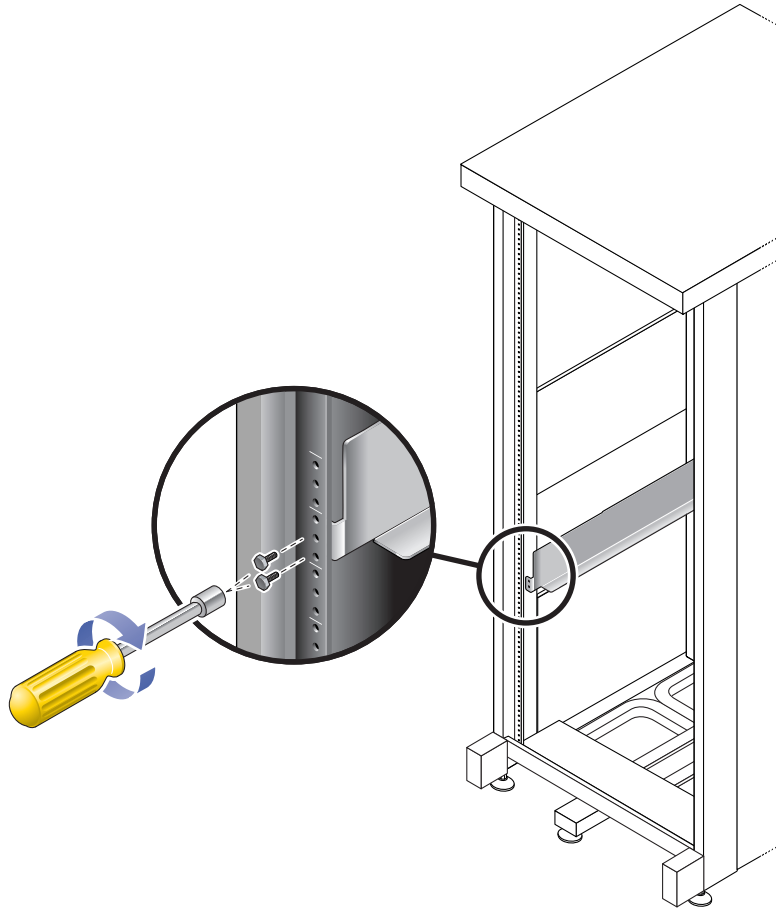
FIGURE 2-7   Securing the Left Rail to the Front of the Cabinet

c. At the back of the cabinet, adjust the length of the rail to position it directly inside the cabinet rail (FIGURE 2-8)**.**

Be sure to align the rail flange so that the mounting holes at the back correspond to those at the front of the cabinet.
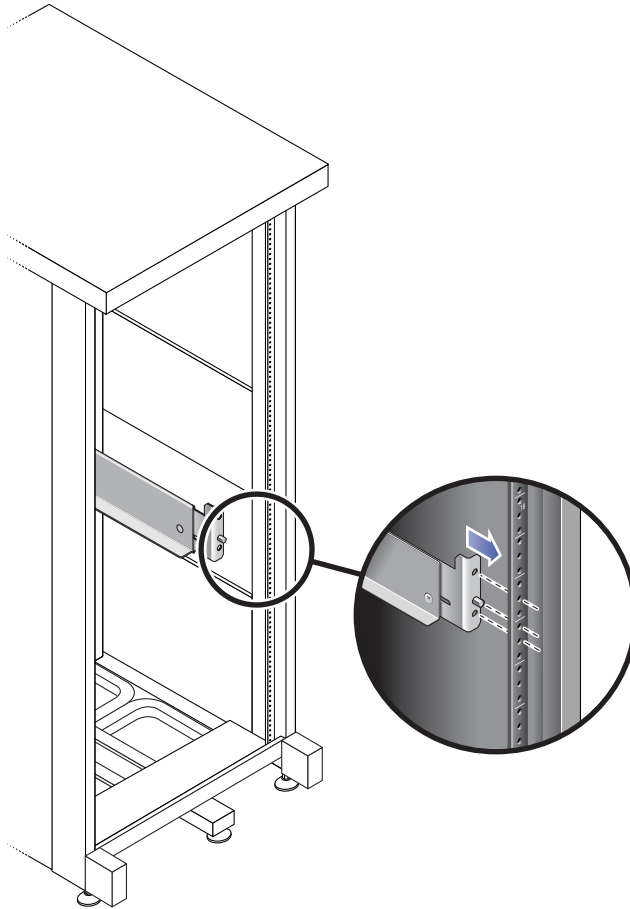
FIGURE 2-8   Adjusting the Length of the Left Rail at the Back of the Cabinet

d. Use the #2 Phillips screwdriver to insert and tighten the three screws at the back of the rail (FIGURE 2-9)**.**
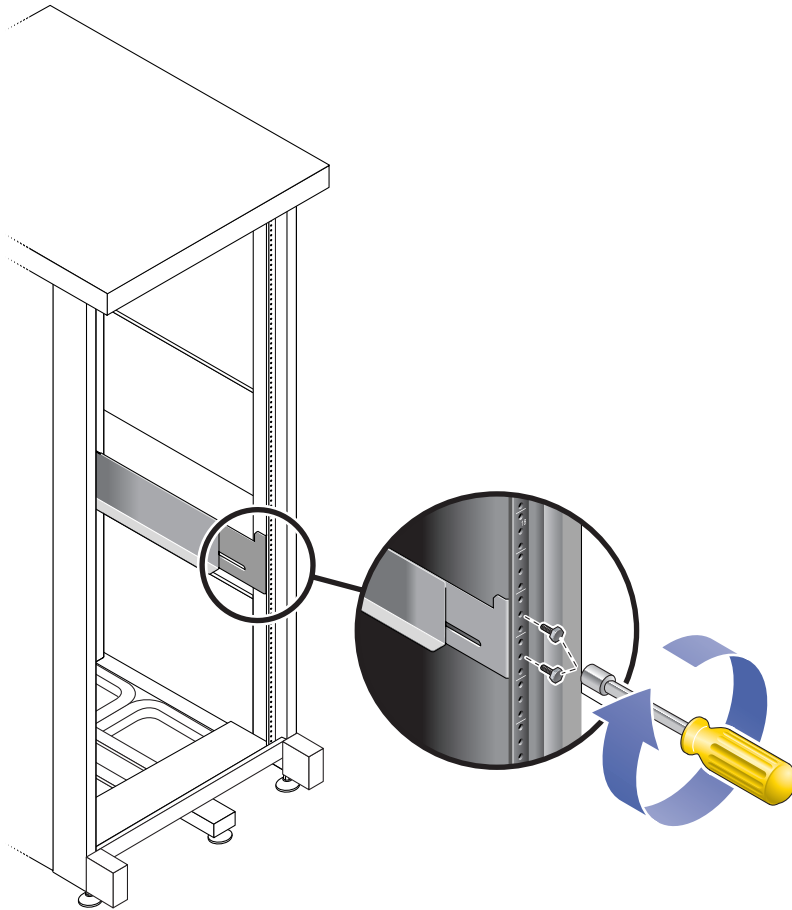
FIGURE 2-9   Securing the Left Rail to the Back of the Cabinet

2. Use the #2 Phillips screwdriver to tighten the adjustment screws at the back of each rail (FIGURE 2-10)**.**
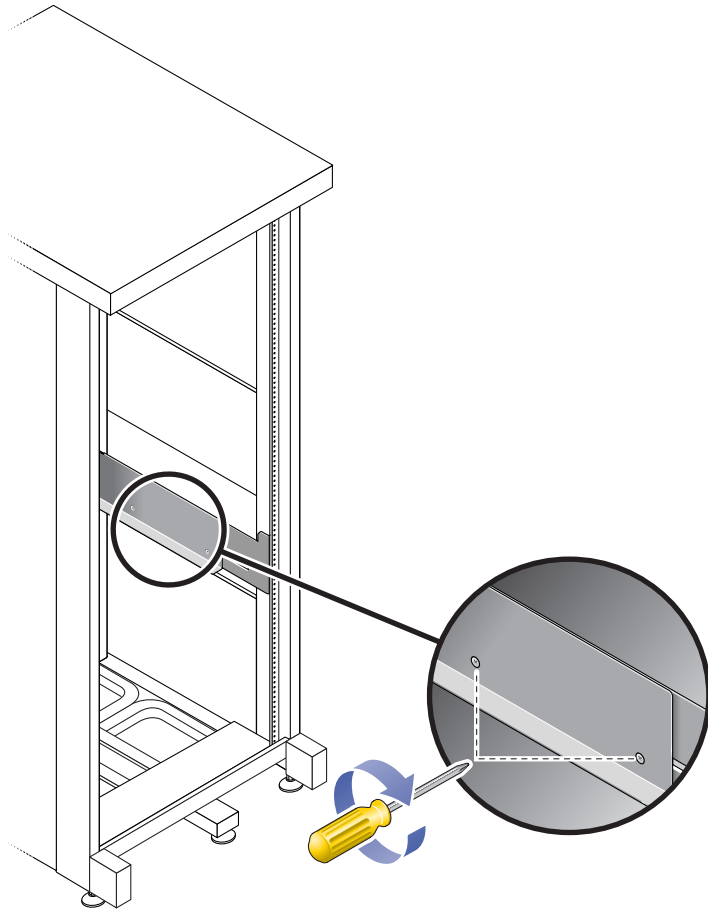
FIGURE 2-10 Tightening the Rail Adjustment Screws

Installing a Controller Tray in a Cabinet

Install the controller tray in the fourth slot up from the bottom of the cabinet, where you have attached the rails.

1. **Using two people, one at each side of the tray, carefully lift and rest the tray on the bottom ledge of the left and right rails** (FIGURE 2-11)**.**

> **Caution –** Use care to avoid injury. A tray can weigh up to 95 pounds (45 kg). Use two people to lift the tray.
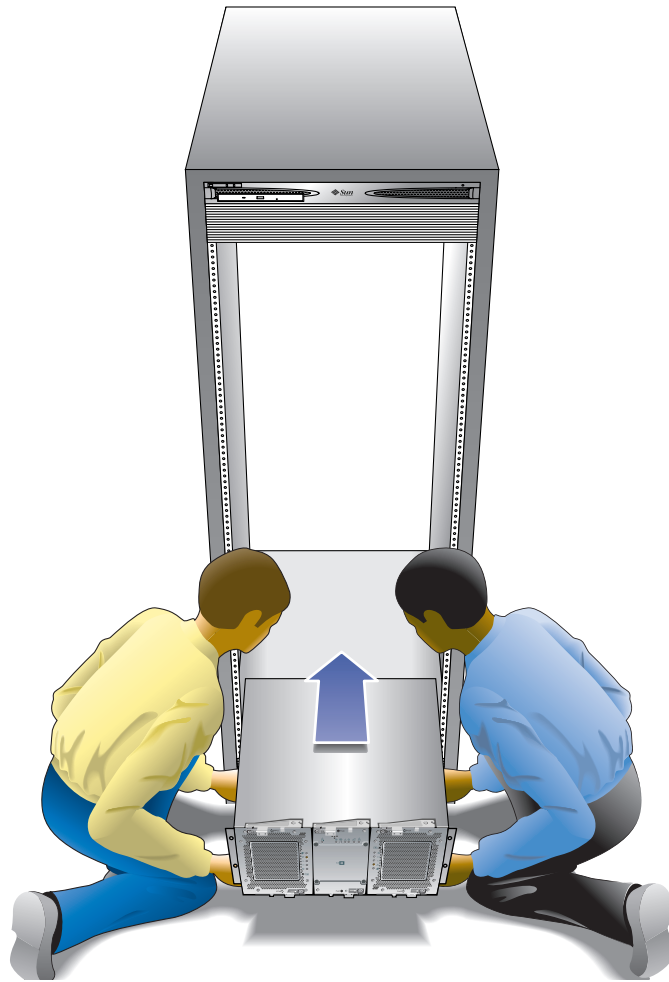
FIGURE 2-11 Positioning the Tray in the Cabinet

2. Carefully slide the tray into the cabinet until the front flanges of the tray touch the vertical face of the cabinet (FIGURE 2-12).
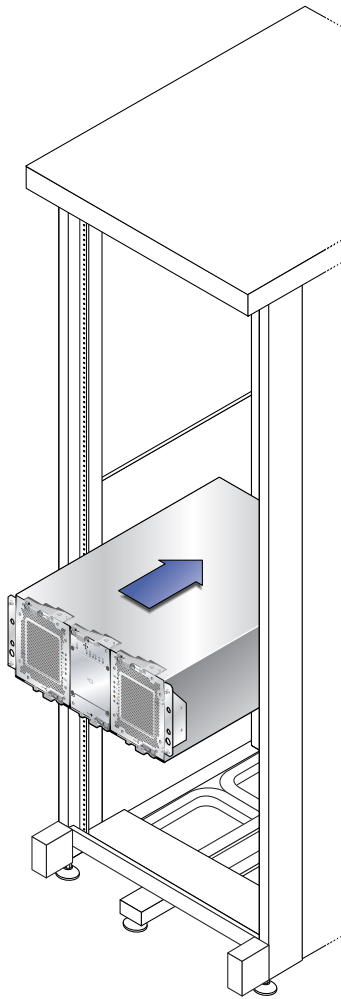
FIGURE 2-12 Sliding the Tray Into the Cabinet

Use the #2 Phillips screwdriver to install and tighten the third rail screw on each side, securing the tray to the cabinet and rail.
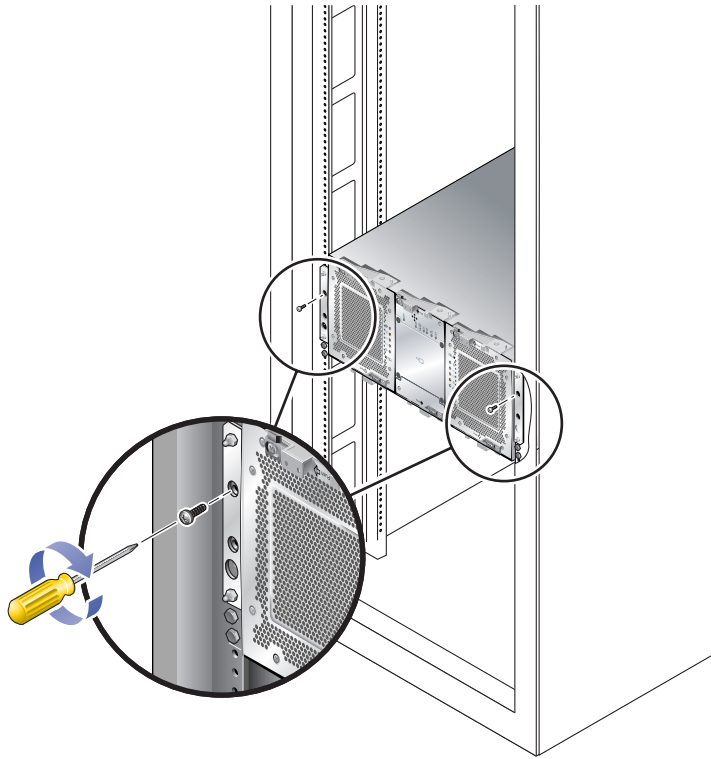
FIGURE 2-13 Securing the Tray to the Front of a Cabinet

3. **Install and tighten the screw on each side of the back of the tray to secure the tray to the cabinet** (FIGURE 2-14)**.**
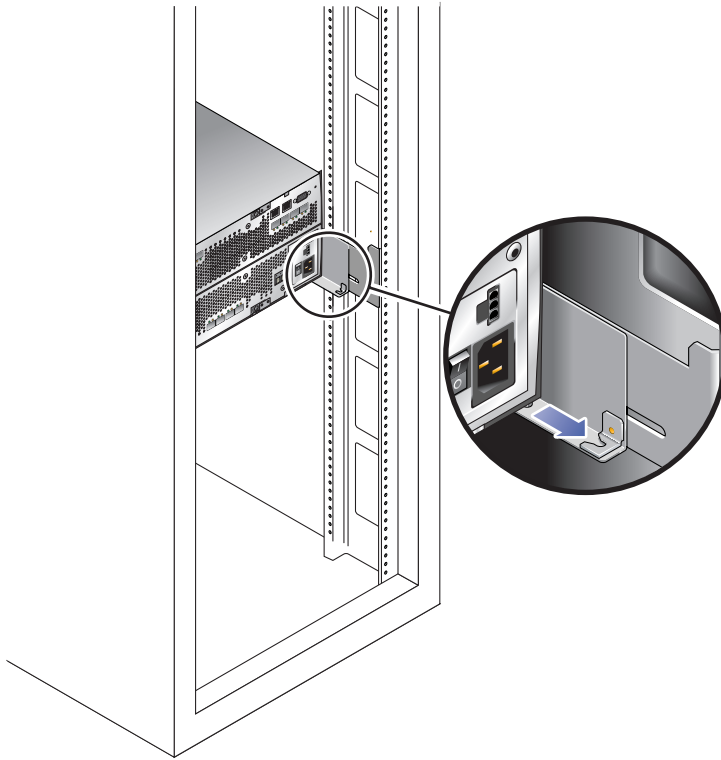
FIGURE 2-14 Securing the Tray to the Back of the Cabinet Rail

Attaching the Expansion Tray Rails to a Cabinet

You will install the expansion trays beneath the controller tray in the first empty 3RU slot at the bottom of the cabinet. If you are installing additional expansion trays, continue installing the trays from the bottom up.

Depending on the type of cabinet in which you will install the expansion tray, use one of the following procedures to attach the rails:

- "Attaching the Universal Rail Kit to a Standard Sun or 19-Inch Cabinet With Threaded Cabinet Rails" on page 49
- "Attaching the Universal Rail Kit to a Sun StorEdge Expansion or Sun Fire Cabinet" on page 55
- "Attaching the Universal Rail Kit to a Standard 19-Inch Cabinet With Unthreaded Cabinet Rails" on page 58

Attaching the Universal Rail Kit to a Standard Sun or 19-Inch Cabinet With Threaded Cabinet Rails

This procedure describes the steps to attach the universal rail kit to:

- All standard Sun cabinets, including the Sun Rack 900/1000 cabinets
- All 19-inch wide, 4-post EIA-compatible racks and cabinets with M5 or 12-24 threaded cabinet rails

To attach the universal rail kit to a Sun Rack cabinet or a cabinet with M5 or 12-24 threaded cabinet rails:

1. **Follow these steps first for the left and then for the right rail:**

   a. **Position the front of the rail directly inside the front cabinet rail** (FIGURE 2-15)**.**
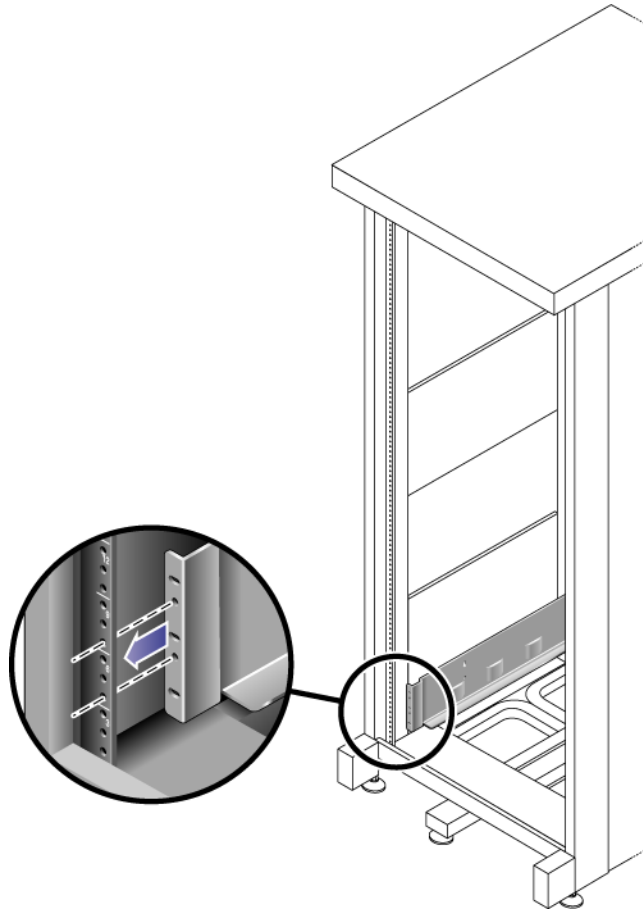
FIGURE 2-15 Positioning the Left Rail Behind the Left Front Cabinet Rail

b. Use the #2 Phillips screwdriver to insert and tighten two 8-32 screws to secure the rail to the front of the cabinet (FIGURE 2-16)**.**

Each expansion tray requires three standard mounting units (3RU) of vertical space in the cabinet. Each standard mounting unit (U) has three mounting holes in the left and right cabinet rails. Insert the screws into the lowest holes in the top two mounting units of the 3RU slot in which the tray is to be mounted.

These screws pass through the cabinet rail holes and screw into threaded holes in the left rail.
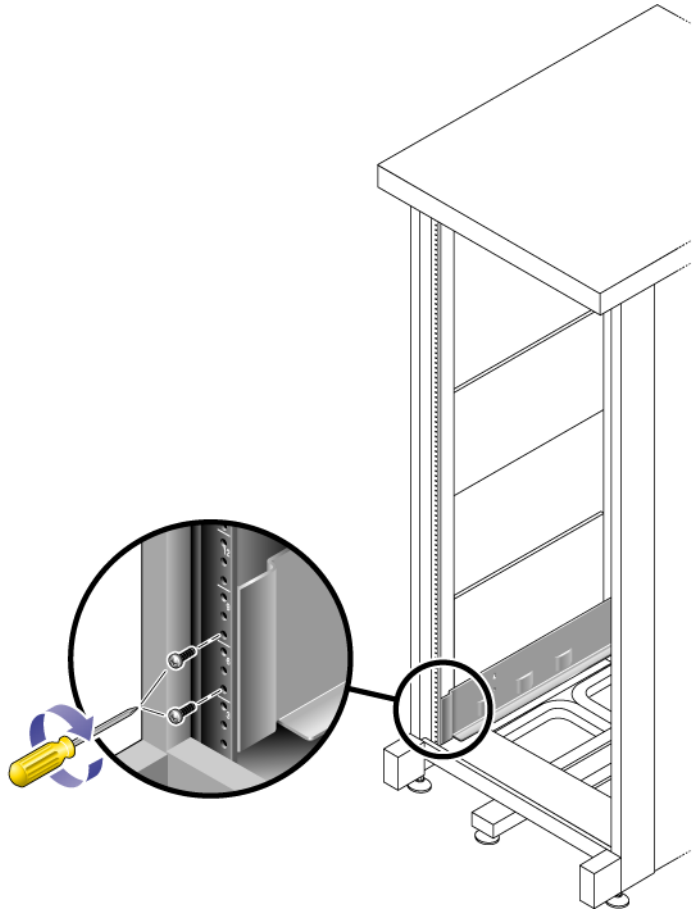
FIGURE 2-16 Securing the Left Rail to the Front of the Cabinet

c. At the back of the cabinet, adjust the length of the rail as needed to fit the cabinet, and position the rail flange over the face of the cabinet rail (FIGURE 2-17)**.**
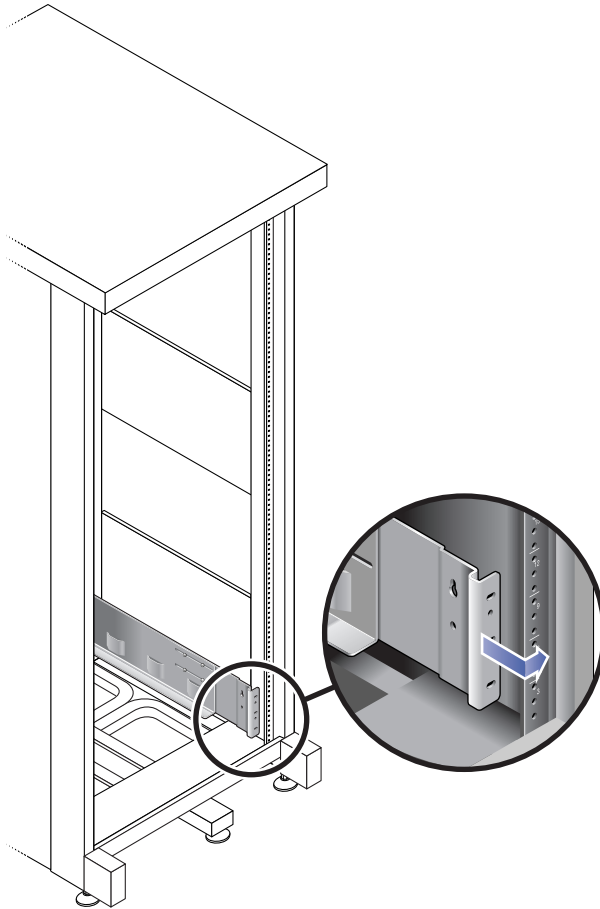
FIGURE 2-17 Adjusting the Length of the Left Rail at the Back of the Cabinet

Be sure to align the rail flange so that the mounting holes at the back correspond to those at the front of the cabinet.

d. Depending on the type of cabinet you have, do one of the following (FIGURE 2-18):

- For a Sun Rack 900 or Sun Rack 1000 cabinet, use the #3 Phillips screwdriver to insert and tighten four metric M6 screws (two per side) at the back of the rail.

- For cabinets with 10-32 cabinet rail threads, use the #2 Phillips screwdriver to insert and tighten four 10-32 screws (two per side) at the back of the rail.

- For other cabinets, use self-supplied screws to secure the rail to the cabinet rail.
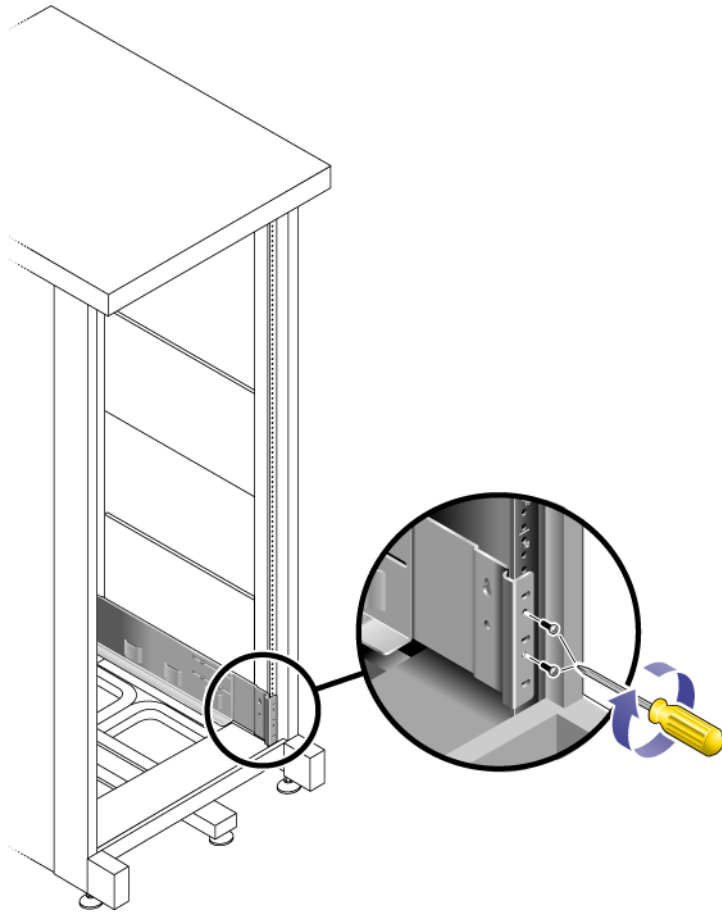
FIGURE 2-18 Securing the Left Rail to the Back of the Cabinet

2. **Using the #2 Phillips screwdriver, tighten the eight adjustment screws (four on each side) at the back of each rail** (FIGURE 2-19)**.**
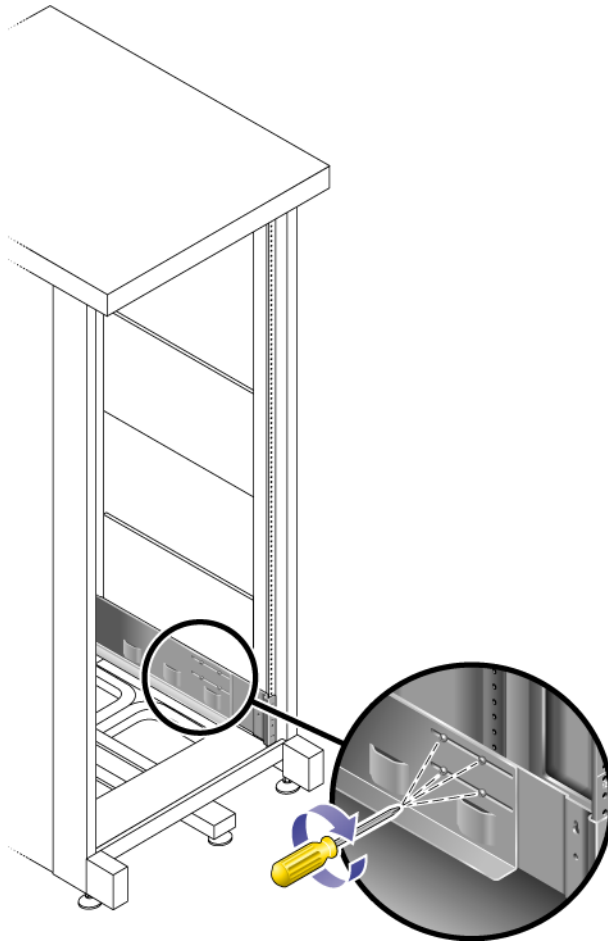
FIGURE 2-19 Tightening the Rail Adjustment Screws

Attaching the Universal Rail Kit to a Sun StorEdge Expansion or Sun Fire Cabinet

This procedure describes the steps to attach the universal rail kit to a Sun StorEdge Expansion cabinet or a Sun Fire cabinet.

To attach the universal rail kit, follow these steps first for the left rail and then for the right rail:

1. **In each of the four inner mounting rails, insert a 10-32 screw in the center hole of the mounting unit of the 3RU slot in which the tray is to be mounted** (FIGURE 2-20)**.**

   Do not tighten at this time. You will hang the side rails on these screws.
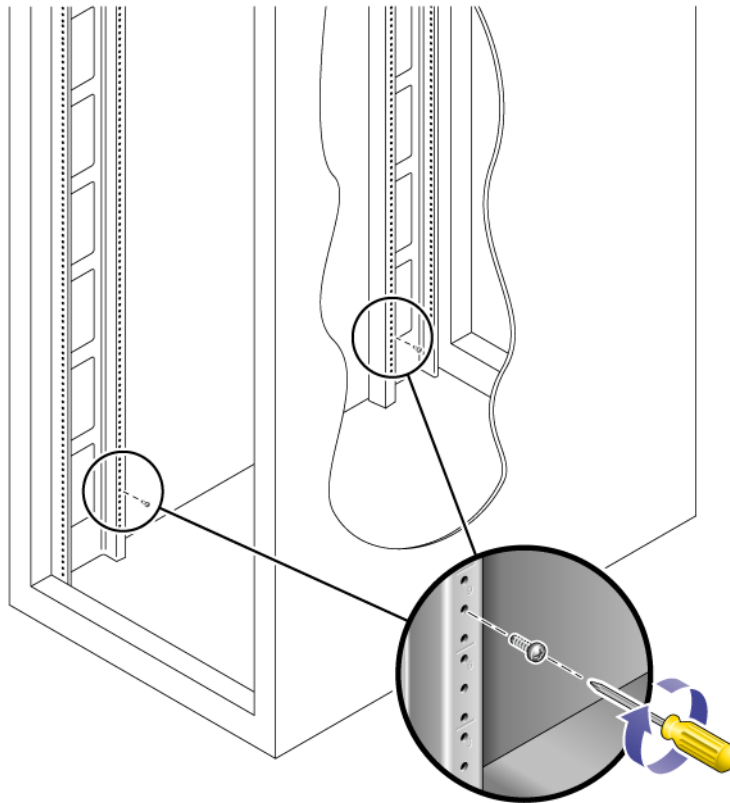
FIGURE 2-20 Inserting Rail Mounting Screws in Middle Holes of the Upper Mounting Unit of the Mounting Slot

2. Hang the rail by aligning the large slots of the rail over the front and back screws and then pulling the rail down so that each screw is at the top of the slot (FIGURE 2-21)**.**
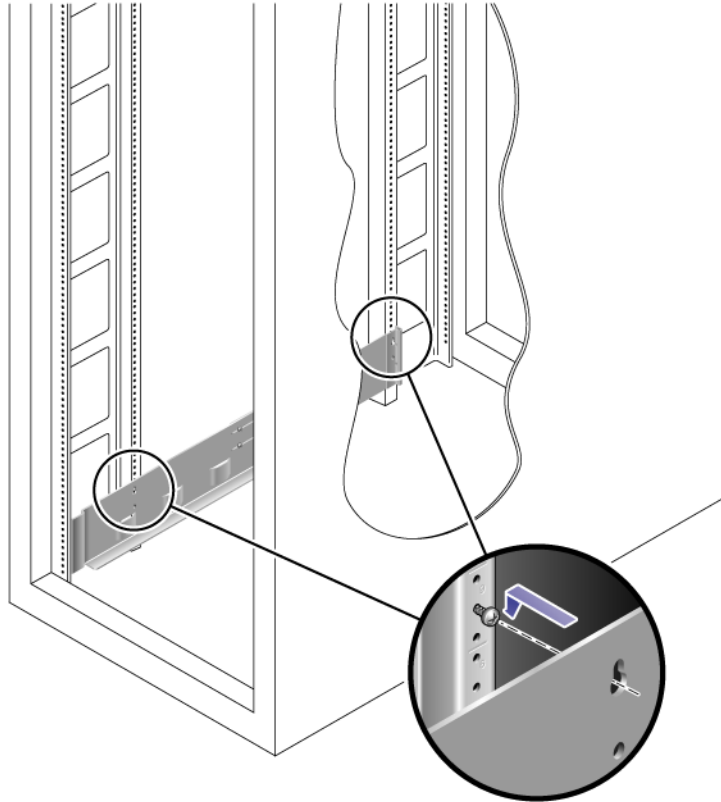
FIGURE 2-21 Hanging the Rail

3. Adjust the length of the rail to fit the cabinet.

4. Using the #2 Phillips screwdriver, insert two 10-32 screws in the lower side mounting holes for the rail (FIGURE 2-22)**.**

The hole corresponds to the center hole of the middle mounting unit of the 3RU slot in which the rail is installed.
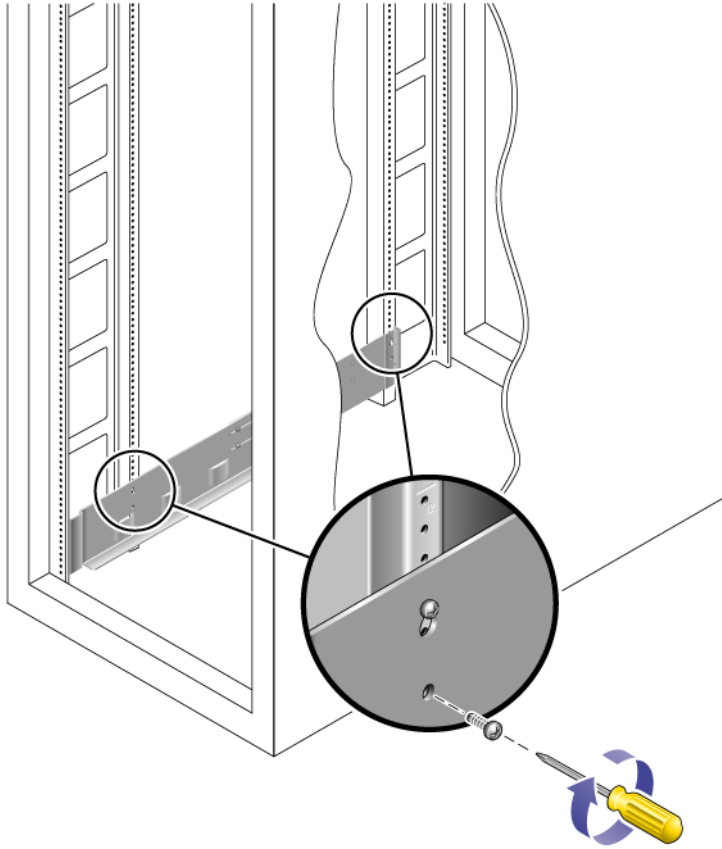
FIGURE 2-22 Inserting Screws in the Lower Side Mounting Holes of the Cabinet

5. **Use the #2 Phillips screwdriver to insert and tighten two 8-32 screws to secure the rail to the front of the cabinet** (FIGURE 2-23)**.**

   These screws pass through the cabinet rail holes and screw into threaded holes in the front of the rails.

   Insert the screws into the lowest holes in the top two mounting units of the 3RU slot in which the tray is to be mounted.
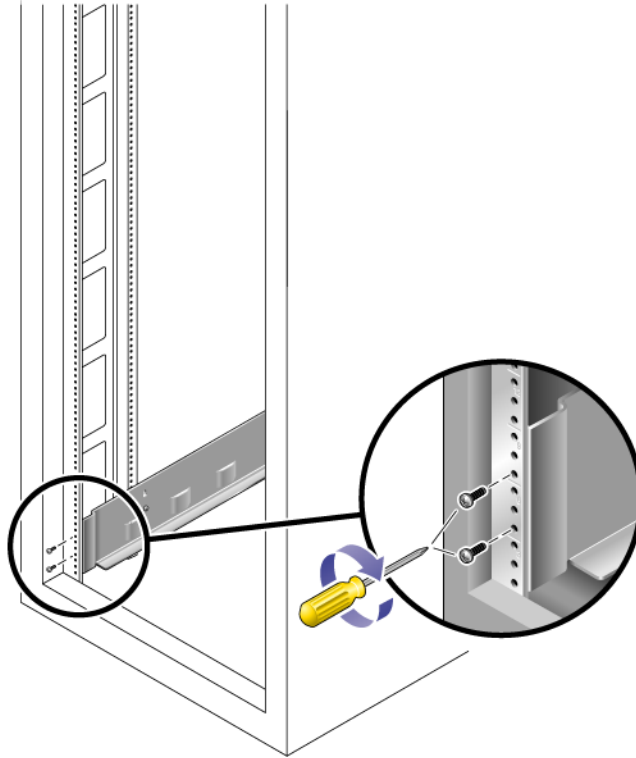
FIGURE 2-23 Securing the Rail to the Front of the Cabinet

6. **Tighten all screws on the rail.**

Attaching the Universal Rail Kit to a Standard 19-Inch Cabinet With Unthreaded Cabinet Rails

This procedure describes the steps to attach the universal rail kit to any 19-inch wide, 4-post EIA-compatible rack, or cabinet with unthreaded cabinet rails.

To attach the universal rail kit, follow these steps first for the left rail and then for the right rail:

1. **Snap two cage nuts over the middle holes in the upper and lower mounting units of the 3RU cabinet slot in which you will mount the tray** (FIGURE 2-24)**.**
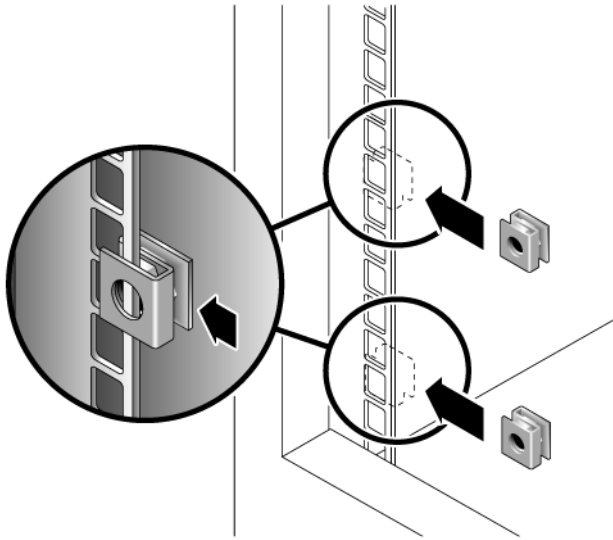
FIGURE 2-24 Inserting Cage Nuts Over Rail Mounting Holes in Cabinet Rails

2. Hook a cabinet rail adapter plate over the front of the cabinet rail (FIGURE 2-25)**.**

Position the adapter plate over the 3RU slot in which the tray is to be mounted.
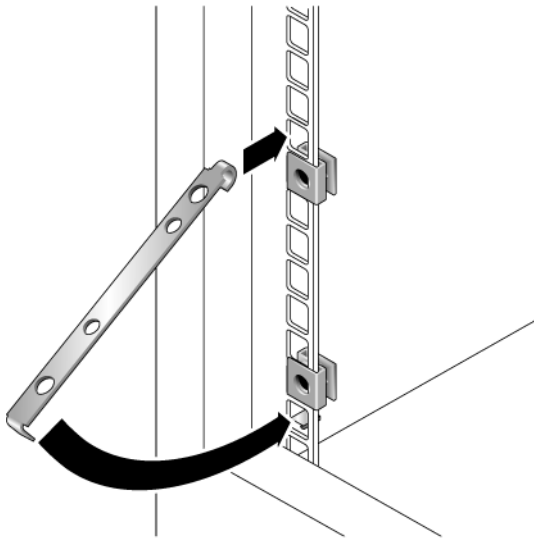
FIGURE 2-25 Inserting the Cabinet Rail Adapter Plate on the Cabinet Rail

3. **Use the #2 Phillips screwdriver to insert and tighten two 8-32 screws to secure the rail to the front of the cabinet** (FIGURE 2-26)**.**

These screws pass through the unthreaded inner holes of the cabinet rail adapter plate and screw into the threaded holes in the front of the mounting rail.
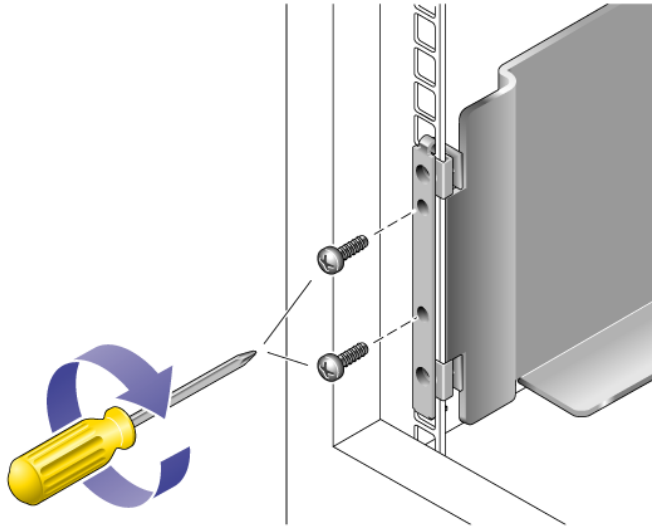
FIGURE 2-26 Securing the Rail to the Front of the Cabinet

4. **On the corresponding cabinet rail at the back of the cabinet, snap one cage nut over the lowest hole in the middle mounting unit of the 3RU cabinet slot in which you will mount the tray** (FIGURE 2-27)**.**
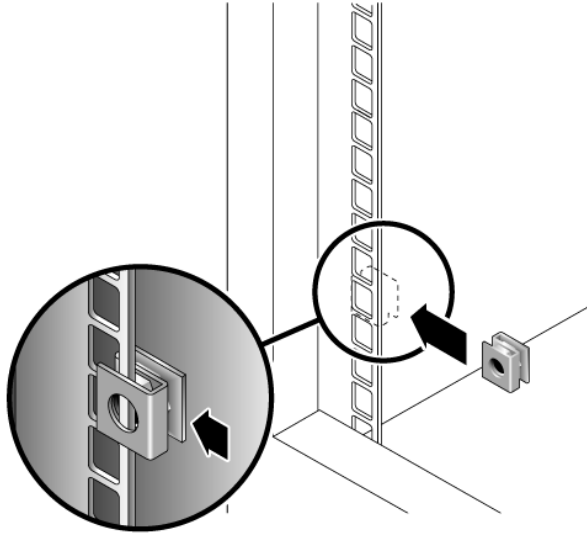
FIGURE 2-27 Inserting a Cage Nut on the Cabinet Rail at the Back of the Cabinet

5. **At the back of the cabinet, adjust the length of the rail as needed to fit the cabinet, and position the rail flange over the face of the cabinet rail** (FIGURE 2-28)**.**
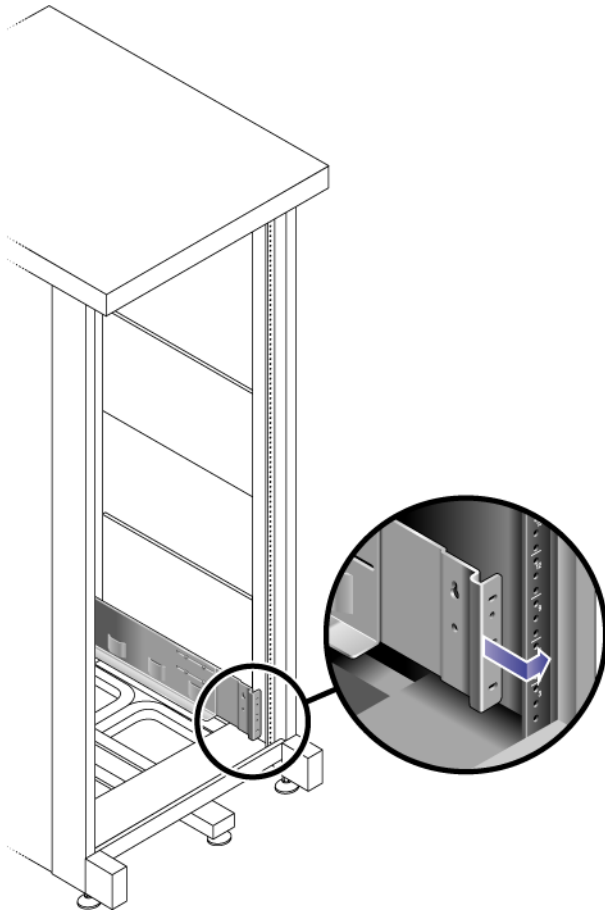
FIGURE 2-28 Adjusting the Length of the Rail at the Back of the Cabinet

6. Insert and tighten a screw appropriate for the cage nut to secure the rail to the back cabinet rail (FIGURE 2-29)**.**

The screw passes through the lower unthreaded inner hole of the mounting rail and screws into the threaded hole of the cage nut.
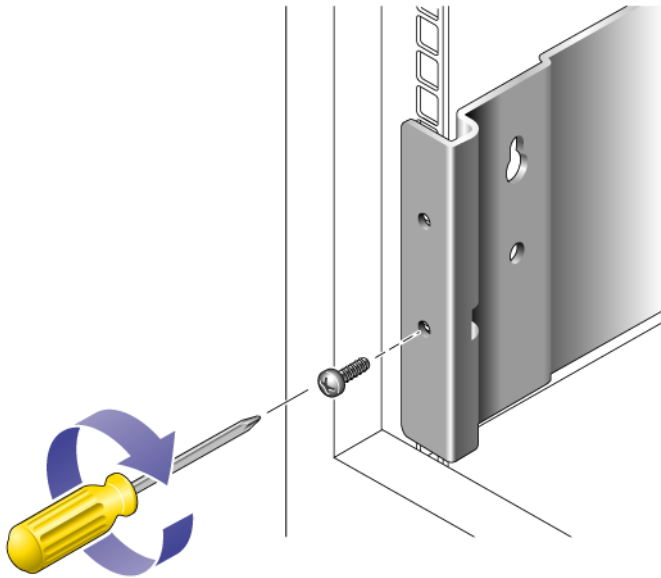
FIGURE 2-29 Securing the Rail to the Back of the Cabinet

Installing an Expansion Tray in a Cabinet

1. **Using two people, one at each side of the tray, carefully lift and rest the tray on the bottom ledge of the left and right rails** (FIGURE 2-30)**.**

Caution – Use care to avoid injury. A tray can weigh up to 95 pounds (45 kg).
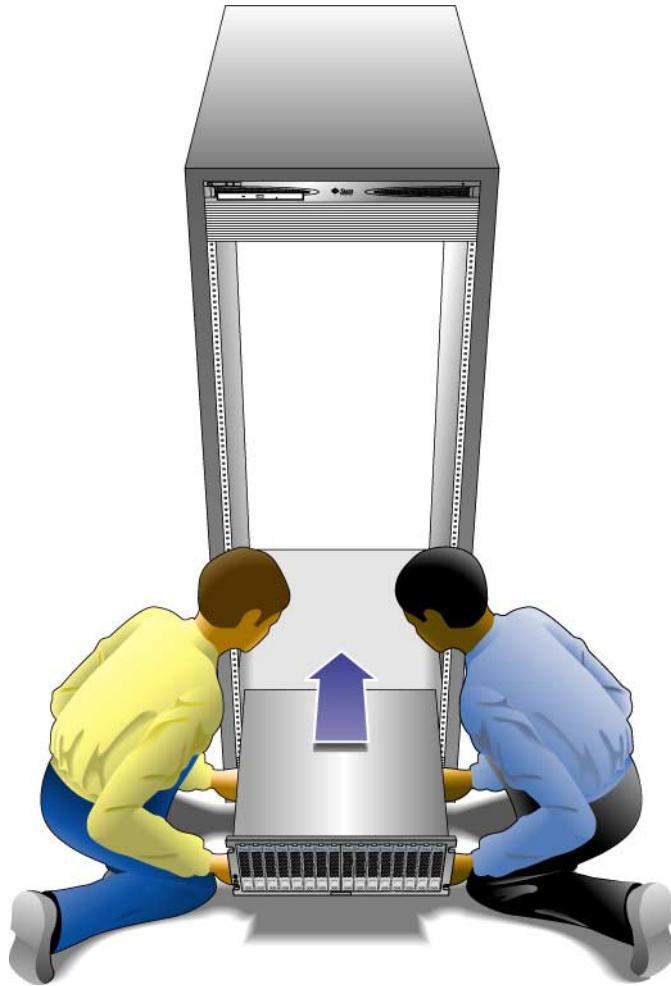
FIGURE 2-30 Positioning the Tray in the Cabinet

2. Carefully slide the tray into the cabinet until the front flanges of the tray touch the vertical face of the cabinet (FIGURE 2-31)**.**
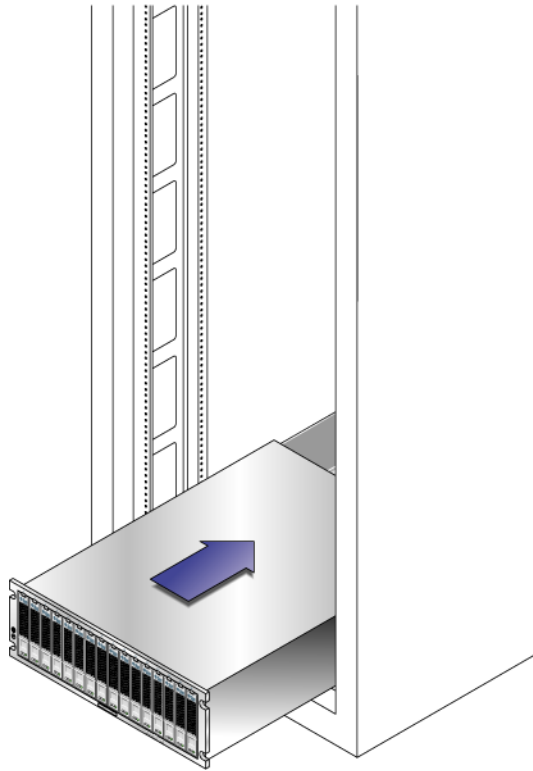
FIGURE 2-31 Sliding the Tray Into the Cabinet

3. **Depending on the type of cabinet you have, do one of the following:**

   ■ For a Sun Rack 900 or Sun Rack 1000 cabinet, use the #3 Phillips screwdriver to insert and tighten four metric M6 screws (two per side) at the back of the rail. (FIGURE 2-32).
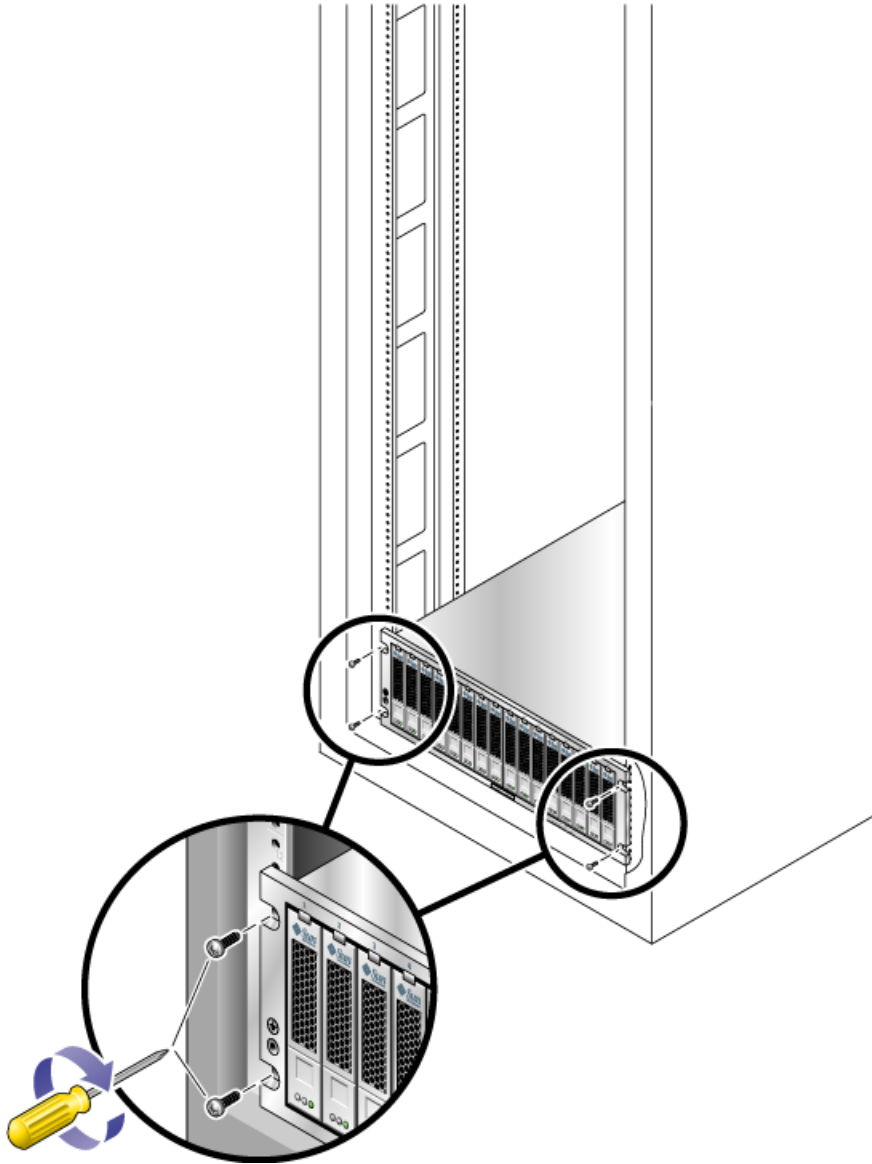
FIGURE 2-32 Securing the Tray to the Front of a Cabinet

- For the Sun StorEdge Expansion cabinet or for cabinets with 10-32 cabinet rail threads, use the #2 Phillips screwdriver to insert and tighten four 10-32 screws (two per side) to secure the tray to the front of the cabinet (FIGURE 2-13).

- For a cabinet with other cabinet rail threads, secure the tray to the front of the cabinet with metric M5 or 12-24 screws.

- For a cabinet with unthreaded cabinet rails, secure the tray to the front of the cabinet with screws that match the inserted cage nuts.

4. **Install and tighten the 6-32 screw on each side of the back of the tray to secure the tray to the cabinet** (FIGURE 2-33)**.**
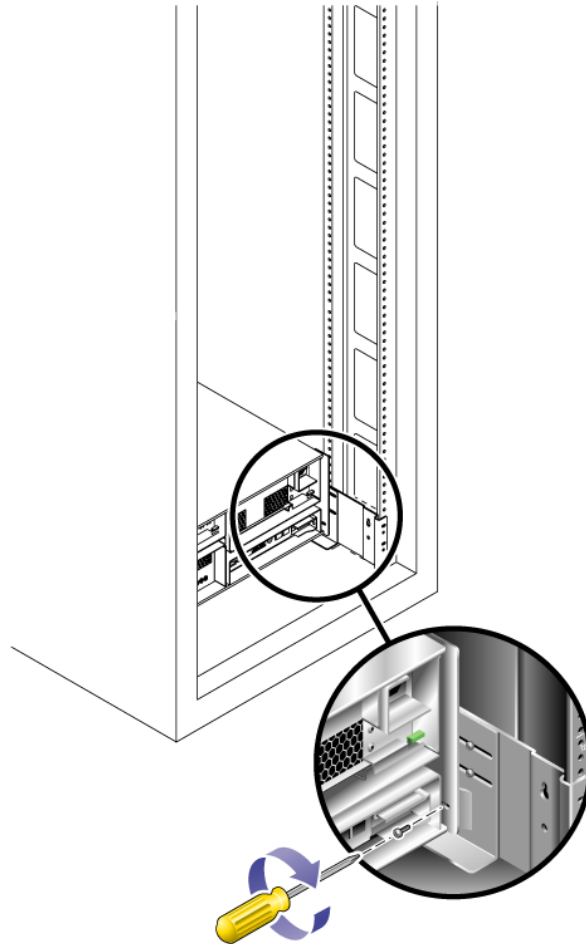
FIGURE 2-33 Securing the Tray to the Back of the Cabinet Rail

Intertray Cabling

This section describes how to cable a controller tray to expansion trays housed in a cabinet other than the Sun 1000-38 cabinet for several different configurations. The controller tray uses Controller A and Controller B drive ports to connect to the expansion ports at the back of each expansion tray.
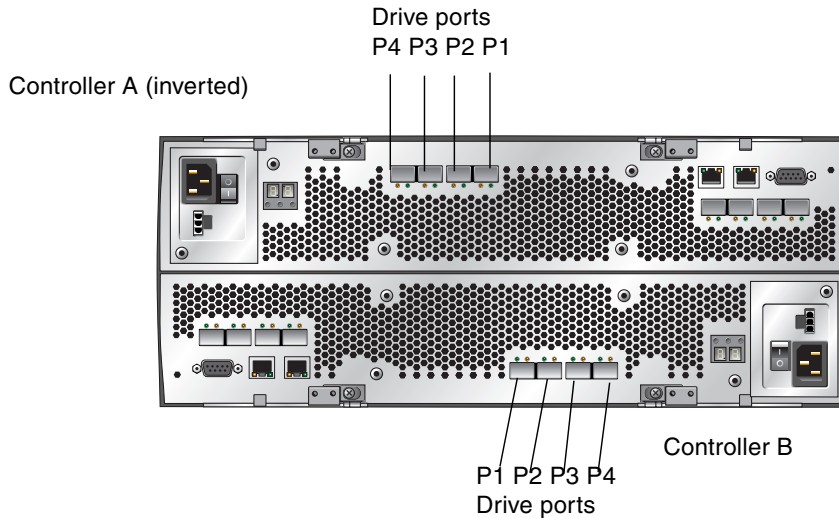
FIGURE 2-34 Drive Ports on the Controller Tray

Array Configuration Naming Convention

The configuration naming convention is the *number of controller trays* x the *number of expansion trays* where the first number is the controller tray and the second is the number of expansion trays. For example, 1x1 is the controller tray and one expansion tray, and 1x7 is the controller tray and 7 expansion trays.

Use the following instructions to connect the dual-RAID controller tray to one or more expansion trays.

Cabling One Controller Tray and Up to Four Expansion Trays

Two 2-meter FC cables are required to connect a controller tray to an expansion tray. TABLE 2-3 lists the number of FC cables required for up to four expansion trays.

TABLE 2-3   Number of FC Cables Required for Up to Four Expansion Trays

Number of Expansion Trays	Number of FC Cables
1	2
2	4
3	6
4	8

TABLE 2-4 lists the cabling between one controller tray and up to four expansion trays.

TABLE 2-4   Cabling Between One Controller Tray and Up to Four Expansion Trays

Device	Port		Device	Port	Corresponding Call-out in FIGURE 2-35
Controller A	P4	to	Expansion tray 1	A-side, 1B	A
Controller B	P1	to	Expansion tray 1	B-side, 1B	B
Controller A	P2	to	Expansion tray 2	A-side, 1B	C
Controller B	P3	to	Expansion tray 2	B-side, 1B	D
Controller A	P3	to	Expansion tray 3	A-side, 1B	E
Controller B	P2	to	Expansion tray 3	B-side, 1B	F
Controller A	P1	to	Expansion tray 4	A-side, 1B	G
Controller B	P4	to	Expansion tray 4	B-side, 1B	H

FIGURE 2-35 shows the cabling between one controller tray and up to four expansion trays.
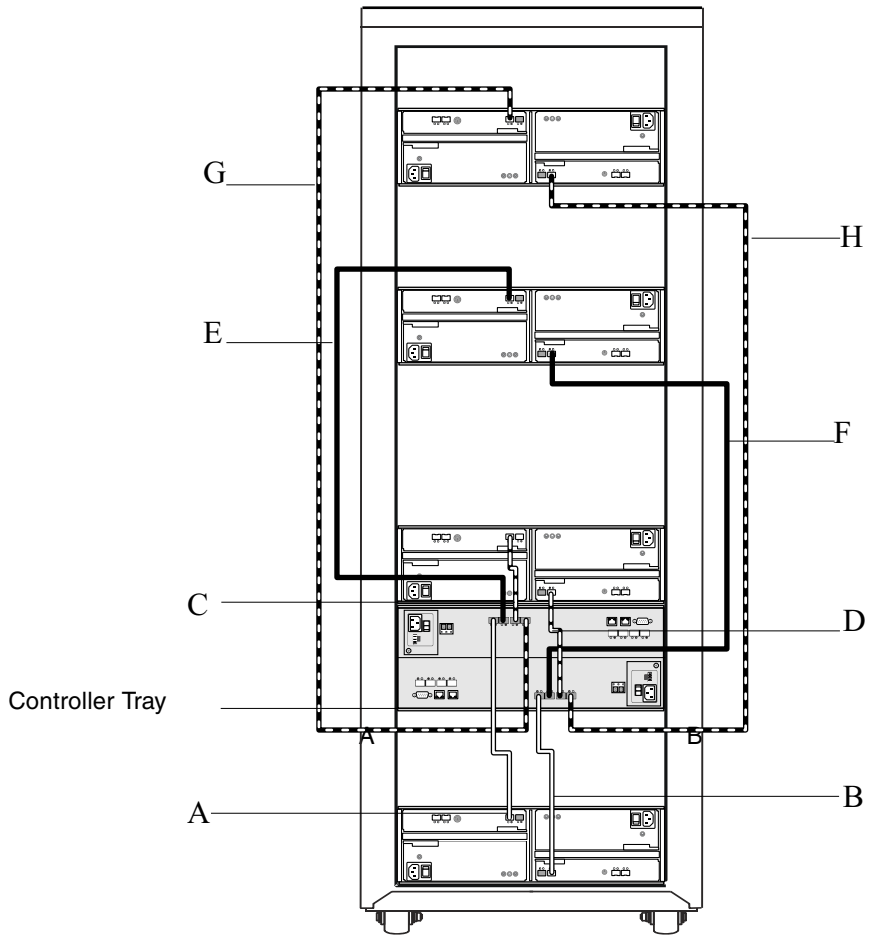
FIGURE 2-35 Cabling of One Controller and Four Expansion Trays

Cabling One Controller Tray to Five Expansion Trays

An array configuration that consists of one controller tray and five expansion trays requires ten 2-meter FC cables.

TABLE 2-5 lists the cabling between one controller tray and five expansion trays.

TABLE 2-5 Cabling Between One Controller Tray and Five Expansion Trays

Device	Port		Device	Port
Controller A	P4	to	Expansion tray 1	A-side, 1B
Controller B	P1	to	Expansion tray 5	B-side, 1B
Expansion tray 1	A-side, 1A	to	Expansion tray 5	A-side, 1B
Expansion tray 1	B-side, 1B	to	Expansion tray 5	B-side, 1A
Controller A	P2	to	Expansion tray 2	A-side, 1B
Controller B	P3	to	Expansion tray 2	B-side, 1B
Controller A	P3	to	Expansion tray 3	A-side, 1B
Controller B	P2	to	Expansion tray 3	B-side, 1B
Controller A	P1	to	Expansion tray 4	A-side, 1B
Controller B	P4	to	Expansion tray 4	B-side, 1B

Cabling One Controller Tray to Six Expansion Trays

An array configuration that consists of one controller tray and six expansion trays requires twelve 2-meter FC cables.

TABLE 2-6 lists the cabling between one controller tray and six expansion trays.

TABLE 2-6 Cabling Between One Controller Tray and Six Expansion Trays

Device	Port		Device	Port
Controller A	P4	to	Expansion tray 1	A-side, 1B
Controller B	P1	to	Expansion tray 5	B-side, 1B
Expansion tray 1	A-side, 1A	to	Expansion tray 5	A-side, 1B
Expansion tray 1	B-side, 1B	to	Expansion tray 5	B-side, 1A

TABLE 2-6 Cabling Between One Controller Tray and Six Expansion Trays

Device	Port		Device	Port
Controller A	P2	to	Expansion tray 2	A-side, 1B
Expansion tray 2	A-side, 1A	to	Expansion tray 6	A-side, 1B
Expansion tray 2	B-side, 1B	to	Expansion tray 6	B-side, 1A
Controller B	P3	to	Expansion tray 6	B-side, 1B
Controller A	P3	to	Expansion tray 3	A-side, 1B
Controller B	P2	to	Expansion tray 3	B-side, 1B
Controller A	P1	to	Expansion tray 4	A-side, 1B
Controller B	P4	to	Expansion tray 4	B-side, 1B

Cabling One Controller Tray to Seven Expansion Trays

An array configuration that consists of one controller tray and seven expansion trays requires fourteen 2-meter FC cables.

TABLE 2-7 lists the cabling between one controller tray and seven expansion trays.

TABLE 2-7   Cabling Between One Controller Tray and Seven Expansion Trays

Device	Port		Device	Port
Controller A	P4	to	Expansion tray 1	A-side, 1B
Controller B	P1	to	Expansion tray 5	B-side, 1B
Expansion tray 1	A-side, 1A	to	Expansion tray 5	A-side, 1B
Expansion tray 1	B-side, 1B	to	Expansion tray 5	B-side, 1A
Controller A	P2	to	Expansion tray 2	A-side, 1B
Expansion tray 2	A-side, 1A	to	Expansion tray 6	A-side, 1B
Expansion tray 2	B-side, 1B	to	Expansion tray 6	B-side, 1A
Controller B	P3	to	Expansion tray 6	B-side, 1B
Controller A	P3	to	Expansion tray 3	A-side, 1B
Controller B	P2	to	Expansion tray 7	B-side, 1B
Expansion tray 3	A-side, 1A	to	Expansion tray 7	A-side, 1B
Expansion tray 3	B-side, 1B	to	Expansion tray 7	B-side, 1A
Controller A	P1	to	Expansion tray 4	A-side, 1B
Controller B	P4	to	Expansion tray 4	B-side, 1B

Cabling One Controller Tray to Eight Expansion Trays

An array configuration that consists of one controller tray and eight expansion trays requires sixteen 2-meter FC cables.

TABLE 2-8 lists the cabling between one controller tray and eight expansion trays.

TABLE 2-8 Cabling Between One Controller Tray and Eight Expansion Trays

Device	Port		Device	Port	Corresponding Call-out in FIGURE 2-36
Controller A	P4	to	Expansion tray 1	A-side, 1B	A
Controller B	P1	to	Expansion tray 5	B-side, 1B	B
Expansion tray 1	A-side, 1A	to	Expansion tray 5	A-side, 1B	C
Expansion tray 1	B-side, 1B	to	Expansion tray 5	B-side, 1A	D
Controller A	P2	to	Expansion tray 2	A-side, 1B	E
Expansion tray 2	A-side, 1A	to	Expansion tray 6	A-side, 1B	F
Expansion tray 2	B-side, 1B	to	Expansion tray 6	B-side, 1A	G
Controller B	P3	to	Expansion tray 6	B-side, 1B	H
Controller A	P3	to	Expansion tray 3	A-side, 1B	I
Controller B	P2	to	Expansion tray 7	B-side, 1B	J
Expansion tray 3	A-side, 1A	to	Expansion tray 7	A-side, 1B	K
Expansion tray 3	B-side, 1B	to	Expansion tray 7	B-side, 1A	L
Controller A	P1	to	Expansion tray 4	A-side, 1B	M
Expansion tray 4	A-side, 1A	to	Expansion tray 8	A-side, 1B	N
Expansion tray 4	B-side, 1B	to	Expansion tray 8	B-side, 1A	O
Controller B	P4	to	Expansion tray 8	B-side, 1B	P

FIGURE 2-36 shows the cabling between one controller tray and up to eight expansion trays.

FIGURE 2-36 Cabling of Sun StorageTek 6540 Array Configuration - One Controller Tray and Eight Expansion Trays

Cabling One Controller Tray to Nine Expansion Trays

An array configuration that consists of one controller tray and nine expansion trays requires eighteen 2-meter FC cables.

TABLE 2-9 lists the cabling between one controller tray and nine expansion trays.

TABLE 2-9   Cabling Between One Controller Tray and Nine Expansion Trays

Device	Port		Device	Port
Controller A	P4	to	Expansion tray 1	A-side, 1B
Controller B	P1	to	Expansion tray 9	B-side, 1B
Expansion tray 1	A-side, 1A	to	Expansion tray 5	A-side, 1B
Expansion tray 1	B-side, 1B	to	Expansion tray 5	B-side, 1A
Expansion tray 5	A-side, 1A	to	Expansion tray 9	A-side, 1B
Expansion tray 5	B-side, 1B	to	Expansion tray 9	B-side, 1A
Controller A	P2	to	Expansion tray 2	A-side, 1B
Expansion tray 2	A-side, 1A	to	Expansion tray 6	A-side, 1B
Expansion tray 2	B-side, 1B	to	Expansion tray 6	B-side, 1A
Controller B	P3	to	Expansion tray 6	B-side, 1B
Controller A	P3	to	Expansion tray 3	A-side, 1B
Controller B	P2	to	Expansion tray 7	B-side, 1B
Expansion tray 3	A-side, 1A	to	Expansion tray 7	A-side, 1B
Expansion tray 3	B-side, 1B	to	Expansion tray 7	B-side, 1A
Controller A	P1	to	Expansion tray 4	A-side, 1B
Expansion tray 4	A-side, 1A	to	Expansion tray 8	A-side, 1B
Expansion tray 4	B-side, 1B	to	Expansion tray 8	B-side, 1A
Controller B	P4	to	Expansion tray 8	B-side, 1B

Cabling One Controller Tray to Ten Expansion Trays

An array configuration that consists of one controller tray and ten expansion trays. requires twenty 2-meter FC cables.

TABLE 2-10 lists the cabling between one controller tray and ten expansion trays.

TABLE 2-10   Cabling Between One Controller Tray and Ten Expansion Trays

Device	Port		Device	Port
Controller A	P4	to	Expansion tray 1	A-side, 1B
Controller B	P1	to	Expansion tray 9	B-side, 1B
Expansion tray 1	A-side, 1A	to	Expansion tray 5	A-side, 1B
Expansion tray 1	B-side, 1B	to	Expansion tray 5	B-side, 1A
Expansion tray 5	A-side, 1A	to	Expansion tray 9	A-side, 1B
Expansion tray 5	B-side, 1B	to	Expansion tray 9	B-side, 1A
Controller A	P2	to	Expansion tray 2	A-side, 1B
Expansion tray 2	A-side, 1A	to	Expansion tray 6	A-side, 1B
Expansion tray 2	B-side, 1B	to	Expansion tray 6	B-side, 1A
Expansion tray 6	A-side, 1A	to	Expansion tray 10	A-side, 1B
Expansion tray 6	B-side, 1B	to	Expansion tray 10	B-side, 1A
Controller B	P3	to	Expansion tray 10	B-side, 1B
Controller A	P3	to	Expansion tray 3	A-side, 1B
Controller B	P2	to	Expansion tray 11	B-side, 1B
Expansion tray 3	A-side, 1A	to	Expansion tray 7	A-side, 1B
Expansion tray 3	B-side, 1B	to	Expansion tray 7	B-side, 1A
Expansion tray 7	A-side, 1A	to	Expansion tray 11	A-side, 1B
Expansion tray 7	B-side, 1B	to	Expansion tray 11	B-side, 1A
Controller A	P1	to	Expansion tray 4	A-side, 1B
Expansion tray 4	A-side, 1A	to	Expansion tray 8	A-side, 1B
Expansion tray 4	B-side, 1B	to	Expansion tray 8	B-side, 1A
Controller B	P4	to	Expansion tray 8	B-side, 1B

Cabling One Controller Tray to Eleven Expansion Trays

An array configuration that consists of the controller tray and eleven expansion requires twenty-two 2-meter FC cables.

TABLE 2-11 lists the cabling between one controller tray and eleven expansion trays.

TABLE 2-11   Cabling Between One Controller Tray and Eleven Expansion Trays

Device	Port		Device	Port	Corresponding Call-out in FIGURE 2-37
Controller A	P4	to	Expansion tray 1	A-side, 1B	A
Controller B	P1	to	Expansion tray 9	B-side, 1B	B
Expansion tray 1	A-side, 1A	to	Expansion tray 5	A-side, 1B	C
Expansion tray 1	B-side, 1B	to	Expansion tray 5	B-side, 1A	D
Expansion tray 5	A-side, 1A	to	Expansion tray 9	A-side, 1B	E
Expansion tray 5	B-side, 1B	to	Expansion tray 9	B-side, 1A	F
Controller A	P2	to	Expansion tray 2	A-side, 1B	G
Expansion tray 2	A-side, 1A	to	Expansion tray 6	A-side, 1B	H
Expansion tray 2	B-side, 1B	to	Expansion tray 6	B-side, 1A	I
Expansion tray 6	A-side, 1A	to	Expansion tray 10	A-side, 1B	J
Expansion tray 6	B-side, 1B	to	Expansion tray 10	B-side, 1A	K
Controller B	P3	to	Expansion tray 10	B-side, 1B	L
Controller A	P3	to	Expansion tray 3	A-side, 1B	M
Controller B	P2	to	Expansion tray 11	B-side, 1B	N
Expansion tray 3	A-side, 1A	to	Expansion tray 7	A-side, 1B	O
Expansion tray 3	B-side, 1B	to	Expansion tray 7	B-side, 1A	P
Expansion Tray 7	A-side, 1A	to	Expansion Tray 11	A-side, 1B	Q
Expansion Tray 7	B-side, 1B	to	Expansion Tray 11	B-side, 1A	R
Controller A	P1	to	Expansion tray 4	A-side, 1B	S
Expansion tray 4	A-side, 1A	to	Expansion tray 8	A-side, 1B	T
Expansion tray 4	B-side, 1B	to	Expansion tray 8	B-side, 1A	U
Controller B	P4	to	Expansion tray 8	B-side, 1B	V

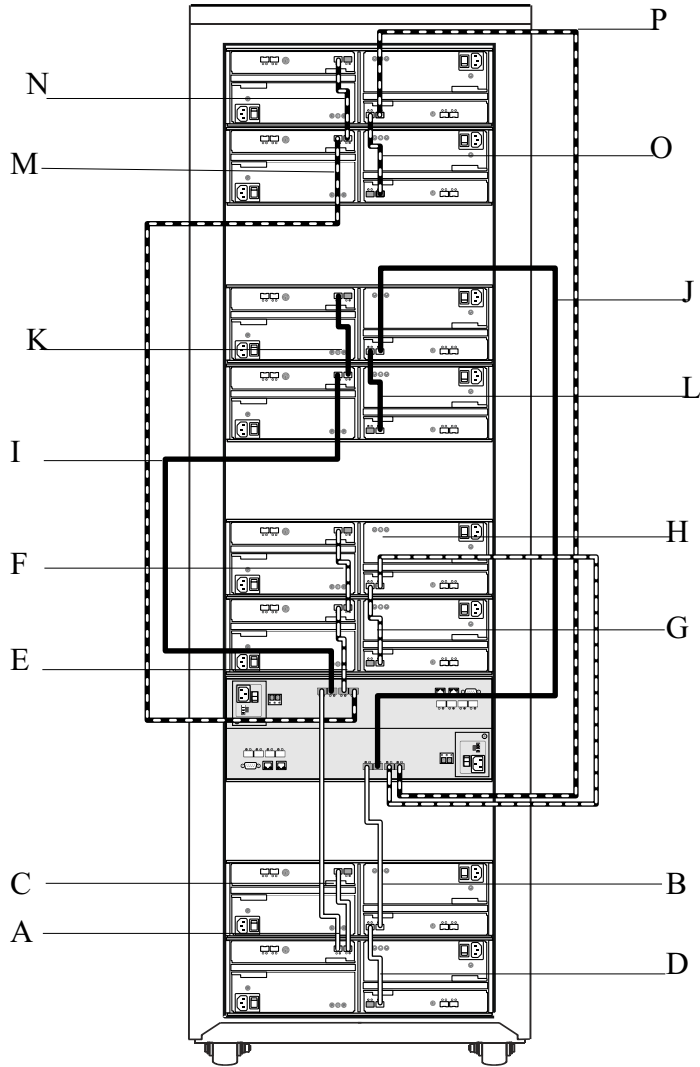FIGURE 2-37 shows the cabling between one controller tray and eleven expansion trays.

FIGURE 2-37 Cabling of Sun StorageTek 6540 Array Configuration - One Controller and Eleven Expansion Trays
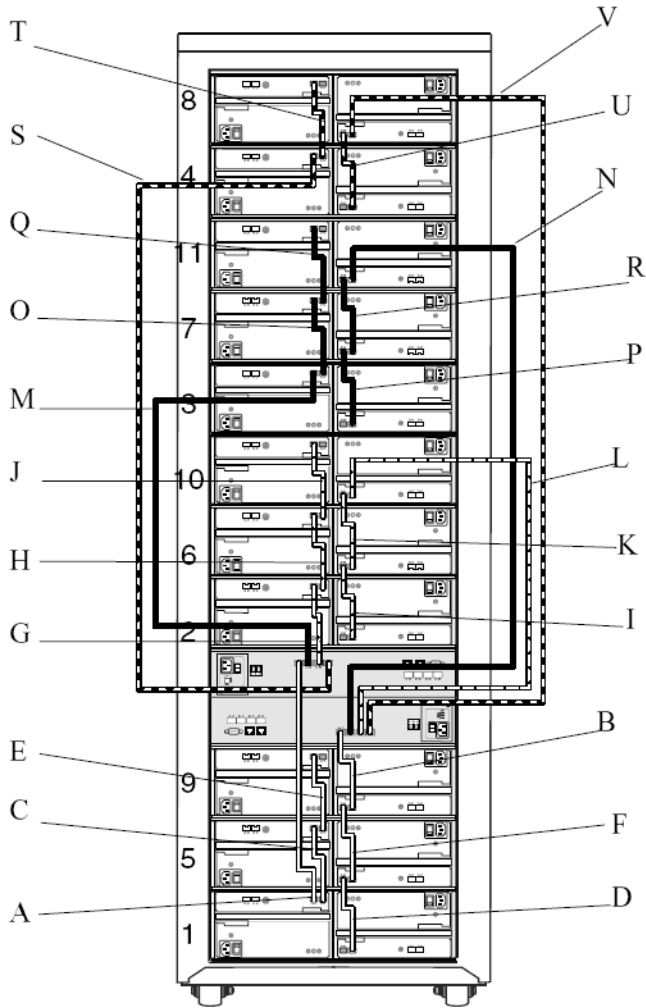
Cabling One Controller Tray to Expansion Trays Twelve, Thirteen and Fourteen

Expansion trays 12, 13, and 14 are located in an expansion rack shown in TABLE 2-12.

TABLE 2-12 Location of Expansion Trays in an Expansion Rack

Tray	Location in Expansion Rack
Expansion tray 12	Slot 1
Expansion tray 13	Slot 2
Expansion tray 14	Slot 3

Two 2-meter FC cables are required to connect a controller tray to an expansion tray that is located side-by-side. Longer cables are required if the cabinets are further apart.

TABLE 2-13 Number of Expansion Trays and Required FC Cables.

Number of Expansion Trays	Number of 2-Meter FC Cables	Number of Longer FC Cables
12	21	3
13	23	3
14	22	6

TABLE 2-14 lists the cabling between one controller tray and up to fourteen expansion trays.

TABLE 2-14   Cabling Expansion Tray 12, 13, and 14 in an Expansion Cabinet

Device	Port		Device	Port	Corresponding Call-out in FIGURE 2-36
Expansion tray 8	A-side, 1B	to	Expansion tray 12	A-side, 1B	A
Expansion tray 8	B-side, 1B	to	Expansion tray 12	B-side, 1A	B
Controller B	P4	to	Expansion tray 13	B-side, 1B	C
Expansion tray 12	B-side, 1B	to	Expansion tray 13	B-side, 1A	D
Expansion tray 12	A-side, 1A	to	Expansion tray 13	A-side, 1B	E
Controller B	P2	to	Expansion tray 14	B-side, 1B	F
Expansion tray 11	B-side, 1B	to	Expansion tray 14	B-side, 1A	G
Expansion tray 11	A-side, 1B	to	Expansion tray 14	A-side, 1B	H

FIGURE 2-38 shows the cabling between one controller tray and up to fourteen expansion trays.

FIGURE 2-38 Cabling of Sun StorageTek 6540 Array Configuration - One Controller and

Fourteen Expansion Trays
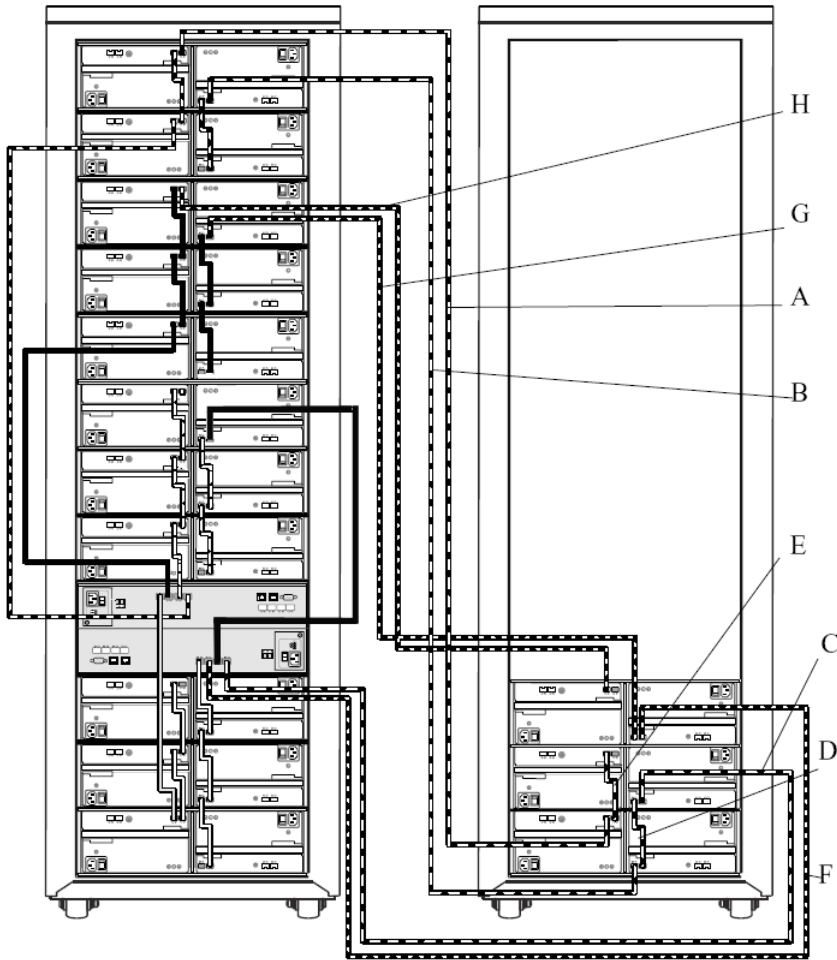
Cabling an Expansion Tray to a Cabinet With a Patch Panel

The initial release of the Sun StorageTek 6540 Array was shipped in a cabinet using a patch panel. To connect to an expansion tray from one of these cabinets, you should bypass the patch panel ():

1. **Disconnect the FC cables and the Ethernet cable from the patch panel.**

Cabling an Expansion Tray to a Cabinet With a Patch Panel

The initial release of the Sun StorageTek 6540 Array was shipped in a cabinet using a patch panel, which was primarily used to extend cable ports from the back of the controller and expansion trays to the rear of the cabinet. The external host FC and Ethernet cables are plugged directly into the patch panel ports, and in the case of an expansion rack, expansion tray FC cables may have also been connected to the corresponding patch panel ports.

To upgrade the system by adding additional expansion trays into one of these cabinets, you should bypass the patch panel and connect directly to the existing expansion trays as shown in FIGURE 2-52. You should bypass the patch panel for the host cables also:

1. **Disconnect the host FC cables and the Ethernet cable from the patch panel and connect to the corresponding ports on the controller tray.**

2. **Connect the FC cables from the expansion tray upgrade directly into Expansion ports A and B on the exiting expansion tray or trays.**

3. **Connect the Ethernet cable directly into the Ethernet port on the expansion tray.**

Connecting the Power Cables

1. **Verify that both power switches are off (see** FIGURE 1-6**) for each tray in the cabinet.**

2. **Connect each power supply in the tray to a different power source in the cabinet.**

3. **Connect the power cables from the cabinet to the external power source.**

Note – The power-on sequence is described in detail in Chapter 6.

Do not power on the array until you complete the procedures in this chapter.

Next Steps

After installing and cabling the trays, you are ready to connect the management and data hosts, as described in Chapter 3.

Connecting the Management Host and Data Hosts

This chapter describes Sun StorageTek 6540 Array cable connections for hosts. It contains the following sections:

Connecting the Management Host

The management host directly manages Sun StorageTek 6540 Arrays over an out-of-band network. This section describes how to set up a connection between the Ethernet port of a controller (FIGURE 3-1) and the management host.
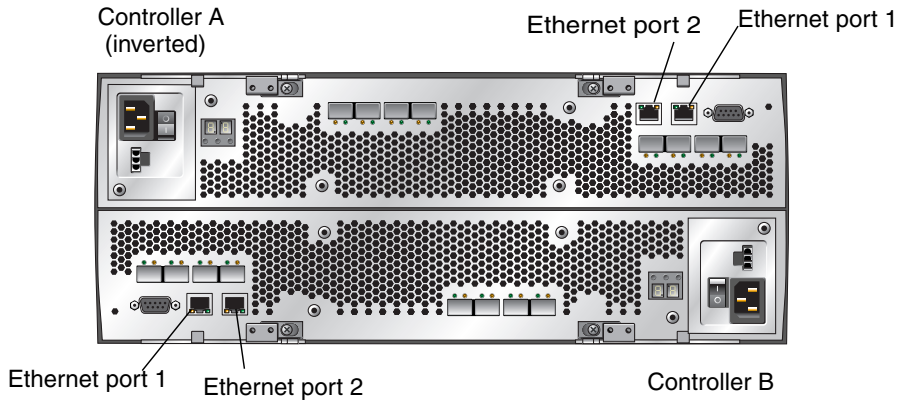
FIGURE 3-1   Ethernet Ports for Controller A and Controller B

Note – Before you begin, ensure that the two required Ethernet cables are available. These requirements are outlined in the *Sun StorageTek 6540 Array Site Preparation Guide*.

There are three ways to establish a connection between the management host and Ethernet port 1 of an array controller:

- "Attaching the Ethernet Ports to the LAN of the Management Host" on page 86
- "Attaching the Ethernet Ports to the LAN Using an Ethernet Hub" on page 87
- "Attaching the Ethernet Ports Directly to the Management Host With a Cross-Over Cable" on page 87

Attaching the Ethernet Ports to the LAN of the Management Host

To attach the Ethernet ports to the local area network (LAN) of the management host:

1. **Locate the Ethernet port 1 for Controller A and Controller B at the back of the controller tray (**FIGURE 3-1**).**

2. **Connect an Ethernet cable to Ethernet port 1 of each controller.**

3. **Connect the other end of each Ethernet cable to the LAN on which your management host resides (preferably on the same subnet).**

Attaching the Ethernet Ports to the LAN Using an Ethernet Hub

To attach the Ethernet ports and the management port Ethernet interface to an Ethernet hub on a private subnet:

1. **Locate Ethernet port 1 on Controller A and Controller B at the back of the controller tray (**FIGURE 3-1**).**

2. **Connect an Ethernet cable to Ethernet port 1 of each controller.**

3. **Connect the other end of each Ethernet cable to an Ethernet hub.**

4. **Connect an Ethernet port on the management host to the Ethernet hub.**

Attaching the Ethernet Ports Directly to the Management Host With a Cross-Over Cable

Use this method to establish temporary IP connectivity between the management host and the controller's Ethernet ports.

To attach the Ethernet ports directly to the management host using a cross-over cable, follow these steps for each controller, as necessary:

1. **Locate Ethernet port 1 on either Controller A or Controller B at the back of the controller tray (**FIGURE 3-1**).**

2. **Obtain and connect an Ethernet cross-over cable to Ethernet port 1 of the controller.**

3. **Connect the other end of the Ethernet cross-over cable directly to your management host Ethernet port.**

Connecting Data Hosts

You can connect data hosts to access the Sun StorageTek 6540 Array through Fibre
Channel (FC) switches to the array or directly to the array.

The Sun StorageTek 6540 Array has eight host connections, four per controller. To
maintain redundancy, connect two data paths from each host, one to each controller.

Note – If you have the Sun StorageTek Data Replication feature, and it is enabled,
then Host port 4 is reserved for remote replication; otherwise, Host port 4 is
available for use.

Connecting Data Hosts Through External Fibre Channel Switches

You can connect the array to data hosts through external FC switches.

Before you connect data hosts, check that the following prerequisites have been met:

■ The FC switches have been installed and configured as described in the vendor's
installation documentation. (See the *Sun StorageTek 6540 Array Release Notes* for a
list of supported switches.)

■ Interface cables are connected and routed between the data host's host bus
adapters (HBAs), switches, and installation site.

■ Fiber-optic cables (2 meters or longer) are available to connect the array to the FC
switches.

1. **Locate the data host ports (Small Form-factor Pluggable [SFP] transceivers) at the
back of the controller tray (**FIGURE 3-2**).**
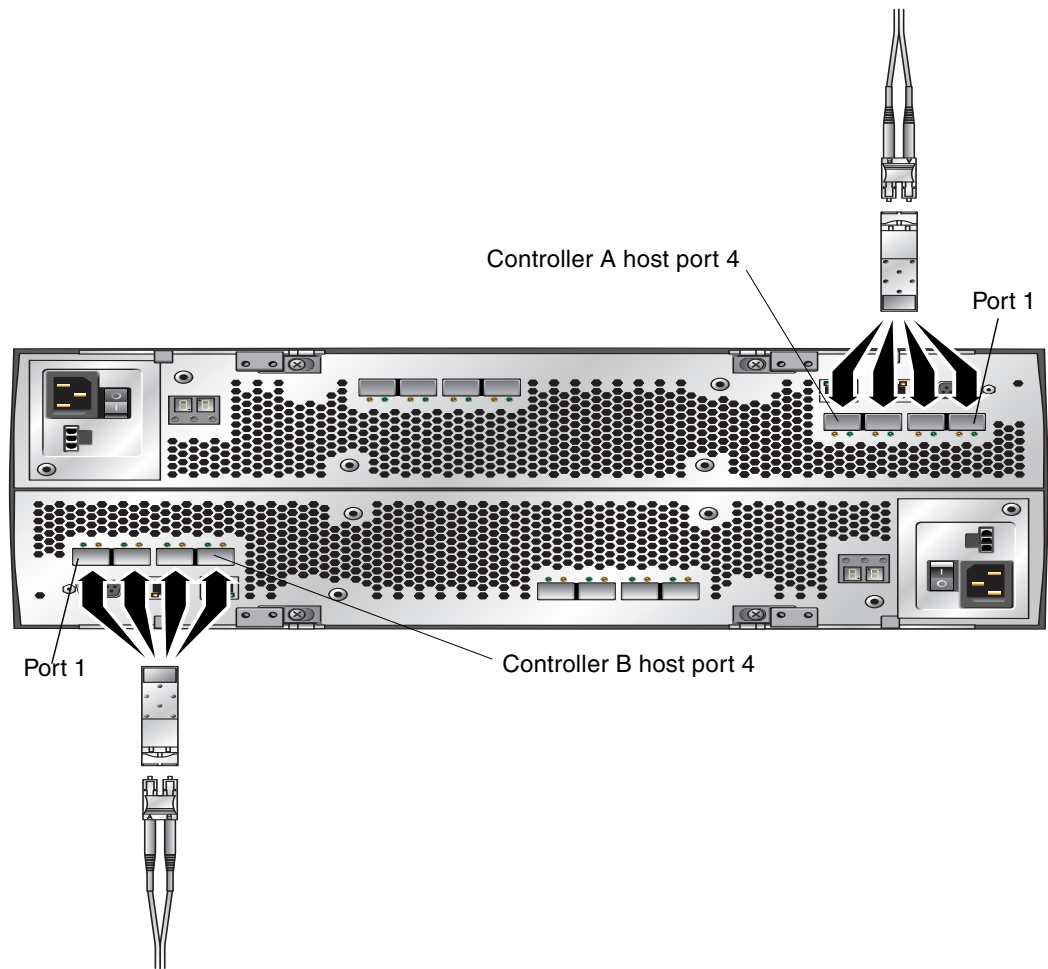
FIGURE 3-2 Data Host Ports

2. **Connect each fiber-optic cable to the data host ports of Controller A and Controller B.**

> **Caution –** Fiber-optic cables are fragile. Do not bend, twist, fold, pinch, or step on the fiber-optic cables. Doing so can degrade performance or cause data loss.

3. Connect the other end of each cable to the external switch as shown in the graphics that follow.

FIGURE 3-3 shows the data hosts connected through switches with single connections.

FIGURE 3-4 shows the data hosts connected through switches with cross-connections.

Note – The configuration in FIGURE 3-4 is not supported for use in a Sun Cluster environment.
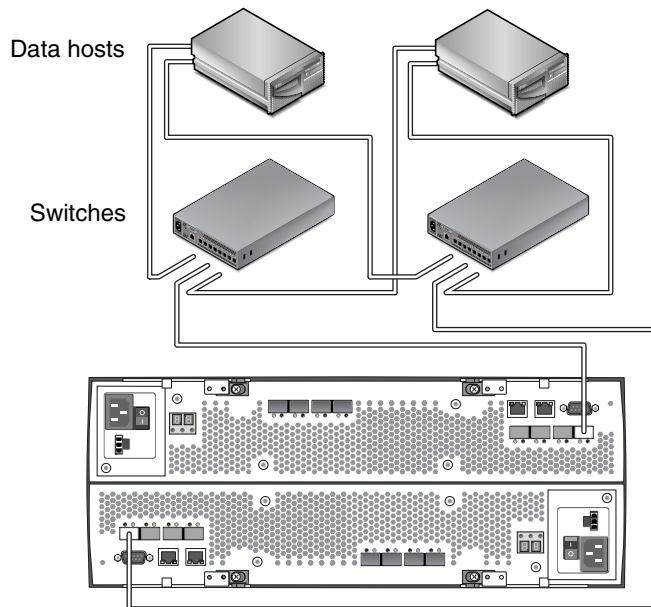
FIGURE 3-3   Cabling Switches With Single Connections
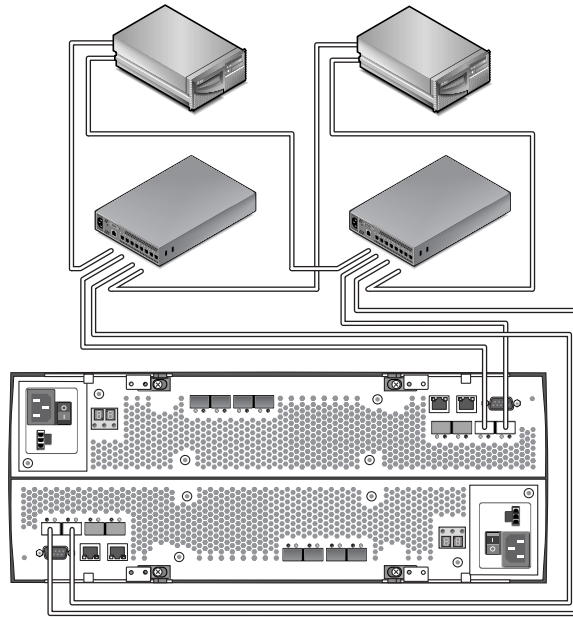
FIGURE 3-4   Cabling Switches With Cross-Connections

4. Connect the cables from the switch to the HBAs for each data host.

Connecting Data Hosts Directly

A direct point-to-point connection is a physical connection in which the data host HBAs are cabled directly to the array's host ports.

Before you connect data hosts directly to the array, check that the following prerequisites have been met:

- Interface cables are connected and routed between the data host's HBAs and the installation site.
- Fiber-optic cables (2 meters or longer) are available to connect the array host ports to the data host HBAs.

1. Locate the data host ports at the back of the controller tray (FIGURE 3-2**).**

2. Connect a fiber-optic cable to each data host port on Controller A and Controller B that you intend to use.

Caution – Fiber-optic cables are fragile. Do not bend, twist, fold, pinch, or step on the fiber-optic cables. Doing so can degrade performance or cause data loss.

3. Connect the other end of each fiber-optic cable to a data host HBA.

FIGURE 3-5 shows an example of a direct host connection of two data hosts with dual HBAs.

FIGURE 3-6 shows an example of a direct host connection of three data hosts with dual HBAs.
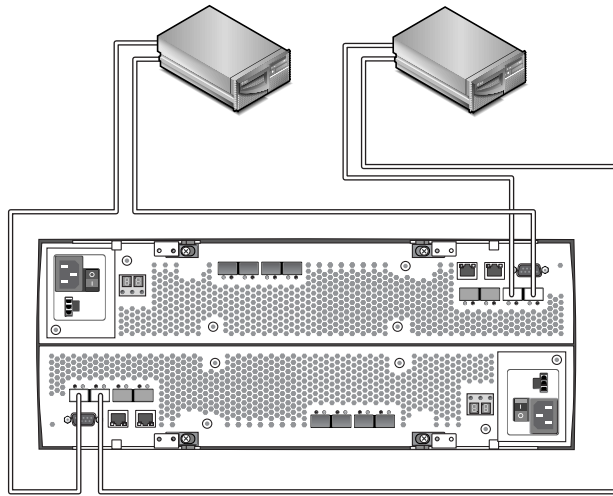
FIGURE 3-5   Direct Connection to Two Hosts With Dual HBAs
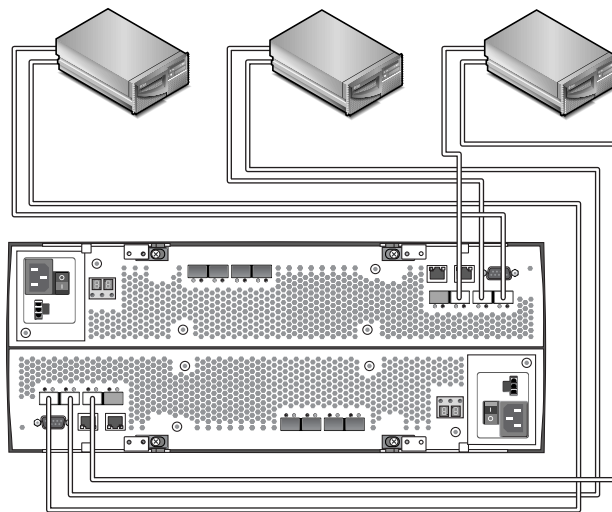
FIGURE 3-6   Direct Connection to Three Hosts With Dual HBAs

Next Steps

After you have connected the management host and data hosts, you should verify the link rate of the trays and power on the arrays, as described in Chapter 4.

Verifying the Link Rate and Powering On the Array

This chapter describes verifying the link rate and initial tray power-on procedures. Perform the following procedures in the order listed:

Before Powering On

You can set up a Dynamic Host Configuration Protocol (DHCP) server to issue the IP address to each controller. If a DHCP server is not available, the controller tray defaults to internal static IP addresses. (See the *Sun StorageTek Common Array Manager Software Installation Guide* for information about configuring IP addresses on array controllers.)

For instructions on how to set up the DHCP server, see "Configuring a DHCP Server" on page 121.

Verifying the Link Rate for Each Tray

The Tray Link Rate switch on each expansion tray enables you to set the data transfer rate to 4 Gbits/second or 2 Gbits/second for drives on the tray.

Note – The Tray Link Rate switch does not affect the data rate of host ports.

An expansion tray can contain disk drives supporting both 4 Gbits/second and 2 Gbits/second data transfer speeds. If the array has one or more disk drives that operate at 2 Gbits/second, set the Tray Link Rate switch on all trays to 2 Gbits/second. If all disk drives in the array operate at 4 Gbits/second, set the Tray Link Rate switch to 4 Gbits/second. If there is a mix of 2 Gbits/second and 4 Gbits/second disk drives in the array, set the link rate to the lower speed.

An expansion tray is set at the factory to whatever speed its disk drive rates are. It is possible to mix drive speeds within an enclosure supporting both 4 Gbits/second and 2 Gbits/second, but the expansion tray rate setting must be set to the lowest disk drive speed rate using the 4 Gbits/second and 2 Gbits/second switch located at the lower right front of the enclosure.

Should there be an enclosure to controller data transfer speed mismatch, the LED error code segment display at the rear of the controller tray will indicate a code of: H7 – Current Enclosure Fibre Channel Rate Different than Rate Switch.

You can determine the speed of the disks in the tray by removing one of the disk drives and examining the label. Next to the disk name on the label is a number indicating the RPM and speed of the disk. For example, the number 15k.4 indicates the disk is 15,000 RPMs and 4 Gbytes.

Verify that all expansion cables and SFPs are rated at 4 Gbits/second when setting the link rate to 4 Gbits/second.

Note – Change the position of a Tray Link Rate switch only when the tray is powered off.

To set the link rate for each tray:

1. **Locate the Tray Link Rate switch at the lower right front of the tray (**FIGURE 4-1**).**
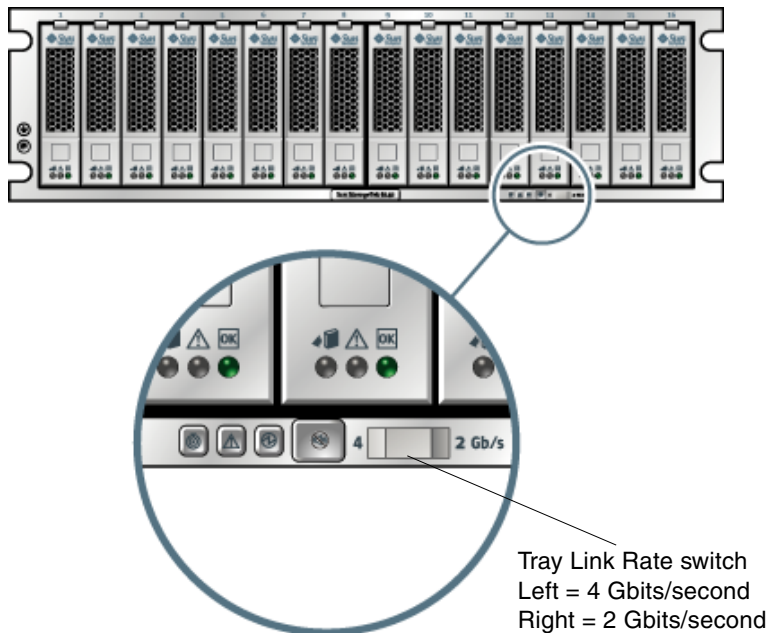
FIGURE 4-1   Tray Link Rate Switch

2. **Set the default link rate for the tray as follows:**

   ■ For 4 Gbits/second, slide the Tray Link Rate switch to the left position.
   ■ For 2 Gbits/second, slide the Tray Link Rate switch to the right position.

Powering On and Powering Off the Array

This chapter provides information on powering on and powering off the Sun StorageTek 6540 Array. It contains the following sections:

■ "Powering On the Array" on page 97
■ "Powering Off the Array" on page 99

Powering On the Array

Use this procedure to turn power on for all trays installed in the cabinet (FIGURE 4-2).

Note – The order in which you power on the trays is important. Be sure to power on the controller tray last in order to ensure that the disks in the expansion trays have enough time to spin completely before being scanned by the redundant array of independent disks (RAID) controllers in the controller tray.
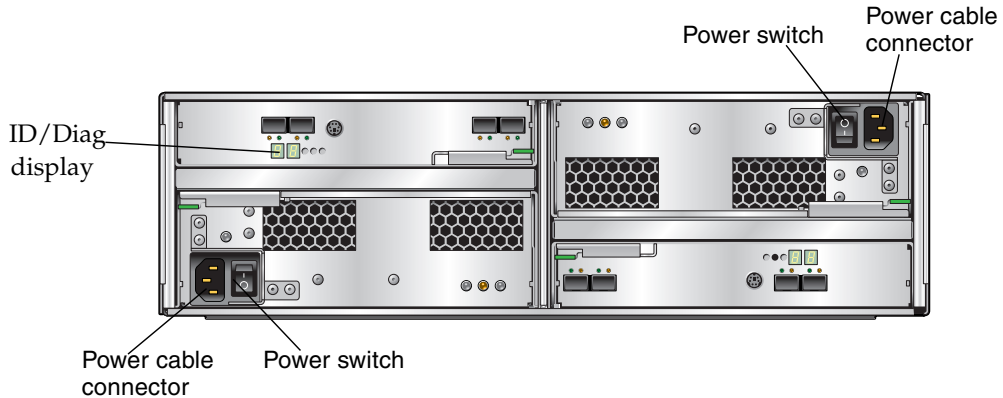
FIGURE 4-2 Tray Power Connectors and Switches

1. **Turn on the cabinet circuit breakers, located at the bottom of the cabinet, if applicable.**

2. **Press the power switches at the back of each expansion tray to the On position.**

   Wait until the tray ID/Diag display on the back indicates the number of the tray ID to be sure that the tray has powered up fully before proceeding to the next step.

3. **Press each power switch at the back of the controller tray to the On position.**

   While the tray powers on, the green and amber LEDs at the front and back of the controller tray turn on and off intermittently. Depending on your configuration, it can take several minutes for the tray to power on. Wait at least two minutes until all of the drives are spinning completely before moving to step 4. When the power-on sequence is complete, the controller tray ID indicates 85.

4. **Check the status of each tray.**

   After the power-on sequence is complete, confirm that the green OK/Power LEDs are steady green, both on the tray and on each drive in the tray.

   If all tray and drive OK/Power LEDs are steady green and the amber Service Required LEDs are off, the power-on sequence is complete and no faults have been detected.

Powering Off the Array

The array rarely needs to be powered off. You remove power only when you plan to physically move the array to another location.

To power off the array, do the following:

1. **Stop all I/O from the hosts, if connected, to the array.**

2. **Wait approximately 2 minutes until all disk drive LEDs have stopped flashing.**

   After a 2-minute period, data residing in cache is written to disk and the battery mechanisms are disengaged.

   Note – If Media Scan is enabled (default), the disk drive LEDs will continue to flash after the 2-minute period has elapsed. However, the LED flash rate during a media scan (slow, periodic blink) is different from the flash rate of I/O (fast, random).

   ---

3. **Check the Cache Active LED on the controller to determine if any outstanding cache needs to be written (**TABLE 1-4**).**

   If the LED is on, there is still data that needs to be flushed and written to disk.

   Ensure that the Cache Active LED is no longer flashing before powering off the array.

4. **Press each power switch at the back of the controller tray to the Off position.**

5. **Press the power switches at the back of each expansion tray to the Off position.**

Next Steps

Now you are ready to install data host software, HBAs, and other software on different host platforms, as described in Chapter 5.

Data Hosts, HBAs, and Other Software

This chapter describes how to install data host software, HBAs, and other software on different host platforms. It contains the following sections:

- "Data Host Software" on page 101
- "Setting Up a Data Host On a Solaris System" on page 102
- "Installing Data Host Software for Operating Systems Other Than Solaris" on page 104
- "Enabling Multipathing Software" on page 106
- "Downloading the Veritas Volume Manager ASL" on page 107
- "Next Steps" on page 108

Data Host Software

The data host software contains tools that manage the data path I/O connections between the data host and the array. This includes drivers and utilities that enable array management hosts to connect to, monitor, and transfer data in a storage area network (SAN).

Note – Some management hosts can also be used as data hosts.

HBAs and Drivers

Host Bus Adapters (HBAs) are network interface cards that manages all data I/O on your data host. The specific HBAs you need depend on the data host server platform, operating system, and data transfer rates used in your storage area network. HBAs must be ordered separately, from Sun or their respective manufacturers. Sun HBAs can be ordered from:

`www.sun.com/storagetek/storage_networking/hba/`

The required versions of HBA drivers must be installed on the data host before you can set up a data host. The *Sun StorageTek 6540 Array Release Notes* lists the data host requirements for HBAs and drivers. Refer to the specific vendor HBA documentation for instructions on installing HBA drivers.

Multipathing

Data host software controls the data path between the data host and the array. Since there can be more than one path between the host and the array for redundancy, this function is called multipathing.

You must install data host software (including multipathing) on each data host that communicates with the Sun StorageTek 6540 Array. For Solaris OS 8 and 9 data hosts, the multipathing software is part of the Sun StorEdge SAN 4.4 software. Multipathing is included in Solaris OS 10.

For multipathing support on data host platforms running non-Solaris operating systems such as Windows, Linux, Novell Netware, IBM AIX, or others, you can use the Sun StorageTek RDAC Driver software or other multipathing software as listed in the *Sun StorageTek 6540 Array Release Notes*.

Setting Up a Data Host On a Solaris System

The Sun StorageTek 6540 Array provides data path support for data hosts running Solaris, Windows 2000, Windows Server 2003, Red Hat Linux, HP-UX, NetWare, and IBM AIX operating systems. This section applies to hosts running Solaris OS 8, 9, and 10.

See the *Sun StorageTek 6540 Array Release Notes* for the latest supported operating system versions.

Note – To install data host software on systems that are not running the Solaris OS, see "Installing Data Host Software for Operating Systems Other Than Solaris" on page 104.

You must install data host software (including multipathing) on each data host that communicates with the Sun StorageTek 6540 Array. Multipathing is included in the Solaris OS 10. For Solaris OS 8 and 9 data hosts, you need the Sun StorEdge SAN Foundation Kit software (which includes the multipathing software).

To install data host software on Solaris OSs, see the following sections:

- "Obtaining Sun Solaris 8 and 9 Data Host Software" on page 103
- "To Install the SAN_4.4 Data Host Software" on page 104

▼ Obtaining Sun Solaris 8 and 9 Data Host Software

Obtain Sun Solaris OS 8 and 9 data host software as follows:

1. **Go to the Sun Microsystems web page (sun.com).**

   The Sun home page is displayed.

2. **Select Downloads from the home page navigation bar.**

   The Downloads page is displayed (it is not labeled).

3. **On the View by Category tab, select System Administration>Storage Management.**

   The Storage Management page is displayed, showing a list of downloadable storage-related products.

4. **Select the StorEdge SAN 4.4 product.**

   The login page is displayed.

5. **Login using your Sun account ID.**

   The SAN 4.4.x Download page is displayed.

6. **Accept the License Agreement and select the SAN 4.4 version required for your operating system.**

   The data host software version you need depends on your operating system. See the *Sun StorageTek 6540 Array Release Notes* for the current data host software requirements. Download the SAN 4.4.x Base Kit (if you do not already have it installed), and the latest patch version as recommended in the release notes.

   There is a README file available on the SAN 4.4.x Download page with instructions for unpacking and installing the download file on your data host computer.

▼ To Install the SAN_4.4 Data Host Software

To launch the host software installer:

1. **Log in to the host as** `root`.

2. **Change to the** `SAN_4.4.xx_install_it` **directory in which the compressed installation file was unpacked:**

   cd *<user-specified location>*/`SAN_4.4..xx_install_it`

   where *xx* is the software version number of the installed files.

3. **Start the host software installer by typing the following command:**

   ./install_it

   When the installation is complete, the root prompt returns.

4. **Enable the Sun StorEdge Traffic Manager multipathing software (see** "Enabling Multipathing Software" on page 106**).**

Installing Data Host Software for Operating Systems Other Than Solaris

To install data host software for operating systems other than Solaris, see the following sections:

- "About Data Host Software For Non-Solaris Platforms" on page 105
- "Downloading and Installing Sun RDAC Software" on page 105
- "To Download the AIX ASL Package" on page 105

About Data Host Software For Non-Solaris Platforms

The data host software for Red Hat Linux and Windows platforms is Sun Redundant Dual Array Controller (RDAC), and is available from the Sun Download Center (SDLC). Data host software for HP-UX and AIX platforms is Veritas Dynamic MultiProcessing (DMP), which is part of the Veritas Volume Manager. Download the AIX ASL from http://support.veritas.com. The AIX ASL is available only from Veritas. Contact Veritas for HP-UX DMP. The Novell Netware OS requires Netware Multiprocessing Executive (MPE). Netware is available only from Novell.

See the *Sun StorageTek 6540 Array Release Notes* for a list of supported operating systems, patches, and HBAs.

Downloading and Installing Sun RDAC Software

1. **To download the latest version of Sun RDAC software (support for Windows and Linux multipathing), go to:**

   http://www.sun.com/download/index.jsp

   and select Hardware Drivers>Storage.

2. **Select the link for the Windows or Linux RDAC.**

   An RDAC Driver download page is displayed.

3. **Click Download.**

4. **Log in using your SDLC user name and password.**

   If you have not already registered, click Register Now.

5. **Read and accept the license agreement.**

6. **Select the link for the data host platform that you want to install.**

7. **Save the install package to a temporary directory.**

8. **Uncompress and untar the install package.**

9. **When the download is finished, log out of the SDLC.**

   A `readme` file is provided as part of the installation package. To install the software, refer to the `readme` file for platform-specific instructions.

▼ To Download the AIX ASL Package

1. **Go to the Veritas AIX ASL page:**

http://support.veritas.com/docs/279730

A page displays with the ASL installation instructions.

2. **Read the instructions and click Download Now.**

3. **Follow the instructions to uncompress and install the ASL.**

Enabling Multipathing Software

Sun StorEdge SAN Foundation software includes the Sun StorEdge Traffic Manager multipathing software.

The procedure you use to enable multipathing software depends on the version of Solaris OS running on the host:

▼ Enabling Multipathing Software for Solaris 8 or 9 OS

To enable the multipathing software on hosts running Solaris OS 8 or 9:

1. **Open the** `/kernel/drv/scsi_vhci.conf` **file with a text editor.**

2. **Set** `mpxio-disabling";` **in the file.**

3. **Set** `load-balance="round-robin";` **in the file.**

4. **Set** `auto-failback="enable";` **in the file.**

5. **Save the updated file.**

6. **Reboot the host.**

7. **Use the** `cfgadm` **command to configure HBA paths.**

   How you configure paths depends on how you are using your arrays in a SAN or direct attach environment. See the *Sun StorageTek SAN Foundation Software 4.4 Configuration Guide* for information about configuring paths.

▼ Enabling Multipathing Software for Solaris 10 OS

To enable multipathing software for all Fibre Channel (FC) ports on hosts running Solaris OS 10:

1. **Type the following command:**

   `# stmsboot -e`

   Note – See the stmsboot(1M) manpage for complete details.

   You are prompted to confirm the command:

   ```
   WARNING: This operation will require a reboot.

   Do you want to continue ? [y/n] (default: y)
   ```

2. **Press the Return key to reboot the host.**

Downloading the Veritas Volume Manager ASL

Veritas Volume Manager provides support for the Sun StorageTek 6540 Array in the form of the Array Support Library (ASL). If you are using the Veritas Volume Manager on your array (recommended), you will need the ASL. There are ASL software packages for the Solaris 8, 9, and 10 OSs, and for the IBM AIX 5.1 and 5.2 OSs. The ASL must be installed on the same host system as the Volume Manager software to enable it to recognize the Sun StorageTek 6540 Array trays.

▼ To Download the Solaris ASL Package

1. **Log in as superuser on the Sun server to be connected to the array.**

2. **Go to the Products Download page:**

   http://www.sun.com/download

3. **In the Search area, search for Veritas ASL, and click on the resulting link.**

   The Products Downloads > Veritas Volume Manager ASL page is displayed.

4. **Click Download.**

5. **If you have not previously registered, register as follows:**

   a. **Click the Register Now link at the bottom of the left column.**

   b. **On the registration page, complete the required fields and click Register.**

6. **Log in:**

   a. **Type your user name and password in the left column, and click Login.**

   b. **On the Terms of Use page, read the license agreement, click Yes to Accept, and click Continue.**

7. **Download the compressed zip file that contains the ASL package for the Sun StorageTek 6540 array and README file.**

8. **Use the unzip command to extract the files.**

9. **Refer to the README file for instructions on installing the Veritas Volume Manager ASL.**

Next Steps

After you have installed and enabled multipathing on the data hosts, configure IP addressing on the array controllers as described in Chapter 6.

Configuring IP Addressing

In order for there to be an out-of-band Ethernet connection between the local management host and the array controllers, the management host and the array controllers must have valid IP addresses.

This chapter describes how to configure IP addressing on the local management host and the array controllers. It contains the following sections:

About IP Addressing

The Sun StorageTek 6540 Array is managed out-of-band using a standard Ethernet connection between the redundant array of independent disk (RAID) controllers and your management host.

Use the procedures in the following sections to ensure that the local management host and the array controllers have valid IP addresses:

Configuring the IP Address of the Array Controllers

You can configure two types of IP addressing for Ethernet port 1 of each array controller:

- Dynamic Host Configuration Protocol (DHCP) IP addressing – IP addresses for Ethernet port 1 are assigned dynamically from a DHCP server running bootstrap protocol (BOOTP) services. By default, this occurs automatically at initial power-on. An IP address assigned to an Ethernet port is held only as long as needed.
- Static IP addressing – You assign a specific IP address to Ethernet port 1 of each controller. Static IP addresses remain in effect until you modify or remove them or you change the method of IP addressing for the Ethernet port to DHCP.

By default, if the array controllers cannot find a DHCP server upon initial power-on, an internal IP address is assigned to Ethernet port 1 of each controller:

- Ethernet port 1 of Controller A is assigned IP address `192.168.128.101.`
- Ethernet port 1 of Controller B is assigned IP address `192.168.128.102.`

The following subsections describe how to configure Ethernet port 1 on a controller with dynamic and static IP addressing.

Configuring Dynamic (DHCP) IP Addressing

If BOOTP services are available on the DHCP server at initial array power-on, this server assigns a dynamic IP address for Ethernet port 1 on each controller.

If a DHCP server is not available, the controller tray defaults to internal static IP addresses. See "Configuring the IP Address of the Array Controllers" on page 110 for details.

If you want to set up a DHCP server, refer to "Configuring a DHCP Server" on page 121 for a description of how to configure BOOTP services in a Sun Solaris or Microsoft Windows environment.

Configuring Static IP Addressing

There are two methods of assigning static IP addresses to the Ethernet ports of a controller:

- Using the serial port interface, as described in the following text.
- Using the Sun StorageTek Common Array Manager browser interface, as described in the *Sun StorageTek Common Array Manager Software Installation Guide.*

Note – It is recommended that you use the serial port interface to assign IP addresses to Ethernet port 1 of each controller, if possible.

To use the serial port interface to configure IP addressing for Ethernet port 1 of each controller, you must complete the tasks described in the following sections:

- "Connecting a Terminal to the Serial Port" on page 111
- "Setting Up the Terminal Emulation Program" on page 111
- "Establishing a Connection With the Serial Port" on page 112
- "Configuring the IP Addresses" on page 113

Connecting a Terminal to the Serial Port

You will establish a serial connection to each controller, Controller A and Controller B.

Note – You can use any null serial extension cable that connects to a serial port base cable.

To connect a terminal to the serial port of a controller:

1. **Connect your terminal (using a null modem cable) to the DB9 port on each controller.**

Setting Up the Terminal Emulation Program

To set up a terminal emulation program to connect to the serial port:

1. **Select VT100 emulation.**

2. **Remove any modem strings from the connection profile.**

3. **Set up the connection profile with the following communication settings:**

- Data Rate: 57600
- Data Bits: 8
- Parity: None
- Stop Bits: 1
- Flow Control: None

Establishing a Connection With the Serial Port

To establish a connection with the serial port and display the Service Interface menu:

1. **Use the key sequence Ctrl-Break.**

   Note – Press Break to synchronize the serial port to a different terminal port rate.

   Send a break or several breaks until the serial port responds with a request to synchronize the with the baud rate of the terminal:

   ```
   Set baud rate: press <space> within 5 seconds
   ```

2. **Press the space bar within five seconds.**

   The serial port confirms the established baud rate for the connection:

   ```
   Baud rate set to 57600
   ```

3. **Use the key sequence Ctrl-Break. Ctrl-Break.**

   Send a break or several breaks until the serial port responds with the following message:

   ```
   Press within 5 seconds: <S> for Service Interface, <BREAK> for
   baud rate
   ```

4. **Press S to display the Service Interface menu.**

   The serial port requests the serial port password:

   ```
   Enter Password to access Service Interface (60 sec timeout):
   ->
   ```

5. **Type the serial port password,** kra16wen**, and press Enter.**

   The Service Interface menu is displayed.

```
Service Interface Main Menu
  =============================
1) Display IP Configuration
2) Change IP Configuration
3) Reset Storage Array (SYMbol) Password
Q) Quit Menu


Enter Selection:
```

Configuring the IP Addresses

The serial port Service Interface menu enables you to set up the IP address
configuration for Ethernet port 1 on the controller.

Note – Ethernet port 2 is reserved for future use.

To set up the IP address configuration for Ethernet port 1 on *each* controller:

1. **Select option 2, Change IP Configuration:**

```
Service Interface Main Menu
  =============================
1) Display IP Configuration
2) Change IP Configuration
3) Reset Storage Array (SYMbol) Password
Q) Quit Menu


Enter Selection: 2
```

The Select Ethernet Port menu is displayed.

2. **Specify the Ethernet port for which you want to configure IP addressing:**

```
Select Ethernet Port
  ==============================
1) Ethernet Port: 1
2) Ethernet Port: 2
Q) Quit

Enter Selection: 1
```

3. **Specify that you do not want dynamic IP addressing, using a DHCP server, used for this port:**

```
Configure using DHCP ? (Y/N): n
```

The current or default IP configuration for the selected Ethernet port is displayed.

4. **Enter the static IP address and, optionally, a subnet mask for the Ethernet port:**

Note – If you are not using DHCP IP addressing and have previously changed the gateway IP address, you must also specify a gateway IP address for the Ethernet port.

```
Press '.' to clear the field;
Press '-' to return to the previous field;
Press <ENTER> and then ^D to quit (Keep Changes)

               Current Configuration          New Configuration
IP Address        if1 : 192.168.128.101       IP-address
Subnet Mask       if1 : 255.255.255.0         <ENTER>
Gateway IP Address if1:                        <ENTER>
```

5. **When prompted, confirm the specified IP addressing.**

The Service Interface menu is redisplayed.

6. **Select option 1, Display IP Configuration, to confirm the IP address changes.**

```
Service Interface Main Menu
  ==============================
1) Display IP Configuration
2) Change IP Configuration
3) Reset Storage Array (SYMbol) Password
Q) Quit Menu


Enter Selection: 1
```

The Select Ethernet Port menu is displayed.

7. **Specify the Ethernet port for which you want to display IP addressing:**

```
Select Ethernet Port
  ==============================
1) Ethernet Port: 1
2) Ethernet Port: 2
Q) Quit


Enter Selection: 1
```

The IP address configuration of the selected Ethernet port is displayed, and the Service Interface menu is redisplayed.

8. **Press Q to quit the Service Interface menu.**

9. **Repeat these steps for the second controller Ethernet port.**

When you have completed the IP address configuration for the Ethernet port on *each* array controller, you are ready to register and configure the array, as described in the *Sun StorageTek Common Array Manager Software Installation Guide*.

Configuring the IP Address of the Management Host

The method you use to configure the IP address on the host depends on the platform you are using. Follow the instructions in one of the following sections, depending on your platform:

- "Configuring the IP Address on the Management Host for the Solaris Operating System" on page 116
- "Configuring the IP Address for Windows 2000 Advanced Server" on page 116
- "Configuring the IP Address for Windows Server 2003" on page 117

Additionally, you might have to establish a virtual subnet in order to temporarily access the array from the management host. Refer to "Creating and Deleting a Temporary Virtual Subnet on a Management Host" on page 118 for additional information.

Configuring the IP Address on the Management Host for the Solaris Operating System

For information about changing the IP address on a Solaris server, see the `ifconfig` man page.

Configuring the IP Address for Windows 2000 Advanced Server

1. **From the Control Panel, select Network and Dial-Up Connections.**

2. **Select Local Area Connection > Properties > Internet Protocol (TCP/IP).**

3. **Make sure that a static IP address is configured, and click Advanced.**

4. **In Advanced TCP/IP Settings, select the IP address you want to configure, and click Add directly below the IP addresses listing.**

5. **Type the IP address and subnet mask as shown in the following example:**
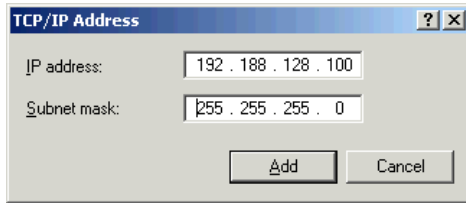
6. Click Add.

The new IP address is added to the IP addresses listing.

7. Open a command window and try to ping the IP addresses of the controller's Ethernet ports, as shown in the following example:

> **`ping 192.188.128.101`**

If the `ping` is unsuccessful, try rebooting the server and `ping` the IP address again.

Configuring the IP Address for Windows Server 2003

1. From the Control Panel, select Network and Dial-Up Connections.

2. Select Local Area Connection > Properties > Internet Protocol (TCP/IP).

3. Make sure a static IP address is configured, and click Advanced.

4. In Advanced TCP/IP Settings, click Add directly below the IP addresses listing.

5. Type an IP address that is on the same subnet as Controller A (`192.168.128.101`) **and Controller B** (`192.168.128.102`)**.**

For example, you can use `192.168.128.100` because it is on the same subnet and does not conflict with the controller IP addresses.

6. Click Add.

The new IP address is added to the IP addresses listing.

Creating and Deleting a Temporary Virtual Subnet on a Management Host

To configure IP addressing for an array, you might have to establish a virtual subnet in order to temporarily access the array from the management host. You should delete the virtual subnet after you configure IP addressing for the array.

This section contains the following subsections:

Creating a Temporary Virtual Subnet on a Management Host

1. **To display the Ethernet ports that are in use on the server, type the following:**

   `ifconfig -a`

   The Ethernet ports that are in use are displayed, as shown in the following example:

   ```
   lo0: flags=1000849<UP,LOOPBACK,RUNNING,MULTICAST,IPv4> mtu 8232
   index 1
           inet 127.0.0.1 netmask ff000000
   bge0: flags=1000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4> mtu 1500
   index 2
           inet 10.4.30.110 netmask ffffff00 broadcast 10.4.30.255
           ether 0:3:ba:32:4d:f1
   ```

2. **As `root`, configure a temporary virtual subnet by typing the following:**

   # **`ifconfig`** *ethernet-port*

   # **`ifconfig`** *ethernet-port***`:1 192.168.128.100 up`**

   For example:

   # **`ifconfig bge0`**

   # **`ifconfig bge0:1 192.168.128.100 up`**

3. **Type the following command to view the changes and thereby verify that you have established IP connectivity between the management host and the array controllers:**

```
ipconfig -a
```

Deleting a Temporary Virtual Subnet on a Management Host

After you have assigned static IP addresses to the controllers, you can delete the temporary virtual subnet.

1. **Enter the following commands as** `root`:

   # ifconfig *ethernet-port***:1 down**

   # ifconfig *ethernet-port***:1 unplumb**

2. **View the changes:**

   ifconfig -a

Next Steps

You are now ready to use the management software to set up the array, as described in the document *Sun StorageTek Common Array Manager Software Installation Guide*.

Among the tasks that you will perform:

- Register the arrays
- Initial configuration
- Create volumes and attach hosts

Configuring a DHCP Server

This appendix describes how to configure bootstrap protocol (BOOTP) services in a Sun Solaris and Microsoft Windows environment. It contains the following sections:

Dynamic IP addresses are assigned through Dynamic Host Control Protocol (DHCP) server BOOTP services.

Before You Begin

You need each controller's media access control (MAC) address to configure the DHCP server. The MAC address is located on the bar code label at the back of each redundant array of independent disks (RAID) controller. Since there are two controllers per array, you need two MAC addresses.

Setting Up a Solaris DHCP Server

The following procedure provides an example of how to set up a DHCP server with the BOOTP option for the Solaris 8, 9, and 10 Operating Systems. Your environment may require different steps.

1. **Modify the** `netmasks` **line of the** `/etc/nsswitch.conf` **file as shown here:**

```
#netmasks:   nis [NOTFOUND=return] files
netmasks:    files nis [NOTFOUND=return]
```

2. Start the DHCP wizard by issuing the following command at the command line:

`/usr/sadm/admin/bin/dhcpmgr &`

The following window is displayed:
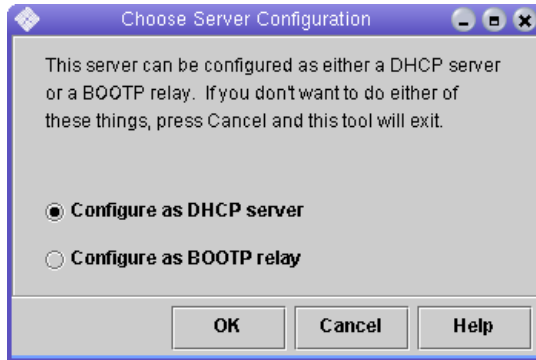
The wizard will prompt you for information related to the configuration, network address, and subnet mask of the controller tray. Select or enter the following information:

- Data storage format: **Text files**
- Nameservice to store host records: **Do not manage hosts records**
- Length of lease:
- Network Address: *Network address of Controller A*
- Subnet Mask: For example, `255.255.255.0`
- Network Type: **Local-Area (LAN)**
- Router: **Use router discovery protocol**

Your summary page should look similar to the following example:

A DHCP Configuration Wizard window showing a Review step. The left panel lists Steps: 3 Select hosts nameservice, 4 Specify lease policy, 5 Specify DNS domain and servers, 6 Specify network address and subnet mask, 7 Specify network type and router, 8 Specify NIS domain and servers, 9 Specify NIS+ domain and servers, 10 Review. The right panel shows: The system will be configured as a DHCP server with the following settings: Data Storage: Text files; Hosts Nameservice: Do not manage hosts records; Length of Lease: 1 days, renewable; DNS Domain: ; DNS Servers: ; Network Address: 10.4.30.0; Subnet Mask: 255.255.255.0; Network Type: Local-Area (LAN); Router: Use router discovery protocol; NIS Domain: ; NIS Servers: ; NIS+ Domain: . Buttons at the bottom: back arrow, Finish, Cancel, Help.

3. **Verify your configuration information and click Finish.**

4. **When you are prompted to configure addresses for the server, click Yes.**
   The Add Address to Network wizard is displayed.

5. **Enter the following information:**
   - Number of IP addresses
   - Name of managing server
   - Starting IP address
   - Configuration macro to be used for configuring the clients
   - Lease type

   Your summary page should look similar to the following example:
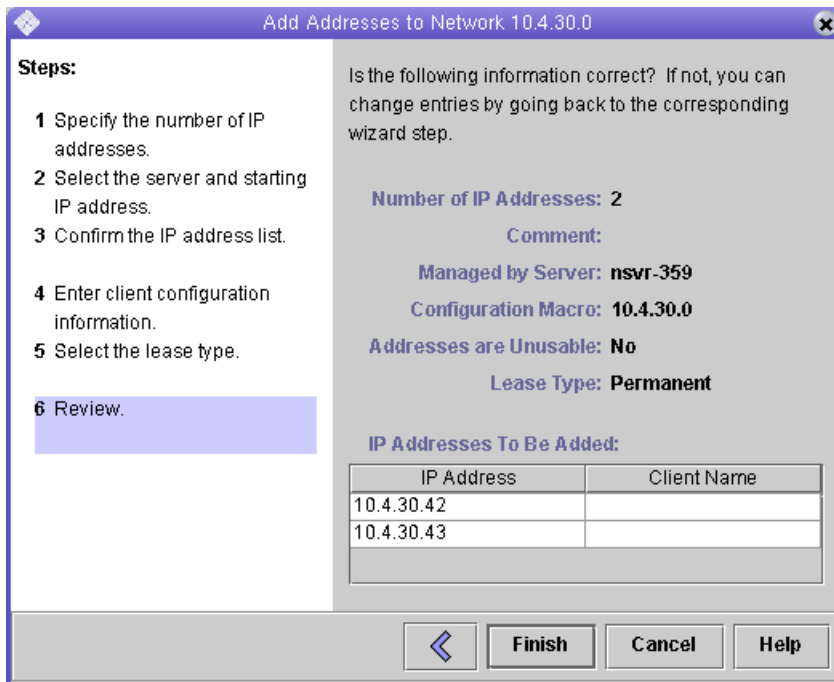
6. **Verify your configuration information and click Finish.**

   The DHCP Manager displays the following:

7. **In the Address Properties window, do the following for each RAID controller:**

   a. **In the Client ID field, enter** `01` **followed by the MAC address that is printed on the back of the RAID controller. For example:**

      `0100A0E80F924C`

   b. **Toward the bottom of the window, select "Assign only to BOOTP clients."**
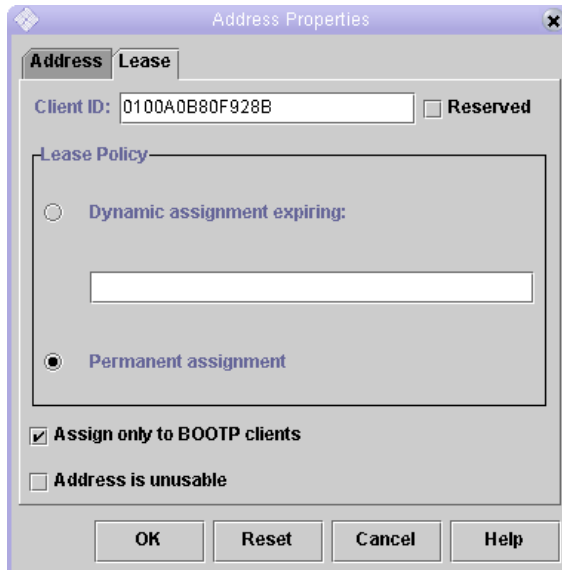
c. **Click OK.**

The DHCP manager updates the status and client ID, as shown in the following example:

8. **Go to Modify Service Options and do the following:**

a. **Select Detect Duplicate IP addresses.**

b. **Under BOOTP Compatibility, select Automatic.**

c. **Select Restart Server, as shown in the following example.**
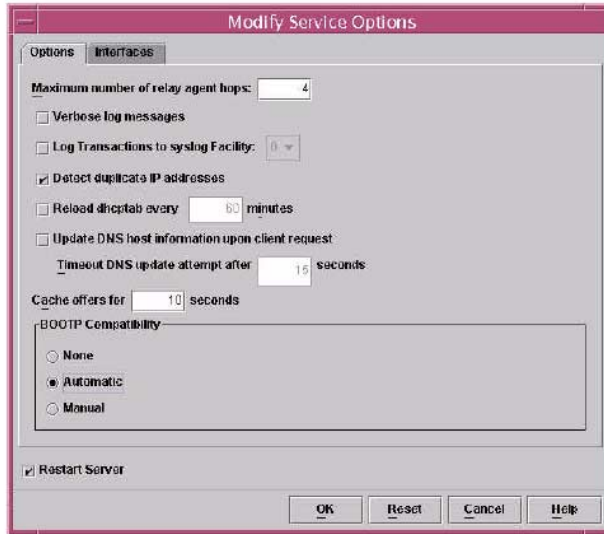
d. Click OK.

After the configuration process has finished, the DHCP server provides BOOTP services to the MAC address you entered for each RAID controller.

9. **To verify that the BOOTP service is running, go to Service > Restart.**

10. **After you power on the array, ping the address.**

If the ping responds with 'alive', the DHCP server BOOTP operation was successful.

Setting Up DHCP on a Windows 2000 Advanced Server

Before you begin, make sure the following requirements are met:

- Windows 2000 server and the array are on the same subnet.
- IP addresses that are assigned to the RAID controllers do not conflict.
- The array is in BOOTP IP addressing mode (the default setting for a new array).
- The Windows 2000 Server setup CD is available.

The following procedure provides an example of how to set up DHCP with the BOOTP option on the Windows 2000 Advanced Server. Your environment may require different steps.

Installing the DHCP Server

To install DHCP server on the Windows 2000 Advanced Server:

1. **From the Control Panel, go to Administrative Tools > Configure Your Server.**

2. **Select DHCP from the Networking drop-down menu on the left.**

   The wizard instructs you to use the Windows Components wizard to add the DHCP component.

3. **Start the Windows Components wizard and double-click Networking Services.**

4. **Select Dynamic Host Configuration Protocol (DHCP), click the check box to its left, and click OK.**

   The Windows Components wizard is displayed.

5. **Click Next.**

6. **If Terminal Services Setup is displayed, select Remote administration mode. Click Next.**

   If your server has obtained an address from a DHCP server for its own address, a warning is displayed.

7. **Click OK to accept the warning.**

   Local Area Connection Properties is displayed.

8. **Assign a static IP address to the server, or click Server to keep DHCP addressing for the server. Click OK.**

9. **Click Finish to exit the Windows Components wizard.**

   The DHCP server is now installed. The next step is to configure the server.

Configuring the DHCP Server

To configure the DHCP server:

1. **From the Control Panel, go to Administrative Tools > Computer Management > Services and Application > DHCP.**

2. **From the Action menu, select New Scope.**

   The New Scope wizard is displayed.

3. **Enter the following information as prompted:**
   - Scope name and description:
   - IP address range (for example, `192.168.0.170` to `192.168.0.171`)

- Subnet mask (for example, `255.255.255.0`)
- Add exclusions (do not exclude any IP addresses)
- Lease duration (accept the default of 8 days)
- Router (default gateway) of your subnet (for example, `192.168.0.1`)
- Domain name, WINS server (these are not needed)
- Activate Scope? (select "Yes, I want to activate this scope now")

4. **Click Finish to exit the wizard.**

   The contents of the DHCP server are listed.

5. **Right-click Scope [***ipaddress***]** *scope-name* **and select Properties.**

6. **In the Scope Properties box, click the Advanced tab.**

7. **Select BOOTP only, set the lease duration to Unlimited, and click OK.**

8. **Right-click Reservations.**

   The Controller A Properties box is displayed.

9. **Enter the IP address and the MAC address for Controller A. Click Add.**

   The Controller B Properties box is displayed.

10. **Enter the IP address and the MAC address for Controller B. Click Add.**

    The controllers are added to the right of the Reservations listing.

11. **Right-click Scope [***ipaddress***]** *scope-name* **to disable the scope.**

12. **Click Yes to confirm disabling of the scope.**

13. **Right-click Scope and select Activate.**

    The DHCP server is now configured with the BOOTP option for the array network.

14. **Power on or power cycle the array modules.**

15. **Click Address Leases in the left pane to check the DHCP server leases.**

    The lease expiration displays the following status for each RAID controller:

    `Reservation (active)`

    If the lease expiration for the controllers is inactive, try refreshing the list. If the lease is still inactive, check the following:

    - Are the IP addresses allocated for BOOTP conflicting?
    - Were the correct MAC addresses added to the DHCP server for the array controllers?
    - Are the DHCP server and array on the same subnet?

- Is the gateway configured correctly on the DHCP server?

  The RAID controllers can gain a lease and an IP address, but they cannot respond out of the subnet for the software if the gateway is not configured properly.

- Are the RAID controllers set up for BOOTP access?

  It is possible that they were previously configured to have static IP addresses. You must be sure when you move an array that you change the array's IP addresses to IP addresses on the new subnet before setting up BOOTP services.

Glossary

Definitions obtained from the Storage Networking Industry Association (SNIA) Dictionary are indicated with "(SNIA)" at the end. For the complete SNIA Dictionary, go to www.snia.org/education/dictionary.

array

Multiple disk drives that function as a single storage device. A high-availability (HA) array configuration has redundant controllers and expansion trays of disk drives.

array hot-spare

A disk that serves as a hot-spare within an array as part of the storage pool; a reserve disk that can be made available to all virtual disks within an array. See also hot spare.

block

The amount of data sent or received by the host per I/O operation; the size of a data unit.

controller tray

A tray with an installed redundant RAID controller pair.

control path

The route used for communication of system management information, usually an out-of-band connection.

customer LAN

See site LAN.

DAS

See direct attached storage (DAS).

data host

Any host that uses the system for storage. A data host can be connected directly to the array (direct attach storage, or DAS) or can be connected to an external switch that supports multiple data hosts (storage area network, or SAN).

data path

The route taken by a data packet between a data host and the storage device.

direct attached storage (DAS)

A storage architecture in which one or two hosts that access data are connected physically to a storage array.

disk

A physical drive component that stores data.

expansion tray

A tray that does not have a RAID controller, used to expand the capacity of an array. This type of tray must be attached to a controller tray to function.

extent

A set of contiguous blocks with consecutive logical addresses on a physical or virtual disk.

FC

See Fibre Channel (FC).

Fibre Channel (FC)

A set of standards for a serial I/O bus capable of transferring data between two ports at up to 100 megabytes/second, with standards proposals to go to higher speeds. Fibre Channel supports point to point, arbitrated loop, and switched topologies. Fibre Channel was completely developed through industry cooperation, unlike SCSI, which was developed by a vendor and submitted for standardization after the fact. (SNIA)

Fibre Channel switch

A networking device that can send packets directly to a port associated with a given network address in a Fibre Channel storage area network (SAN). Fibre Channel switches are used to expand the number of servers that can connect to a particular storage port. Each switch is managed by its own management software. (SNIA)

field-replaceable unit (FRU)

An assembly component that is designed to be replaced on site, without the system having to be returned to the manufacturer for repair.

FRU

See field-replaceable unit (FRU).

HBA

See host bus adapter (HBA).

host bus adapter (HBA)

An I/O adapter that connects a host I/O bus to a computer's memory system. (SNIA)

Abbreviated HBA. Host bus adapter is the preferred term in SCSI contexts. Adapter and NIC are the preferred terms in Fibre Channel contexts. The term NIC is used in networking contexts such as Ethernet and token ring. See also initiator.

hot-spare

The drive used by a controller to replace a failed disk. See also array hot-spare.

initiator

A system component that initiates an I/O operation over a Fibre Channel (FC) network. If allowed by FC fabric zoning rules, each host connection within the FC network has the ability to initiate transactions with the storage array. Each host in the FC network represents a separate initiator, so if a host is connected to the system through two host bus adapters (HBAs), the system identifies two different initiators (similar to multi-homed, Ethernet-based hosts). In contrast, when multipathing is used in round-robin mode, multiple HBAs are grouped together, and the multipathing software identifies the group of HBAs as a single initiator.

IOPS

A measure of transaction speed, representing the number of input and output transactions per second.

LAN

Local area network.

logical unit number (LUN)

The SCSI identifier for a volume as it is recognized by a particular host. The same volume can be represented by a different LUN to a different host.

LUN

See logical unit number (LUN).

MAC address

See media access control (MAC) address.

management host

A Solaris or Windows host serving the configuration, management, and monitoring software for a Sun StorageTek array. The software on the station can be accessed with a browser to run the browser interface or with a remote scripting command-line interface (CLI) client.

master / alternate master

A design for reliability that uses redundant configuration. Array configurations share master/alternate master configurations: each array configuration has two controller trays that are grouped as one host. In each case, the master component uses the IP address and name. If the master fails, the alternate master assumes the IP address and name and takes over the master's functions.

media access control (MAC) address

The physical address identifying an Ethernet controller board. The MAC address, also called an Ethernet address, is set at the factory and must be mapped to the IP address of the device.

multipathing

A design for redundancy that provides at least two physical paths to a target.

out-of-band traffic

System management traffic outside of the primary data path that uses an Ethernet network.

PDU

See power distribution unit (PDU).

power distribution unit (PDU)

The assembly that provides power management for the system. The redundant design uses two PDUs in each system so that the system's data path continues to function if one of the PDUs fails.

provisioning

The process of allocation and assignment of storage to hosts.

RAID

An acronym for Redundant Array of Independent Disks, a family of techniques for managing multiple disks to deliver desirable cost, data availability, and performance characteristics to host environments. (SNIA)

Also, a phrase adopted from the 1988 SIGMOD paper A Case for Redundant Arrays of Inexpensive Disks.

remote monitoring

Monitoring of the functions and performance of a hardware system from a location other than where the hardware resides.

remote scripting CLI client

A command-line interface (CLI) that enables you to manage the system from a remote management host. The client communicates with the management software through a secure out-of-band interface, HTTPS, and provides the same control and monitoring capability as the browser interface. The client must be installed on a host that has network access to the system.

SAN

See storage area network (SAN).

site LAN

The local area network at your site. When the system is connected to your LAN, the system can be managed through a browser from any host on the LAN.

SSCS

Sun Storage Command System. The command-line interface (CLI) that can be used to manage the array.

storage area network (SAN)

An architecture in which the storage elements are connected to each other and to a server that is the access point for all systems that use the SAN to store data.

stripe size

The number of blocks in a stripe. A striped array's stripe size is the stripe depth multiplied by the number of member extents. A parity RAID array's stripe size is the stripe depth multiplied by one less than the number of member extents. See also striping.

striping

Short for data striping; also known as RAID Level 0 or RAID 0. A mapping technique in which fixed-size consecutive ranges of virtual disk data addresses are mapped to successive array members in a cyclic pattern. (SNIA)

target

The system component that receives a SCSI I/O command. (SNIA)

thin-scripting client

See remote scripting CLI client.

tray

See controller tray and expansion tray.

WWN

World Wide Name. A unique 64-bit number assigned by a recognized naming authority such as the Institute of Electrical and Electronics Engineers (IEEE) that identifies a connection (device) or a set of connections to the network. The World Wide Name (WWN) is constructed from the number that identifies the naming authority, the number that identifies the manufacturer, and a unique number for the specific connection.

Index