



Sun StorageTek™ 6140 Array Hardware Installation Guide

Sun Microsystems, Inc.
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Contents

Preface	xv
1. Overview	1
Product Overview	1
Hardware Overview	2
Controller Tray	3
Battery Backup Compartments	11
Expansion Tray	13
LED Status Codes	17
Common Array Manager Software	17
Overview of the Installation Process	18
2. Installing Trays	21
Preparing for the Installation	22
Preparing the Universal Rail Kit	22
Unpacking the Universal Rail Kit	22
Required Hardware by Cabinet/Rack Type	23
Loosening the Rail Adjustment Screws	25
Preparing the Tray	25
Preparing the Cabinet	26

Planning the Order of the Tray Installation	26
Attaching the Rails to a Cabinet	27
Attaching the Universal Rail Kit to a Standard Sun or 19-Inch Cabinet With Threaded Cabinet Rails	27
Attaching the Universal Rail Kit to a Sun StorEdge Expansion or Sun Fire Cabinet	32
Attaching the Universal Rail Kit to a Standard 19-Inch Cabinet With Unthreaded Cabinet Rails	36
Preparing the Two-Post Telco Rack	41
Preparing the Telco Rack	42
Attaching the Rails to a Telco 2-Post Rack	42
Installing a Tray in a Telco 2-Post Rack	47
Installing a Tray in a Cabinet	52
Connecting the Power Cables	56
Intertray Cabling	57
Array Configuration Naming Convention	58
Balancing Expansion Trays	59
Cabling a 1x2 Array Configuration	60
Cabling a 1x3 Array Configuration	61
Cabling a 1x4 Array Configuration	62
Cabling a 1x5 Array Configuration	65
Cabling a 1x6 Array Configuration	66
Cabling a 1x7 Array Configuration	69
Next Steps	71
3. Connecting the Management Host and Data Hosts	73
Connecting the Management Host	73
Attaching the Ethernet Ports to the LAN of the Management Host	74
Attaching the Ethernet Ports to the LAN Using an Ethernet Hub	74

Attaching the Ethernet Ports Directly to the Management Host With a Cross-Over Cable	75
Connecting Data Hosts	75
Connecting Data Hosts Through External Fibre Channel Switches	76
Connecting Data Hosts Directly	79
Next Steps	80
4. Verifying the Link Rate for Each Tray and Powering On the Array	81
Before Powering On	81
Verifying the Link Rate for Each Tray	82
Powering On the Array	83
Checking the Link Rate for Each Port	84
Powering Off the Array	85
Next Steps	86
5. Data Hosts, HBAs, and Other Software	87
Data Host Software	87
HBAs and Drivers	88
Multipathing	88
Setting Up a Data Host On a Solaris System	88
▼ Obtaining Sun Solaris 8 and 9 Data Host Software	89
▼ To Install the SAN 4.4 Data Host Software	90
Installing Data Host Software for Operating Systems Other Than Solaris	90
About Data Host Software For Non-Solaris Platforms	91
Downloading and Installing Sun RDAC Software	91
▼ To Download the AIX ASL Package	92
Enabling Multipathing Software	92
▼ Enabling Multipathing Software for Solaris 8 or 9 OS	92
▼ Enabling Multipathing Software for Solaris 10 OS	93
Downloading the Veritas Volume Manager ASL	93

▼ To Download the Solaris ASL Package	94
Next Steps	94
6. Configuring IP Addressing	95
About IP Addressing	95
Configuring the IP Address of the Array Controllers	96
Configuring Dynamic (DHCP) IP Addressing	96
Configuring Static IP Addressing	97
Using the Serial Port Interface to Assign IP Addresses	97
▼ To Connect a Terminal to the Serial Port	97
▼ To Set Up the Terminal Emulation Program	98
▼ To Establish a Connection With the Serial Port	98
▼ To Configure the IP Addresses	99
A. Configuring a DHCP Server	103
Before You Begin	103
Setting Up a Solaris DHCP Server	103
Setting Up a Windows 2000 Advanced Server	108
Installing the DHCP Server	109
Configuring the DHCP Server	109
B. Disk Drive Insertion	113
Glossary	117
A	117
B	118
C	118
D	118
E	119
F	119

H	120
I	121
L	121
M	121
N	122
O	122
P	122
R	123
S	123
T	124
U	125
V	125
W	125
Index	127

Figures

FIGURE 1-1	Sun StorageTek 6140 Array Product Overview	2
FIGURE 1-2	Controller Tray (Front View)	4
FIGURE 1-3	Controller Tray Port and Components (Back View)	7
FIGURE 1-4	Controller Tray LEDs and Indicators (Back View)	9
FIGURE 1-5	Battery Backup Compartment LEDs	12
FIGURE 1-6	Expansion Tray Ports and Components (Back)	14
FIGURE 1-7	Expansion Tray LEDs and Indicators (Back)	15
FIGURE 2-1	Loosening the Rail Screws to Adjust the Rail Length	25
FIGURE 2-2	Positioning the Front of the Left Rail Behind the Left Front Cabinet Rail	28
FIGURE 2-3	Securing the Left Rail to the Front of the Cabinet	29
FIGURE 2-4	Adjusting the Length of the Left Rail at the Back of the Cabinet	30
FIGURE 2-5	Securing the Left Rail to the Back of the Cabinet	31
FIGURE 2-6	Tightening the Rail Adjustment Screws	32
FIGURE 2-7	Inserting Rail Mounting Screws in Middle Holes of the Upper Mounting Unit of the Mounting Slot	33
FIGURE 2-8	Hanging the Rail	34
FIGURE 2-9	Inserting Screws in the Lower Side Mounting Holes of the Cabinet	35
FIGURE 2-10	Securing the Rail to the Front of the Cabinet	36
FIGURE 2-11	Inserting Cage Nuts Over Rail Mounting Holes in Cabinet Rails	37
FIGURE 2-12	Inserting the Cabinet Rail Adapter Plate on the Cabinet Rail	38
FIGURE 2-13	Securing the Rail to the Front of the Cabinet	39

FIGURE 2-14	Inserting A Cage Nut on the Cabinet Rail at the Rear of the Cabinet	39
FIGURE 2-15	Adjusting the Length of the Rail at the Back of the Cabinet	40
FIGURE 2-16	Securing the Rail to the Back of the Cabinet	41
FIGURE 2-17	Inserting Screws in the Front and Back Mounting Holes	43
FIGURE 2-18	Seating the Mounting Rails Over the Front and Back Screws	44
FIGURE 2-19	Inserting Screws in the Lower Mounting Holes	45
FIGURE 2-20	Inserting Screws in the Lower Mounting Holes	46
FIGURE 2-21	Positioning the Tray in the Rack	47
FIGURE 2-22	Sliding the Tray Into the Rack	48
FIGURE 2-23	Securing the Tray to the Front of the Rack	49
FIGURE 2-24	Securing the Tray to the Back of the Rack	50
FIGURE 2-25	Tightening the Locknuts on the Rail Extension.	51
FIGURE 2-26	Positioning the Tray in the Cabinet	52
FIGURE 2-27	Sliding the Tray Into the Cabinet	53
FIGURE 2-28	Securing the Tray to the Front of a Sun Rack 900/1000 Cabinet	54
FIGURE 2-29	Securing the Tray to the Front of a Sun StorEdge Expansion Cabinet	55
FIGURE 2-30	Securing the Tray to the Back of the Cabinet Rail	56
FIGURE 2-31	Expansion Ports on the Controller and Expansion Trays	58
FIGURE 2-32	1x2 Array Configuration Cabling	60
FIGURE 2-33	1x3 Array Configuration Cabling	61
FIGURE 2-34	1x4 Array Configuration Cabling	63
FIGURE 2-35	1x5 Array Configuration Cabling	65
FIGURE 2-36	1x6 Array Configuration Cabling	67
FIGURE 2-37	1x7 Array Configuration Cabling	69
FIGURE 3-1	Ethernet Ports for Controller A and Controller B	73
FIGURE 3-2	Host Connections	77
FIGURE 3-3	Connecting Data Hosts Through a Switch	78
FIGURE 3-4	Connecting Data Hosts Through a Switch With Cross-Connections	78
FIGURE 3-5	Direct Connection to Two Hosts With Dual HBAs	80
FIGURE 3-6	Direct Connection to Three Hosts With Dual HBAs	80

FIGURE 4-1	Tray Link Rate Switch	83
FIGURE 4-2	Tray Power Connectors and Switches	84
FIGURE A-1	Inserting a Disk Drive.	114
FIGURE A-2	Successfully Inserted Disk Drive	115
FIGURE A-3	Incorrect Method of Inserting a Hard Drive	116

Tables

TABLE 1-1	Sun StorageTek 6140 Array Controller Tray	3
TABLE 1-2	Controller Tray LEDs and Components (Front)	5
TABLE 1-3	Controller Tray Ports and Components (Back)	7
TABLE 1-4	Controller Tray LEDs and Indicators (Back)	10
TABLE 1-5	Battery Backup Compartment LEDs	12
TABLE 1-6	Sun StorageTek 6140 Array Expansion Tray	13
TABLE 1-7	Expansion Tray Ports and Components (Back)	14
TABLE 1-8	Expansion Tray LEDs and Indicators (Back)	15
TABLE 1-9	Sun StorageTek 6140 Array Hardware Installation Checklist	18
TABLE 2-1	Controller and Expansion Tray Configurations	58

Preface

The *Sun StorageTek 6140 Array Hardware Installation Guide* describes how to install rack-mounting rails and array modules on the Sun StorageTek 6140 array.

Host management, data host management, and remote Command Line Interface functions are performed by the Sun StorageTek Common Array Manager software. For installation and initial configuration of the Sun StorageTek 6140 array, including firmware upgrades, initial array setup, partitioning domains, configuring storage, and configuring IP addressing, see the *Sun StorageTek Common Array Manager Software Installation Guide*.

Before You Read This Book

Before you begin to install the Sun StorageTek 6140 array, you must have already prepared the site as described in these books:

- *Sun StorageTek 6140 Array Regulatory and Safety Compliance Manual*
- *Sun StorageTek 6140 Array Site Preparation Guide*

How This Book Is Organized

Chapter 1 provides an overview of the Sun StorageTek 6140 array and the hardware installation process.

Chapter 2 describes how to install rack-mounting rails, controller modules, and expansion cabinets in three Sun cabinets and the telco rack.

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

Chapter 4 describes tray power-on procedures.

Chapter 5 describes data host software and what you need to do to acquire and install it.

Chapter 6 describes how to configure IP addressing on the local management host and the array controllers.

Appendix A describes how to set up a DHCP server.

Related Documentation

Application	Title	Part Number
Site planning information	<i>Sun StorageTek 6140 Array Site Preparation Guide</i>	819-5046- <i>nn</i>
Late-breaking information not included in the information set	<i>Sun StorageTek 6140 Array Release Notes</i> <i>Sun StorageTek Common Array Manager Release Notes</i>	820-2127- <i>nn</i> 820-2935- <i>nn</i>
Quick reference information for installing the array	<i>Sun StorageTek 6140 Array Poster</i>	819-5064- <i>nn</i>
Instructions for installing the Common Array Manager host management software	<i>Sun StorageTek Common Array Manager Software Installation Guide, version 6.0 or higher</i>	820-2934- <i>nn</i>
Quick reference information for the CLI	<i>Sun StorageTek Common Array Manager CLI Quick Reference, version 6.0 or higher</i>	820-2932- <i>nn</i>

Application	Title	Part Number
Regulatory and safety information	<i>Sun StorageTek 6140 Array Regulatory and Safety Compliance Manual</i>	819-5047- <i>nn</i>
Instructions for installing the Sun StorEdge Expansion cabinet	<i>Sun StorEdge Expansion Cabinet Installation and Service Manual</i>	805-3067- <i>nn</i>
Instructions for installing the Sun Rack 900/1000 cabinets	<i>Sun Rack Installation Guide</i>	816-6386- <i>nn</i>

Accessing Sun Documentation

You can obtain this product's network storage documentation at:

<http://docs.sun.com/app/docs/coll/st6140array5.0>

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

<http://www.docs.sun.com/app/docs>

and

<http://www.docs.sun.com/app/docs/prod>

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

Sun StorageTek 6140 Array Hardware Installation Guide, part number 819-7497-11.

Overview

This chapter provides an overview of the Sun StorageTek 6140 Array. It contains the following sections:

- [“Product Overview”](#) on page 1
- [“Overview of the Installation Process”](#) on page 18

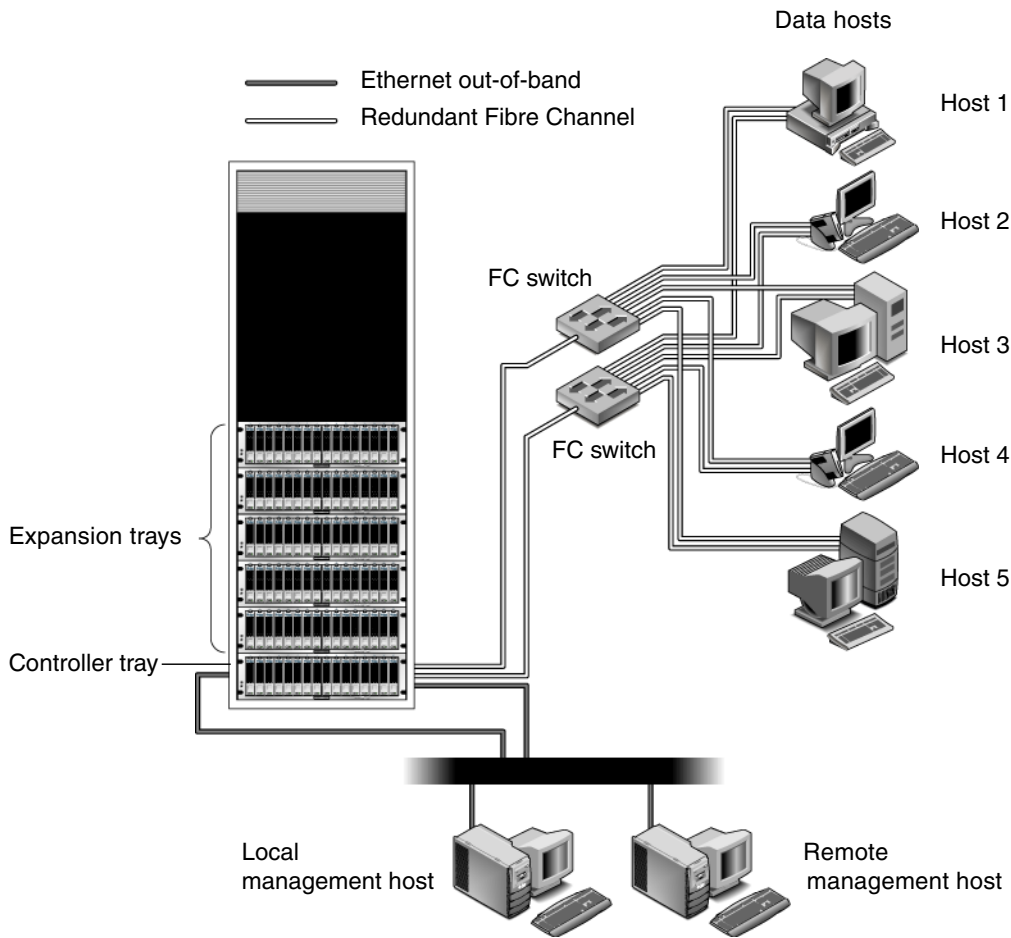
Product Overview

The Sun StorageTek 6140 Array is a high-performance, enterprise-class, full 2 or 4 Gigabit per second (Gb/s) Fibre Channel solution that combines outstanding performance with the highest reliability, availability, flexibility, and manageability.

The Sun StorageTek 6140 Array is modular, rackmountable and scalable from a single dual-controller tray (1x1) configuration to a maximum configuration of 1x7 with six additional expansion trays behind one controller tray ([FIGURE 1-1](#)).

This section contains an overview of the Sun StorageTek 6140 Array hardware and software.

FIGURE 1-1 Sun StorageTek 6140 Array Product Overview



Hardware Overview

The Sun StorageTek 6140 Array is a modular storage device that can scale from one controller tray to an array with a maximum of seven trays, consisting of one controller tray and six expansion trays. Each controller or expansion tray can contain 5 to 16 disk drives, allowing the array to support up to 112 disk drives.

The StorageTek 6140 Array can be installed in the Sun Rack 900 /1000 or Sun StorEdge Expansion cabinets.

This section describes the main components of the Sun StorageTek 6140 Array controller and expansion trays.

Controller Tray

A 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 Fibre Channel (FC) or Serial Advanced Technology Attachment (SATA) II disk drives and provides RAID functionality, caching, and disk storage.

[TABLE 1-1](#) describes the controller tray configuration.

TABLE 1-1 Sun StorageTek 6140 Array Controller Tray

Description	Quantity
FC RAID controllers	2
FC/SATA II disk drives	5 –16, 4-Gb or 2-Gb drives per tray
Ethernet ports for management host connections	4 (2 per controller)
4/2 Gbps FC host ports with SFPs	8 (4 per controller)
4/2 Gbps FC expansion ports	4 (2 per controller)
Power supply/fan assemblies	2
Battery Backup Compartments	2

[FIGURE 1-2](#) shows the LEDs and components at the front of the controller tray.

FIGURE 1-2 Controller Tray (Front View)

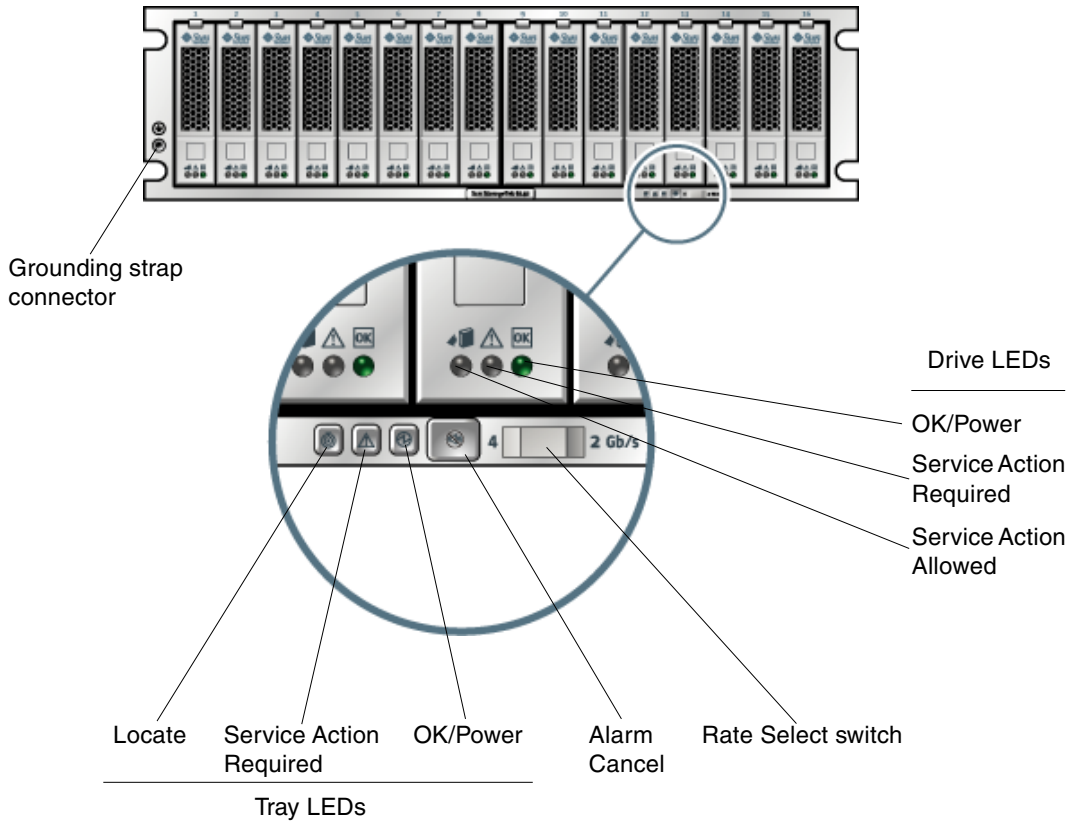


TABLE 1-2 describes the LEDs and components at the front of the controller tray.

Note – A tray LED icon may not be visible unless the LED is illuminated.

TABLE 1-2 Controller Tray LEDs and Components (Front)






LED/Component	Description
<i>Drive LEDs</i>	
Service Action Allowed 	Steady blue indicates that service action can be taken on the drive without adverse consequences. Off indicates that the drive is engaged and service cannot be implemented.
Service Action Required 	Steady amber indicates that the drive requires service. Off indicates that the drive does not require service.
OK OK	Steady green indicates that power is applied to the drive and the drive is functioning normally. Off indicates that power is not applied to the drive. Flash indicates that normal activity is in progress.
<i>Tray LEDs</i>	
Locate 	Steady white identifies the tray after initiation from the management station.
Service Action Required 	Steady amber indicates that the tray requires service. Off indicates that the tray does not require service.
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.

TABLE 1-2 Controller Tray LEDs and Components (Front) (Continued)


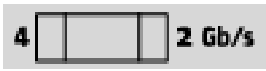

LED/Component	Description
<i>Tray Components</i>	
Alarm Cancel button	Reserved for canceling audio alarm functionality that is not currently activated. Use the management software to review alarms and events.
	
Rate Select switch	When the switch is in the left position, the link rate for the tray is 4 Gbits/second; When the switch is in the right position, the link rate for the tray is 2 Gbits/second. Set all tray switches to match the link rate of the drive with the lowest link rate of any tray in the array.
	
Grounding strap connector	Use this connector to connect a grounding strap to the tray before handling the tray or its components.
	

FIGURE 1-3 shows the ports and components at the back of the controller tray.

FIGURE 1-3 Controller Tray Port and Components (Back View)

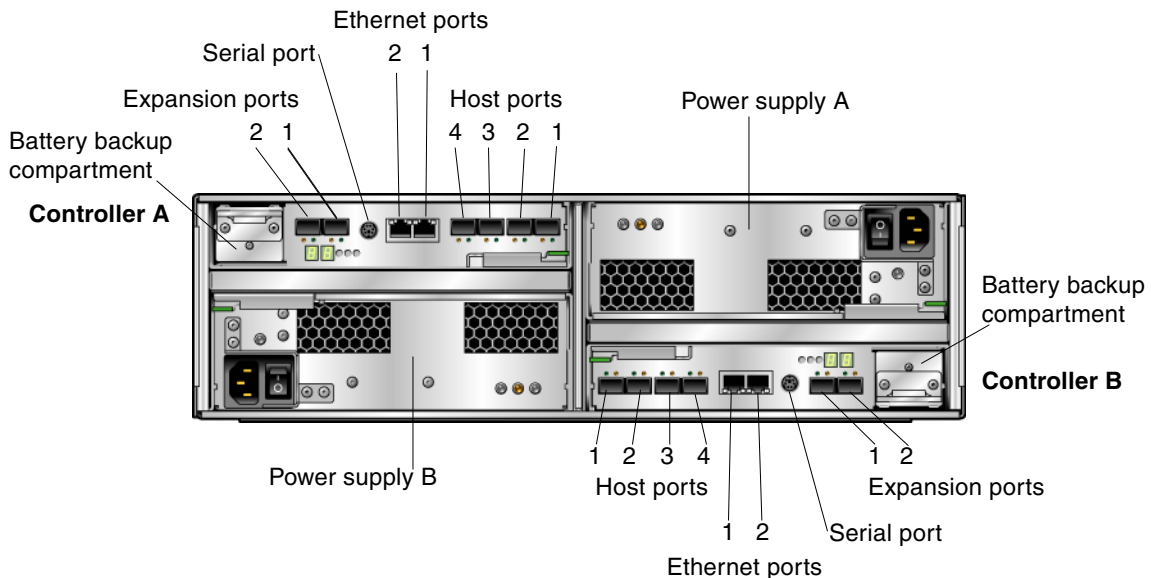


TABLE 1-3 describes the ports and components at the back of the controller tray.

TABLE 1-3 Controller Tray Ports and Components (Back)

Ports/Switches	Description
Host ports (Ch 1 - Ch4)	Four 4-, 2-, or 1-Gbit/second FC Small Form-factor Plug-in (SFP) ports. Ch4 host port is reserved for remote replication (if remote replication is licensed and activated; otherwise, Ch4 is available for host port use). Note: 1 Gbit/second operation is supported for legacy equipment only).
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 standard 10 Mbits/second and 100 Mbits/second full-duplex connectivity. Ethernet port 2 has limited functionality and is reserved for future use.
Expansion ports (P1 and P2)	4- or 2-Gbit FC ports used to connect to the drive channel device and expansion trays.
Serial port	Port that allows terminal access for display or configuration of the IP addresses for the array, and for recovery of a lost password for the array.
Power supplies	For each controller tray, two power supplies with battery backup. The power supplies provide redundant power to both controllers. If one power supply fails, both controllers are powered by the remaining power supply.
Battery backup compartments	For each controller, a battery backup to maintain the integrity of the controller's data cache for up to 72 hours in the event of power loss to both controller tray power supplies. See "Battery Backup Compartments" on page 11 for more information on the battery backup compartments.

FIGURE 1-4 shows the LEDs and indicators at the back of the controller tray.

FIGURE 1-4 Controller Tray LEDs and Indicators (Back View)

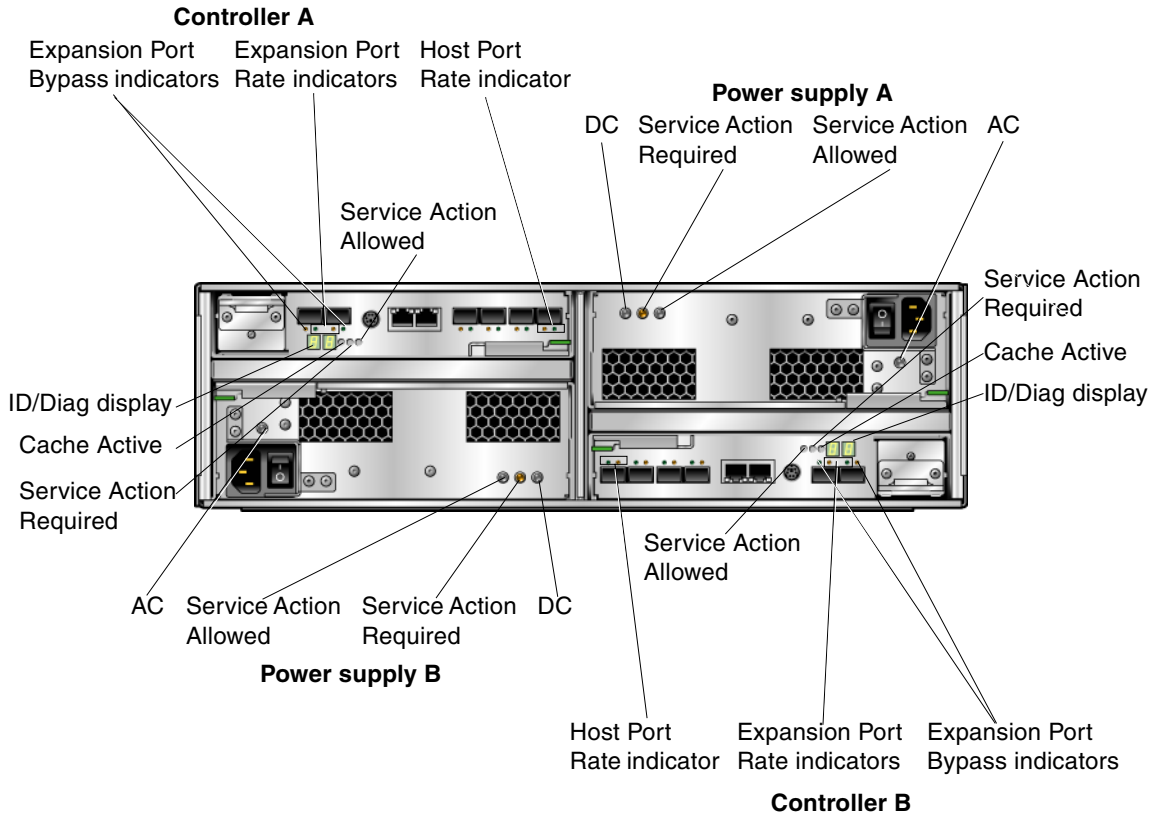


TABLE 1-4 describes the LEDs and indicators at the back of the controller tray.

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











LED/Indicator	Description
<i>Power Supply LEDs</i>	
DC 	On indicates that the correct DC power is being output 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.
<i>Controller LEDs</i>	
ID/Diag display	Seven-segment readouts indicate the ID of the tray and fault diagnostic status codes. See “LED Status Codes” on page 17 for definitions of the codes.
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 Required 	Steady amber indicates that the controller requires service. Off indicates that the controller does not require service.

TABLE 1-4 Controller 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.
<i>Controller Indicators</i>	
Host Port Rate 	The combined display indicates the host port link rate for the tray: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • LED 4 On, LED 2 Off – 4 Gbits/second • LED 4 Off, LED 2 On – 2 Gbits/second
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 small form factor plug-in (SFP) transceiver installed or that the port is enabled.
Ethernet Link Activity (on upper left-side of Ethernet connector)	Steady green indicates that there is an active connection. Off indicates that there is not an active connection.
Ethernet Link Speed (on upper right-side of Ethernet connector)	Steady green indicates that there is a 100BaseTX connection to the port. Off (when Ethernet Status LED is on) indicates that there is a 10BaseT connection to the Ethernet port.

Battery Backup Compartments

The controller tray has a battery backup compartment for each controller in which a battery is housed for power backup.

[FIGURE 1-5](#) shows the location of the battery compartments on the controller and identifies the LEDs on the compartment.

FIGURE 1-5 Battery Backup Compartment LEDs

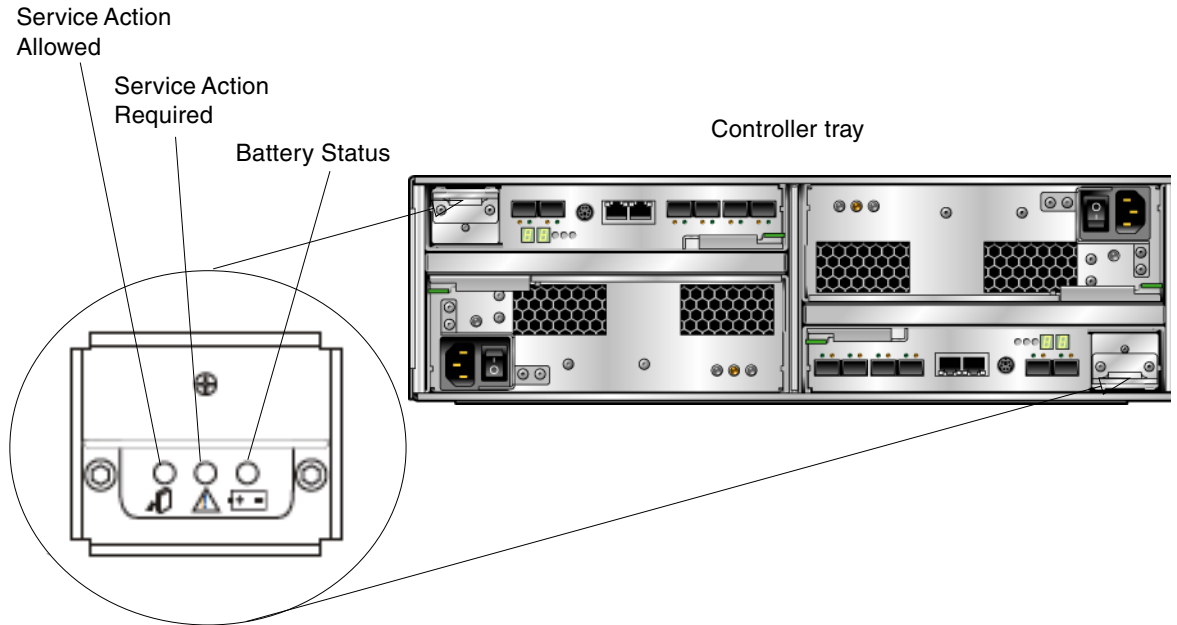





TABLE 1-5 describes the LEDs on the back of each battery backup compartment.

TABLE 1-5 Battery Backup Compartment LEDs

LED/Indicator	Description
Ready-to-Remove 	Steady blue indicates that service action can be taken on the battery backup (that is, it can be removed or disconnected) without adverse consequences. Off indicates that the battery is engaged and should not be removed or disconnected.
Battery Fault 	Steady amber indicates that the battery requires replacement. Off indicates that the battery does not require replacement.
Battery Pack Charging 	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.

Expansion Tray

The expansion tray provides from 5 to 16 additional FC or Serial Advanced Technology Attachment (SATA) II drives. An expansion tray is cabled directly to a controller tray and cannot operate independently.

[TABLE 1-6](#) describes the expansion tray configuration. Check the latest *Sun StorageTek 6140 Array Release Notes* to verify the current supported configuration.

TABLE 1-6 Sun StorageTek 6140 Array Expansion Tray

Description	Quantity
FC or SATA II disk drives	FC hard disk drives: 73G10K, 73G15K, 146G10K, 146G15K, 300G10K
	SATA II hard disk drives: 500G7.2K (500 GB, 7,200 rpm)
Drive expansion ports	Five to sixteen 4- or 2-Gbit/second drives.
	Five to sixteen 3-Gbit/second drives with circuitry to support operation in either 4- or 2- Gbit/second environments.
	2 pairs per controller. One pair is for current use; an additional port pair (per controller) is reserved for future use. Ports 2A and 2B are disabled in firmware.
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)

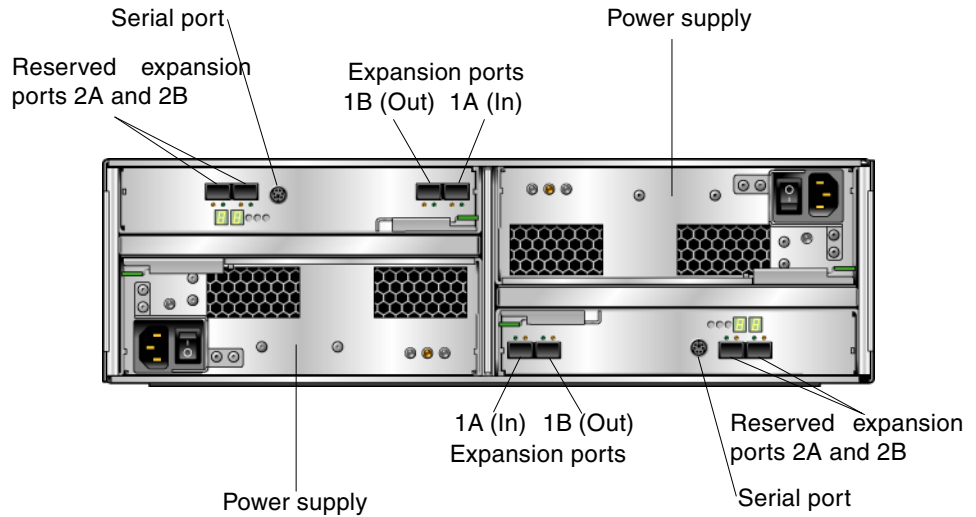


TABLE 1-7 describes the ports and components at the back of the expansion tray.

TABLE 1-7 Expansion Tray Ports and Components (Back)

Ports/Switches/LEDs	Description
Expansion ports 1A (In), 1B (Out)	Two 4- or 2-Gbit FC ports used to connect to an array controller and/or additional expansion trays.
Serial port	Not used in the 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 2A and 2B	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)

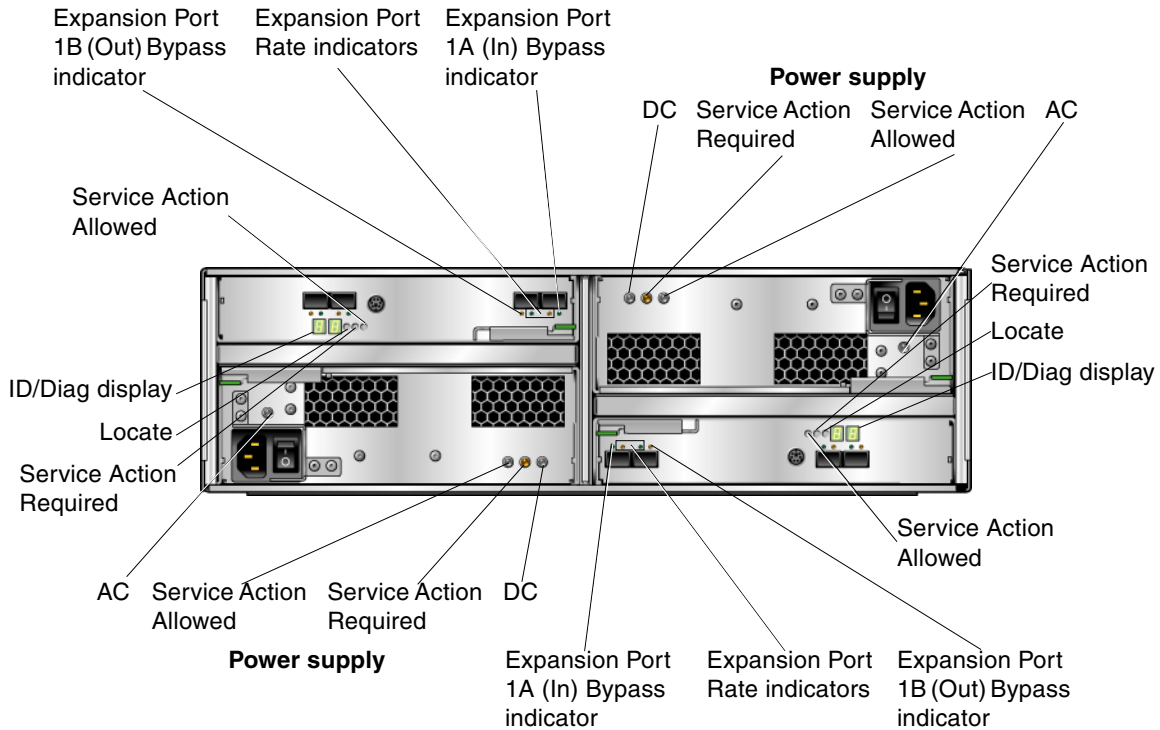


TABLE 1-8 describes the LEDs and indicators at the back of the expansion tray.

TABLE 1-8 Expansion Tray LEDs and Indicators (Back)










LED/Indicator	Description
<i>Power Supply LEDs</i>	
DC	On indicates that the correct DC power is being output 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.
	

TABLE 1-8 Expansion Tray LEDs and Indicators (Back) (*Continued*)

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 action should not be implemented.
AC 	On indicates that AC power is being supplied to the controller power supply.
<i>Expansion Tray LEDs</i>	
ID/Diag display	Seven-segment readouts indicate the ID of the tray and fault diagnostic status codes. See “LED Status Codes” on page 17 for definitions of the codes.
Locate 	Steady white identifies the controller after initiation from the management station.
Service Action Required 	Steady amber indicates that the controller requires service. Off indicates that the controller does not require service.
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.
<i>Expansion Tray Indicators</i>	
Expansion Port Rate 	The combined display indicates the expansion port link rate for the tray: <ul style="list-style-type: none"> • LED 4 On, LED 2 Off – 4 Gbits/second • LED 4 Off, LED 2 On – 2 Gbits/second
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.

LED Status Codes

The following is a list of the meanings of the status codes that may display on the numerical LEDs on the controller or expansion trays.

- FF – ESM Boot Diagnostic executing
- 88 – This ESM is being held in Reset by the other ESM
- AA – ESM-A application is booting up
- bb – ESM-B application is booting up
- L0 – Mismatched ESM 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
- 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)

Common Array Manager Software

The Sun StorageTek 6140 Array is managed by the Sun StorageTek Common Array Manager software. The Common Array Manager provides web browser-based management and configuration from an external management host, data host software that controls the data path between the data host and the array, and a remote CLI client that provides the same control and monitoring capability as the web browser, and is scriptable for running frequently performed tasks.

For information about installing the Common Array Manager software and configuring and managing the array, see the *Sun StorageTek Common Array Manager Software Installation Guide*.

Overview of the Installation Process

Before you begin to install the array, you must do the following:

- Read the *Sun StorageTek 6140 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 6140 Array Regulatory and Safety Compliance Manual*
 - *Sun StorageTek 6140 Array Site Preparation Guide*

The following checklist (TABLE 1-9) outlines all of the tasks required for installing the Sun StorageTek 6140 Array hardware 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.

TABLE 1-9 Sun StorageTek 6140 Array Hardware 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.	Install and secure the cabinet.	<ul style="list-style-type: none">• <i>Sun StorEdge Expansion Cabinet Installation and Service Manual</i>• <i>Sun Rack Installation Guide</i>
3.	Unpack the rackmounting kit and check its contents.	“Preparing the Universal Rail Kit” on page 22
4.	Unpack the tray box and check its contents.	“Preparing the Tray” on page 25
5.	Prepare the cabinet for installation.	“Preparing the Cabinet” on page 26
6.	Attach the rails to the cabinet.	“Attaching the Rails to a Cabinet” on page 27
7.	Mount the controller tray and expansion trays in the cabinet.	“Installing a Tray in a Cabinet” on page 52
8.	Attach the power cables.	“Connecting the Power Cables” on page 56
9.	Cable the controller tray and expansion trays.	“Intertray Cabling” on page 57

TABLE 1-9 Sun StorageTek 6140 Array Hardware Installation Checklist *(Continued)*

Step	Installation Task	Where to Find Procedure
10.	Set the link rate for each tray.	“Verifying the Link Rate for Each Tray” on page 82
11.	Connect the management host.	“Connecting the Management Host” on page 73
12.	Attach the host interface cables.	“Connecting Data Hosts” on page 75
13.	Turn on the power.	“Powering On the Array” on page 83

Installing Trays

Use the procedures in this chapter to install trays in a cabinet. The number of trays you need to install depends on your overall storage requirements. You can install a maximum of seven trays, one controller tray and up to six expansion trays, for each array.

This chapter describes the process of installing the Sun StorageTek 6140 array. It contains the following sections:

- “Preparing for the Installation” on page 22
- “Attaching the Rails to a Cabinet” on page 27
- “Preparing the Two-Post Telco Rack” on page 41
- “Installing a Tray in a Cabinet” on page 52
- “Connecting the Power Cables” on page 56
- “Intertray Cabling” on page 57
- “Next Steps” on page 71

The installation procedures in this chapter require 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.



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

Preparing for the Installation

Use the following procedures to prepare for installation:

- [“Preparing the Universal Rail Kit” on page 22](#)
- [“Preparing the Tray” on page 25](#)
- [“Preparing the Cabinet” on page 26](#)

Preparing the Universal Rail Kit

Use the universal rail kit to mount the Sun StorageTek 6140 array 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 24-36 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.

- 12 10-32 panhead screws
- Eight M6x12mm panhead screws
- Four 8-32 panhead screws
- 2 6-32 flathead screws
- 2 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

Type	Quantity	Use
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
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	Snaps into left and right front cabinet rails to allow you to secure the front of the array to the left and front 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:

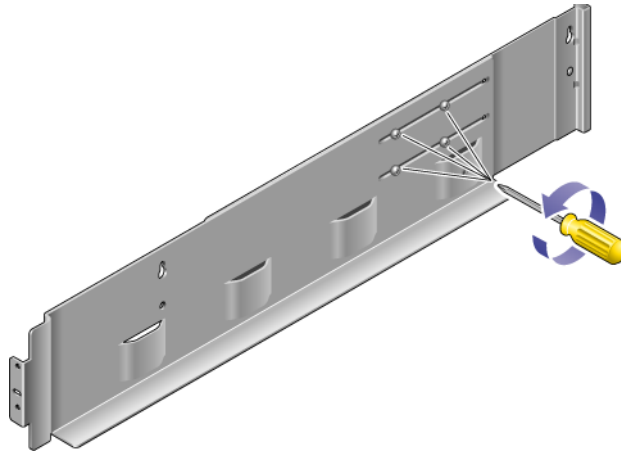
- Four cage nuts to snap over the rail mounting holes in the left and right front cabinet rails
- Four screws that match the cage nuts to secure the left and right rails to the left and right front cabinet rails
- Two cage nuts to snap over the rail mounting holes in the left and right back cabinet rails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

Loosening the Rail Adjustment Screws

To loosen the adjustment screws on the left and right rails:

Using the #2 Phillips screwdriver, loosen the four 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 Rail Length



Note – The 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 2-1) 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. A tray can weigh up to 95 pounds (43 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 6140 array trays (controller or expansion)
- Ship kit for the controller tray
 - Two 5-meter optical Fibre Channel (FC) cables for connecting the redundant array of independent disks (RAID) controllers to your storage area network (SAN) or host
 - Two 6-meter RJ45 -RJ45 Ethernet cables
 - Two RJ45-miniDIN cables
 - One RJ45-DB9 adapter
 - RJ45-DB9 adapter with null modem
 - Sun StorageTek Common Array Manager Software CD
 - *Sun StorageTek Common Array Manager Software Installation Guide*
 - *Sun StorageTek 6140 Array Hardware Installation Guide*
 - *Sun StorageTek 6140 Array Poster*
 - *Accessing Documentation* guide
- Ship kit for each expansion tray
 - Two 2-meter optical FC cables and SFPs
 - *Accessing Documentation* guide

AC power cords are shipped separately for each tray.

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.**

Planning the Order of the Tray Installation

Install the trays starting with the controller tray at the lowest available 3RU tray slot in the cabinet. Next, install the expansion trays for the first controller tray. If room remains in the cabinet, repeat for the next controller and expansion trays.

Starting at the bottom distributes the weight correctly in the cabinet.

Attaching the Rails to a Cabinet

Depending on the type of cabinet in which you will install the 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 27](#)
- [“Attaching the Universal Rail Kit to a Sun StorEdge Expansion or Sun Fire Cabinet” on page 32](#)
- [“Attaching the Universal Rail Kit to a Standard 19-Inch Cabinet With Unthreaded Cabinet Rails” on page 36](#)

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

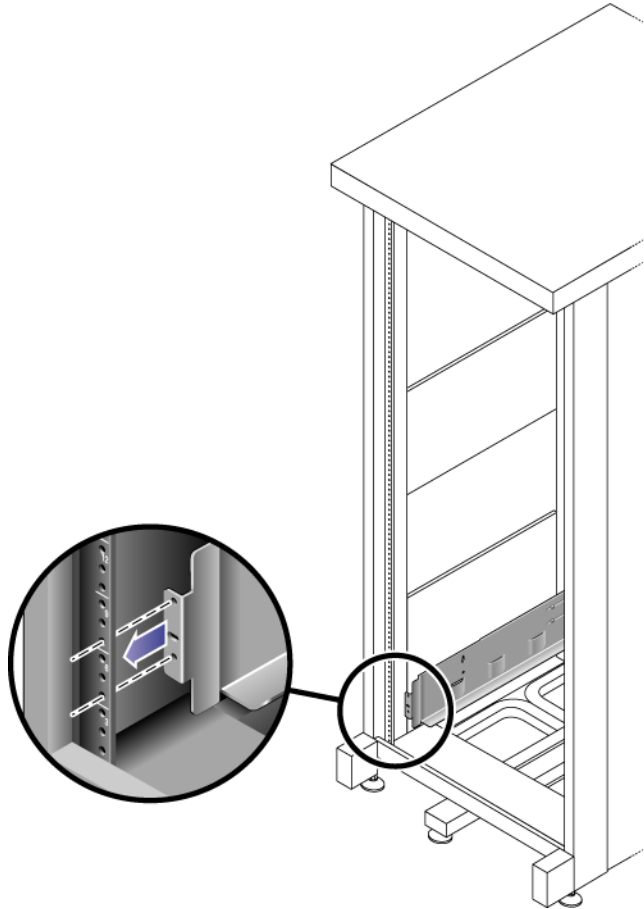
This procedure describes the steps to attach the universal rail kit to:

- 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 cabinet with M5 or 12-24 threaded cabinet rails:

- 1. Position the front of the left rail behind the left front cabinet rail (FIGURE 2-2).**

FIGURE 2-2 Positioning the Front of the Left Rail Behind the Left Front Cabinet Rail

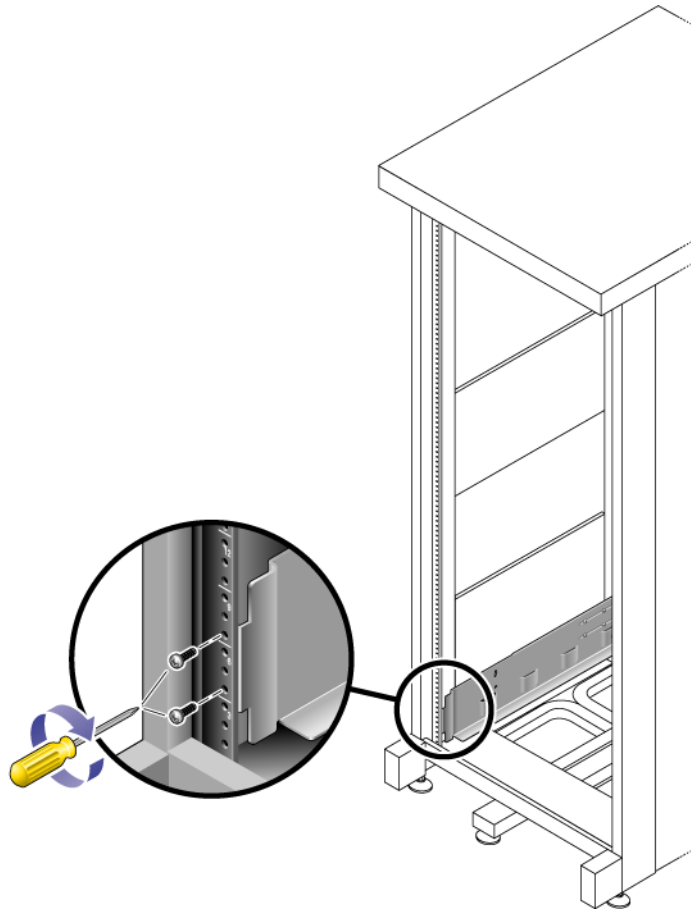


2. Use the #2 Phillips screwdriver to insert and tighten two 8-32 screws to secure the left rail to the front of the cabinet (FIGURE 2-3).

Each array 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.

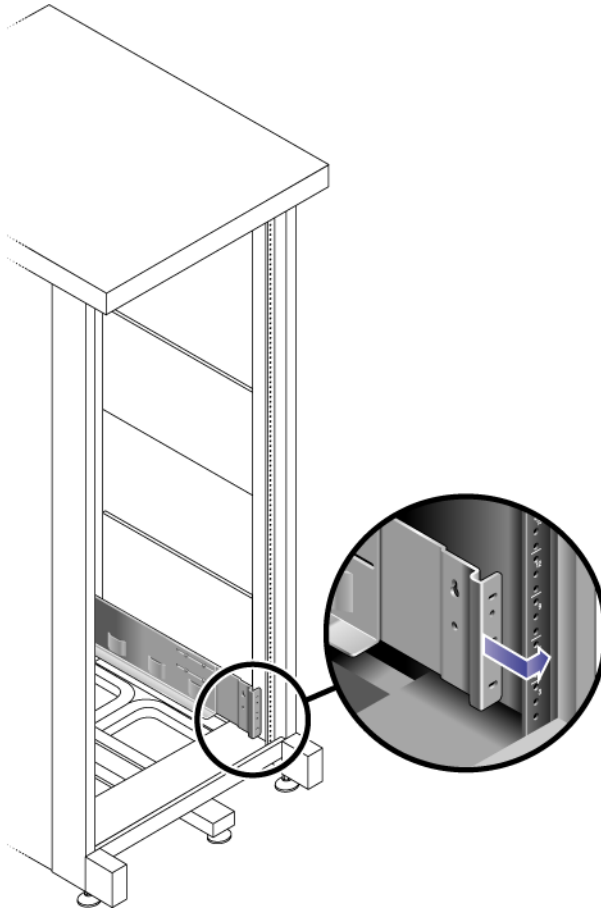
These screws pass through the cabinet rail holes and screw into threaded holes in the left rail.

FIGURE 2-3 Securing the Left Rail to the Front of the Cabinet



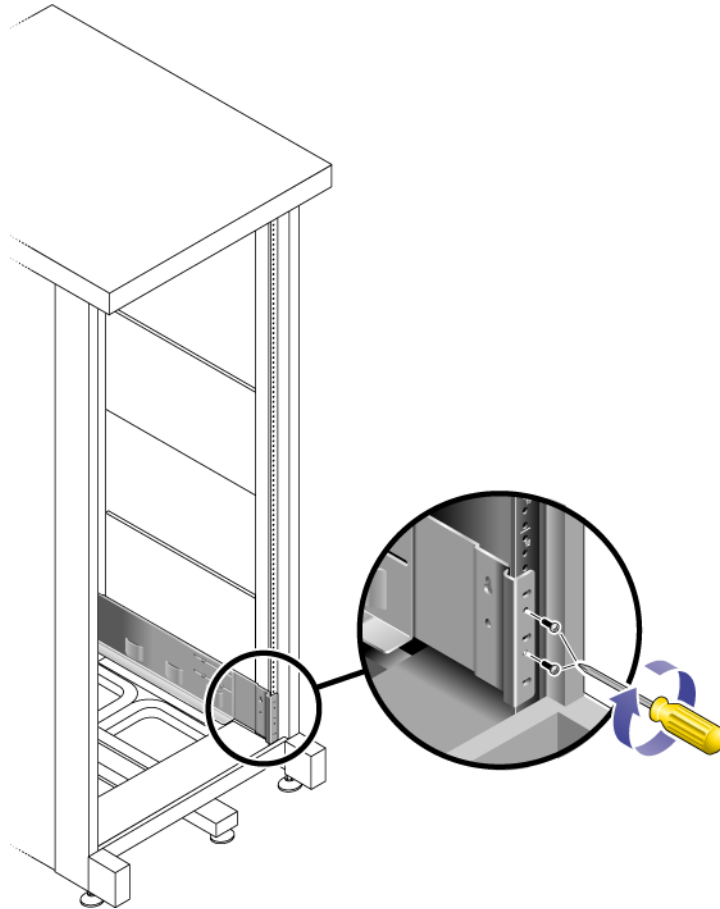
3. Repeat [Step 1](#) and [Step 2](#) for the right rail.
4. At the back of the cabinet, adjust the length of the left rail as needed to fit the cabinet, and position the rail flange over the face of the cabinet rail ([FIGURE 2-4](#)).

FIGURE 2-4 Adjusting the Length of the Left Rail at the Back of the Cabinet



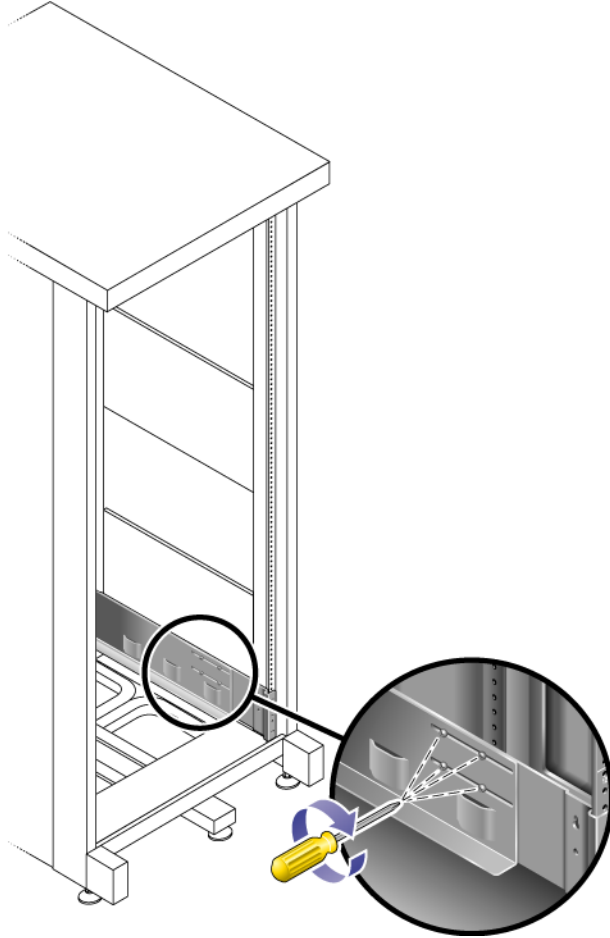
5. **Align the rail flange so that the mounting holes correspond to those at the front of the cabinet.**
6. **Depending on the type of cabinet you have, do one of the following (FIGURE 2-5):**
 - For a Sun Rack 900 or Sun Rack 1000 cabinet, use the #3 Phillips screwdriver to insert and tighten four metric 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 right rail to the cabinet rail.

FIGURE 2-5 Securing the Left Rail to the Back of the Cabinet



7. Repeat [Step 4](#), [Step 5](#), and [Step 6](#) for the right rail.
8. Using the #2 Phillips screwdriver, tighten the eight adjustment screws (four on each side) toward the back of each rail ([FIGURE 2-6](#)).

FIGURE 2-6 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:

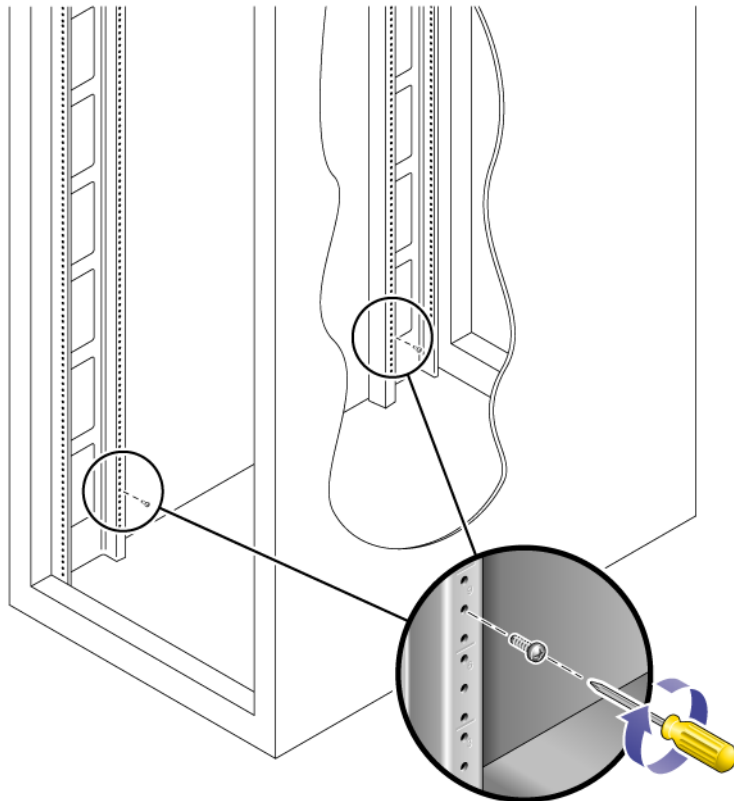
- Sun StorEdge Expansion cabinets
- Sun Fire cabinets

To attach the universal rail kit to a Sun StorEdge Expansion or Sun Fire cabinet, 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 2-7).**

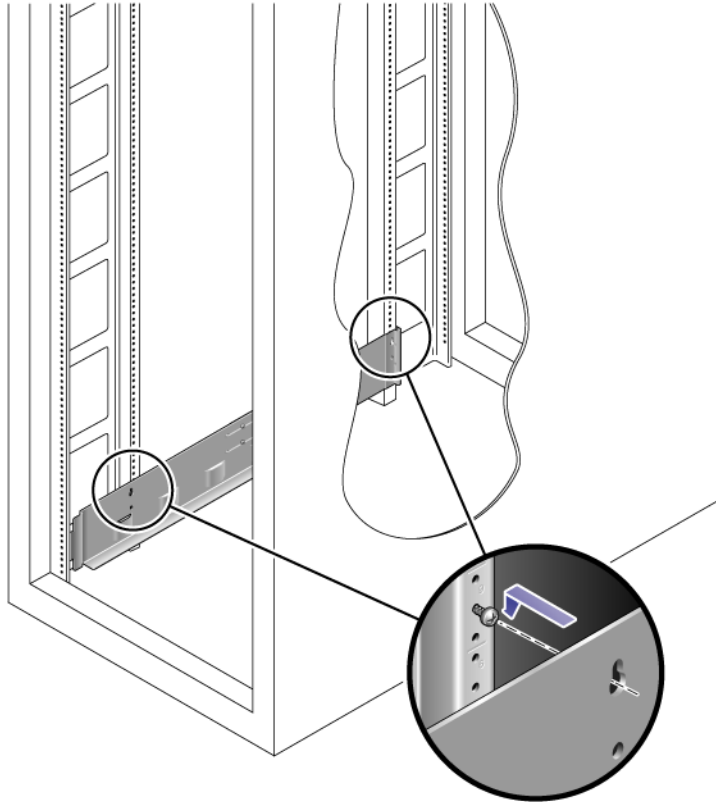
Do not tighten at this time. You will hang the side rails on these screws.

FIGURE 2-7 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 2-8).

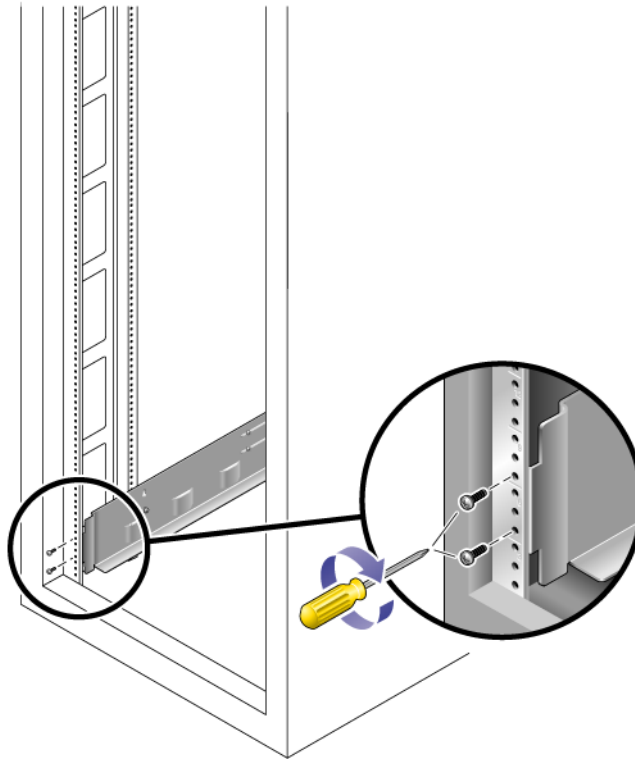
FIGURE 2-8 Hanging the Rail



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 2-9).

The hole corresponds to the center hole of the middle mounting unit of the 3RU slot in which the rail is installed.

FIGURE 2-9 Inserting Screws in the Lower Side Mounting Holes of the Cabinet

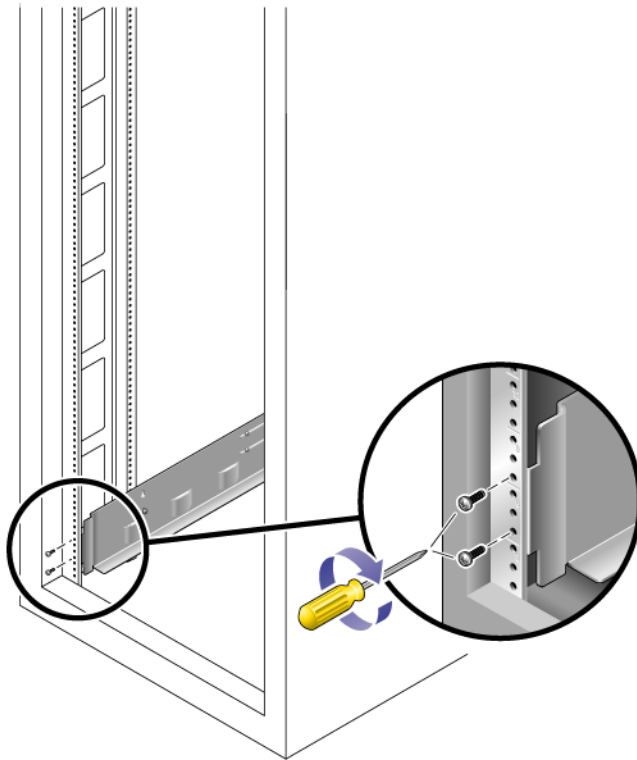


5. Use the #2 Phillips screwdriver to insert and tighten two 8-32 screws to secure the rail to the front of the cabinet (FIGURE 2-10).

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 2-10 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

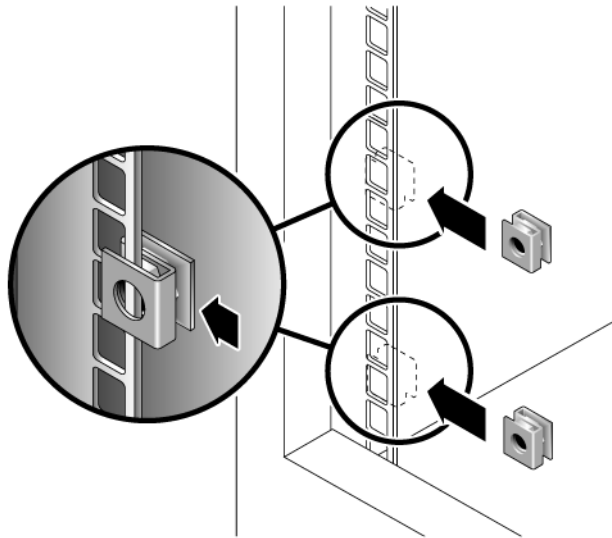
This procedure describes the steps to attach the universal rail kit to:

- All 19-inch wide, 4-post EIA-compatible racks and cabinets with unthreaded cabinet rails.

To attach the universal rail kit to a cabinet with unthreaded cabinet rails, 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 2-11](#)).

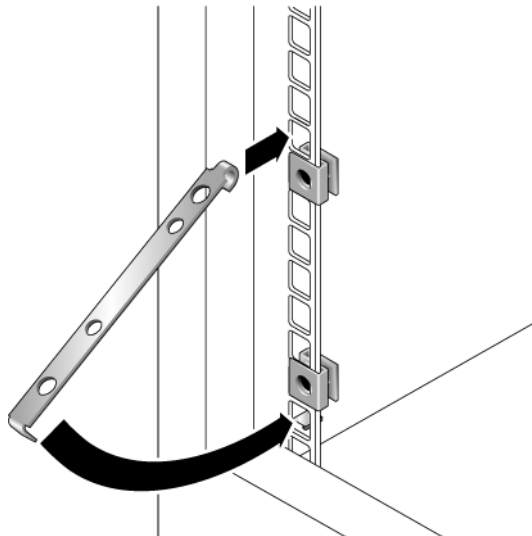
FIGURE 2-11 Inserting Cage Nuts Over Rail Mounting Holes in Cabinet Rails



2. Hook a cabinet rail adapter plate over the front of the cabinet rail. (FIGURE 2-12)

Position the adapter plate over of the 3RU slot in which the tray is to be mounted.

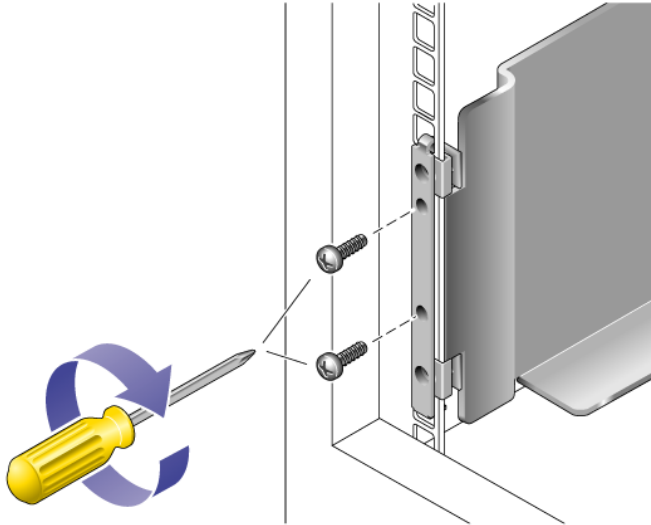
FIGURE 2-12 Inserting the Cabinet Rail Adapter Plate on the Cabinet Rail



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 2-13).

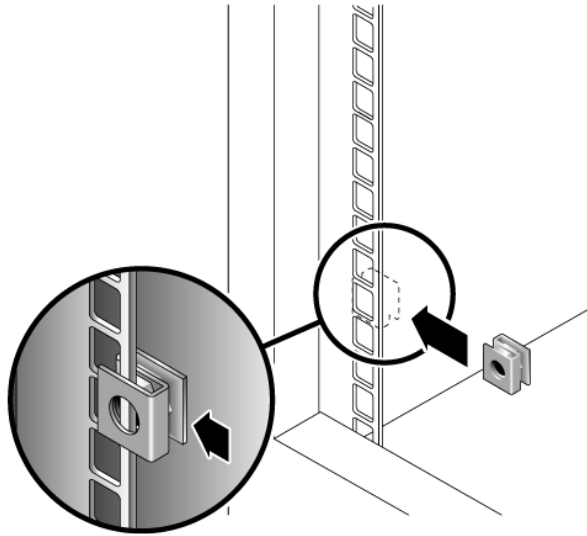
These screws pass through the unthreaded inner holes of the cabinet rail adapter plate and screw into the threaded holes in the front of the mounting rail.

FIGURE 2-13 Securing the Rail to the Front of the Cabinet



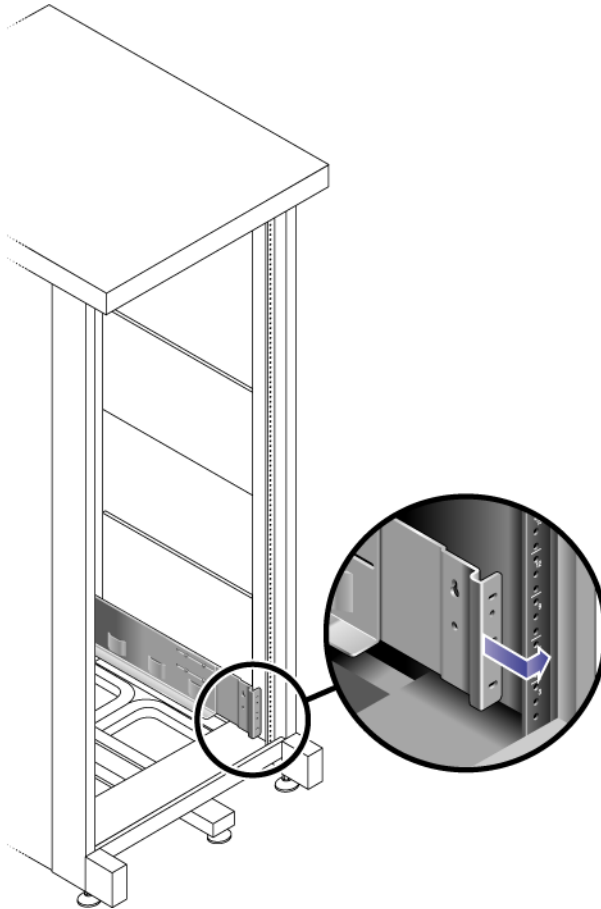
4. On the corresponding cabinet rail at the back of the cabinet, snap one cage nut over the lowest hole in the middle mounting unit of the 3RU cabinet slot in which you will mount the tray (FIGURE 2-14).

FIGURE 2-14 Inserting A Cage Nut on the Cabinet Rail at the Rear 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 2-15](#)).

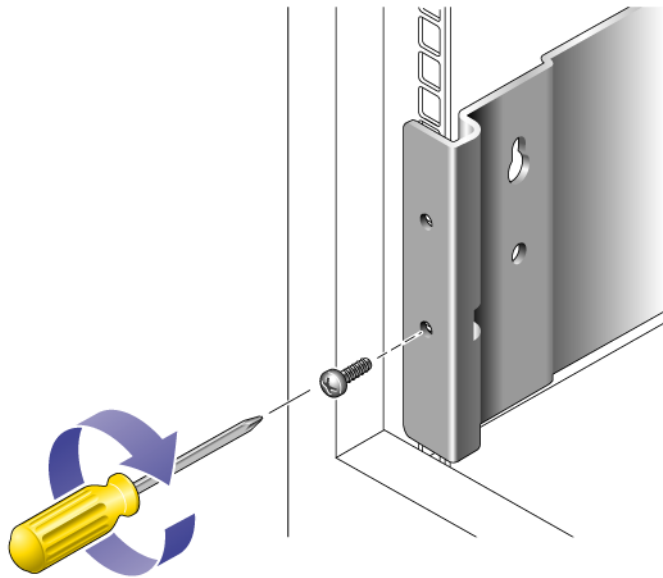
FIGURE 2-15 Adjusting the Length of the Rail at the Back of the Cabinet



- 6. Insert and tighten a screw appropriate for the cage nut to secure the rail to the back cabinet rail (FIGURE 2-16).**

The screw passes through the lower unthreaded inner hole of the mounting rail and screws into the threaded hole of the cage nut.

FIGURE 2-16 Securing the Rail to the Back of the Cabinet



Preparing the Two-Post Telco Rack

Use the procedures in this chapter to install trays in a standard Telco rack. (You can use the existing universal rack kit and procedures to install the Sun StorageTek 6140 array in a four-post Telco rack.) The number of trays you need to install depends on your overall storage requirements. You can install a maximum of eight, one controller tray and up to seven expansion trays, in a third-party Telco rack.

This chapter describes the process of installing Sun StorEdge 6140 trays. It contains the following sections:

- [“Preparing the Telco Rack” on page 42](#)
- [“Attaching the Rails to a Telco 2-Post Rack” on page 42](#)
- [“Installing a Tray in a Telco 2-Post Rack” on page 47](#)

The installation procedures in this chapter require the following items:

- #2 Phillips screwdriver
- #3 Phillips screwdriver
- Flathead screwdriver
- 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 the Telco Rack

Install the rack as described in the installation instructions provided by the manufacturer.

Note – Sun Microsystems makes no warranties or guaranties as to fit, form, or function of the Sun StorEdge 6140 array installed in third-party racks or cabinets. It is the customer's responsibility to ensure that the rack or cabinet can house the Sun StorEdge 6140 array in all conditions that may exist. All racks and cabinets must comply with local building and construction codes.

Populating a rack with trays starting from the bottom and moving up distributes the weight correctly in the cabinet.

Attaching the Rails to a Telco 2-Post Rack

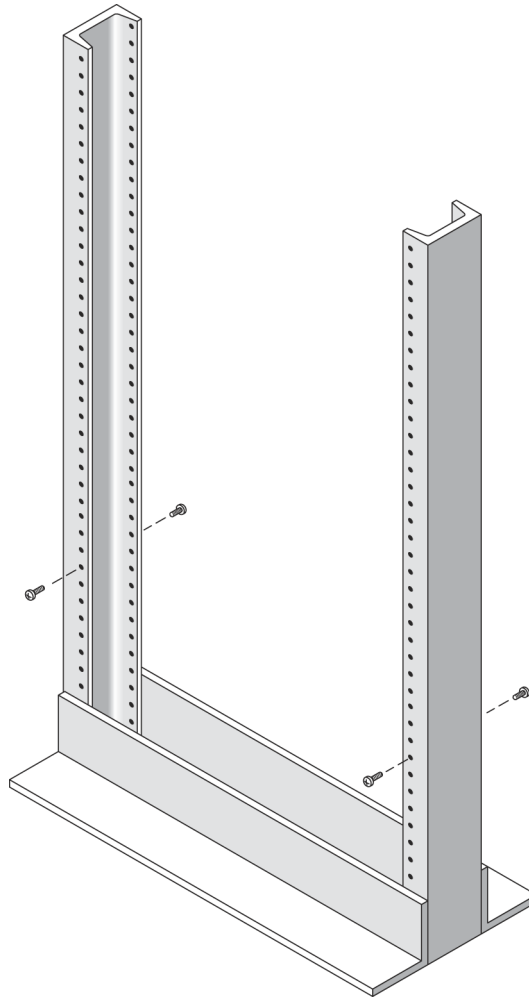
This procedure describes how to attach the rackmount rail kit to a Telco 2-post frame. You can use rack rails with a depth of 3-to-6 inches.

You will mount each tray with its horizontal center aligned with the frame of the Telco 2-post rack.

1. **Loosely adjust the rail length to accommodate the length of the array.**
1. **Insert four (12-24 or 10-32) screws (one in each post side) in the front and back mounting holes of the right and left posts (FIGURE 2-17). Do not tighten at this time.**

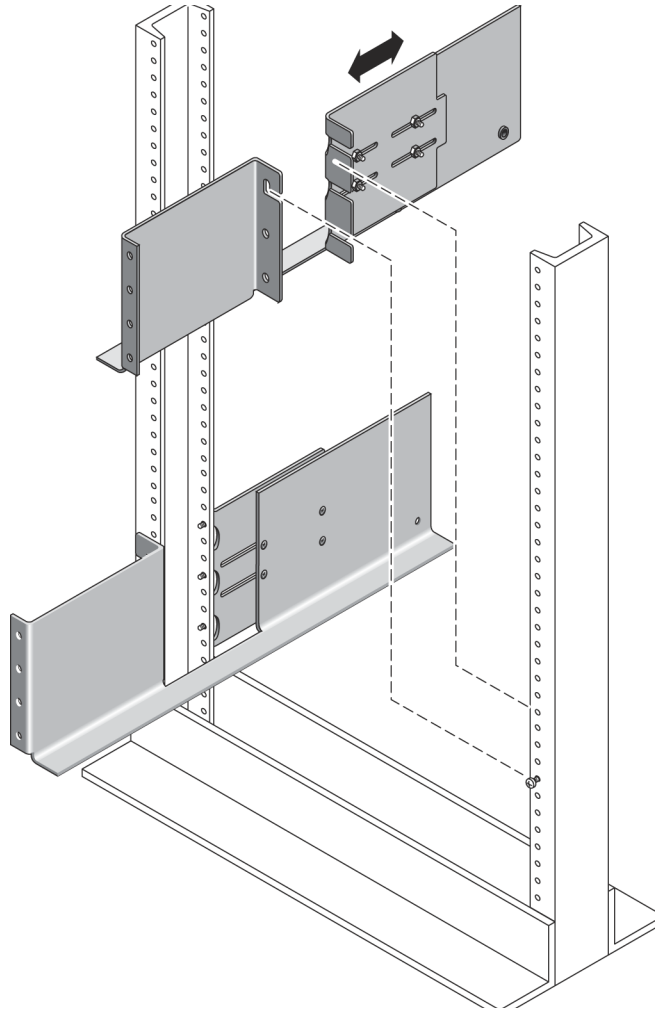
Use the lowest available mounting hole at the bottom of each post that can be aligned with the top mount slot on the rail. The mount slot allows the rail to hang over the screw. Make sure that all four screws are aligned and mounted at the same height.

FIGURE 2-17 Inserting Screws in the Front and Back Mounting Holes



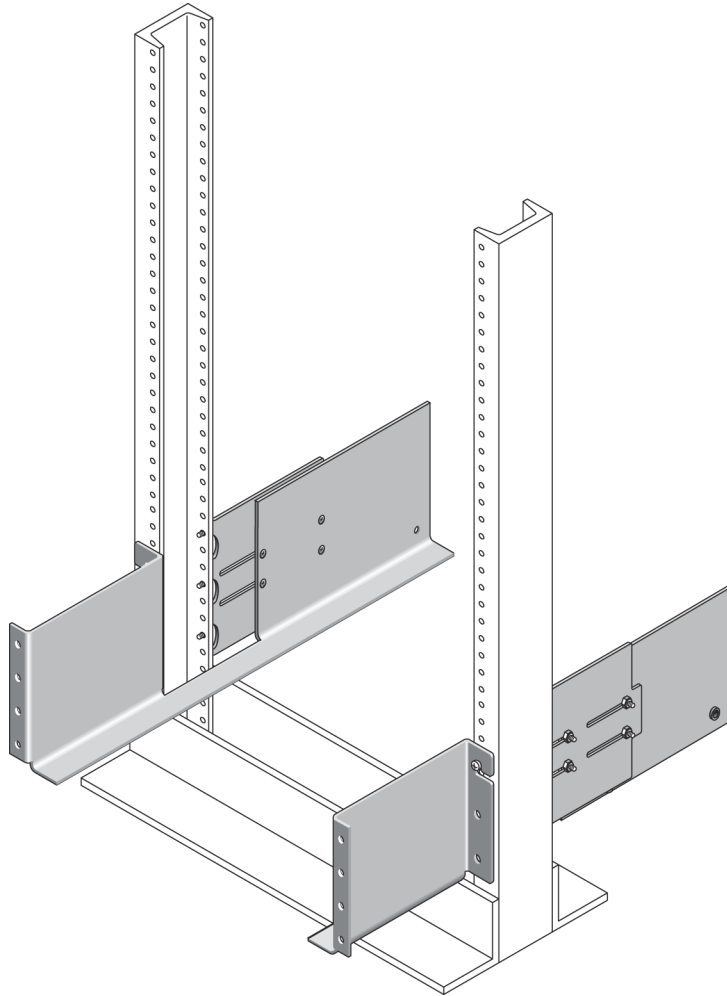
2. Align the open slot of the left mounting rail over the front and back screws of the left post, and press the rail down until it is seated over the screws (FIGURE 2-18). Repeat for the right rail.

FIGURE 2-18 Seating the Mounting Rails Over the Front and Back Screws



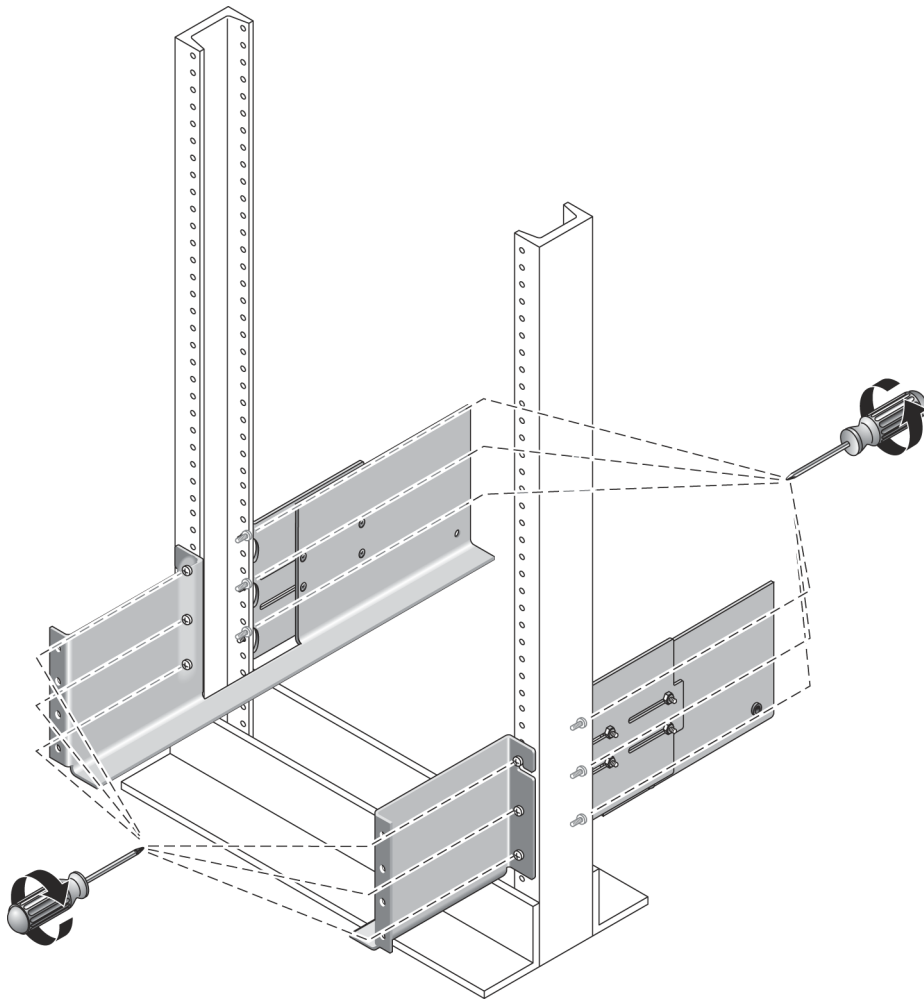
- 3. Insert eight more (12-24 or 10-32) screws (two in each post side) in the lower mounting holes at the front and back of the left and right rails ([FIGURE 2-19](#)).**

FIGURE 2-19 Inserting Screws in the Lower Mounting Holes



4. Using the #3 Phillips screwdriver, tighten all twelve screws (three on each side of a post) at the front and back of both mounting rails to secure each rail to its post (FIGURE 2-20).

FIGURE 2-20 Inserting Screws in the Lower Mounting Holes



Installing a Tray in a Telco 2-Post Rack

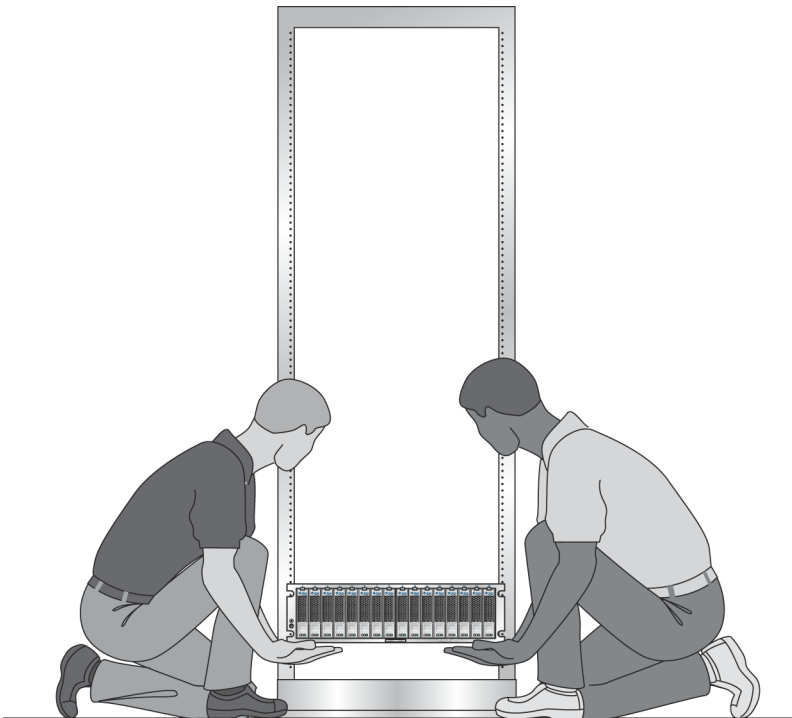
When installing a tray in a Telco 2-post rack, follow these instructions:

1. **Unsnap and remove the left and right end caps on the tray to permit access to the screw mounting holes.**
2. **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 2-21).**



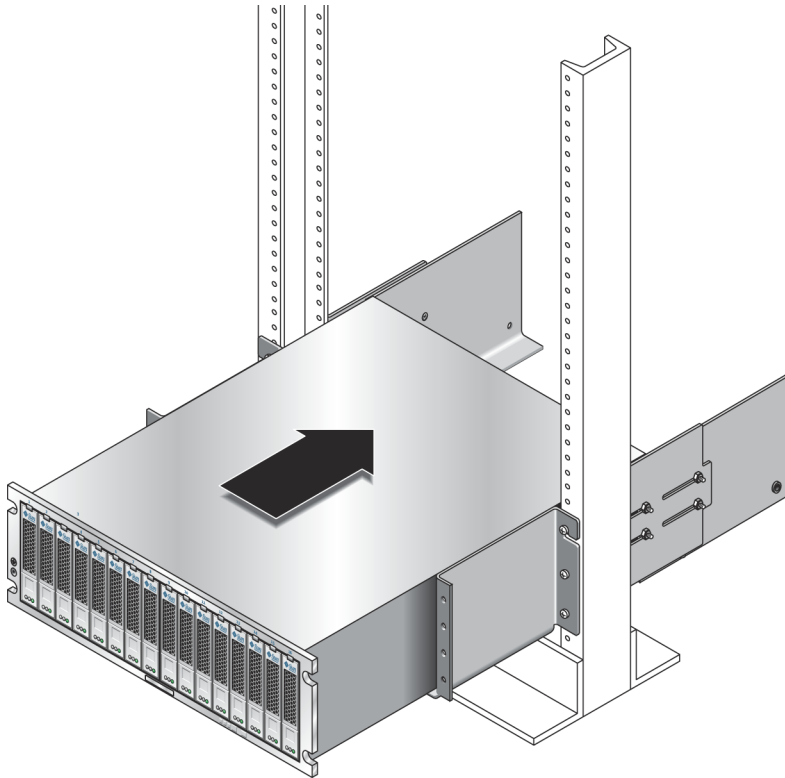
Caution – Use care to avoid injury. An tray can weigh up to 95 pounds (45 kg).

FIGURE 2-21 Positioning the Tray in the Rack



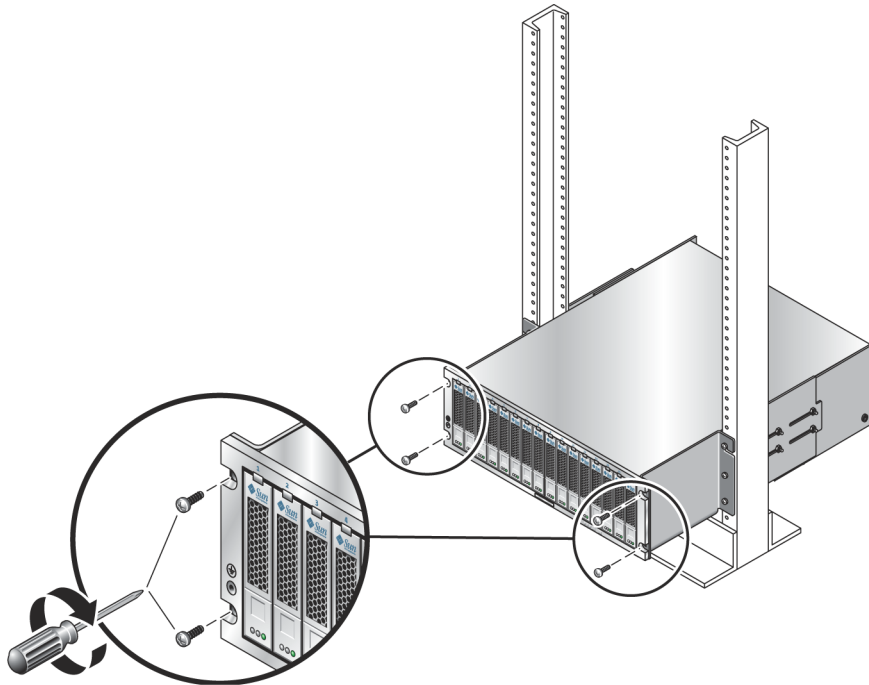
3. **Carefully slide the tray onto the mounting rails until the front bezel of the tray contacts the rail flange on each side (FIGURE 2-22).**

FIGURE 2-22 Sliding the Tray Into the Rack



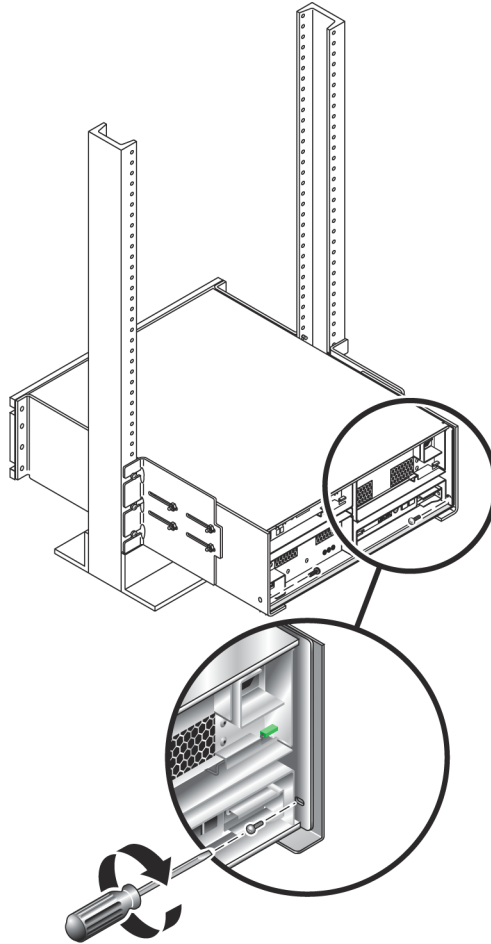
4. Use the #2 Phillips screwdriver to insert and tighten four 10-32 x 1/2" screws, washers, and nuts (two each per side) to secure the tray to the front of the rack (FIGURE 2-23).

FIGURE 2-23 Securing the Tray to the Front of the Rack



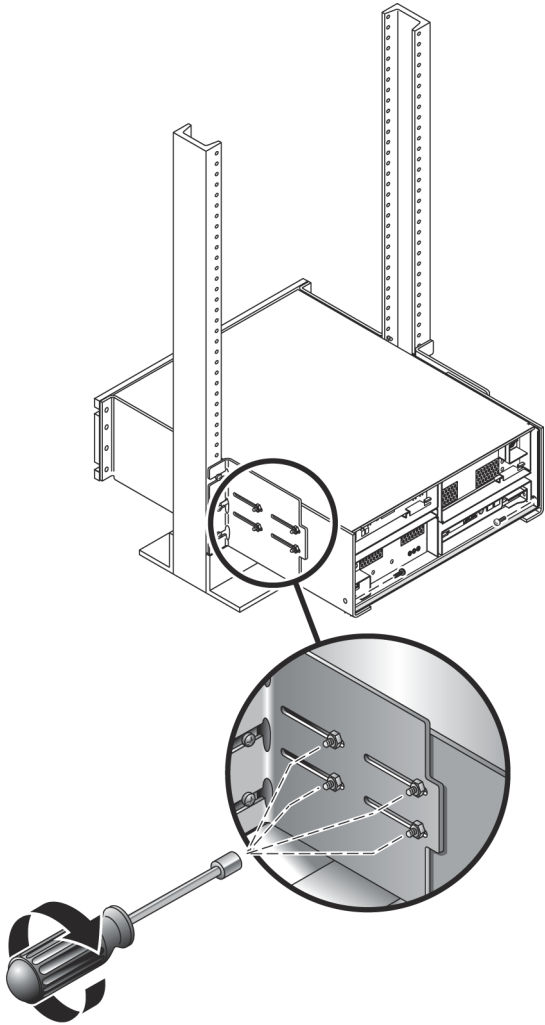
5. **Replace the left and right end caps to hide the front mounting screws.**
The end caps snap onto the front bezel of the tray.
6. **At the back of the tray, make a final adjustment to the rail lengths to align the back mounting points (FIGURE 2-24) on the rail and array.**
7. **At the back of the tray, use the flathead screwdriver to install and tighten two 6-32 flat-head screws (one per side) through the back mounting points (FIGURE 2-25).**

FIGURE 2-24 Securing the Tray to the Back of the Rack



8. Tighten the four 10-32 locknuts (two on each rail) on each rail extension to secure the rail length.

FIGURE 2-25 Tightening the Locknuts on the Rail Extension.



Installing a Tray in a Cabinet

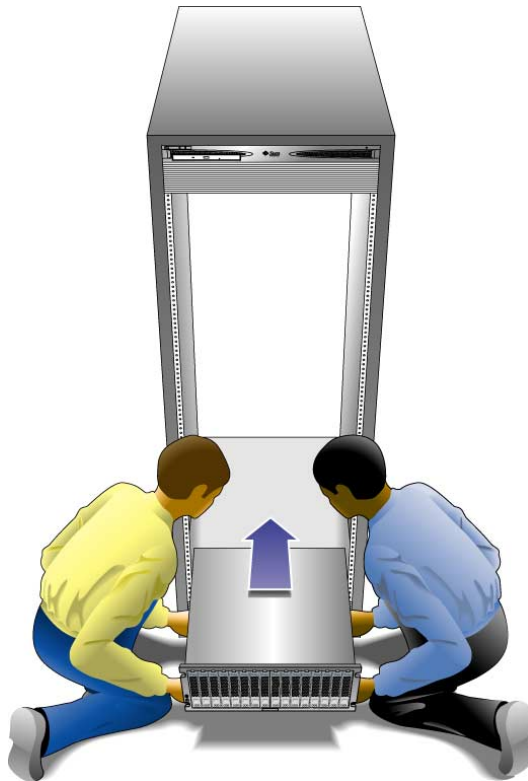
Install the controller tray in the first empty 3RU slot at the bottom of the cabinet. If you are installing expansion trays, continue installing the trays from the bottom up.

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 2-26).



Caution – Use care to avoid injury. A tray can weigh up to 95 pounds (45 kg).

FIGURE 2-26 Positioning the Tray in the Cabinet



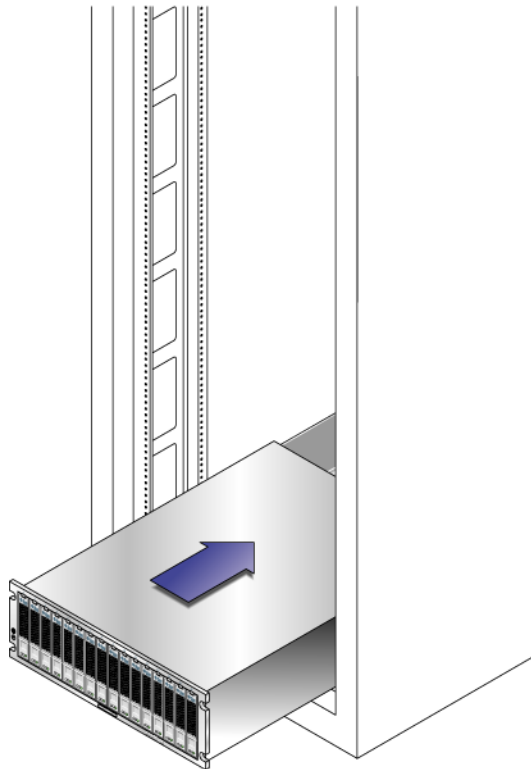
Controller FRU Handle Can Be Hazardous



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

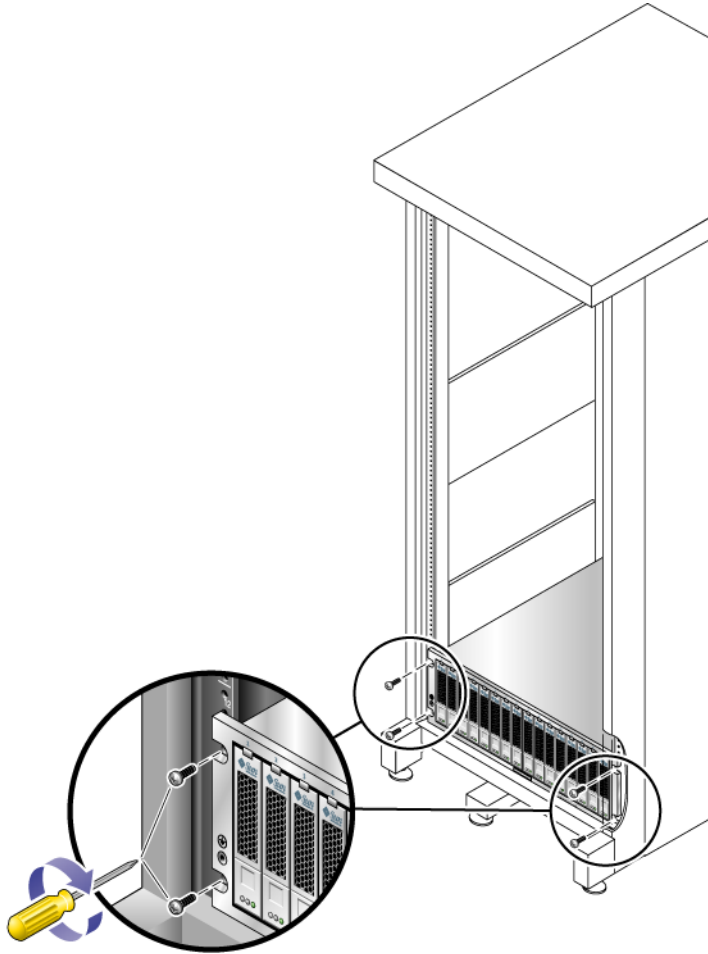
2. Carefully slide the tray into the cabinet until the front flanges of the tray touch the vertical face of the cabinet (FIGURE 2-27).

FIGURE 2-27 Sliding the Tray Into the Cabinet



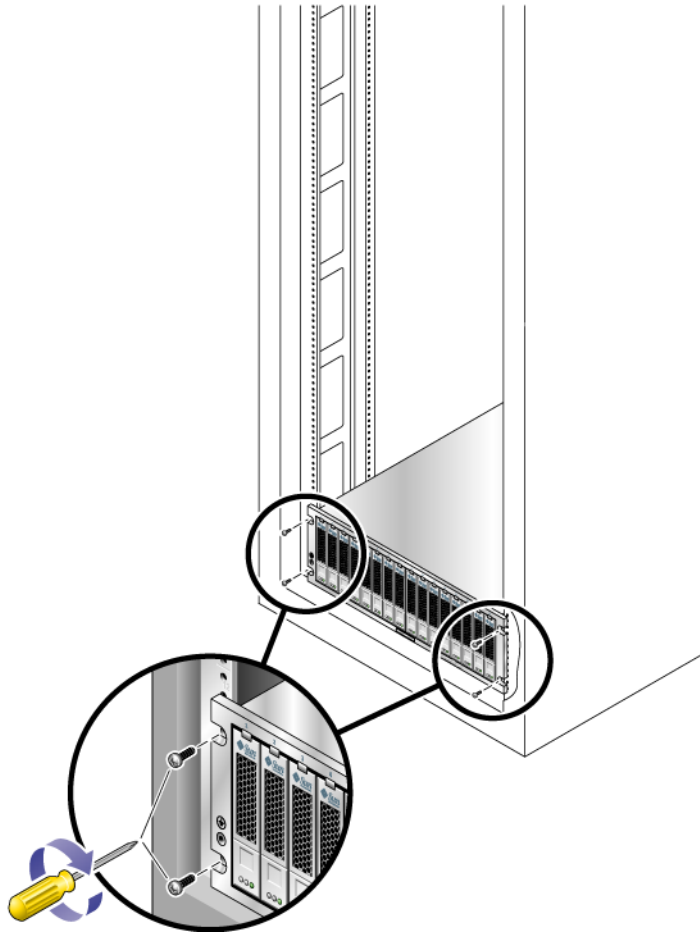
3. Depending on the type of cabinet you have, do one of the following:
 - For a Sun Rack 900/1000 cabinet, use the #3 Phillips screwdriver to install and tighten four M6 screws (two per side) to secure the tray to the front of the cabinet (FIGURE 2-28).

FIGURE 2-28 Securing the Tray to the Front of a Sun Rack 900/1000 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 2-29).

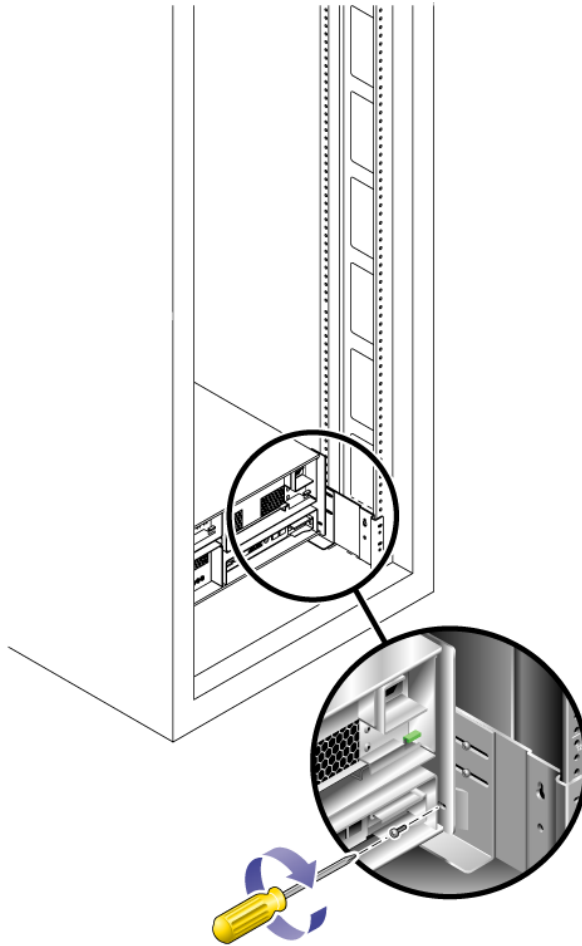
FIGURE 2-29 Securing the Tray to the Front of a Sun StorEdge Expansion Cabinet



- For cabinets with other cabinet rail threads, secure the tray to the front of the cabinet with metric M5 or 12-24 screws.
 - For cabinets 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 two 6-32 screws (one per side) at the back of the tray, to secure the back of the tray to the cabinet (FIGURE 2-30).**

Note – The two upper holes on the back of the tray are not used.

FIGURE 2-30 Securing the Tray to the Back of the Cabinet Rail



Connecting the Power Cables

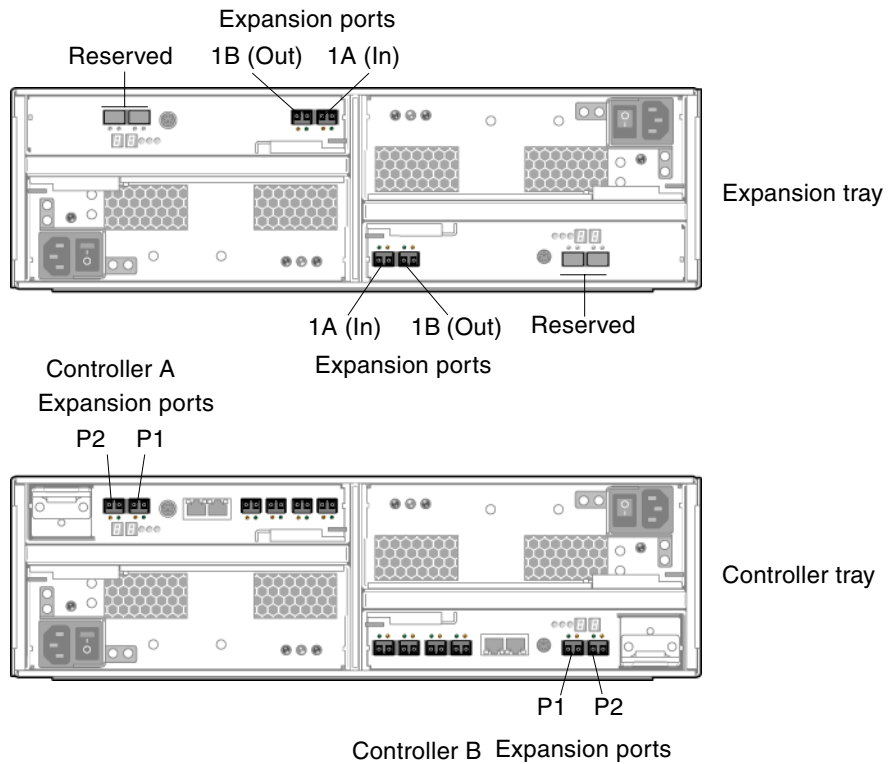
1. Verify that both power switches are off for each tray in the cabinet.
2. Connect each power supply in the tray to a separate power source in the cabinet.
3. Connect the primary power cables from the cabinet to the external power source.

Note – Do not power on the array until you complete the procedures in this chapter. The power-on sequence is described in detail in [Chapter 4](#).

Intertray Cabling

This section describes how to cable a controller tray to expansion trays for several different configurations. The controller tray uses Controller A and Controller B expansion ports to connect to FC-AL ports at the back of each expansion tray ([FIGURE 2-31](#)).

FIGURE 2-31 Expansion Ports on the Controller and Expansion Trays



Array Configuration Naming Convention

The configuration naming convention is “controllers x trays” where the first number is the controller tray and the second is the sum of the controller tray and the number of expansion trays. For example, 1x1 is a standalone controller tray, 1x2 is the controller tray and one expansion tray, and 1x7 is the controller tray and 6 expansion trays (TABLE 2-1).

TABLE 2-1 Controller and Expansion Tray Configurations

Configuration Identifier	Controller Tray	Number of Expansion Trays
1x1	1	0
1x2	1	1
1x3	1	2
1x4	1	3
1x5	1	4
1x6	1	5
1x7	1	6

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

Balancing Expansion Trays

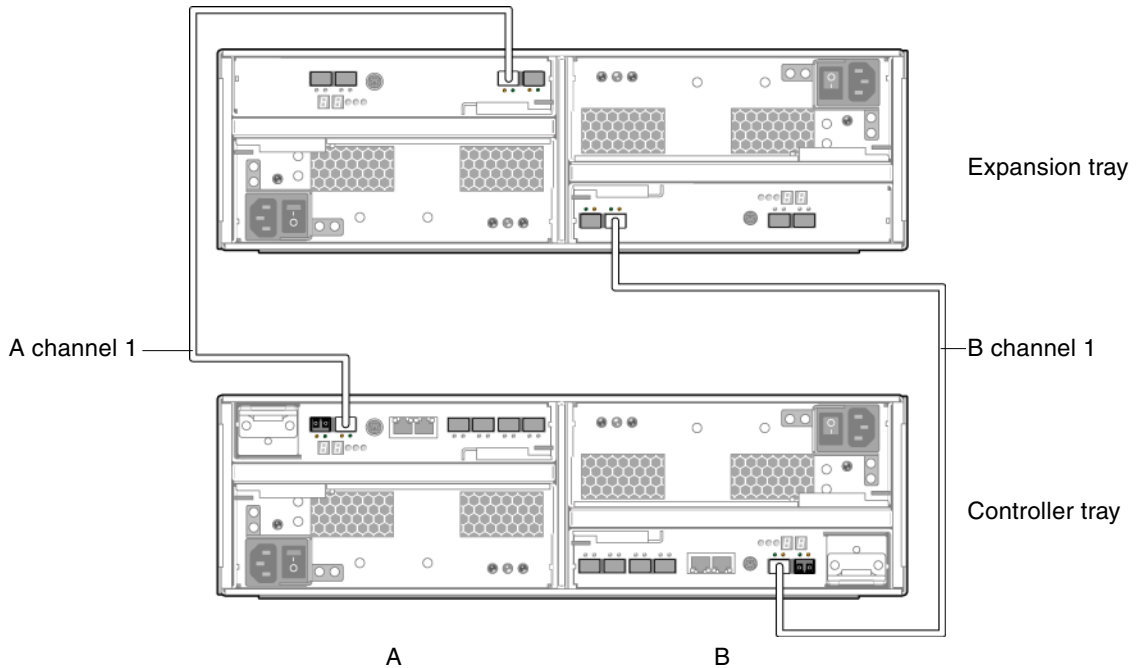
Each controller in the Sun StorageTek 6140 Array has two expansion channels. For optimal reliability, availability, and serviceability, installation of expansion trays should be divided evenly between the two expansion channels.

If there are an uneven number of expansion trays, such as in a 1x4 and 1x6 array configuration, cable the extra expansion tray in the expansion channels of the two lowest expansion trays in the cabinet. This allows for easier addition of an expansion tray in the future.

Cabling a 1x2 Array Configuration

A 1x2 array configuration consists of one controller tray and one expansion tray. Two 2-meter optical FC cables are required.

FIGURE 2-32 1x2 Array Configuration Cabling



1. Locate the Controller A and Controller B expansion ports at the back of the controller tray (FIGURE 2-31).
2. Locate expansion ports 1A (In) and 1B (Out) at the A-side and B-side back of the expansion tray (FIGURE 2-31).
3. Connect one FC cable between the Controller B channel 1 expansion port and the B-side port 1B of the expansion tray (FIGURE 2-32).
4. Connect one FC cable between the Controller A channel 1 expansion port and the A-side port 1B of the expansion tray (FIGURE 2-32).

In this configuration, the following expansion ports are not used:

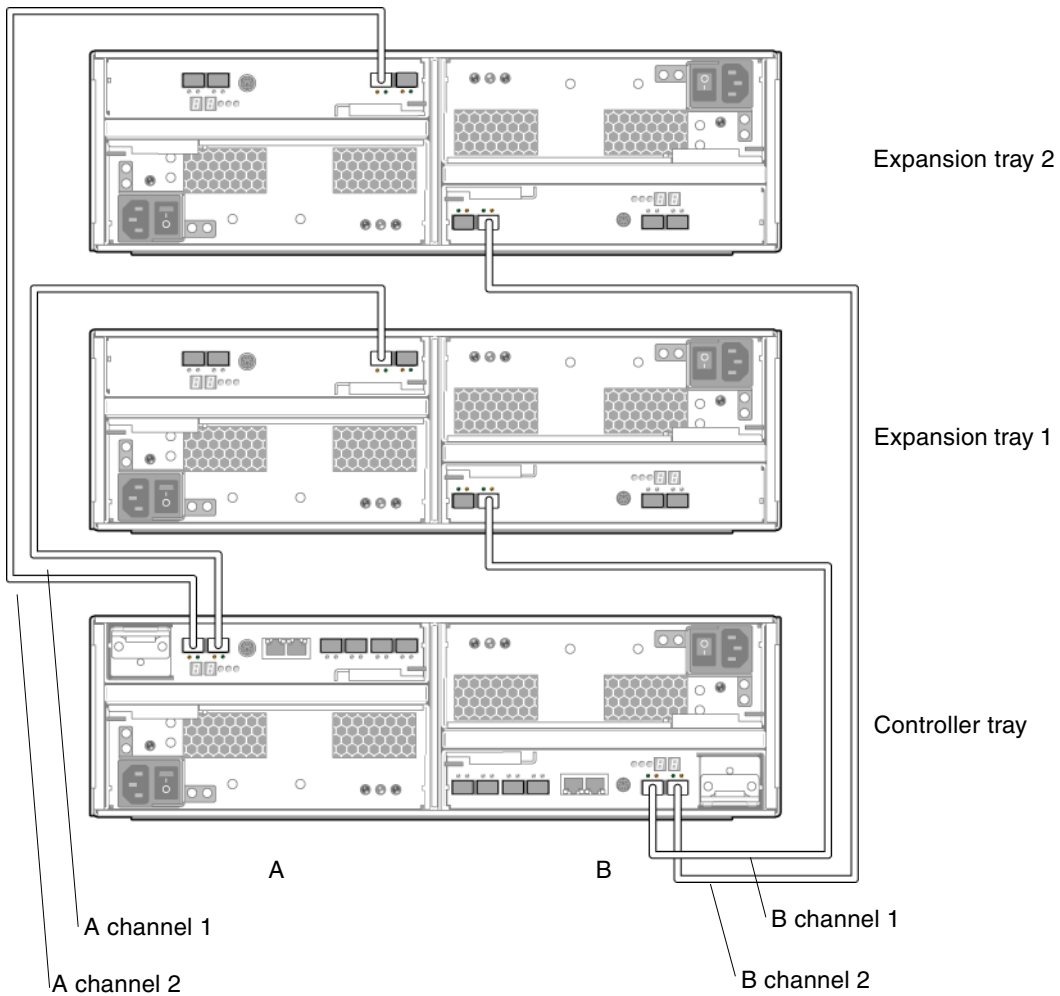
- Controller B channel 2 expansion port
- Controller A channel 2 expansion port

- A-side controller expansion port 1A of the expansion tray
- B-side controller expansion port 1A of the expansion tray

Cabling a 1x3 Array Configuration

A 1x3 array configuration consists of one controller tray and two expansion trays. Four 2-meter optical FC cables are required.

FIGURE 2-33 1x3 Array Configuration Cabling



1. Locate the Controller A and Controller B expansion ports at the back of the controller tray (FIGURE 2-31).
2. Locate expansion ports 1A (In) and 1B (Out) at the A-side and B-side back of the expansion tray (FIGURE 2-31).
3. Connect one FC cable between the Controller B channel 1 expansion port and the B-side expansion port 1B of expansion tray 1 (FIGURE 2-33).
4. Connect one FC cable between the Controller B channel 2 expansion port and the B-side expansion port 1B of expansion tray 2 (FIGURE 2-33).
5. Connect one FC cable between the Controller A channel 1 expansion port and the A-side expansion port 1B of expansion tray 1 (FIGURE 2-33).
6. Connect one FC cable between the Controller A channel 2 expansion port and the A-side expansion port 1B of expansion tray 2 (FIGURE 2-33).

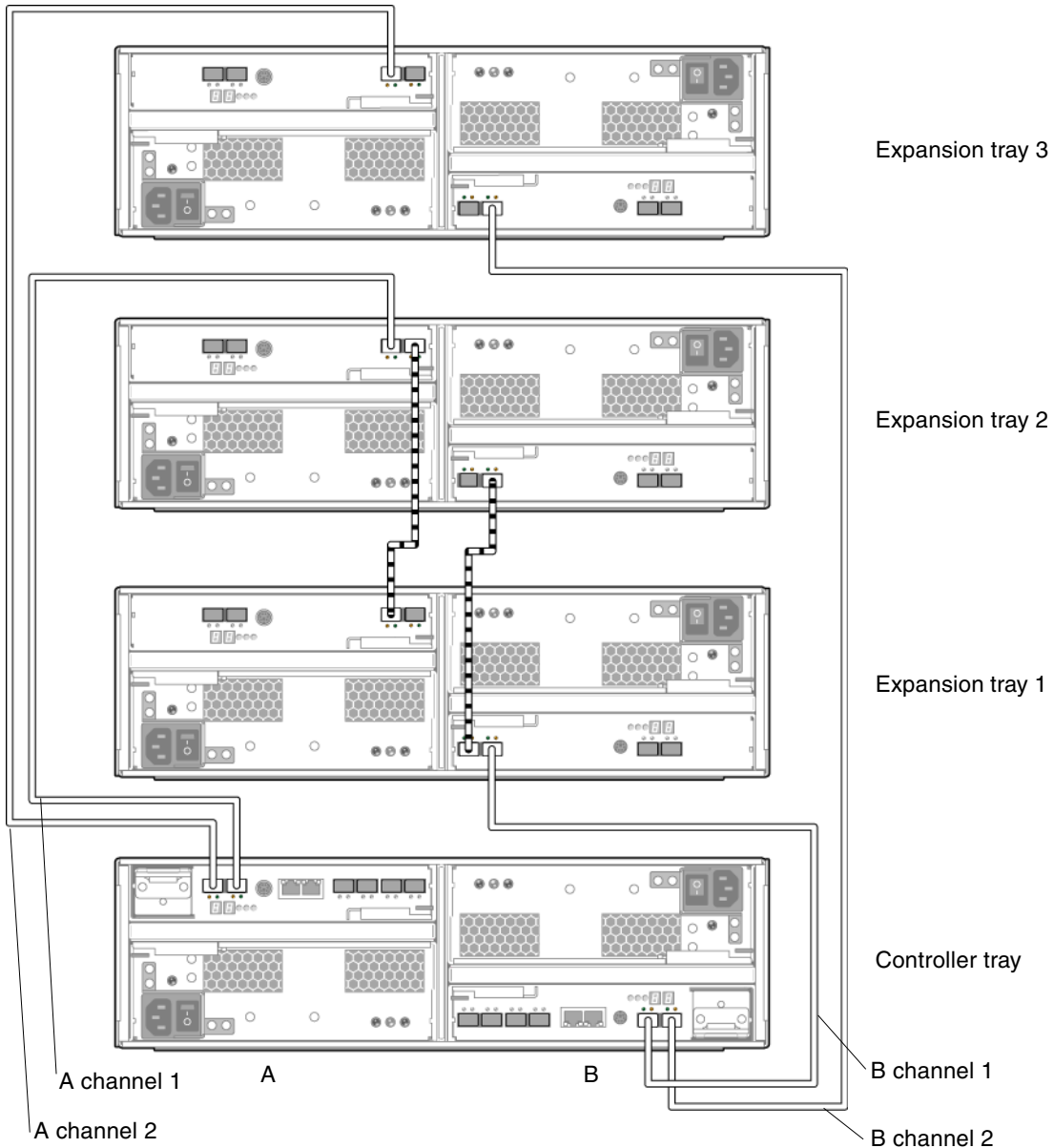
In this configuration, the following expansion ports are not used:

- A-side controller expansion port 1A of expansion tray 1
- A-side controller expansion port 1A of expansion tray 2
- B-side controller expansion port 1A of expansion tray 1
- B-side controller expansion port 1A of expansion tray 2

Cabling a 1x4 Array Configuration

A 1x4 array configuration consists of one controller tray and three expansion trays. Six 2-meter optical FC cables are required.

FIGURE 2-34 1x4 Array Configuration Cabling



1. Locate the Controller A and Controller B expansion ports at the back of the controller tray (FIGURE 2-31).
2. Locate the expansion ports 1A (In) and 1B (Out) at the A-side and B-side back of the expansion tray (FIGURE 2-31).

3. Connect one FC cable between the Controller B channel 1 expansion port and the B-side expansion port 1B of expansion tray 1 (FIGURE 2-34).
4. Connect one FC cable between the Controller B channel 2 expansion port and the B-side expansion port 1B of expansion tray 3 (FIGURE 2-34).
5. Connect one FC cable between the B-side expansion port 1A of expansion tray 1 and the B-side expansion port 1B of expansion tray 2 (FIGURE 2-34).
6. Connect one FC cable between the Controller A channel 1 expansion port and the A-side expansion port 1B of expansion tray 2 (FIGURE 2-34).
7. Connect one FC cable between the Controller A channel 2 expansion port and the A-side expansion port 1B of expansion tray 3 (FIGURE 2-34).
8. Connect one FC cable between the A-side expansion port 1B of expansion tray 1 and the A-side expansion port 1A of expansion tray 2 (FIGURE 2-34).

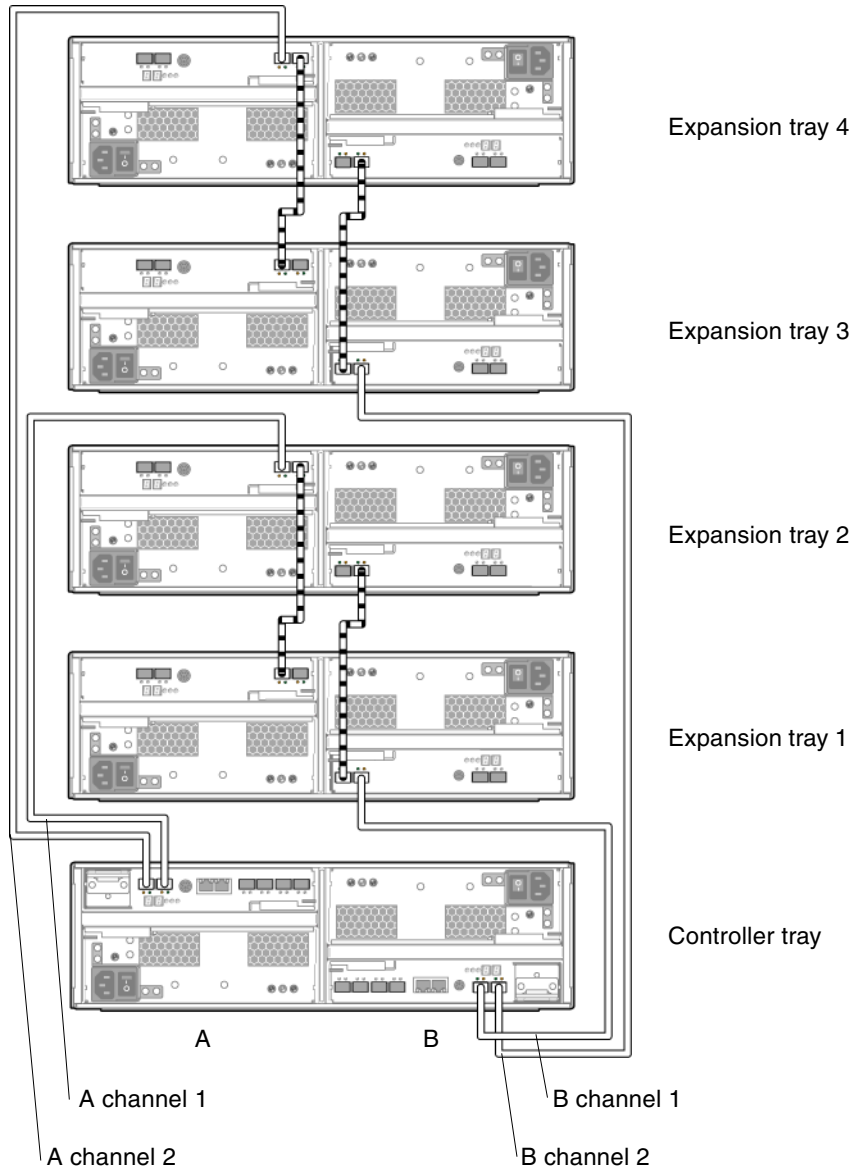
In this configuration, the following expansion ports are not used:

- A-side controller expansion port 1A of expansion tray 1
- A-side controller expansion port 1A of expansion tray 3
- B-side controller expansion port 1A of expansion tray 2
- B-side controller expansion port 1A of expansion tray 3

Cabling a 1x5 Array Configuration

A 1x5 array configuration consists of one controller tray and four expansion trays. Eight 2-meter optical FC cables are required.

FIGURE 2-35 1x5 Array Configuration Cabling



1. Locate the Controller A and Controller B expansion ports at the back of the controller tray (FIGURE 2-31).
2. Locate the expansion ports 1A (In) and 1B (Out) at the A-side and B-side back of the expansion tray (FIGURE 2-31).
3. Connect one FC cable between the Controller B channel 1 expansion port and the B-side expansion port 1B of expansion tray 1 (FIGURE 2-35).
4. Connect one FC cable between the B-side expansion port 1A of expansion tray 1 and the B-side expansion port 1B of expansion tray 2 (FIGURE 2-35).
5. Connect one FC cable between the Controller B channel 2 expansion port and the B-side expansion port 1B of expansion tray 3 (FIGURE 2-35).
6. Connect one FC cable between the B-side expansion port 1A of expansion tray 3 and the B-side expansion port 1B of expansion tray 4 (FIGURE 2-35).
7. Connect one FC cable between the Controller A channel 1 expansion port and the A-side expansion port 1B of expansion tray 2 (FIGURE 2-35).
8. Connect one FC cable between the A-side expansion port 1A of expansion tray 2 and the A-side expansion port 1B of expansion tray 1 (FIGURE 2-35).
9. Connect one FC cable between the Controller A channel 2 expansion port and the B-side expansion port 1B of expansion tray 4 (FIGURE 2-35).
10. Connect one FC cable between the A-side expansion port 1A of expansion tray 4 and the A-side expansion port 1B of expansion tray 3 (FIGURE 2-35).

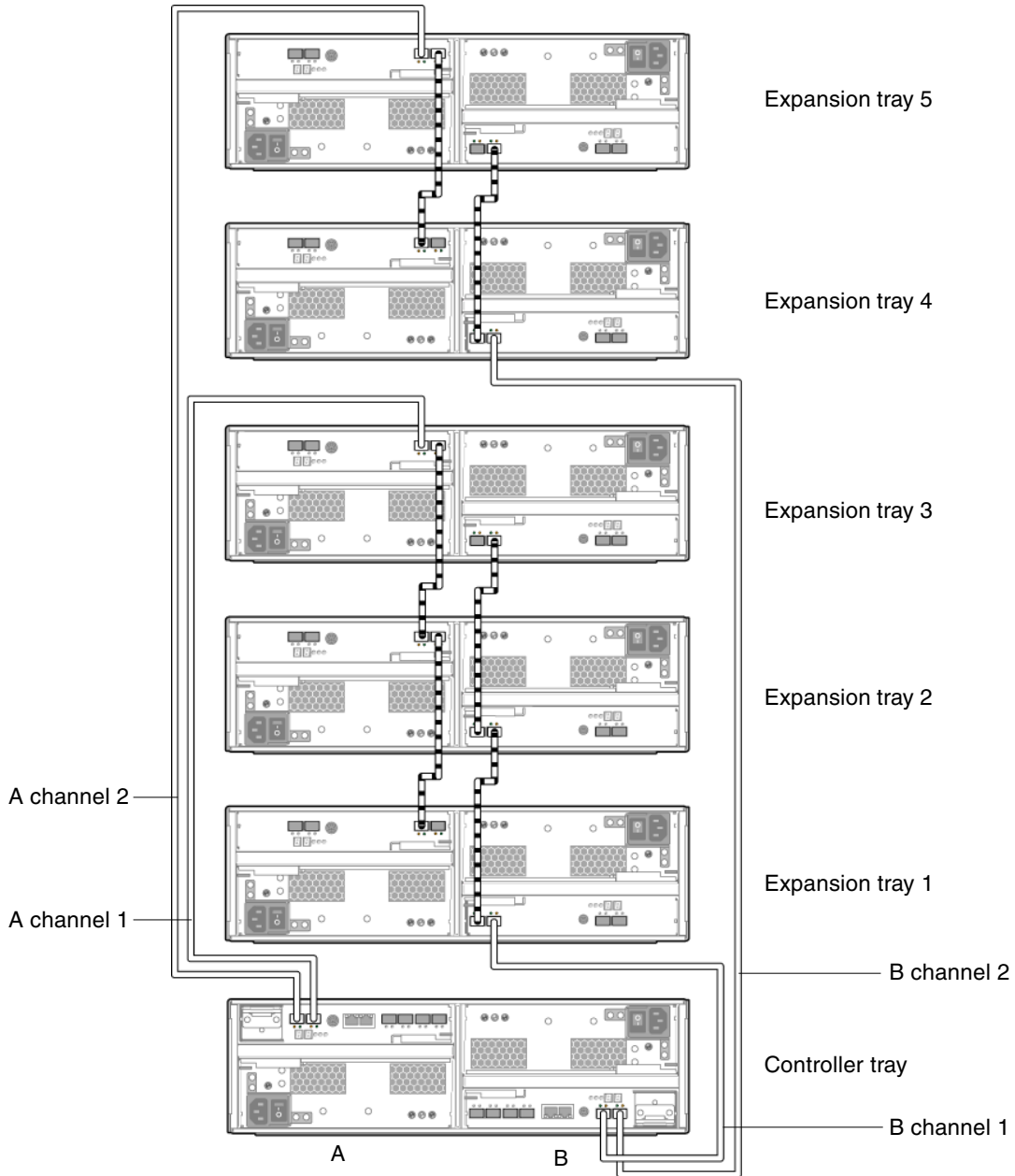
In this configuration, the following expansion ports are not used:

- A-side controller expansion port 1A of expansion tray 1
- A-side controller expansion port 1A of expansion tray 3
- B-side controller expansion port 1A of expansion tray 2
- B-side controller expansion port 1A of expansion tray 4

Cabling a 1x6 Array Configuration

A 1x6 array configuration consists of one controller tray and five expansion trays. Ten 2-meter optical FC cables are required.

FIGURE 2-36 1x6 Array Configuration Cabling



1. Locate the Controller A and Controller B expansion ports at the back of the controller tray (FIGURE 2-31).

2. Locate the expansion ports 1A (In) and 1B (Out) at the A-side and B-side back of the expansion tray (FIGURE 2-31).
3. Connect one FC cable between the Controller B channel 1 expansion port and the B-side expansion port 1B of expansion tray 1 (FIGURE 2-36).
4. Connect one FC cable between the B-side expansion port 1A of expansion tray 1 and the B-side expansion port 1B of expansion tray 2 (FIGURE 2-36).
5. Connect one FC cable between the B-side expansion port 1A of expansion tray 2 and the B-side expansion port 1B of expansion tray 3 (FIGURE 2-36).
6. Connect one FC cable between the Controller B channel 2 expansion port and the B-side expansion port 1B of expansion tray 4 (FIGURE 2-36).
7. Connect one FC cable between the B-side expansion port 1A of expansion tray 4 and the B-side expansion port 1B of expansion tray 5 (FIGURE 2-36).
8. Connect one FC cable between the Controller A channel 1 expansion port and the A-side expansion port 1B of expansion tray 3 (FIGURE 2-36).
9. Connect one FC cable between the A-side expansion port 1A of expansion tray 3 and the A-side expansion port 1B of expansion tray 2 (FIGURE 2-36).
10. Connect one FC cable between the A-side expansion port 1A of expansion tray 2 and the A-side expansion port 1B of expansion tray 1 (FIGURE 2-36).
11. Connect one FC cable between the Controller A channel 2 expansion port and the A-side expansion port 1B of expansion tray 5 (FIGURE 2-36).
12. Connect one FC cable between the A-side expansion port 1A of expansion tray 5 and the A-side expansion port 1B of expansion tray 4 (FIGURE 2-36).

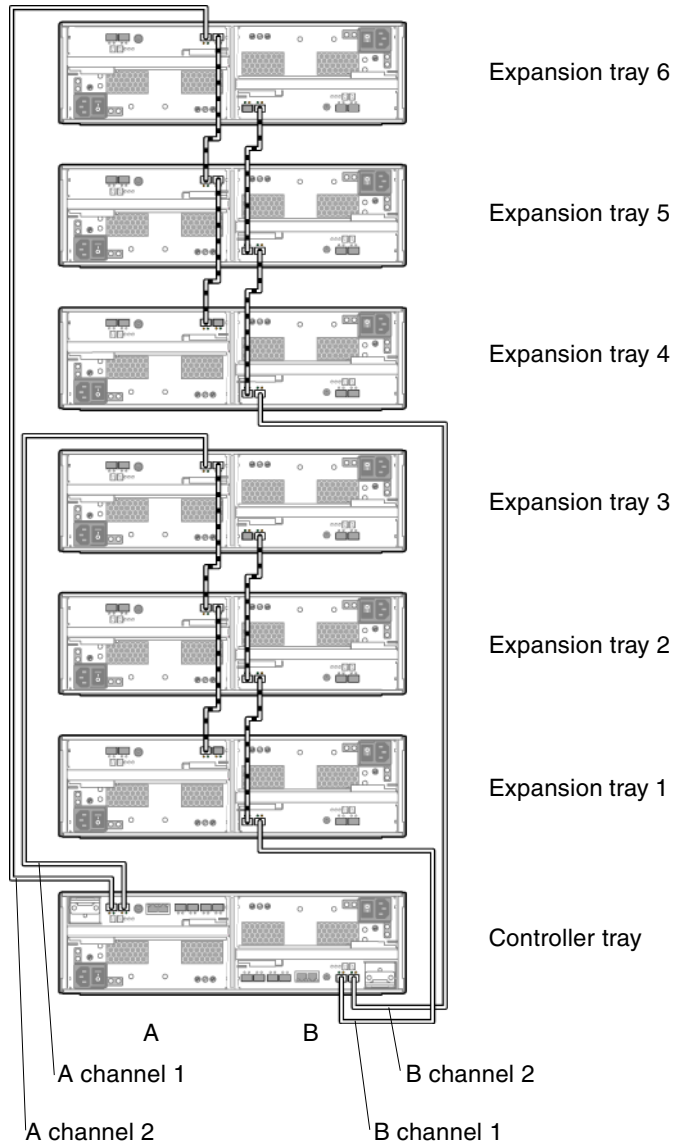
In this configuration, the following expansion ports are not used:

- A-side controller expansion port 1A of expansion tray 1
- A-side controller expansion port 1A of expansion tray 4
- B-side controller expansion port 1A of expansion tray 3
- B-side controller expansion port 1A of expansion tray 5

Cabling a 1x7 Array Configuration

A 1x7 array configuration consists of the controller tray and six expansion trays. Twelve 2-meter optical FC cables are required.

FIGURE 2-37 1x7 Array Configuration Cabling



1. Locate the Controller A and Controller B expansion ports at the back of the controller tray (FIGURE 2-31).
2. Locate the expansion ports 1A (In) and 1B (Out) at the A-side and B-side back of the expansion tray (FIGURE 2-31).
3. Connect one FC cable between the Controller B channel 1 expansion port and the B-side expansion port 1B of expansion tray 1 (FIGURE 2-37).
4. Connect one FC cable between the B-side expansion port 1A of expansion tray 1 and the B-side expansion port 1B of expansion tray 2 (FIGURE 2-37).
5. Connect one FC cable between the B-side expansion port 1A of expansion tray 2 and the B-side expansion port 1B of expansion tray 3 (FIGURE 2-37).
6. Connect one FC cable between the Controller B channel 2 expansion port and the B-side expansion port 1B of expansion tray 4 (FIGURE 2-37).
7. Connect one FC cable between the B-side expansion port 1A of expansion tray 4 and the B-side expansion port 1B of expansion tray 5 (FIGURE 2-37).
8. Connect one FC cable between the B-side expansion port 1A of expansion tray 5 and the B-side expansion port 1B of expansion tray 6 (FIGURE 2-37).
9. Connect one FC cable between the Controller A channel 1 expansion port and the A-side expansion port 1B of expansion tray 3 (FIGURE 2-37).
10. Connect one FC cable between the A-side expansion port 1A of expansion tray 3 and the A-side expansion port 1B of expansion tray 2 (FIGURE 2-37).
11. Connect one FC cable between the A-side expansion port 1A of expansion tray 2 and the A-side expansion port 1B of expansion tray 1 (FIGURE 2-37).
12. Connect one FC cable between the Controller A channel 2 expansion port and the A-side expansion port 1B of expansion tray 6 (FIGURE 2-37).
13. Connect one FC cable between the A-side expansion port 1A of expansion tray 6 and the A-side expansion port 1B of expansion tray 5 (FIGURE 2-37).
14. Connect one FC cable between the A-side expansion port 1A of expansion tray 5 and the A-side expansion port 1B of expansion tray 4 (FIGURE 2-37).

In this configuration, the following expansion ports are not used:

- A-side controller expansion port 1A of expansion tray 1
- A-side controller expansion port 1A of expansion tray 4
- B-side controller expansion port 1A of expansion tray 3
- B-side controller expansion port 1A of expansion tray 6

Next Steps

Now you are ready to connect the management and data hosts, as described in [Chapter 3](#).

Connecting the Management Host and Data Hosts

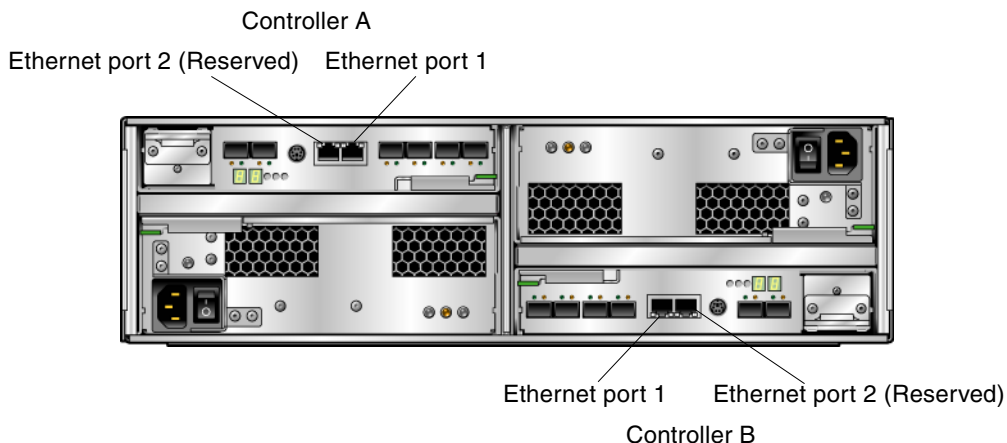
This chapter describes Sun StorageTek 6140 Array cable connections for hosts. It contains the following sections:

- “Connecting the Management Host” on page 73
- “Connecting Data Hosts” on page 75
- “Next Steps” on page 80

Connecting the Management Host

The management host directly manages Sun StorageTek 6140 Arrays over an out-of-band network. This section describes how to setup 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 *StorageTek 6140 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 74
- [“Attaching the Ethernet Ports to the LAN Using an Ethernet Hub”](#) on page 74
- [“Attaching the Ethernet Ports Directly to the Management Host With a Cross-Over Cable”](#) on page 75

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

Note – This method would typically be used only to establish temporary IP connectivity between the management host and the controller’s Ethernet ports.

To attach the Ethernet ports to directly to the management host using a cross-over cable:

1. **Locate the Ethernet port 1 for Controller A and 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 each controller.**
3. **Connect the other end of each Ethernet cable directly to [www.sun.com/products-n-solutions/hardware/docs/Network_Storage_Solutions/SAN/san_software/our management host Ethernet port](http://www.sun.com/products-n-solutions/hardware/docs/Network_Storage_Solutions/SAN/san_software/our_management_host_ethernet_port).**

Connecting Data Hosts

You can connect data hosts to access the Sun StorageTek 6140 Array through Fibre Channel (FC) switches to the array or directly to the array.

The Sun StorageTek 6140 Array has eight host connections, four per controller. To maintain redundancy, connect two data paths from each host, one to each controller.

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

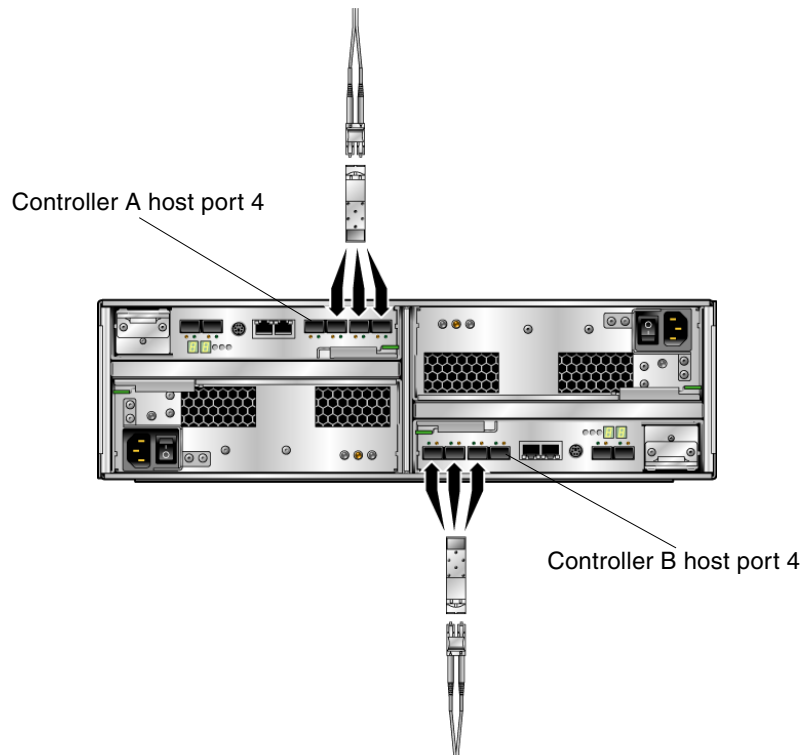
Connecting Data Hosts Through External Fibre Channel Switches

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 switch has been installed and configured as described in the vendor's installation documentation. (See the *Sun StorageTek 6140 Array Release Notes* for a list of supported switches.)
 - Interface cables are connected and routed between the host bus adapters (HBAs), switches, and installation site.
 - Fiber-optic cables (2-meter or required length) are available to connect the array to the FC switch.
1. **Locate the data host ports (Small Form-factor Plug-in (SFP) transceivers) at the back of the controller tray (FIGURE 3-2).**

FIGURE 3-2 Host Connections



2. Connect each fiber-optic cable to the 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 direct 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 Connecting Data Hosts Through a Switch

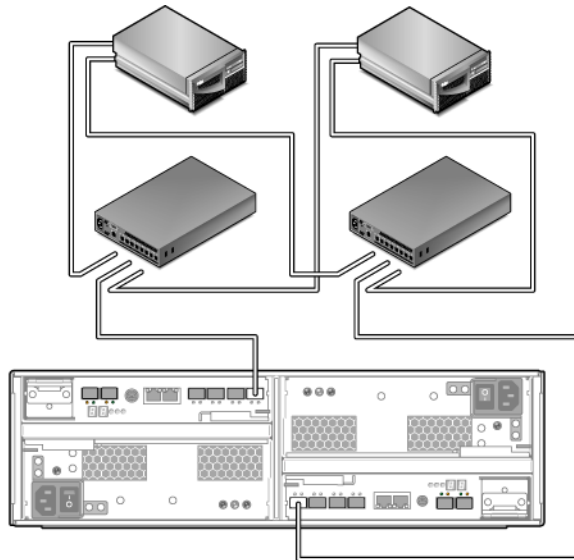
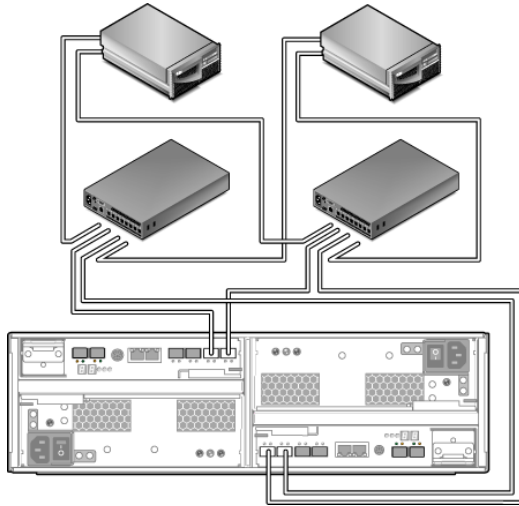


FIGURE 3-4 Connecting Data Hosts Through a Switch With Cross-Connections



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 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 HBAs and the installation site.
- Fiber-optic cables (2-meter or required length) are available to connect the array host ports to the data host HBAs.

1. Locate the host ports at the back of the controller tray (FIGURE 3-2).
2. Connect a fiber-optic cable to each 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

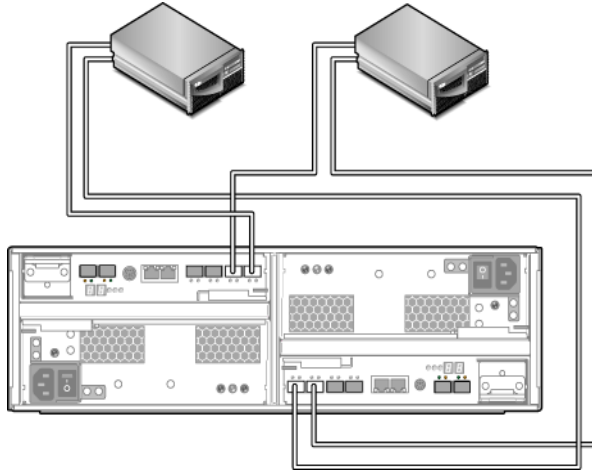
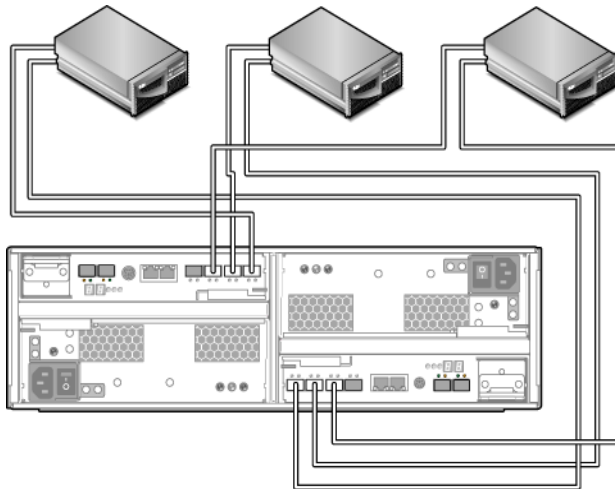


FIGURE 3-6 Direct Connection to Three Hosts With Dual HBAs



Next Steps

After you connected the management and data hosts, you can set the link rate and power on the trays, as described in [Chapter 4](#).

Verifying the Link Rate for Each Tray and Powering On the Array

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

- [“Before Powering On” on page 81](#)
- [“Verifying the Link Rate for Each Tray” on page 82](#)
- [“Powering On the Array” on page 83](#)
- [“Checking the Link Rate for Each Port” on page 84](#)
- [“Powering Off the Array” on page 85](#)
- [“Next Steps” on page 86](#)

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 103](#).

Verifying the Link Rate for Each Tray

The Tray Link Rate switch on each 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 2 Gbits/second and 4 Gbits/second data transfer speeds. 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 2 Gbits/second and 4 Gbits/second, but the expansion tray rate setting must be set to the lowest Disk Drive speed rate via the 2 Gbits/second and 4 Gbits/second switch located on the lower right of the enclosure (FIGURE 4-1).

If there is an enclosure-to-controller data transfer speed mismatch, the LED error code segment display at the back of the controller tray indicates a code of: H7 – Current Enclosure Fibre Channel Rate Different than Rate Switch.

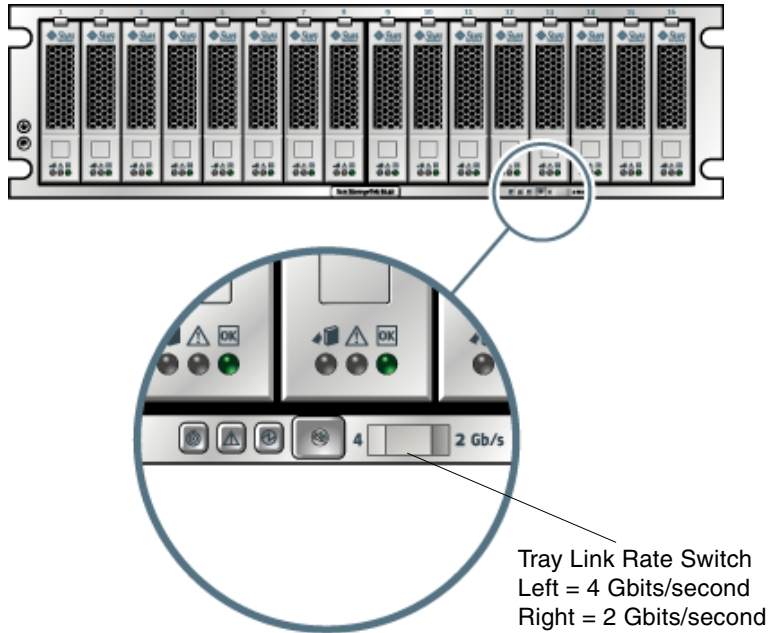
You can determine the speed of the disks in the tray by removing one of the disk drives and examining the label. Next to the disk name on the label is a number indicating the RPM and speed of the disk. For example, the number 15k.4 indicates the disk is 15,000 RPMs and 4 Gbytes.

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:

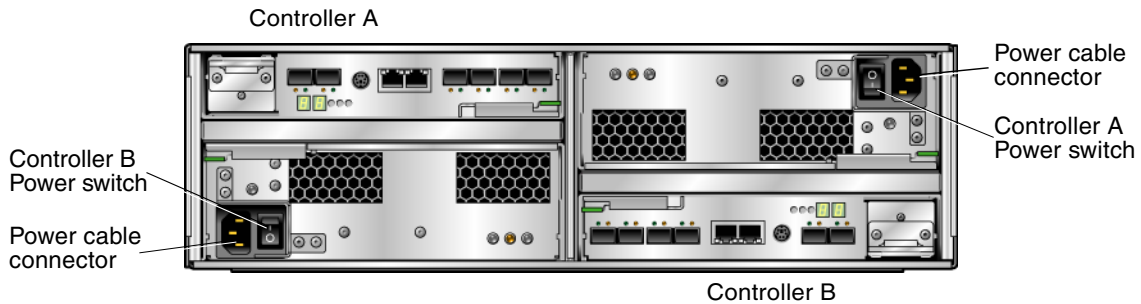
- For 4 Gbits/second, slide the Tray Link Rate switch to the left position.
- For 2 Gbits/second, slide the Tray Link Rate switch to the right position.

Powering On 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 up 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. Prepare the power cables as specified in [“Connecting the Power Cables” on page 56](#).
2. Turn on the cabinet circuit breakers, if applicable.
3. Press the power switches at the back of each expansion tray to the On position.
4. 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 on 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. When the power-on sequence is complete, the controller tray ID indicates 85.
5. Check the status of each tray.
After the power-on sequence is complete, confirm the following:
 - The green OK/Power LEDs on each drive in the tray are steady on.
 - The green OK/Power LED on the tray is steady on.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.

Checking the Link Rate for Each Port

Verify the expected link rate for each port. Link rate indicators for the expansion ports are located at the back of the controller tray ([FIGURE 1-4](#)) and the expansion tray ([FIGURE 1-7](#)).

Note – The host port indicators at the back of the controller tray (FIGURE 1-4) cannot be verified until the hosts are connected (See “Connecting Data Hosts” on page 75).

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

Note – If Media Scan is enabled (the default), the disk drive LEDs will continue to flash after the 2-minute period has elapsed. By waiting the 2-minute period, you ensure that the data residing in cache has been written to disk. The LED flash rate during a media scan (slow, periodic blink) is different from the flash rate of I/O (fast, random).

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

3. **Check the Cache Active LED on the controller (FIGURE 1-4) to determine if any outstanding cache needs to be written.**
If the LED is on, there is still data that needs to be flushed and written to disk.
4. **Ensure that the Cache Active LED is no longer flashing before powering off the array.**
5. **Press each power switch at the back of the controller tray to the Off position.**
6. **Press the power switches at the back of each expansion tray to the Off position.**

Next Steps

After you have connected the management host and data hosts, you are ready to install the management host software as described in the *Sun StorageTek Common Array Manager Software Installation Guide* and the data host software 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 87](#)
- [“Setting Up a Data Host On a Solaris System” on page 88](#)
- [“Installing Data Host Software for Operating Systems Other Than Solaris” on page 90](#)
- [“Enabling Multipathing Software” on page 92](#)
- [“Downloading the Veritas Volume Manager ASL” on page 93](#)
- [“Next Steps” on page 94](#)

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

A Host Bus Adapter (HBA) is a network interface card 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/storageetek/storage_networking/hba/](http://www.sun.com/storageetek/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 6140 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 6140 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 the Solaris 10 OS.

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 6140 Array Release Notes*.

Setting Up a Data Host On a Solaris System

The Sun StorageTek 6140 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 6140 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 90.

You must install data host software (including multipathing) on each data host that communicates with the Sun StorageTek 6140 Array. Multipathing is included in the Solaris 10 OS. 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 89
- [“To Install the SAN 4.4 Data Host Software”](#) on page 90

▼ 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 6140 Array Release Notes* for the current data host software requirements. Download the Solaris *x* (8 or 9) Base Package (if you do not already have it installed), and then the `Install_it` Script SAN 4.4.x 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 92).**

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 91
- [“Downloading and Installing Sun RDAC Software”](#) on page 91
- [“To Download the AIX ASL Package”](#) on page 92

Note – To download software from the Sun Download Center, you must register as a Sun customer. The first time you click Download to download a software product, click the Register Now link on the Login page, complete the required fields, and click Register.

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 MultiPathing (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 Multi-Processing Executive (MPE). Netware is available only from Novell.

See the *Sun StorageTek 6140 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.**
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” on page 92](#)
- [“Enabling Multipathing Software for Solaris 10 OS” on page 93](#)

▼ 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-disable="no"`; 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 StorEdge SAN Foundation Software 4.4 Configuration Guide* (www.sun.com/products-n-solutions/hardware/docs/Network_Storage_Solutions/SAN/san_software/) 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)` man page 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 Return to reboot the host.

Downloading the Veritas Volume Manager ASL

Veritas Volume Manager provides support for the Sun StorageTek 6140 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 6140 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. 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.
6. Download the compressed zip file that contains the ASL package for the Sun StorageTek 6140 array and README file.
7. Use the unzip command to extract the files.
8. 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” on page 95](#)
- [“Configuring the IP Address of the Array Controllers” on page 96](#)

About IP Addressing

The Sun StorageTek 6140 Array is managed out-of-band by way of a standard Ethernet connection between the redundant array of independent disk (RAID) controllers and your management host.

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

- Configure IP addresses for the array controllers (see [“Configuring the IP Address of the Array Controllers” on page 96](#))
- Configure an IP address for the management host (see the *Sun StorageTek Common Array Manager Software Installation Guide*)

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

To configure Ethernet port 1 on a controller with either dynamic or static IP addressing, see one of the following sections:

- [“Configuring Dynamic \(DHCP\) IP Addressing” on page 96](#)
- [“Configuring Static IP Addressing” on page 97](#)

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 as described in [“Configuring the IP Address of the Array Controllers” on page 96](#).

If you want to set up a DHCP server, refer to [Appendix A](#) for a description of how to configure BOOTP services in Sun Solaris or Microsoft Windows environments.

You can restore DHCP IP addressing to Ethernet port 1 of either controller in either of two ways:

- Using the serial port interface (see [“Using the Serial Port Interface to Assign IP Addresses” on page 97](#))
- Using the Sun StorageTek Common Array Manager (see the *Sun StorageTek Common Array Manager Software Installation Guide*)

Configuring Static IP Addressing

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

- The serial port interface (see [“Using the Serial Port Interface to Assign IP Addresses”](#) on page 97)
- The Common Array Manager (see 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.

Using the Serial Port Interface to Assign IP Addresses

You can use the serial port interface on a controller to set the IP address for Ethernet port 1 on the controller.

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:

- [“To Connect a Terminal to the Serial Port”](#) on page 97
- [“To Set Up the Terminal Emulation Program”](#) on page 98
- [“To Establish a Connection With the Serial Port”](#) on page 98
- [“To Configure the IP Addresses”](#) on page 99

▼ To Connect a Terminal to the Serial Port

You will establish a serial connection to each controller, Controller A and Controller B. Two mini-DIN to RJ45 serial port cables are supplied with each controller tray.

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

1. **Connect the 6-pin mini-DIN connector of the serial cable to the serial port connector on the controller** ([FIGURE 1-3 on page 7](#)).
2. **Connect the RJ-45 connector of the serial cable to the serial port connector on the terminal.**

▼ To Set 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: 38400
 - Data Bits: 8
 - Parity: None
 - Stop Bits: 1
 - Flow Control: None

▼ To Establish a Connection With the Serial Port

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

1. **Press Break.**

Note – The array serial port requires that the break character be received. Use the appropriate escape sequence for your terminal setup to send the required break character to the array controller. For example, you generate the Break character on some terminals by pressing the Control and Break keys simultaneously.

The serial port responds with a request to synchronize 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 38400
```

3. **Press Break (see Note above)**

The serial port responds with the following message:

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

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

Note – Send Break to synchronize the serial port to a different terminal port rate (see Note above).

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:
```

▼ To Configure 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	<i>IP-address</i>
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 Ethernet port on the controller.

When you have completed the IP address configuration for the Ethernet ports on both array controllers, see the *Sun StorageTek Common Array Manager Software Installation Guide* for instructions on registering and configuring the array.

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:

- “Before You Begin” on page 103
- “Setting Up a Solaris DHCP Server” on page 103
- “Setting Up a Windows 2000 Advanced Server” on page 108

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:**

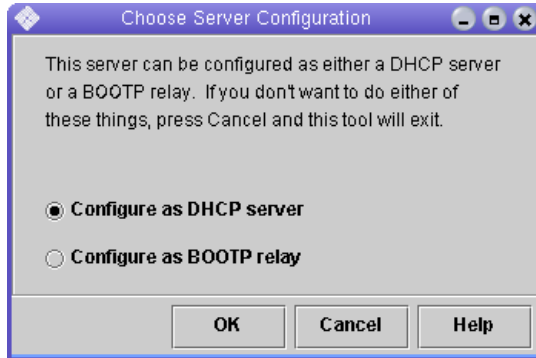
```
#netmasks: nis [NOTFOUND=return] files
```

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

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

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

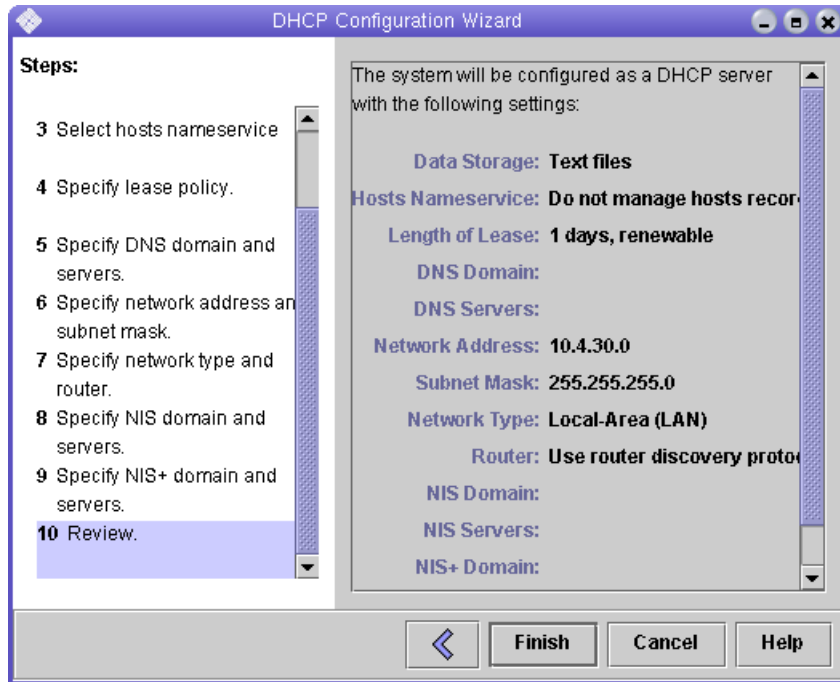
The following window is displayed:



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:

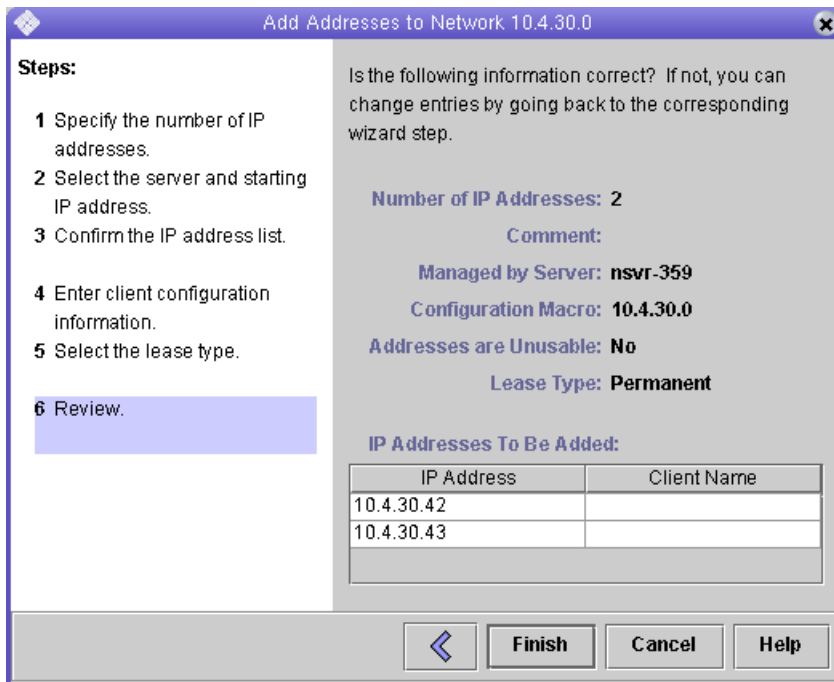
- Data storage format: **Text files**
- Nameservice to store host records: **Do not manage hosts records**
- Length of lease:
- Network Address: *Network address of Controller A*
- Subnet Mask: For example, 255.255.255.0
- Network Type: **Local-Area (LAN)**
- Router: **Use router discovery protocol**

Your summary page should look similar to the following example:



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:



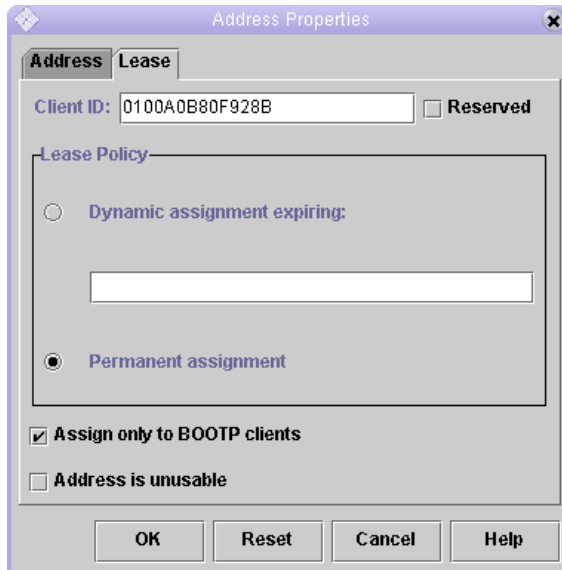
6. Verify your configuration information and click Finish.

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."



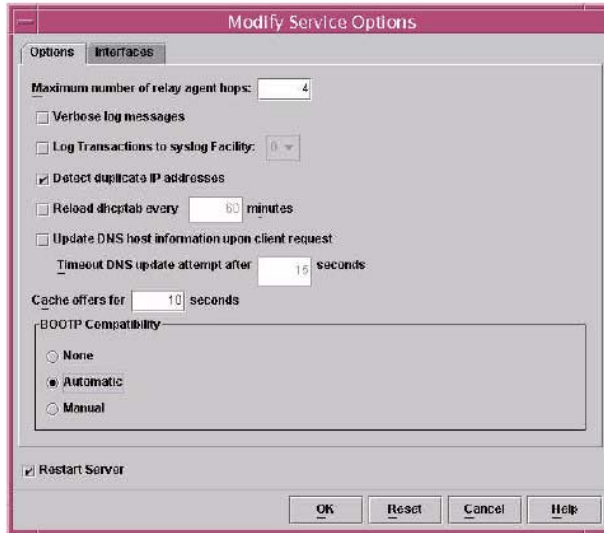
c. Click OK.

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

Network:	Client Name	Status	Expires	Server	Macro	Client ID	Com
10.4.30.0	nenc-388	Bootp		nsvr-359	10.4.30.0	0100A0B80F928B	
	nenc-388b	Bootp		nsvr-359	10.4.30.0	0100A0B80F924C	

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 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.

Disk Drive Insertion

This appendix describes how to properly insert a disk drive into a controller or expansion tray.

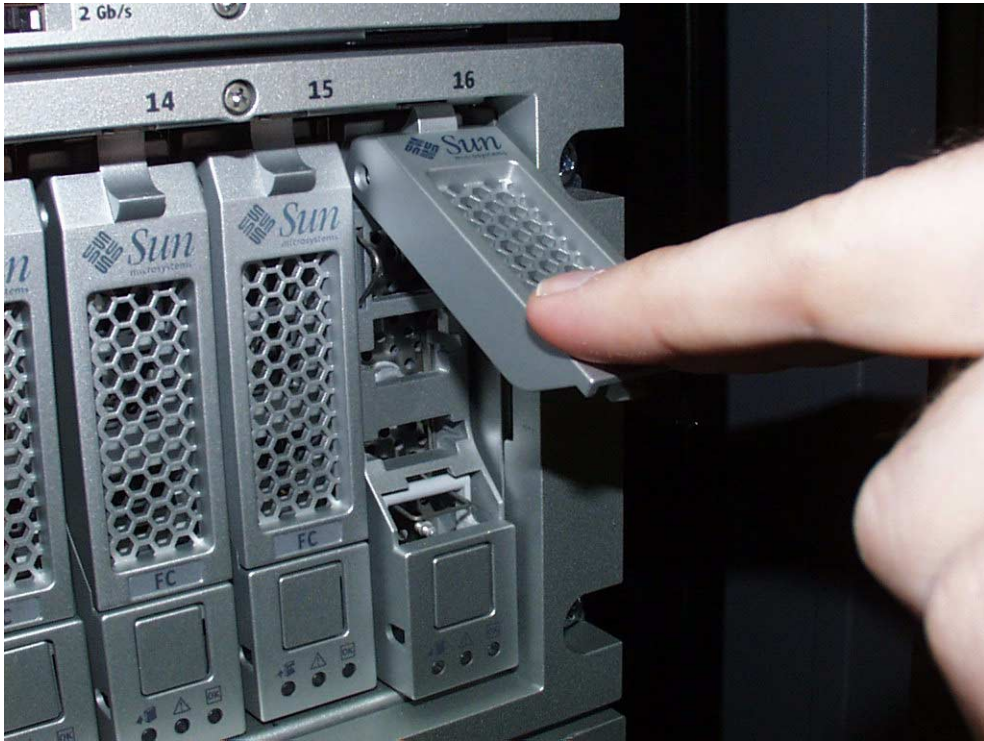
Drives are inserted with the power on, unless specifically instructed not to by Sun technical support.

The correct way to insert a disk drive into the tray is as follows:

1. Lift the drive handle up to open it.
2. Push the disk drive into the chassis by slowly pushing against the drive housing until the drive handle engages with the chassis.
3. When the handle starts to move itself downwards, push the disk drive handle down. This will crank the disk drive the rest of the way into the chassis.

FIGURE A-1 shows a drive being inserted into the chassis the correct way.

FIGURE A-1 Inserting a Disk Drive.



When the drive is completely installed, the drive and handle will be flush with the others, as shown in [FIGURE A-2](#).

FIGURE A-2 Successfully Inserted Disk Drive



Caution – Do not insert a disk drive into a tray by pushing on its housing until it is all the way in. This can cause the handle to be stuck in the “up” position so it is unable to close.

[FIGURE A-3](#) shows the wrong way to insert the drive.

FIGURE A-3 Incorrect Method of Inserting a Hard Drive



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.

A

agent

The component of the system monitoring and diagnostic software that collects health and asset information about the array.

alarm

A type of event that requires service action. See also [event](#).

alert

A subtype of an event that requires user intervention. The term *actionable event* often describes an alert. See also [event](#).

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](#).

B

block

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

C

capacity

The amount of storage you must allocate to storage elements, including volumes, pools, and virtual disks. Capacity planning should include allocations for volume snapshots and volume copies.

CLI

Command-line interface. The SSCS command-line interface is available from the remote CLI client or through an SSCS directory on the Solaris Operating System management software station.

controller tray

A tray with an installed redundant RAID controller pair. In a Sun StorageTek 6140 array, 1x1, 1x2, 1x3, 1x4, 1x5, 1x6, and 1x7 array types are available.

control path

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

customer LAN

See [site LAN](#).

D

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). See also [host](#).

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.

E**event**

A notification of something that happened on a device. There are many types of events, and each type describes a separate occurrence. See also [alarm](#) and [alert](#).

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.

F**failover and recovery**

The process of changing the data path automatically to an alternate path.

fault coverage

The percentage of faults detected against all possible faults or against all faults of a given type.

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.

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.

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 \(FRU\)](#).

H

HBA

See [host bus adapter \(HBA\)](#).

host

As a function of the Sun StorageTek 6140 array configuration, a representation of a data host that is mapped to initiators and volumes to create a storage domain. See also [data host](#), [initiator](#).

host bus adapter (HBA)

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

host group

A group of hosts with common storage characteristics that can be mapped to volumes. See also [host](#).

hot-spare

The drive used by a controller to replace a failed disk. See also [array hot-spare](#).

I

in-band traffic

System management traffic that uses the data path between a host and a storage device. See also [out-of-band traffic](#).

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.

L

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 \(LUN\)](#).

M

MAC address

See [media access control \(MAC\) address](#).

management host

A Solaris host serving the configuration, management, and monitoring software for the Sun StorageTek 6140 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 to access the SCS CLI commands.

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.

mirroring

A form of storage – also called RAID Level 1, independent copy, and real-time copy – whereby two or more independent, identical copies of data are maintained on separate media. Typical mirroring technologies enable the cloning of data sets to provide redundancy for a storage system.

multipathing

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

N**O****out-of-band traffic**

System management traffic outside of the primary data path that uses an Ethernet network. See also [in-band traffic](#).

P**PDU**

See [power distribution unit \(PDU\)](#).

pool

See [storage pool](#).

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.

profile

See [storage profile](#).

provisioning

The process of allocation and assignment of storage to hosts.

R**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. 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.

S**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.

snapshot

An copy of a volume's data at a specific point in time.

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.

storage domain

A secure container that holds a subset of the system's total storage resources. Multiple storage domains can be created to securely partition the system's total set of storage resources. This enables you to organize multiple departments or applications into a single storage management infrastructure.

storage pool

A container that groups physical disk capacity (abstracted as virtual disks in the browser interface) into a logical pool of available storage capacity. A storage pool's characteristics are defined by a storage profile. You can create multiple storage pools to segregate storage capacity for use in various types of applications (for example, high throughput and online transaction-processing applications).

storage profile

A defined set of storage performance characteristics such as RAID level, segment size, dedicated hot-spare, and virtualization strategy. You can choose a predefined profile suitable for the application that is using the storage, or you can create a custom profile.

storage tray

An enclosure containing disks. A tray with dual RAID controllers is called a controller tray; a tray without controllers is called an expansion tray.

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).

T

target

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

thin-scripting client

See [remote scripting CLI client](#).

tray

See [storage tray](#).

U**V****virtual disk**

A set of disk blocks presented to an operating environment as a range of consecutively numbered logical blocks with disk-like storage and I/O semantics. The virtual disk is the disk array object that most closely resembles a physical disk from the operating environment's viewpoint.

volume

A logically contiguous range of storage blocks allocated from a single pool and presented by a disk array as a logical unit number (LUN). A volume can span the physical devices that constitute the array, or it can be wholly contained within a single physical disk, depending on its virtualization strategy, size, and the internal array configuration. The array controller makes these details transparent to applications running on the attached server system.

volume snapshot

See [snapshot](#).

W**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

A

about installing data host software for non-Solaris host, 91

about IP addressing, 95

array

about IP addressing, 95

balancing expansion trays, 59

cabling a 1x2 configuration, 60

cabling a 1x3 configuration, 61

cabling a 1x4 configuration, 62

cabling a 1x5 configuration, 65

cabling a 1x6 configuration, 66

cabling a 1x7 configuration, 69

configuration naming convention, 58

configuring controller IP addressing, 96

installation checklist for, 18

powering on, 83

powering-off, 85

pre-installation process for, 18

attaching rails to a Telco rack

2-post rack, 42

B

balancing expansion trays, 59

book

before you read, xv

organization, xvi

related documentation, xvi

submitting comments to Sun, xviii

C

cabinet

attaching rails to a standard 19-inch cabinet, 27

attaching rails to a Sun Expansion cabinet, 32

attaching rails to a Sun Fire cabinet, 32

attaching rails to a Sun Rack 900/1000, 27

controller tray slot, 26

installing a tray, 52

preparing for tray installation, 26

universal rail kit mounting hardware, 23

cabling

1x2 array configuration, 60

1x3 array configuration, 61

1x4 array configuration, 62

1x5 array configuration, 65

1x6 array configuration, 66

1x7 array configuration, 69

Ethernet ports directly to management host, 75

Ethernet ports to a management LAN, 74

Ethernet ports using a hub, 74

intertray connections, 57

power connections, 56

comments

submitting to Sun, xviii

components

expansion tray, 13

configuration naming convention, 58

Configuration wizard for DHCP, 104

configuring controller IP addressing, 96

configuring DHCP IP addressing, 96

configuring IP addressing using the controller serial port, 97

configuring static IP addressing, 97

connecting a data host through an FC switch, 76

- connecting a terminal to a controller serial port, 97
- connecting data hosts directly, 79
- connecting power cables, 56
- connecting the management host, 73
- contacting technical support, xviii
- contents
 - universal rail kit, 22
- controller
 - configuring IP addressing, 96
 - connecting a terminal to the serial port, 97
 - connecting Ethernet ports to a management LAN, 74
 - connecting Ethernet ports to directly to management host, 75
 - connecting using an Ethernet hub, 74
 - establishing communication between a terminal and the serial port, 98
 - using the serial port to configure IP addressing, 97
- controller tray
 - installation slot in cabinet, 26
 - ship kit contents, 26
- controller tray configuration, 3
- controller tray LEDs and switches, 5, 9

D

- data host
 - connecting directly, 79
 - connecting through FC switches, 76
 - setting up, 88
- data host software
 - about installing for a non-Solaris host, 91
 - downloading software for a non-Solaris OS, 91
 - installing for a non-Solaris host, 89, 90, 92
- DHCP
 - Configuration wizard for, 104
 - server configuration
 - before you begin, 103
 - Solaris DHCP server setup, 109
 - Windows 2000 Advanced Server installation, 109
 - Windows 2000 Advanced Server requirements, 108
- DHCP IP addressing
 - configuring, 96
- documentation
 - accessing from Sun, xvii

- related, xvi
- downloading data host software for a non-Solaris host, 91

E

- emulation
 - setting up a terminal, 98
- enabling multipathing software, 92
- establishing communication between a terminal and a controller serial port, 98
- Ethernet ports
 - connecting directly to management host, 75
 - connecting to a management LAN, 74
 - connecting using a hub, 74
- expansion tray, 13
 - balancing, 59
 - LEDS (back), 15
 - LEDS (front), 14
 - ports and components, 13
 - ship kit contents, 26

F

- FC switch
 - connecting a data host through, 76

H

- hardware
 - universal rail kit, 23
- hardware overview, 2
 - controller tray configuration in, 3
 - controller tray LEDs and switches in, 5, 9
 - expansion trays in, 13
- host
 - connecting data directly, 79
 - connecting data through a FC switch, 76
 - connecting for management, 73
 - setting up a data host, 88

I

- installation of trays
 - Telco 2-post rack, 47
- installation process, 18
- installing a tray in a cabinet, 52
- installing data host for a non-Solaris host, 92
- installing data host software for a non-Solaris host, 92

installing data host software for non-Solaris host, 89, 90

intertray cabling, 57
1x2 configuration, 60
1x3 configuration, 61
1x4 configuration, 62
1x5 configuration, 65
1x6 configuration, 66
1x7 configuration, 69

IP addressing
about, 95
configuring DHCP, 96
configuring for array controllers, 96
configuring static, 97
using the controller serial port, 97

L

LEDs
controller tray (back), 9
controller tray (front), 5, 9
expansion tray (back), 15
expansion tray (front), 14
Port Link Rate, 84

link rate
checking for a port, 84
setting, 82

M

management host
connecting, 73
mounting
universal rail kit hardware, 23
multipathing software
enabling, 92

N

New Scope wizard, 109

O

organization of book, xvi

P

part numbers
universal rail kit, 22
planning the tray installation order, 26
Port Link Rate LED, 84
ports

expansion tray, 13

power
connecting cables, 56
powering off the array, 85
power-on procedures
array, 83
before powering-on, 81
checking the port link rate, 84
preparing the cabinet for tray installation, 26
preparing the tray for installation, 25
product overview, 1
hardware, 2
controller tray configuration, 3
controller tray LEDs and switches, 5, 9
expansion tray, 13
software, 17

R

rack
universal rail kit mounting hardware, 23
rackmount kit preparation, 22
rail kit
unpacking, 22
rails
attaching to a Sun Expansion cabinet, 32
attaching to a Sun Fire cabinet, 32
attaching to a Telco rack
2-post rack, 42
attaching to standard 19-inch cabinet, 27
attaching to Sun Rack 900/1000, 27
attaching to unthreaded cabinet
attaching rails to unthreaded cabinet, 36
loosening length adjustment screws, 25
related documentation, xvi

S

serial port
connecting a terminal, 97
establishing communication with a terminal, 98
setting up terminal emulation, 98
using to configure IP addressing, 97
setting the tray link rate, 82
setting up a data host, 88
setting up terminal emulation, 98
ship kit
controller tray, 26

- expansion tray, 26
- software
 - enabling multipathing, 92
 - installing data host for non-Solaris host, 89, 90
- software overview, 17
- static IP addressing
 - configuring, 97
- switch
 - connecting a data host through, 76
 - Tray Link Rate, 82

T

- technical support
 - contacting, xviii
- terminal
 - connecting to a controller serial port, 97
 - establishing communication with a controller
 - serial port, 98
 - setting up emulation, 98
- third party web sites, xvii
- tools
 - required for tray installation, 21
- tools required for tray installation, 41
- tray
 - installation order, 26
 - installing, 52
 - intertray cabling, 57
 - preparing for installation, 25
 - preparing the cabinet for installation, 26
 - setting the link rate, 82
 - ship kit contents, 26
 - tools required for installation, 21
 - unpacking, 25
- tray installation
 - preparing the rackmount kit for, 22
 - tools required for, 41
- Tray Link Rate switch, 82

U

- universal rail kit
 - attaching to a standard 19-inch cabinet, 27
 - attaching to a Sun Expansion cabinet, 32
 - attaching to a Sun Fire cabinet, 32
 - attaching to a Sun Rack 900/1000, 27
 - attaching to unthreaded cabinet, 36
 - contents, 22
 - mounting hardware, 23

- part numbers, 22
- unpacking, 22
- unpacking a tray, 25

W

- web sites
 - third-party, xvii