

Hitachi Simple Modular Storage 100

User's Guide

FASTFIND LINKS

[Document Organization](#)

[Product Version](#)

[Getting Help](#)

[Table of Contents](#)

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Table of Contents

- Preface vii**
- Document Revision Levelviii
- Changes in this Revision.viii
- Safety and Warningsviii
- Environmental Notices ix
- Intended Audience ix
- Product Version. ix
- Supplemental Documentation ix
- Document Organization ix
- Related Documents x
- Document Conventions x
- Convention for Storage Capacity Values. xi
- Getting Help xi
 - Support Contact Information xi
 - HDS Support Web Site xii
- Comments xii

- 1 Introduction 1-1**
- Overview 1-1
- Product Description 1-2
- Key Features. 1-2
- Clear Customer Benefits. 1-3
- Storage Features. 1-3
 - Holistic Backup and Recovery 1-3
 - LUN Management 1-4
 - Security 1-4
 - Monitoring System Performance 1-5
- Supported Host Operating Systems 1-5
- Supported Topologies 1-5
 - Direct Connect Topology 1-6
 - Switch (Fabric) Topology 1-6

| | |
|--|-----|
| Concepts and Terms | 1-7 |
| RAID 6 | 1-7 |
| iSCSI | 1-7 |
| iSCSI Initiators and Targets | 1-7 |
| LUNs | 1-8 |
| CHAP | 1-8 |

2 Identifying Hardware Components 2-1

| | |
|--|-----|
| Front Panel Components | 2-1 |
| Drive Slots | 2-2 |
| Front Panel LEDs. | 2-2 |
| Power LED | 2-2 |
| Ready LED | 2-2 |
| Alarm LED | 2-2 |
| Warning LED. | 2-3 |
| Back Panel Components. | 2-3 |
| iSCSI Gigabit Ethernet Data Ports (PORT A and PORT B). | 2-4 |
| 10/100 Ethernet Management Ports (LAN). | 2-5 |
| 10/100 Ethernet Maintenance Ports (MAINTENANCE ONLY) | 2-6 |
| Fans. | 2-6 |
| Power Supplies | 2-7 |
| ON/OFF Switch (MAIN SW) | 2-8 |
| Mode Switch. | 2-8 |
| Top Components. | 2-9 |

3 Installing Your Array 3-1

| | |
|--|------|
| Installation at a Glance | 3-2 |
| Preparing Your Site | 3-3 |
| Topology Considerations | 3-3 |
| Site Considerations | 3-3 |
| Rack-Mount Considerations | 3-4 |
| Server Considerations | 3-4 |
| Safety Considerations | 3-5 |
| Unpacking | 3-7 |
| Required Items Supplied by the User | 3-8 |
| Installing the Hitachi Simple Modular Storage 100 | 3-9 |
| Installing on a Table or Shelf | 3-9 |
| Rack-Mounting the Hitachi Simple Modular Storage 100 | 3-9 |
| Attaching the Front Panel Bezel | 3-11 |
| Removing the Front Panel Bezel | 3-12 |
| Connecting to the 10/100 Ethernet Management Port. | 3-13 |
| Connecting to the iSCSI Gigabit Ethernet Data Ports. | 3-14 |
| Connecting Power | 3-15 |
| Verifying Startup Operations | 3-16 |
| Configuring and Managing Your Storage | 3-17 |

| | |
|--|------------|
| Installing the Storage Navigator Modular 2 Software | 3-17 |
| Logging in to Storage Navigator Modular 2 | 3-18 |
| Adding Arrays (Add Array Wizard) | 3-18 |
| Configuring Array Drives (Initial Setup Wizard) | 3-19 |
| Creating Logical Units | 3-19 |
| Specifying Mode Parameters | 3-20 |
| Installing iSCSI Initiator Software | 3-21 |
| Hitachi Simple Modular Storage 100 Host Installation Guide | 3-21 |
| 4 Maintaining Your Array | 4-1 |
| Installing Spares | 4-2 |
| Before You Begin | 4-2 |
| Checking for Defective Drives | 4-2 |
| Installing the Spare Drives | 4-5 |
| Caring for Your Hitachi Simple Storage Modular | 4-7 |
| Migrating Data | 4-7 |
| Moving Your Hitachi Simple Storage Modular | 4-8 |
| Before You Move Your Hitachi Simple Modular Storage 100 | 4-8 |
| After Your Array is in the New Location | 4-8 |
| Storing Your Hitachi Simple Storage Modular 100 | 4-9 |
| 5 Troubleshooting | 5-1 |
| Recovering from Failures | 5-2 |
| Troubleshooting Your Array | 5-5 |
| A Upgrading Firmware | A-1 |
| B Specifications | B-1 |
| Mechanical Specifications | B-2 |
| Electrical Specifications | B-3 |
| Environmental Specifications | B-4 |
| Power Cables | B-4 |
| Ethernet Specifications | B-6 |
| | |
| Glossary | |
| | |
| Index | |



Preface

Congratulations on your new Hitachi Simple Modular Storage 100 array.

Your Hitachi Simple Modular Storage 100 is a powerful Internet Small Computer System Interface (iSCSI) solution that provides a range of benefits, features, and economics from its ability to use familiar, proven, and widespread networking technologies like Internet Protocol (IP) and Ethernet for storage solutions. Your Hitachi Simple Modular 100 is designed for businesses that want to improve the reliability, availability, serviceability, and performance of their storage systems.

This guide will assist you in installing, configuring, and maintaining your Hitachi Simple Modular Storage 100.

This preface includes the following information:

- [Document Revision Level](#)
- [Changes in this Revision](#)
- [Safety and Warnings](#)
- [Environmental Notices](#)
- [Intended Audience](#)
- [Product Version](#)
- [Supplemental Documentation](#)
- [Document Organization](#)
- [Related Documents](#)
- [Document Conventions](#)
- [Convention for Storage Capacity Values](#)
- [Getting Help](#)
- [Comments](#)

Notice: The use of the Hitachi Simple Modular Storage and all Hitachi Data Systems products is governed by the terms of your agreement(s) with Hitachi Data Systems.

Document Revision Level

This section provides a history of the revision changes to this document.

| Revision | Date | Description |
|----------------|----------------|---|
| MK-97DF8061 | September 2007 | Initial Release |
| MK-97DF8061-01 | November 2007 | Revision 1, supersedes and replaces MK-97DF8061-00. |

Changes in this Revision

This section provides a list of changes from the previous revision to this one.

- Not applicable (initial release)

Safety and Warnings

This document uses the following symbols to draw your attention to certain information.

| Symbol | Meaning | Description |
|---|-------------------------|---|
|  | Tip | Tips provide helpful information, guidelines, or suggestions for performing tasks more effectively. |
|  | Note | Notes emphasize or supplement important points of the main text. |
|  | Caution | Cautions indicate that failure to take a specified action could result in damage to the software or hardware. |
|  | WARNING | Warnings indicate that failure to take a specified action could result in loss of data or serious damage to hardware. |
|  | DANGER | Danger warns users of possible injury or death if instructions are not followed. |
|  | ELECTRIC SHOCK HAZARD! | This symbol warns users of electric shock hazard. Failure to take appropriate precautions such as not opening or touching hazardous areas of the equipment could result in injury or death. |
|  | Electrostatic Sensitive | The ESD symbol warns users that the equipment is sensitive to electrostatic discharge (ESD) and could be damaged if users do not take appropriate precautions such as using a grounded wrist strap when touching or handling the equipment. |

Environmental Notices

FCC Notice Federal Communications Commission

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case users will be required to correct the interference at their own expense.

Intended Audience

This document is intended for users who are involved in installing, configuring, and operating your Hitachi Simple Modular Storage 100.

To use this document, you should have a working knowledge of the following:

- A basic understanding of data storage concepts
- Familiarity with system installation and configuration terminology
- An understanding of the host operating system supported by your Hitachi Simple Modular Storage 100

Product Version

This document revision applies to Hitachi Simple Modular Storage microcode versions 1810/A and higher.

Supplemental Documentation

Release Notes. Please read the Release Notes before installing and/or using this product. The Release Notes are located on the installation CD). They may contain requirements and/or restrictions that are not fully described in this document. The Release Notes may also contain updates and/or corrections to this document.

Document Organization

The following table provides an overview of the contents and organization of this document. Click the [chapter title](#) in the first column to go to that chapter. The first page of every chapter or appendix contains a brief list of the contents of that section of the manual, with links to the pages where the information is located.

| Chapter/Appendix Title | Description |
|--|---|
| Chapter 1, Introduction | Provides a brief overview of your Hitachi Simple Modular Storage 100. |
| Chapter 2, Identifying Hardware Components | Describes the hardware components on your Hitachi Simple Modular Storage 100. |
| Chapter 3, Installing Your Array | Provides instructions for installing your Hitachi Simple Modular Storage 100. |
| Chapter 4, Maintaining Your Array | Describes how to install spares and care, transport, and store your Hitachi Simple Modular Storage 100. An overview of migrating data is also provided. |
| Chapter 5, Troubleshooting | Provides information for identifying and resolving problems. |
| Appendix A, Upgrading Firmware | Describes how to upgrade your Hitachi Simple Modular Storage 100 firmware. |
| Appendix B, Factory Default Settings | Shows your Hitachi Simple Modular Storage 100 factory default configuration. |
| Appendix B, Specifications | Lists your Hitachi Simple Modular Storage 100 specifications. |
| Glossary | Defines the acronyms and special terms used in this document. |
| Index | Provides a detailed and linked list of topics in this manual. |

Related Documents

- *Hitachi Simple Modular Storage 100 Quick Installation Guide* (MK-97DF8059)
- *Hitachi Simple Modular Storage 100 Quick Configuration Guide* (MK-96DF8090)
- *Hitachi Simple Modular Storage 100 Drive Installation Guide* (MK-96DF8060)
- *Hitachi Simple Modular Storage 100 Auto Migration Assistant Guide* (MK-96DF8066)
- Hitachi Storage Navigator Modular 2 online help

Document Conventions

The following table describes the typographic conventions used in this document.

| Convention | Description |
|---------------------|--|
| Bold | Indicates text on a window, other than the window title, including menus, menu options, buttons, fields, and labels. |
| Italic | Indicates a variable, which is a placeholder for actual text provided by the user or system. Example: copy source-file target-file. Note: Angled brackets (< >) are also used to indicate variables. |
| screen/code | Indicates text that is displayed on screen or entered by the user. |
| < > angled brackets | Indicates a variable, which is a placeholder for actual text provided by the user or system. Italic font is also used to indicate variables. |
| [] square brackets | Indicates optional values. |
| { } braces | Indicates required or expected values. |
| vertical bar | Indicates that you have a choice between two or more options or arguments. |
| underline | Indicates the default value. |

Convention for Storage Capacity Values

Storage capacity values for hard disk drives (HDDs) in Hitachi Data Systems' storage products are calculated based on the following values:

- 1 KB = 1,000 bytes
- 1 MB = 1,000² bytes
- 1 GB = 1,000³ bytes
- 1 TB = 1,000⁴ bytes

For further information on Hitachi Data Systems products and services, please contact your Hitachi Data Systems account team, or visit Hitachi Data Systems online at <http://www.hds.com>.

Getting Help

If you have questions after reading this guide, contact an HDS authorized service provider or visit the HDS support website: <http://support.hds.com>

Support Contact Information

If you purchased this product from an authorized HDS reseller, contact that reseller for support. For the name of your nearest HDS authorized reseller, refer to the HDS support web site for locations and contact information.

To contact the Hitachi Data Systems Support Center, please visit the HDS website for current telephone numbers and other contact information.
<http://support.hds.com>

Please provide at least the following information about the problem:

- Product name, model number, part number (if applicable) and serial number
- System configuration, including names of optional features installed, host connections, and storage configuration such as RAID groups and LUNs
- Operating system name and revision or service pack number
- The exact content of any error message(s) displayed on the host system(s)
- The circumstances surrounding the error or failure
- A detailed description of the problem and what has been done to try to solve it
- Confirmation that the HDS Hi-Track remote monitoring feature has been installed and tested.



NOTE: To help improve the quality of our service and support, your calls may be recorded or monitored.

HDS Support Web Site

The following pages on the HDS support web site contain other further help and contact information:

- Home Page: <http://support.hds.com>

Comments

Your comments and suggestions to improve this document are greatly appreciated. When contacting HDS, please include the document title, number, and revision. Please refer to specific section(s) and paragraph(s) whenever possible.

- E-mail: doc.comments@hds.com
- Mail: Technical Writing, M/S 35-10
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San Diego, CA 92131

Thank you! (All comments become the property of Hitachi Data Systems Corporation.)

Introduction

This chapter provides an overview of your Hitachi Simple Modular Storage 100 array. This chapter covers the following key topics:

- ❑ [Overview](#)
- ❑ [Product Description](#)
- ❑ [Key Features](#)
- ❑ [Clear Customer Benefits](#)
- ❑ [Storage Features](#)
- ❑ [Supported Host Operating Systems](#)
- ❑ [Supported Topologies](#)
- ❑ [Concepts and Terms](#)

Overview

Your Hitachi Simple Modular Storage 100 is a cost-effective, easily deployable, and fully integrated iSCSI storage solution that allows servers to connect to storage networking using Internet SCSI (iSCSI).

iSCSI is a standard for linking data storage devices over a network and transferring data by carrying SCSI commands over IP networks. On your Hitachi Simple Modular Storage 100, iSCSI disks reside on an expandable RAID-protected volume, but appear to a client machine as a local SCSI drive. Connectivity to the iSCSI disk is established using a software package or PCI card known as an iSCSI initiator, which must be installed on a client machine. The initiator recognizes your Hitachi Simple Modular Storage 100 as a “target portal” and an iSCSI disk as a “target.”

Hitachi Data Systems has qualified a number of iSCSI initiators, network interface cards (NICs), and other devices to interoperate with your Hitachi Simple Modular Storage 100. For the latest information about supported versions and models of iSCSI software and hardware products, please refer to the Hitachi Feature and Interoperability Reports at <https://extranet.hds.com/http://hifirerw.hds.com/HiFire/GuestRegister.jsp>.

Product Description

Your Hitachi Simple Modular Storage 100 is available in single- and dual-controller configurations:

- Arrays with a single controller provide two iSCSI data ports and 1 GB of cache.
- Arrays with dual controllers provide four iSCSI data ports and 2 GB of cache.

All iSCSI data ports support 1 Gbps full-duplex Ethernet (1000Base-T) speeds using standard Category 5e or Category 6 Ethernet Local Area Network (LAN) cables.

Both configurations support six, eight, or 12 Serial Advanced Technology Attachment (SATA) or Serial Attached SCSI (SAS) drives. SATA and SAS drives cannot be mixed in the same array.

Key Features

- 1 Gbps full-duplex Ethernet (1000Base-T) iSCSI data ports using standard Category 5e or Category 6 cables
- Available in single- and dual-controller configurations
- 1 GB cache per controller
- Provides up to 9 TB of storage
- Supports up to 255 host connections via iSCSI switch
- RAID 6 support allows for two simultaneous drive failures without data loss or downtime
- Modular design supports up to 12 SATA or SAS drives
- Modular design allows two spare drives to be added without having to power-down the array
- Challenge Handshake Authentication Protocol (CHAP) authentication authenticates end-node identities
- iSNS for discovery of devices on the iSCSI network
- Redundant (2) power supplies and fans
- Web-based management software featuring a point-and-click GUI and step-by-step wizards that simplify your ability to configure, provision, and manage storage on an as-needed basis
- Array can be configured to send email alerts when a serious event, such as a failure, occurs

Clear Customer Benefits

- Designed from the ground up as a reliable, cost-effective storage solution that is easy for users to install and maintain, without requiring storage expertise
- Proven, third-generation SAN storage technology that delivers enterprise features and remote data protection to small-to-midsize businesses
- High availability with RAID 6 protection to safeguard critical data assets
- Installs in minutes, with no single point of failure
- Scalable architecture allows up to two spare drives to be added while the array is running
- Built-in redundancy provide continuous access to data with dual paths from servers to disk drives, and fully redundant power
- Complete suite of quick-start guides, user guides, and Storage Navigator Modular 2 online help ensure you get the most out of your Hitachi Simple Modular Storage 100

Storage Features

Your Hitachi Simple Modular Storage 100 may come with several pre-installed storage features that enable you to simplify your storage tasks. The following sections describe these storage features.

User manuals for the features described in the following sections can be found as PDF files on the documentation CD supplied with your Hitachi Simple Modular Storage 100. If your storage feature requires a license key or code before it can be used, please refer to the Storage Navigator Modular 2 online help for instructions.



NOTE: Some of the features described in the following sections may not be available at the time your Hitachi Simple Modular Storage 100 was shipped. For more information, please refer to the Hitachi Feature and Interoperability Reports at <https://extranet.hds.com/http://hifirw.hds.com/HiFire/GuestRegister.jsp>.

Holistic Backup and Recovery

Features

- ShadowImage™ In-system Replication software
- Hitachi Copy-on-Write Snapshot software

From accidental file deletions to natural disasters, all kinds of data calamities threaten business operations and escalate the demands for better business practices. The challenge facing most companies is how to minimize the lost revenue and operating expenses these disasters cause. No matter what your company does or what size it is, business continuity matters to you. Your ability to recover data and resume operations depend completely on what you do before the disaster.

Data backups offer critically important benefits, as long as backups are done correctly and consistently. ShadowImage In-system Replication software offers nondisruptive, high-speed data backup operations on a copy of up-to-date production data, while critical applications run unaffected and businesses remain online.

Traditional downtime recovery processes can be labor-intensive and span several hours, during which production data is unavailable. Copy-on-Write Snapshot software rapidly creates point-in-time copies of any data volume within your Hitachi Simple Modular Storage 100 without impacting application service or performance levels. Because snapshots store only the changed data blocks, the storage capacity required for each copy is substantially smaller than the source volume, providing significant savings over full cloning methods. The Copy-on-Write Snapshot copies are fully read/write compatible, simplifying rapid data restores, data mining and warehousing, and nondisruptive backup and maintenance procedures.



NOTE: ShadowImage In-system Replication software and Copy-on-Write Snapshot software are available only for Hitachi Simple Modular Storage 100s equipped with dual controllers.

LUN Management

Feature

- LUN Manager

A Logical Unit Number (or LUN) refers to either an entire physical disk, or a subset of a larger physical disk or disk volume. LUNs represent the “virtualization layer” between the physical disk/volume and applications. A LUN can be used to present a smaller view of the total amount of disk storage available to a server. For example if you partition a drive into small pieces for an application or to accommodate disk limitations of your server’s operating system, each segment would share a common SCSI target ID, with each partition having a unique LUN.

LUN Manager streamlines the processes associated with adding, configuring, modifying, deleting, and reassigning LUNs to specific paths without having to reboot your array. LUN Manager also lets you assign multiple paths to a single LUN to support alternative path failover, path load balancing, and clustered systems.

Security

Feature

- Password Protection

Your Hitachi Simple Modular Storage 100 offers several data-protection features to protect your critical data assets. Password Protection lets you restrict access to your Hitachi Simple Modular Storage 100 to one registered user at a time.

Monitoring System Performance

Feature

- Hitachi Performance Monitor feature

With business infrastructures constantly growing more complex, companies need the knowledge, skills, and tools to quickly identify potential bottlenecks in each element of the infrastructure and take corrective action, preferably before a problem becomes severe enough to be noticed.

Performance Monitor is an essential tool for planning and analysis of storage resource requirements. It provides detailed, in-depth storage performance monitoring and reporting of your Hitachi Simple Modular Storage 100, including drives, logical volumes, processors, cache, ports, and other resources. It can help you achieve and maintain service-level objectives for performance and availability, identify storage performance bottlenecks, and maximize the utilization of your storage assets. Performance Monitor's in-depth troubleshooting and analysis reduce the time to resolve storage performance problems.

Supported Host Operating Systems

Your Hitachi Simple Modular Storage 100 works with a number of operating systems, including:

- Microsoft Windows Server 2003, XP, and Vista
- Red Hat Linux
- Red Flag Linux
- SUSE Linux
- Solaris
- VMware

The list of supported host operating systems continues to grow. For the latest information, please refer to the Hitachi Feature and Interoperability Reports at <https://extranet.hds.com/http://hifirerw.hds.com/HiFire/GuestRegister.jsp>.

Supported Topologies

Your Hitachi Simple Modular Storage 100 is designed to provide disk storage for use by your host servers. At its front end, your Hitachi Simple Modular Storage 100 uses the iSCSI protocol over Ethernet to connect to iSCSI HBAs or NICs installed in your server. This connection can be a direct, point-to-point connection or a switched configuration through an IP storage switch (also known as a "fabric").

At its back end, your Hitachi Simple Modular Storage 100 contains six, eight, or 12 internal SATA or SAS drives. The drives are preconfigured for RAID 6 and are not intended to be removed from the array. Two spare drive slots are provided for adding capacity, for a total of 12 drives and 9 TB of storage.

Direct Connect Topology

Figure 1-1 shows an example of a direct connection between your Hitachi Simple Modular Storage 100 and host server. In a direct-connect configuration, the host server can reside up to 100 meters (328 feet) from your Hitachi Simple Modular Storage 100.

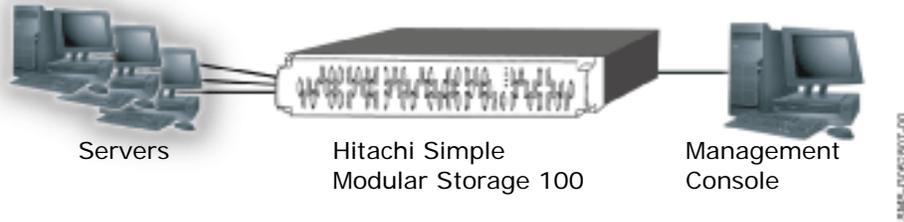


Figure 1-1: Example of a Direct Connection

Switch (Fabric) Topology

Figure 1-2 shows an example of using your Hitachi Simple Modular Storage 100 in a switch (fabric) configuration. Your Hitachi Simple Modular Storage 100 supports up to 256 connections in a switch configuration. The Storage Area Network shown in the figure is an Ethernet network used to exchange data between your servers and your Hitachi Simple Modular Storage 100.

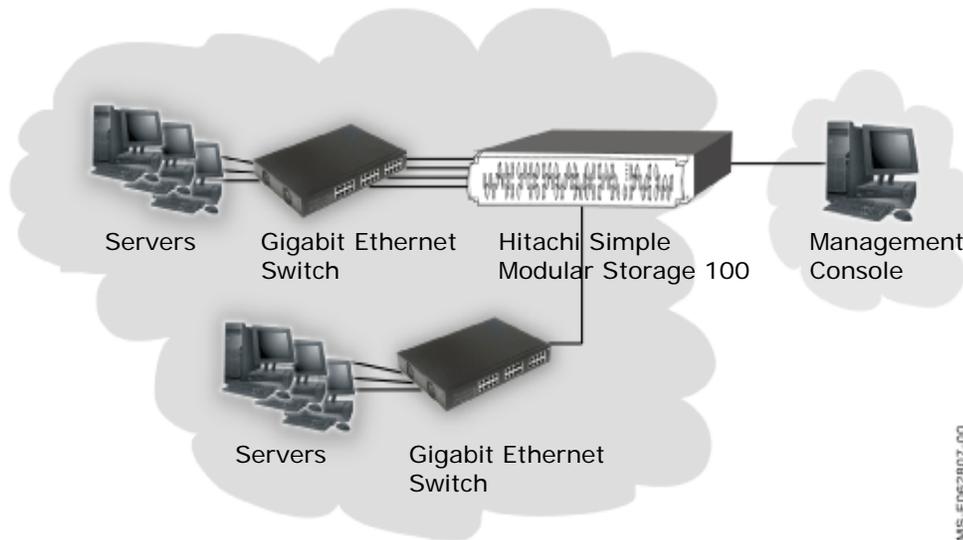


Figure 1-2: Example of a Switch Connection

Concepts and Terms

This section describes key concepts and terms you will find helpful when using your Hitachi Simple Modular Storage 100. For additional assistance, a [Glossary](#) at the back of this guide defines the technical terms in this guide.

RAID 6

Drives in your Hitachi Simple Modular Storage 100 are preconfigured for RAID 6. RAID 6 is an extension of the RAID 5 array, with a second independent distributed parity scheme. Data and parity are striped on a block level across multiple array members, and a second set of parity is calculated and written across all drives. In this way, RAID 6 delivers enhanced data protection compared with single-parity RAID systems by allowing for two simultaneous drive failures without downtime or data loss.

Your Hitachi Simple Modular Storage 100 supports RAID 6 in 6-, 8-, or 12-drive configurations:

- For arrays with six drives, four drives are used for data and two are used for parity.
- For arrays with eight drives, six drives are used for data and two are used for parity.
- For arrays with 12 drives, 9 drives are used for data, two are used for parity, and one acts as a spare in case one of the other drives fails.

iSCSI

Your Hitachi Simple Modular Storage 100 is an iSCSI storage device. iSCSI (pronounced “eye skuzzy”) is an IP-based protocol that leverages the low cost and familiarity of Ethernet and IP networking.

iSCSI links data storage devices over standard Ethernet-based TCP/IP networks using small computer system interface (SCSI) commands. Because iSCSI uses the standard Ethernet infrastructure to provide access to storage “targets,” it is compatible with, and can connect directly to, standard Gigabit Ethernet switches and IP routers. In this way, iSCSI enables low-cost storage access through the mature and predominant Ethernet infrastructure.

iSCSI Initiators and Targets

iSCSI defines a SCSI encapsulation protocol across a TCP/IP connection. As with SCSI, there are two types of components in an iSCSI system: initiators and targets.

An iSCSI initiator is a hardware device — such as an iSCSI host bus adapter (HBA) or TCP/IP offload engine (TOE) — and/or software installed in a server. The iSCSI initiator is the source of iSCSI commands that are sent over the network to the target. As such, it is responsible for:

- Originating iSCSI requests for target discovery and target connection.
- Creating the iSCSI packets.

- Handling transmission of the packets and corresponding responses using TCP/IP.

An iSCSI target is a device that receives iSCSI requests originating from an iSCSI initiator. Typically, the target is a drive contained in a storage device, such as your Hitachi Simple Modular Storage 100.

The following steps describe the sequence followed by the iSCSI initiator and target when establishing a "session."

1. The iSCSI initiator starts a TCP session with a target and tries to log in by sending a list of log-in parameters.
2. The initiator and target may insist on authenticating each other with one of several authentication methods (described next), depending on the system's configuration.
3. After passing the authentication stage, the initiator and target negotiate operating parameters, after which SCSI commands and data can pass between them.

LUNs

Your Hitachi Simple Modular Storage 100 includes several drives, with each drive including many gigabytes of storage. To effectively enable access to this storage, it is organized into smaller portions called logical units or volumes that can be allocated to different resources that want to access the storage.

Each volume itself consists of a numeric address, thereby permitting the storage on your Hitachi Simple Modular Storage 100 to appear as many smaller storage units to the host computers accessing it, enabling more efficient operation. To the server, a volume appears to be a single virtual "disk".

LUNs can be assigned to hosts, so that a particular volume can be accessed only by designated hosts that have "permission" to access that portion of the storage. This provides enhanced security as the software controlling access to the storage system will only permit access by certain previously defined hosts. While it is somewhat arbitrary how many hosts are permitted to access a given volume, conventionally only one host usually has access rights to a given volume at a given time. As a result, data on the volume is protected against access by hosts or servers other than those previously designated, thereby enhancing the security of the data.

CHAP

The Challenge Handshake Authentication Protocol (CHAP) is a security mechanism that one entity uses to verify the identity of another entity, without revealing a secret password that is shared by the two entities. In this way, CHAP prevents an unauthorized system from using an authorized system's iSCSI name to access storage.

CHAP involves configuring a secret that both your Hitachi Simple Modular Storage 100 and the host server must know. You enable and configure CHAP using Storage Navigator Modular 2. CHAP is not enabled by default, but it is strongly recommended. The Storage Navigator Modular 2 online help describes how to enable and configure CHAP.

The following sequence describes how CHAP works when it is configured and enabled on your Hitachi Simple Modular Storage 100.

1. During negotiations between the iSCSI initiator and target, the initiator sends a “challenge” message to the target.
2. The target responds with a calculated value.
3. The initiator compares the response against its own calculation of the value. If the values match, the initiator acknowledges the authentication; otherwise, it terminates the connection.

At random intervals, the initiator sends a new challenge to the target and repeats steps 1 through 3 to ensure that it is communicating with the appropriate peer.

Identifying Hardware Components

In This Chapter

This chapter describes the hardware components on your Hitachi Simple Modular Storage 100 array. This chapter covers the following key topics:

- ❑ [Front Panel Components](#)
- ❑ [Back Panel Components](#)
- ❑ [Top Components](#)

Front Panel Components

Figure 2-1 shows the hardware components on the front panel of your Hitachi Simple Modular Storage 100.

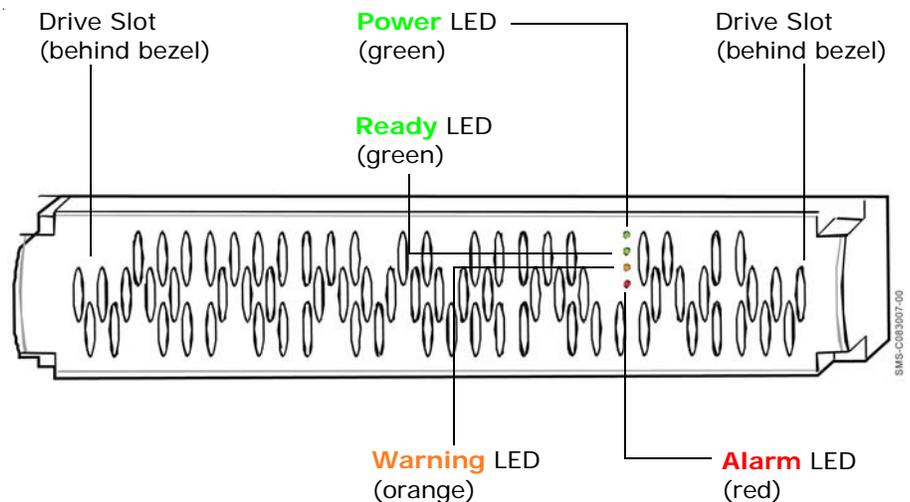


Figure 2-1: Front Panel Components

Drive Slots

The front panel of your Hitachi Simple Modular Storage 100 has two drive slots. Each slot can accommodate a spare drive. The spare drive must be of the same type (SATA or SAS) as the other drives in your Hitachi Simple Modular Storage 100.

Front Panel LEDs

The front panel has several light-emitting diodes (LEDs) that show the status of your Hitachi Simple Modular Storage 100.

Power LED

The front panel has a green **Power** LED that shows when your Hitachi Simple Modular Storage 100 is turned on and receiving power.

Table 2-1: Front Panel Power LED

| LED Status | Description |
|------------|--|
| ON | Hitachi Simple Modular Storage 100 is turned on and receiving power. |
| OFF | Hitachi Simple Modular Storage 100 is not turned on. |

Ready LED

The green **Ready** LED shows when your Hitachi Simple Modular Storage 100 is ready for operation.

Table 2-2: Ready LED

| LED Status | Description |
|------------|--|
| ON | Normal operation; the array is operational. |
| Slow Blink | Downloaded firmware execution procedure is finished (displayed during maintenance mode). |
| Fast Blink | Firmware is downloading (do not turn off the array). |

Alarm LED

The red **Alarm** LED shows when your Hitachi Simple Modular Storage 100 is operating normally or has encountered a fatal error.

Table 2-3: Alarm LED

| LED Status | Description |
|------------|--|
| OFF | Normal operation |
| ON | Fatal error. Please visit the Hitachi Web Portal at http://support.hds.com . |
| Slow Blink | A serious failure has occurred. Please visit the Hitachi Web Portal at http://support.hds.com . |

Warning LED

The orange **Warning** LED shows when your Hitachi Simple Modular Storage 100 is operating normally, has encountered a nonfatal error, and is upgrading firmware.

Table 2-4: Warning LED

| LED Status | Description |
|------------------|---|
| OFF | Normal operation |
| ON or Slow Blink | Nonfatal error. Array can remain operating. |
| Fast Blink | Flash is being updated with new firmware (do not turn off the array). |

Back Panel Components

Figure 2-2 shows the key hardware components on the back panel of a 2-controller Hitachi Simple Modular Storage 100. Components associated with CTL0 are indicated with blue callouts in the following figure, while components associated with CTL1 are indicated with red callouts. If your Hitachi Simple Modular Storage 100 has a single controller, ignore the components for CTRL 1.



NOTE: If your Hitachi Simple Modular Storage 100 has a single controller, ignore the components for CTL1.

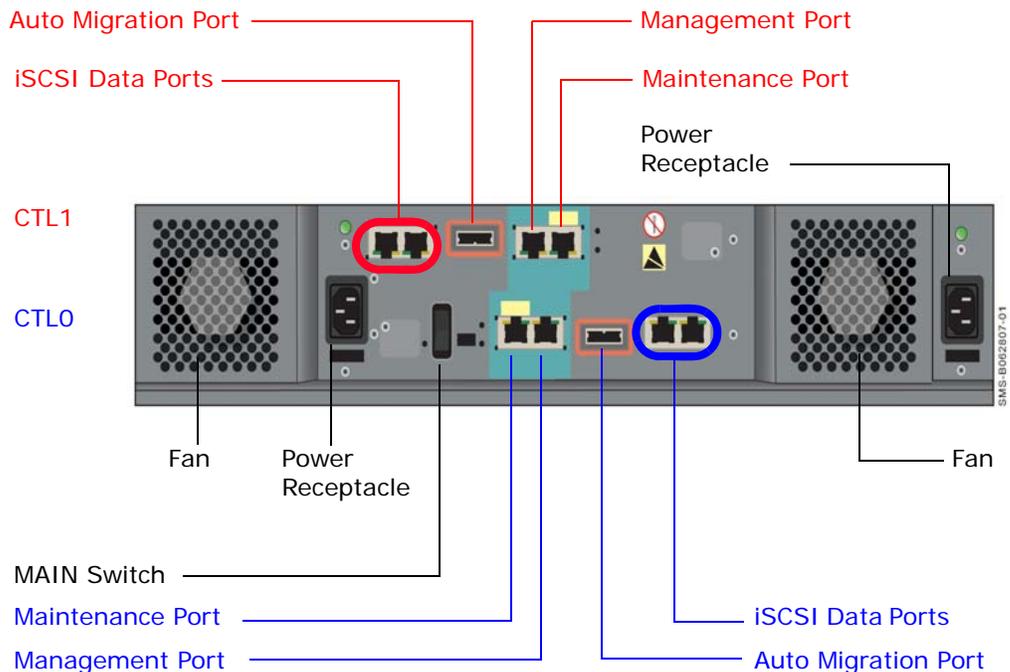


Figure 2-2: Key Back Panel Components

iSCSI Gigabit Ethernet Data Ports (PORT A and PORT B)

Each Hitachi Simple Modular Storage 100 controller has two standard RJ-45 Ethernet iSCSI data ports labeled **PORT A** and **PORT B**. Each iSCSI data port provides a 1-Gigabit Ethernet interface for direct or switched connections to IP hosts that require IP access to storage. Each iSCSI data port accepts a straight-through or cross-over Ethernet cable, and automatically adjusts to the type of cable used.

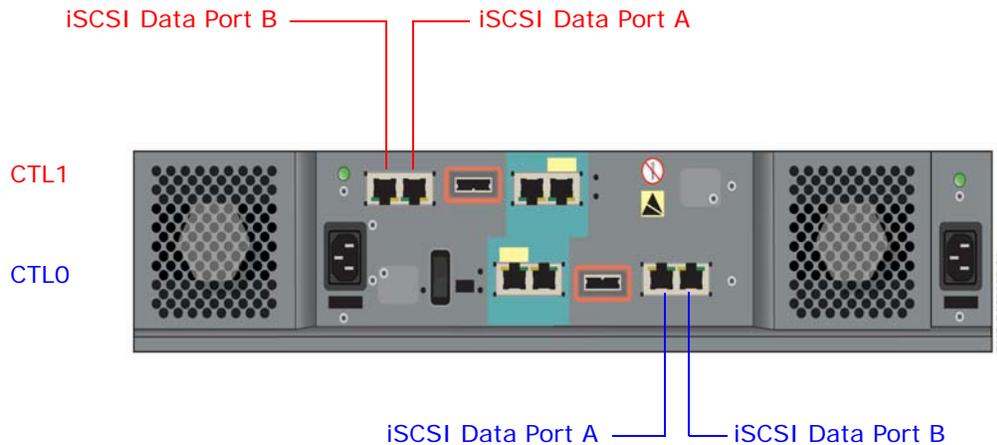


Figure 2-3: Location of iSCSI Data Ports on the Back Panel

Each iSCSI data port has an amber port activity LED on the left side of the port and a green link LED on the right side.

Table 2-5: Port Activity LED

| LED Status | Description |
|------------|---|
| OFF | Data is not being sent or received on the port. |
| ON | Data is being sent or received on the port. |

Table 2-6: Link LED

| LED Status | Description |
|------------|------------------------|
| OFF | Link status error. |
| ON | Link status is normal. |

10/100 Ethernet Management Ports (LAN)

Each Hitachi Simple Modular Storage 100 controller has a 10/100BaseT Ethernet management port labeled **LAN**. These ports connect to the PC acting as the management console.

Using these ports, you can configure and manage your Hitachi Simple Modular Storage 100 using the Hitachi Storage Navigator Modular 2 software on the supplied CD. You can also use the storage features described under [Storage Features on page 1-3](#) to interact with your Hitachi Simple Modular Storage 100.

These ports accept either a cross-over cable for direct connections to the management port or a straight-through cable if connecting to the management port through a switch.

Each management port has an amber port activity LED on the left side of the port and a green link LED on the right side (see [Table 2-5 on page 2-4](#) and [Table 2-6 on page 2-4](#)).



NOTE: If you use the Storage Navigator Modular 2 software to configure your Hitachi Simple Modular Storage 100 to send email alerts, be sure the management port can communicate via Ethernet with your mail server. For more information, refer to the Storage Navigator Modular 2 online help.

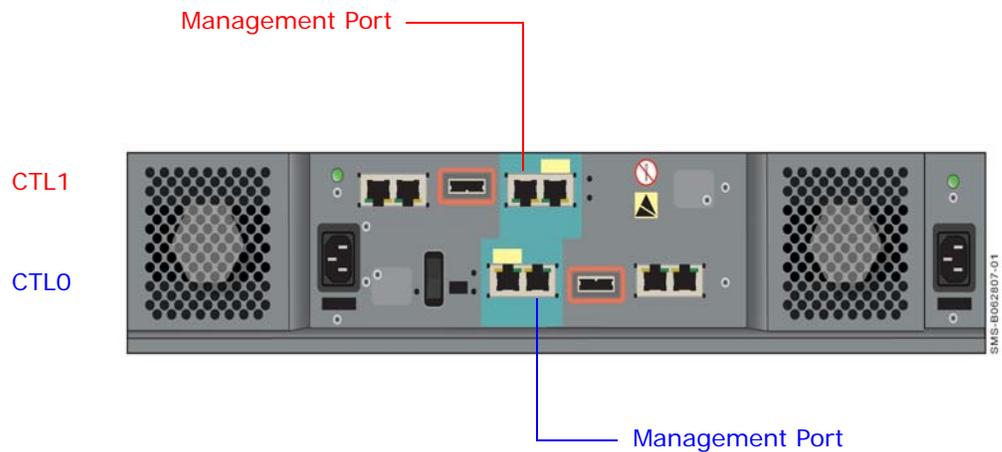


Figure 2-4: Location of Management Ports on the Back Panel

10/100 Ethernet Maintenance Ports (MAINTENANCE ONLY)

Each Hitachi Simple Modular Storage 100 controller has a 10/100 10/100BaseT Ethernet maintenance port labeled **MAINTENANCE ONLY**. These ports are for performing troubleshooting procedures in the unlikely event you encounter a problem with your Hitachi Simple Modular Storage 100. You should not have to use these ports unless instructed to do so by an Hitachi Customer Service Representative.

Each maintenance port has an amber port activity LED on the left side of the port and a green link LED on the right side (see [Table 2-5 on page 2-4](#) and [Table 2-6 on page 2-4](#)).

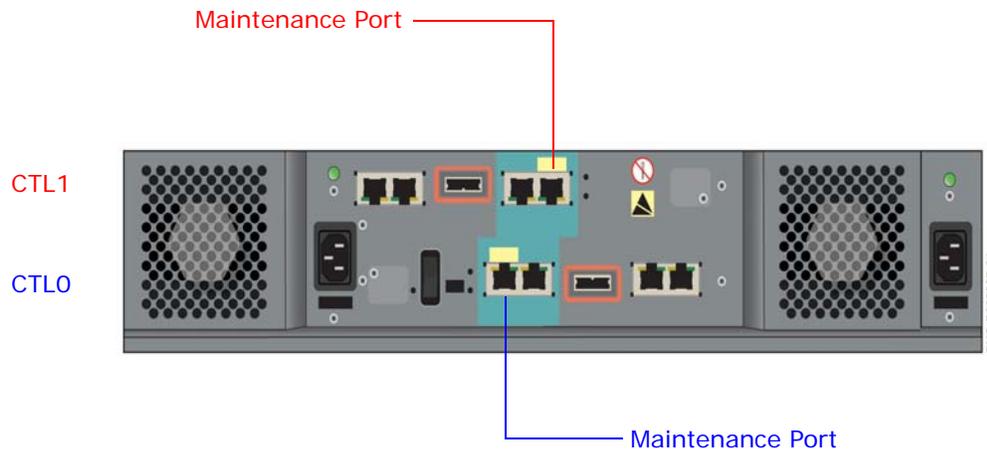


Figure 2-5: Location of Maintenance Ports on the Back Panel

Fans

The back panel has two fans that provide ventilation for your Hitachi Simple Modular Storage 100. The fans pull air from the front and exhaust to the back. When you install your Hitachi Simple Modular Storage 100, be sure these fans are not blocked and that there is a free flow of air passing from the front of your Hitachi Simple Modular Storage 100. The fans provide redundant cooling. If one fan fails, the other fan runs at a higher speed to compensate for the loss.

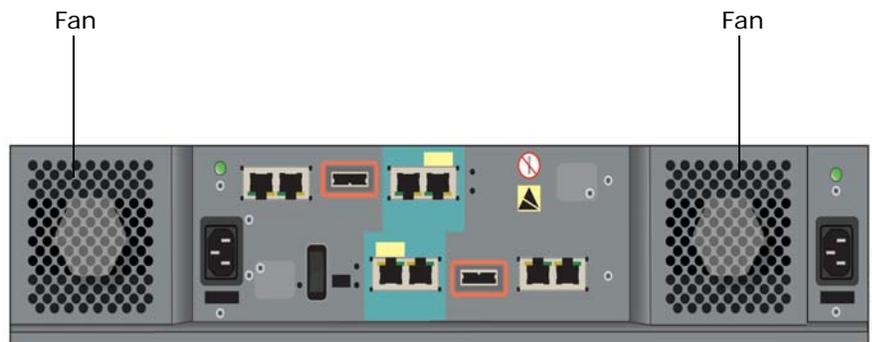


Figure 2-6: Location of Fans on the Back Panel

Power Supplies

Your Hitachi Simple Modular Storage 100 comes with two fully redundant power supplies. If one power supply fails, the other one takes over to compensate for the loss.

Each power supply has its own power receptacle that is accessed on the back panel. Both receptacles must be connected to a working AC source using the supplied power cable.

A green LED above each power receptacle blinks when the corresponding power receptacle is connected to a working AC outlet, even if your Hitachi Simple Modular Storage 100 is not powered on; otherwise, the LED is OFF.

Below each power receptacle is a holder you can use to secure the power cable after connecting it to your Hitachi Simple Modular Storage 100.



CAUTION! When connecting to an AC outlet, do not use an outlet controlled by a wall switch. Otherwise, you will lose access to your Hitachi Simple Modular Storage 100 if the wall switch is inadvertently turned off.

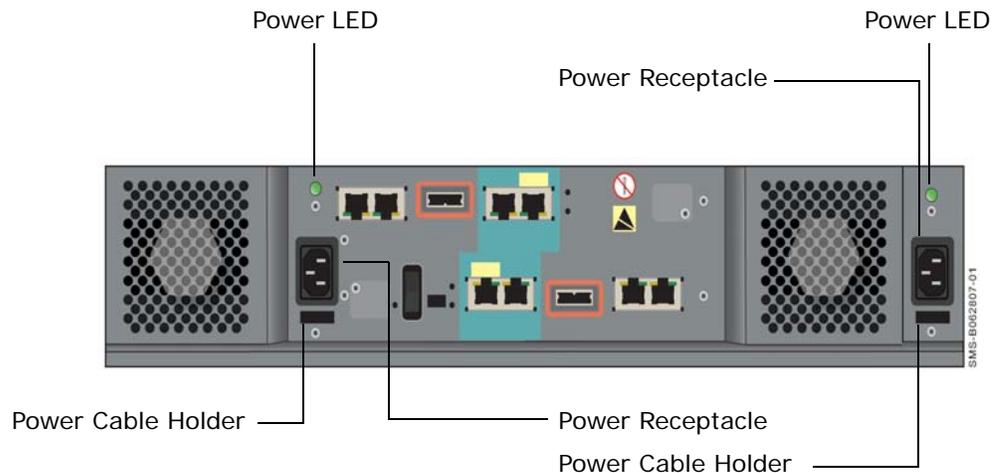


Figure 2-7: Location of Power Receptacles, LEDs, and Cable Insets

ON/OFF Switch (MAIN SW)

The back panel has an ON/OFF switch labeled **MAIN SW** that applies power to your Hitachi Simple Modular Storage 100. To apply power, move this switch to the following ON position:



The **Power** LED on the front panel goes ON.

To turn off your Hitachi Simple Modular Storage 100, move the **MAIN SW** switch to the following OFF position:



The front panel **Power** LED and the **C-PWR** LED on the back panel both go OFF.



WARNING! Before you move your Hitachi Simple Modular Storage 100, set the **MAIN SW** switch to the **OFF** position and disconnect the power cables from the power receptacles and from the AC source.

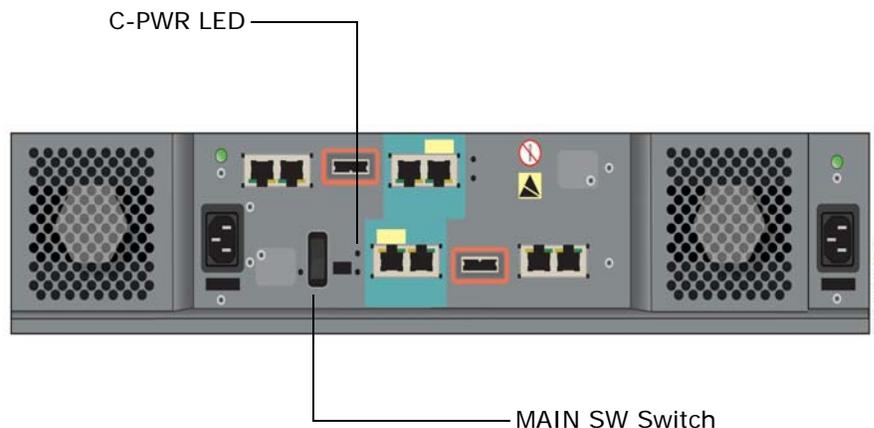


Figure 2-8: Location of MAIN SW Switch on the Back Panel

Mode Switch

The back panel has a mode switch labeled **MODE** that places a dual-controller Hitachi Simple Modular Storage 100 into migration mode.

For normal operation, the mode switch should be in the **N** position. The **E** position is used when you need to migrate data from one dual-controller Hitachi Simple Modular Storage 100 to another. The back panel **C-PWR** LED then goes OFF and the **EXT** LED goes ON to show that the array is in migration mode. For more information, see [Migrating Data on page 4-7](#).



NOTE: When you move the **MODE** switch to the **E** position, a question mark (?) appears for the status shown for the array in Storage Navigator Modular 2 to show that the array is in migration mode.

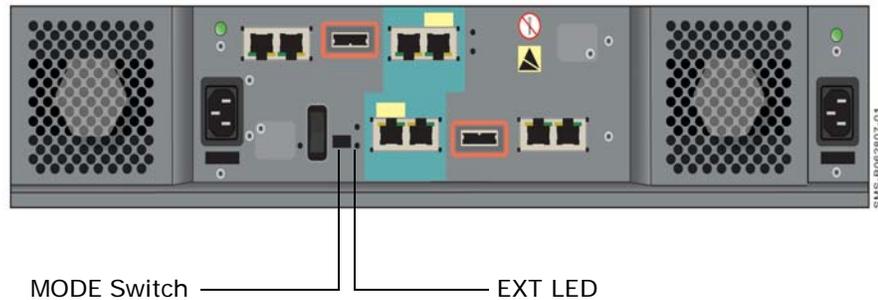


Figure 2-9: Location of MODE Switch and EXT LED on the Back Panel

Top Components

The top of your Hitachi Simple Modular Storage 100 may have cautions, product information labels, and/or agency certifications.

Installing Your Array

This chapter describes how to install your Hitachi Simple Modular Storage 100 array. This chapter covers the following key topics:

- ❑ [Installation at a Glance](#)
- ❑ [Preparing Your Site](#)
- ❑ [Safety Considerations](#)
- ❑ [Unpacking](#)
- ❑ [Required Items Supplied by the User](#)
- ❑ [Installing the Hitachi Simple Modular Storage 100](#)
- ❑ [Verifying Startup Operations](#)
- ❑ [Configuring and Managing Your Storage](#)
- ❑ [Installing iSCSI Initiator Software](#)
- ❑ [Hitachi Simple Modular Storage 100 Host Installation Guide](#)

Installation at a Glance

Table 3-1 describes the steps to follow when installing your Hitachi Simple Modular Storage 100.

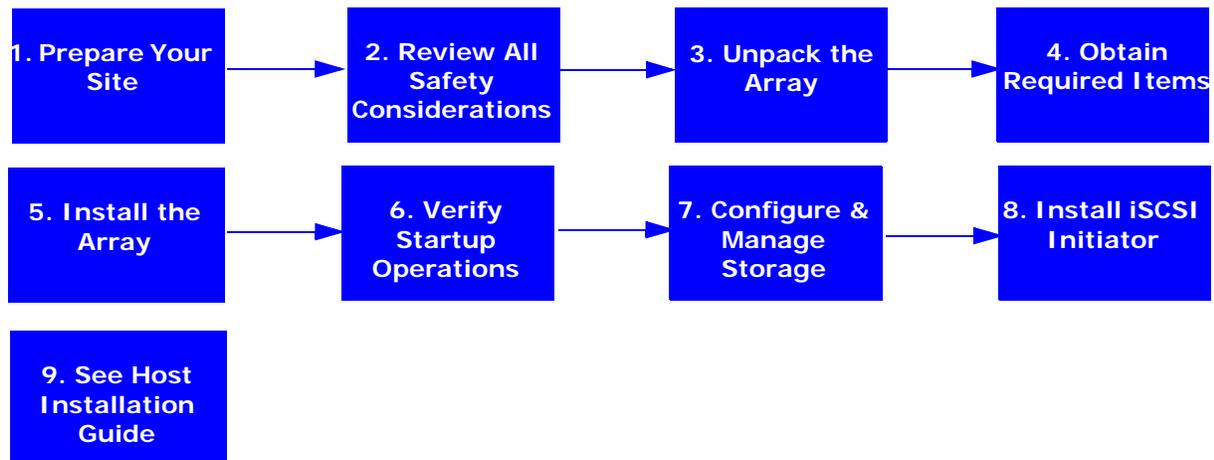


Figure 3-1: Installation Roadmap

Table 3-1: Installation Roadmap

| Step | Description | See Page |
|------|--|----------------------|
| 1. | Prepare the site where you intend to install your Hitachi Simple Modular Storage 100. | 3-3 |
| 2. | Review all safety considerations before you start the installation process. | 3-5 |
| 3. | Unpack and make sure all items are accounted for and not damaged. | 3-7 |
| 4. | Obtain the required user-supplied items to perform the installation. | 3-8 |
| 5. | Install your Hitachi Simple Modular Storage 100. The array can be installed on a desk or shelf or in a rack. | 3-9 |
| 6. | Verify startup operations. | 3-17 |
| 7. | Configure and manage your storage. | 3-18 |
| 8. | Install iSCSI initiator software. | 3-22 |
| 9. | Consult the Hitachi Simple Modular Storage 100 Host Installation Guide for your host operating system. | 3-22 |

Preparing Your Site

Planning the proper location and layout of your Hitachi Simple Modular Storage 100 is essential for its successful operation. Equipment placed too close together or in an inadequately ventilated area can cause over-temperature conditions. In addition, poor equipment placement can make the back panel inaccessible.

To ensure normal operation and to avoid unnecessary maintenance, plan your site configuration and prepare your site before installation. The following sections provide guidelines to be observed when preparing your site prior to installing your Hitachi Simple Modular Storage 100.

Topology Considerations

Plan the topology in which your Hitachi Simple Modular Storage 100 will be used. Determine whether you want to set up a dedicated point-to-point configuration for your Hitachi Simple Modular Storage 100 and its iSCSI initiators (a recommended, simple configuration) or include your Hitachi Simple Modular Storage 100 in a shared and potentially complex switch configuration that requires more network expertise and possibly the use of Challenge Handshake Authentication Protocol (CHAP) security.

For more information, see [Supported Topologies on page 1-5](#).

Site Considerations

The site where you install your Hitachi Simple Modular Storage 100 can affect its performance. Therefore, choose a site that:

- Is fairly cool and dry for the acceptable temperature and humidity ranges.
- Is free of strong electromagnetic field generators (such as motors), vibration, dust, and direct exposure to sunlight.
- Provides a sturdy, level surface that can support your Hitachi Simple Modular Storage 100. A fully populated unit weighs approximately 72.6 lbs. (33 kg.).
- Has a power outlet within six feet (1.82 meters) of your Hitachi Simple Modular Storage 100.
- Allows for at least six inches (152.3 mm) of space at the front and back of your Hitachi Simple Modular Storage 100 for ventilation.
- Will not place your Hitachi Simple Modular Storage 100 next to, on top of, or below any device that generates heat or will block the free flow of air through the array's ventilation slots.

Rack-Mount Considerations

The following additional considerations must be observed for rack installations (see Figure 2-4):

- Your Hitachi Simple Modular Storage 100 can be mounted in a standard 19-inch rack. The rack-mounting hardware must be carefully selected to properly support the equipment. Follow the instructions in the documentation for the rack.
- The operating ambient temperature of rack-mounted equipment must not exceed the maximum rated ambient temperature indicated in this guide (refer user to Appendix A for more information).
- The air flow clearances specified in this guide must be maintained within the rack.
- The AC supply circuit for rack-mounted equipment must be capable of supplying the total current specified on all the labels of the rack-mounted equipment.
- All AC power supply connections must be properly earthed. To ensure the integrity of the earth connection, special attention must be given to connections that are not directly connected to the branch circuit (for example, power strips).

Server Considerations

- Your Hitachi Simple Modular Storage 100 supports a variety of client operating systems (see [Supported Host Operating Systems on page 1-5](#)).
- Be sure your server has an installed iSCSI HBA or NIC with the latest HDS-supported Basic Input Output System (BIOS). For the latest HDS-supported iSCSI HBAs and NICs, please refer to Hitachi Feature and Interoperability Reports at <https://extranet.hds.com/http://hifirw.hds.com/HiFire/GuestRegister.jsp>.
- Follow the directions for your iSCSI HBA or NIC to install the card and its appropriate driver(s). Install any required updates, such as service packs, hot fixes, or patches, and reboot the server when the installation is complete.
- Be sure your server is using an HDS-supported iSCSI initiator and driver. For a list of HDS-supported iSCSI initiators and HBAs, please refer to Hitachi Feature and Interoperability Reports at <https://extranet.hds.com/http://hifirw.hds.com/HiFire/GuestRegister.jsp>.

Safety Considerations

Observe the following guidelines to ensure safety. Failure to follow these guidelines could result in bodily injury or damage to your Hitachi Simple Modular Storage 100 chassis or components

- Do not wear loose clothing that could get caught in the chassis or mounting hardware.
- Wear safety glasses when working under conditions that are hazardous to your eyes.
- Do not perform any action that creates a potential hazard to people or makes the equipment or rack unsafe.
- Do not work on the equipment or disconnect cables during a thunderstorm, when wearing a wool sweater or other heavy wool clothing, or when power is applied.
- Disconnect all power before installation.
- Avoid hazards such as moist floor and ungrounded power-extension cables.
- To avoid damage to your Hitachi Simple Modular Storage 100 due to electrostatic discharge (ESD), wear an anti-static wrist strap. Connect the clip to an unpainted part of the array chassis frame to safely channel any static electricity generated by your body to ground. If no wrist strap is available, ground yourself by touching an unpainted part of the array chassis frame.
- A fully populated Hitachi Simple Modular Storage 100 weighs approximately 72.6 pounds (33 kg) and requires three or more persons to lift the array. Always turn off your Hitachi Simple Modular Storage 100 and unplug all data and power cables before lifting.
- If rack mounting the array, mount the array at the bottom of the rack. If the array is mounted at the top of the rack, the rack may become unstable and fall.





WARNING! During installation, if your Hitachi Simple Modular Storage 100 falls at a high position, a personal injury will be caused. Three or more persons are required to installing the array in a rack above chest level. Perform the positioning, fastening, or other handlings very carefully.



CAUTION! Be sure to perform the rack installation with three or more persons. Work carefully because a single Hitachi Simple Modular Storage 100 can weigh 72.6 pounds (33 kg). Be sure to install the array from the bottom of the rack to prevent the rack from falling. Lift the array up to the height suitable for mounting. Adjust the position of the array, so it is seated in the center of the rack frame. Shift the array onto the rails in the rack frame. When shifting the array, push it in to the end gently.

Unpacking

After receiving your Hitachi Simple Modular Storage 100, perform the following steps to ensure that your contents arrived safely.

1. Inspect the outer shipping container for damage during shipping. Report any sign of damage to the appropriate shipping carrier.
2. Remove the contents from the shipping container and check for the following items:
 - One Hitachi Simple Modular Storage 100
 - Two power cables
 - A front bezel
 - Product and documentation CDs
 - One Quick Installation Guide
3. Inspect your Hitachi Simple Modular Storage 100 thoroughly. If you see any signs of damage, contact the shipping carrier.

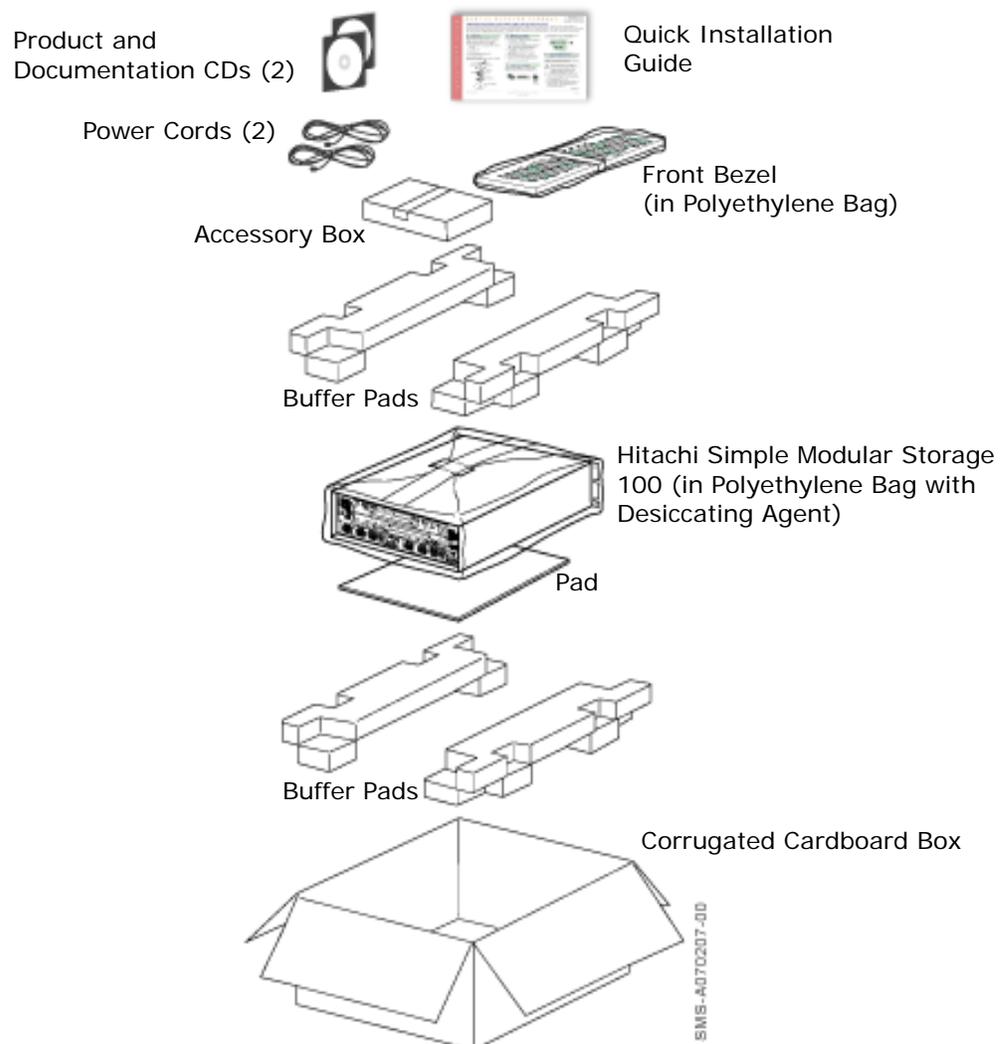


Figure 3-2: Hitachi Simple Modular Storage 100 Package

Required Items Supplied by the User

In addition to the contents supplied in your Hitachi Simple Modular Storage 100, the following user-supplied items are required to perform the installation.

For your Hitachi Simple Modular Storage 100

- An IP address, subnet mask, gateway (if applicable), and Ethernet cable for each iSCSI data port that will connect to your storage network
- An IP address and Ethernet cable for each management port
- Two AC outlets (100 V to 120/200 V to 240 V)

For the computer that will act as the iSCSI initiator

- A NIC
- An iSCSI initiator driver for your operating system

For the computer that will act as the management console

- An installed NIC with connection to the storage network
- 1 GHz Intel processor (2.4 GHz, Intel dual-processor recommended)
- At least 1 GB of Random-Access Memory
- At least 1.5 GB of available disk space
- Video resolution of 800 x 600 dots per inch (1024 x 768 or higher recommended)
- One of the following operating systems:
 - Microsoft Windows XP (Service Pack 2)
 - Microsoft Windows 2003 Server (Service Pack 1)
 - Microsoft Windows 2000 (Service Pack 3/4)
 - Sun™ Solaris™ v8
 - Sun Solaris v9
- Internet access using one of the following browsers
 - Internet Explorer v6.0
 - Mozilla v1.7



CAUTION! Pop-up blockers must be disabled in the browser.

Rack-mount users require the following additional items

- A standard 19-inch rack.
- Mounting hardware for the specific rack being used.
- Documentation for the rack and mounting hardware.

Optional Items

An Ethernet switch and Ethernet cable are required to use your Hitachi Simple Modular Storage 100 in a switch (fabric) topology.

Installing the Hitachi Simple Modular Storage 100

Installing your Hitachi Simple Modular Storage 100 involves the following steps:

1. Installing your Hitachi Simple Modular Storage 100 on a table or shelf or in a rack. See the sections below.
2. Attaching the front panel bezel. See page [3-12](#).
3. Connecting to the 10/100 Ethernet management ports. See page [3-14](#).
4. Connecting to the iSCSI Gigabit Ethernet Data Ports. See page [3-15](#).
5. Connecting power. See page [3-16](#).

Installing on a Table or Shelf

If installing your Hitachi Simple Modular Storage 100 on a table or shelf:

- Place your Hitachi Simple Modular Storage 100 near an AC power source.
- Allow enough ventilation space between your Hitachi Simple Modular Storage 100 and other objects in the vicinity.
- Be sure the air vents on the front and back of the your Hitachi Simple Modular Storage 100 enclosure are not blocked.



WARNING! Three or more persons are required to lift your Hitachi Simple Modular Storage 100. Grasp the enclosure from the bottom and lift with both hands. To prevent injury, keep your back straight and lift with your legs, not your back.

Rack-Mounting the Hitachi Simple Modular Storage 100

Your Hitachi Simple Modular Storage 100 can be mounted in a standard 19-inch rack. The rack-mount and/or rail kit hardware must be carefully selected to support the equipment properly. Follow the instructions in the documentation for the rack and/or rail kit. For more information, please contact your place of purchase.

The following procedure provides general guidelines to follow when installing your Hitachi Simple Modular Storage 100 in a rack.



WARNING! Three or more persons are required to lift your Hitachi Simple Modular Storage 100. Grasp the enclosure from the bottom and lift with both hands. To prevent injury, keep your back straight and lift with your legs, not your back.



DANGER! Before mount your Hitachi Simple Modular Storage 100 in a rack, be sure the rack is secure and is in no danger of falling over.



NOTE: Be sure the rack provides sufficient airflow to the front and back of your Hitachi Simple Modular Storage 100 to maintain correct cooling.

1. Verify that your Hitachi Simple Modular Storage 100 is turned off.
 2. Verify that the **MAIN SW** switch is in the OFF position.
 3. With help from another person, position and hold your Hitachi Simple Modular Storage 100 in the rack. Then secure the array to the rack frame using M5×10 binding screws (one screw at the right and left sides of the array, as shown in [Figure 3-3](#)). For more information, refer to the manual for your mounting hardware and rack.
-



WARNING! To prevent bodily injury when mounting or servicing your Hitachi Simple Modular Storage 100 in a rack, you must take special precautions to ensure that the array remains stable. The following guidelines are provided to ensure your safety:

- Perform the rack installation with three or more persons.
 - Work carefully because a single Hitachi Simple Modular Storage 100 can weigh 72.6 pounds (33 kg).
 - Your Hitachi Simple Modular Storage 100 should be mounted at the bottom of the rack if it is the only unit in the rack.
 - Lift the array up to the height suitable for mounting. Adjust the position of the array, so it is seated in the center of the rack frame. Shift the array onto the rails in the rack frame. When shifting the array, push it in to the end gently.
 - When mounting your Hitachi Simple Modular Storage 100 in a partially filled rack, load the rack from the bottom to the top, with the heaviest component at the bottom of the rack.
 - If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing your Hitachi Simple Modular Storage 100 in the rack.
-



WARNING! During installation, if your Hitachi Simple Modular Storage 100 falls at a high position, a personal injury will be caused. Three or more persons are required to installing the array in a rack above chest level. Perform the positioning, fastening, or other handlings very carefully.

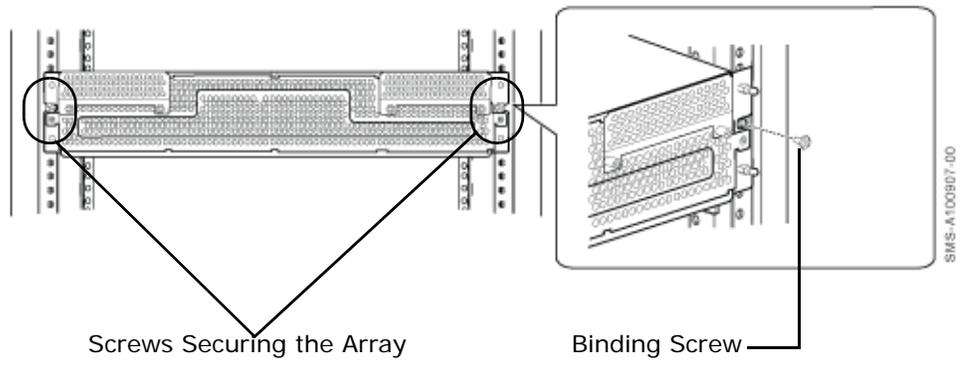


Figure 3-3: Example of Securing the Array to a Rack

Attaching the Front Panel Bezel

For table and shelf installations, the bezel connects directly to the four ball catches (two on each side) of the Hitachi Simple Modular Storage 100 front panel:

1. Unwrap the front bezel.
2. Holding the side of front bezel with both hands, align it with the four ball catches on the front panel.
3. Gently push the bezel against the catches and front panel until the bezel snaps into place.

Figure 3-4 shows how to attach the bezel for table and shelf installations.

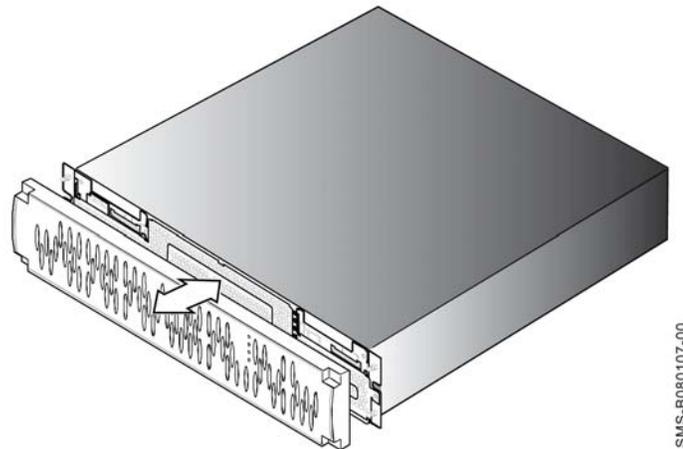


Figure 3-4: Attaching the Front Bezel (Table/Shelf Installations)

For rack-mount installations, attach the bezel to the front left and right sides of the rack chassis (see [Figure 3-5 on page 3-13](#)).

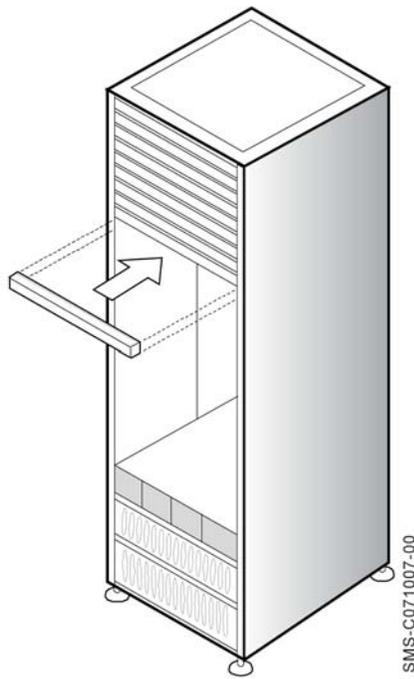


Figure 3-5: Attaching the Front Bezel (Rack-Mount Installation)



CAUTION! It is important to keep the front panel bezel and rear panel clean (see [Caring for Your Hitachi Simple Storage Modular on page 4-7](#)). Otherwise, the array's internal temperature can increase, causing the array to fail.

Removing the Front Panel Bezel

To remove the front bezel, grasp the front bezel and gently pull it toward you until it disengages from the four ball catches (two on each side).

Connecting to the 10/100 Ethernet Management Port

For local administrative access to your Hitachi Simple Modular Storage 100, connect the 10/100 Ethernet management port to a PC acting as the management console. You can then use the Storage Navigator Modular 2 software to configure your Hitachi Simple Modular Storage 100.

Initially, you configure your Hitachi Simple Modular Storage 100 by directly connecting a management console PC equipped with a NIC to each management port using the default IP addresses in [Table 3-2](#). These default IP addresses can be changed using the Storage Navigator Modular 2 software. Thereafter, you can connect the management port(s) to your network and access your Hitachi Simple Modular Storage 100 via the Web using Storage Navigator Modular 2.

Table 3-2: Default Management Port IP Addresses

| Controller | IP Address |
|--------------|--------------|
| Controller 0 | 192.168.0.16 |
| Controller 1 | 192.168.0.17 |

1. Connect either end of an Ethernet cable to a NIC installed in a management console.
2. Connect the other end of the cable to the management port(s) labeled **LAN** on the back of your Hitachi Simple Modular Storage 100 (see [Figure 3-6 on page 3-15](#)).



NOTE: If your Hitachi Simple Modular Storage 100 has one controller, ignore the management port on CTL1 in [Figure 3-6 on page 3-15](#).

3. Configure the NIC in the management console to use the subnet 192.168.0.x.
4. Launch your browser and access the management port at the appropriate default IP address:
 - For CTL0, use the IP address 192.168.0.16.
 - For CTL1, use the IP address 192.168.0.17.



NOTE: If you are not able to connect, you may need to use a cross-over cable between the management console PC and the management ports.

5. Perform the configuration activities for that controller.
6. If your Hitachi Simple Modular Storage 100 has a second controller, perform the configuration activities for the other controller using the appropriate IP address in [Table 3-2](#).

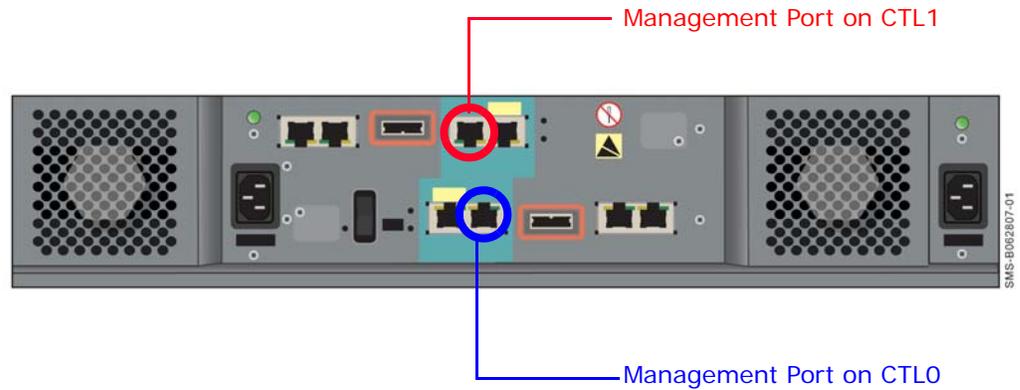


Figure 3-6: Management Ports

Connecting to the iSCSI Gigabit Ethernet Data Ports

The following procedure describes how to connect the iSCSI Gigabit Ethernet data ports to your storage network or server. The default IP addresses for the iSCSI data ports are shown in [Table 3-3](#). These settings can be changed using the Storage Navigator Modular 2 software.



NOTE: If your Hitachi Simple Modular Storage 100 has one controller, ignore the IP addresses for on CTL1 in [Table 3-3](#).

Table 3-3: Default iSCSI Data Port IP Addresses

| Controller | iSCSI Data Port | IP Address |
|--------------|-----------------|---------------|
| Controller 0 | Port A | 192.168.0.200 |
| | Port B | 192.168.0.201 |
| Controller 1 | Port A | 192.168.0.208 |
| | Port B | 192.168.0.209 |

1. On the back panel, insert one end of an Ethernet cable into an iSCSI data port (either **PORT A** or **PORT B**) on the back of your Hitachi Simple Modular Storage 100 (see [Figure 3-7 on page 3-16](#) and [Figure 3-8 on page 3-16](#)). Connect the other end of the cable to your host system or switch.
2. To connect additional iSCSI data ports to your storage network, repeat step 1 using another Ethernet cable and another available iSCSI data port.



NOTE: If your Hitachi Simple Modular Storage 100 has one controller, ignore the iSCSI data ports on CTL1 in [Figure 3-7 on page 3-16](#).



NOTE: The IP address for your server(s) console must be on the same IP subnetwork (192.168.0.x) as the iSCSI data ports.

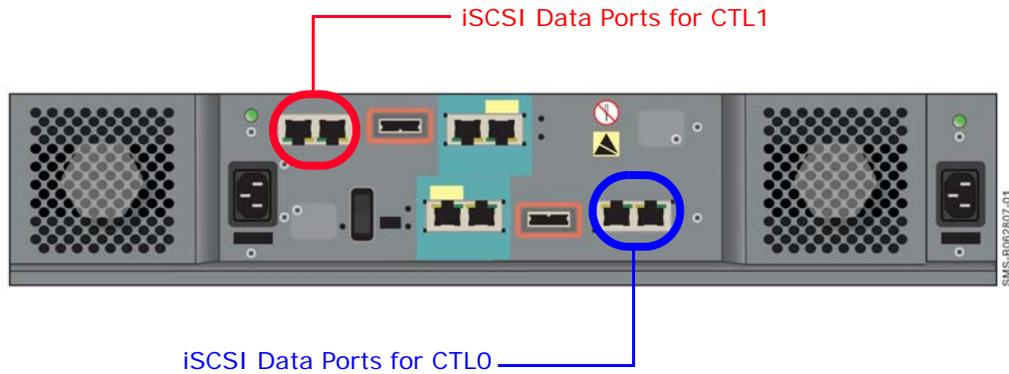


Figure 3-7: iSCSI Gigabit Ethernet Data Ports

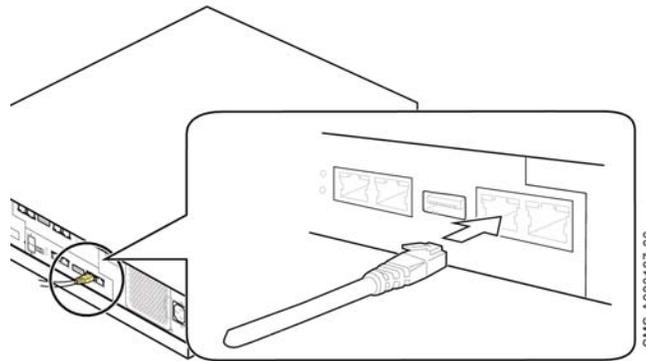


Figure 3-8: Connecting an Ethernet Cable

Connecting Power

Your Hitachi Simple Modular Storage 100 comes with two power cables. Both receptacles must be connected to a working AC source using the supplied power cables. This provides redundancy in the unlikely event that one power supply fails.

1. Make sure the **MAIN SW** switch on the back panel is in the OFF position (see [Figure 3-9 on page 3-17](#)).
2. Attach one power cable to the 3-pronged power connectors on the back panel and secure with the power clamp (see [Figure 3-9 on page 3-17](#)). Attach the other end to a working AC outlet. Use the holder below the receptacle to secure the power cable. The green LED above the power receptacle blinks.



NOTE: The AC outlet should not be controlled by a wall switch. Otherwise, the wall switch can accidentally turn off power to your Hitachi Simple Modular Storage 100.

3. We recommend that you repeat step 2 to connect and secure the second power cable.
4. Set the **MAIN SW** switch to the ON position.

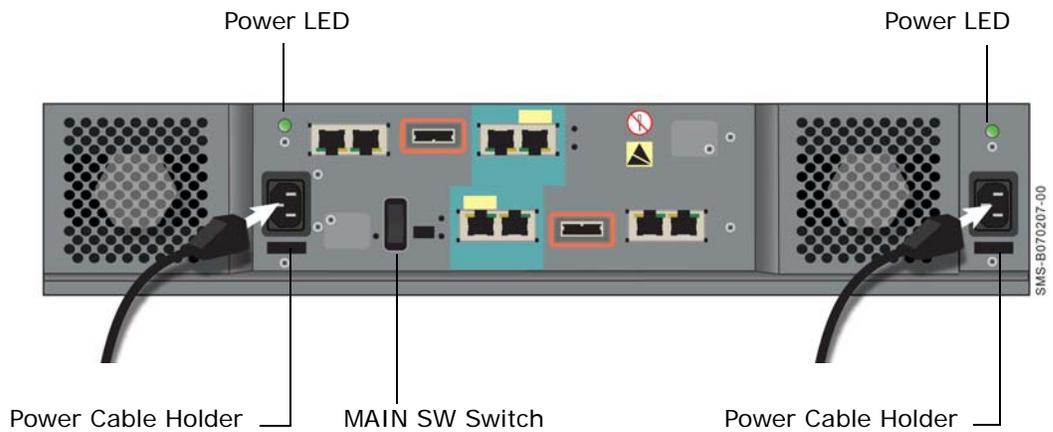


Figure 3-9: Attaching the Power Cables

Verifying Startup Operations

To verify that your Hitachi Simple Modular Storage 100 is installed and starts up properly:

1. On the back panel, verify that the green LEDs above each power receptacle are blinking.
2. Set the **MAIN SW** switch on the back panel to the ON position to apply power.
3. Listen for the fans to start operating and check for airflow.
4. On the front panel, verify that the green **Power** LED goes on (see [Figure 2-1 on page 2-1](#)).
5. In a few minutes, verify that the green **Ready** LED on the front panel goes ON (see [Figure 2-1 on page 2-1](#)).

Configuring and Managing Your Storage

After you verify startup operations, your Hitachi Simple Modular Storage 100 is ready for software configuration using the Storage Navigator Modular 2 software on the supplied CD.

With primary goals of simplicity and ease-of-use, the configuration of your Hitachi Simple Modular Storage 100 has been designed to make things obvious for new users from the get-go. To that end, the Storage Navigator Modular 2 software includes the following wizards and point-and-click screens for configuring, provisioning, and managing your storage quickly and easily.

Installing the Storage Navigator Modular 2 Software

The Storage Navigator Modular 2 software is installed on the management console attached to the **LAN** management port. The console must meet the following minimum requirements:

- Intel processor: 1 GHz (2 GHz or faster recommended)
- Memory: At least 1 GB
- Free disk space: 1.5 GB
- Video resolution: 1024 x 768
- Microsoft® Windows® XP (Service Pack 2), 2003 Server (Service Pack 1), Windows 2000 (Service Pack 3/4); or Sun Solaris™ v8 or v9
- Browser: Internet Explorer v 6.0 for Microsoft Windows operating systems or Mozilla v1.7 for Solaris operating systems



CAUTION! Pop-up blockers must be disabled in the browser.

To install Storage Navigator 2:

1. In the management console's CD-ROM drive, insert the CD containing the Storage Navigator Modular 2 software (see [Figure 3-10](#)).

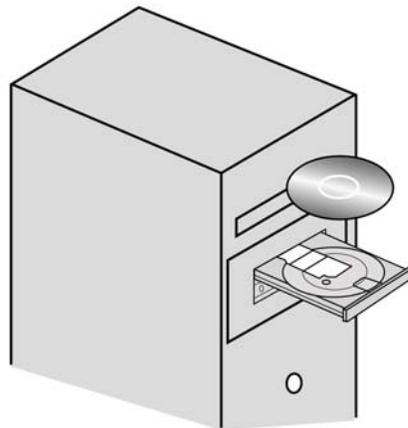


Figure 3-10: Inserting the Storage Navigator Modular 2 CD

2. When the installation starts, follow the instructions in the friendly screens that appear. As part of these instructions, you will be asked to either accept the default destination directory where Storage Navigator Modular 2 is to be installed or specify a different location.



NOTE: If autostart is turned off on the management console, double-click the file SNM2.exe in the SNM2 folder to start the installation.

Logging in to Storage Navigator Modular 2

1. After you install Storage Navigator Modular 2, log in:
`http://<IP address of management console PC>:23015/StorageNavigatorModular/`
2. When the login window appears (see [Figure 3-11](#)), enter **system** as the default User ID and **manager** as the default password ID box.

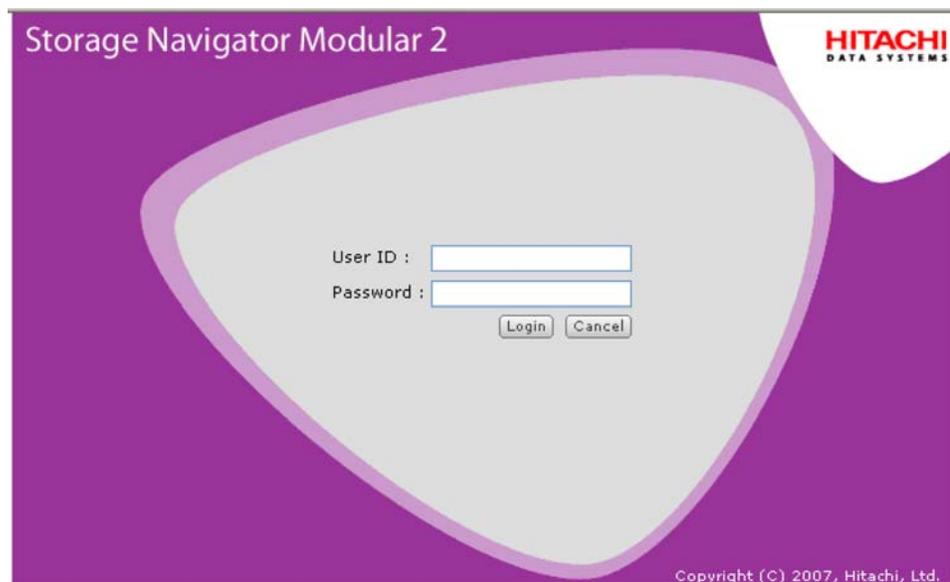


Figure 3-11: Storage Navigator Modular Login Window



NOTE: For security, each password character you type appears as a dot (•). We recommend you change the default password to protect your Hitachi Simple Modular Storage 100 against unauthorized access. For more information, refer to the Storage Navigator Modular 2 online help.

3. Click the **Login** button.

Adding Arrays (Add Array Wizard)

When Storage Navigator Modular 2 is launched, it displays all existing arrays contained in its database. The first time it starts, the database does not contain any arrays and Storage Navigator Modular 2 launches the Add Array wizard automatically.

The Add Array wizard takes you step by step through the process of discovering arrays on your storage network and adding them to the Storage Navigator Modular 2 database.

For more information, please refer to the *Hitachi Simple Modular Storage 100 Quick Configuration Guide* (MK-97DF8090) and the Storage Navigator Modular 2 online help.

Configuring Array Drives (Initial Setup Wizard)

After you finish using the Add Array wizard, you use the Initial Setup wizard to configure the array's spare drives. This wizard lets you:

- Enable the array to send email notifications of serious array events
- Set the IP address, subnet mask, and default gateway for each management port
- Select the type of negotiation to be used
- Set the IP addresses for each data port

After you run the Initial Setup wizard, you edit the management port IP addresses for the controllers in your array to match the addresses you specified in this wizard. For more information, please refer to the *Hitachi Simple Modular Storage 100 Quick Configuration Guide* (MK-97DF8090) and the Storage Navigator Modular 2 online help.

Creating Logical Units

After you add arrays and configure the array drives, you define the logical units to be allocated to the host. In this step, you:

- Add the LU to a RAID group
- Enter a LUN number and specifying the amount of free space to be allocated to the LUN
- Specify a stripe size
- Indicate whether formatting is necessary

For more information, please refer to the *Hitachi Simple Modular Storage 100 Quick Configuration Guide* (MK-97DF8090) and the Storage Navigator Modular 2 online help.

Specifying Mode Parameters

After you run the Storage Navigator Modular 2 wizards, use Storage Navigator Modular 2 to set mode parameters. The selections you make will be based on your host's operating system and clustering configuration.

To access this page, use the following procedure.

1. If the Arrays pane appears next to the Explorer pane, skip to the next step. Otherwise:
 - a. In the Explorer pane, click **Resources > Arrays**.
 - b. In the Arrays area, check an array to be initialized.
 - c. Click **Show & Configure Array**.
2. In the Arrays pane, select **Groups > iSCSI Targets**.
3. Under the **iSCSI Target** column, check an iSCSI target. Then click **Edit Target**.
4. When the Edit iSCSI Target window appears, click on the **Options** tab and make the following selections (see [Table 3-4](#)):
 - a. **Platform** — select your host's operating system. If your host's operating system is not shown, select **not specified**.
 - b. **Middleware** — select **Not specified** for all operating systems.
 - c. **Common Setting** — select **Standard Mode** for all operating systems.
 - d. **Additional Settings** — select **None** for all operating systems.

Table 3-4: Mode Parameters

| For This Operating System | Select This Platform... | ...This Middleware Setting... | ...and These Mode Settings | |
|-------------------------------------|-------------------------|-------------------------------|----------------------------|---------------------|
| | | | Common Setting | Additional Settings |
| Asianux | Linux | Not specified (none) | Standard Mode | None |
| Red Hat Linux | Linux | Not specified (none) | Standard Mode | None |
| Microsoft Windows 2003 | Windows | Not specified (none) | Standard Mode | None |
| Microsoft Windows XP | Windows | Not specified (none) | Standard Mode | None |
| Microsoft Windows Vista | Windows | Not specified (none) | Standard Mode | None |
| Solaris | Solaris | Not specified (none) | Standard Mode | None |
| SuSE Linux Enterprise Server (SLES) | Linux | Not specified (none) | Standard Mode | None |
| VMware | Not specified | Not specified (none) | Standard Mode | None |

Installing iSCSI Initiator Software

Depending on your operating system, you may need to download an initiator software. For example, the iSCSI initiator for Microsoft Windows XP or Windows Server 2003 can be downloaded free of charge from the following site: <http://www.microsoft.com/downloads>. iSCSI initiator software for Microsoft Windows Vista or Windows Server 2008, Solaris, and VMware, on the other hand, are included with these operating systems.

Using the instructions for your iSCSI initiator, install the software on your host and write the name of the initiator (you will need this when you enter the iSCSI host name). Then tell your host where to find volumes on your array. Depending on your operating system, you may also need to add the target to the iSCSI service's binding list, initialize new drives, create partitions, and format new volumes.

Hitachi Simple Modular Storage 100 Host Installation Guide

Before you start using your Simple Modular Storage 100, please refer to the *Hitachi Simple Modular Storage 100 Host Installation Guide* that is appropriate for your host operating system. These guides, which are available on the documentation CD that came with your array, contain valuable information specific to your operating system that will enable you to get the most out of your Hitachi Simple Modular Storage 100.

Maintaining Your Array

This chapter describes how to maintain your Hitachi Simple Storage Modular 100 array. This chapter covers the following key topics:

- ❑ [Installing Spares](#)
- ❑ [Caring for Your Hitachi Simple Storage Modular](#)
- ❑ [Migrating Data](#)
- ❑ [Moving Your Hitachi Simple Storage Modular](#)
- ❑ [Storing Your Hitachi Simple Storage Modular 100](#)

Installing Spares

Your Hitachi Simple Modular Storage 100 contains two compartments that can accommodate spare drives. The array's hot-swappable feature enables you to add the drives without shutting down or turning off your Hitachi Simple Modular Storage 100.

To install a spare drive, you need:

- A new drive that meets the requirements in step 2 below.
- A server connected to the management port of your Hitachi Simple Modular Storage 100.

Before You Begin

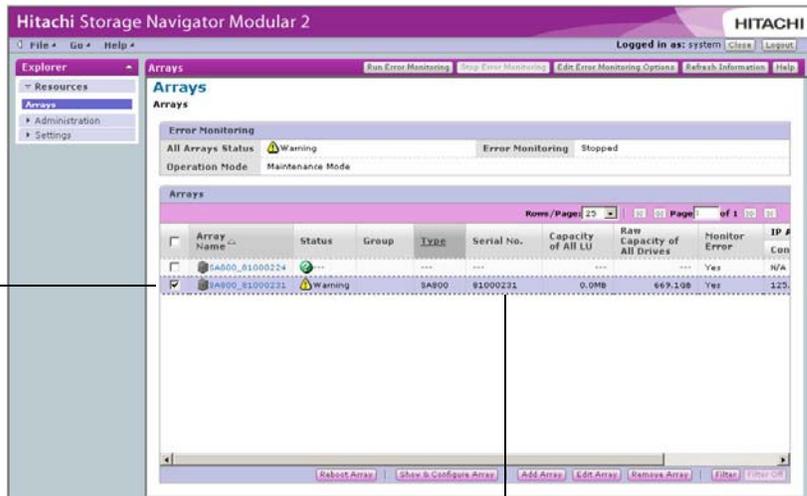
Before you begin, observe the following guidelines:

- The new drive(s) must be the same type (SATA or SAS) as the others in your Hitachi Simple Modular Storage 100.
- The new drive(s) must have the same capacity as the other drives in your Hitachi Simple Modular Storage 100.
- Wear a wrist strap attached to chassis ground when performing this procedure.

Checking for Defective Drives

Before installing a spare drive, use Storage Navigator 2 to see whether any of the other drives are defective.

1. Start a Web browser and launch Storage Navigator 2.
2. Log in to Storage Navigator 2:
`http://<IP address of management console PC>:23015/StorageNavigatorModular/`
3. In the Explorer pane and select **Resources > Arrays**.
4. If a **Warning** does not appear in the **Status** column, skip to [Installing the Spare Drives on page 4-5](#). Otherwise:
 - Verify that the serial number shown in the **Serial No.** column matches the one on your array (see [Figure 4-2 on page 4-3](#)).
 - In the **Array Name** column, click the name of the array that has the **Warning** status.



Example of Array with Warning Status

Serial Number Column

Figure 4-1: Checking for Failed Drives

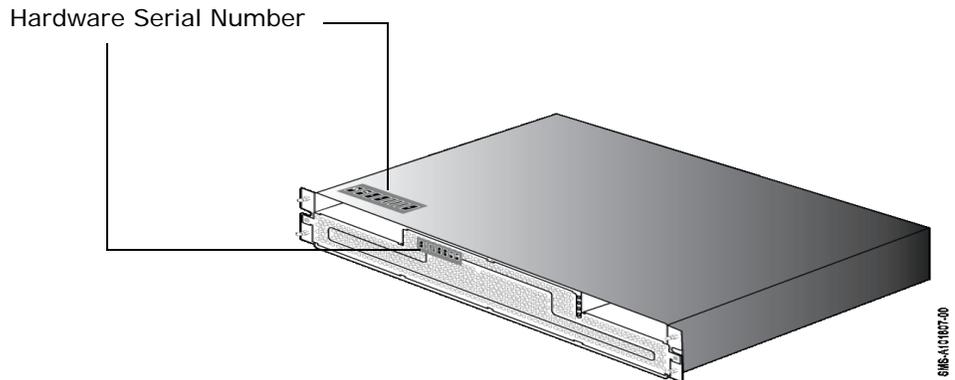


Figure 4-2: Locating the Serial Number

- If one failed part is shown in the Alerts & Events window, click **Show Details** (see [Figure 4-3 on page 4-4](#)), read the details about the failed part in the Alarm Information window (see [Figure 4-4 on page 4-4](#)), and click the link to the support site.

If two or more parts are shown, see [Chapter 5, Troubleshooting](#).



NOTE: If the console does not have an Internet connection, note the information shown and access the link from a computer that has a connection to the Internet.

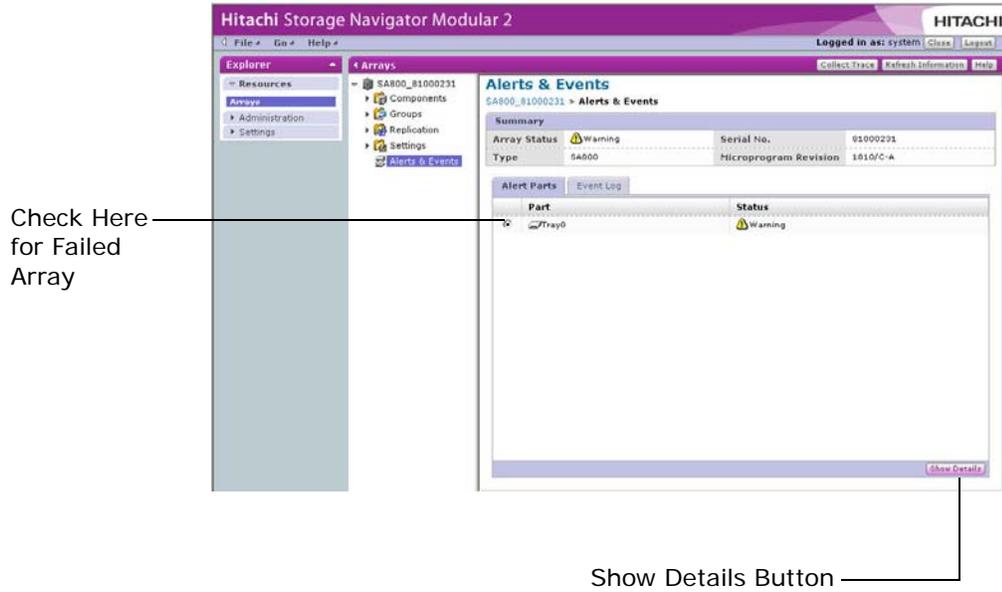


Figure 4-3: Example of Failed Part in the Alerts & Events Window

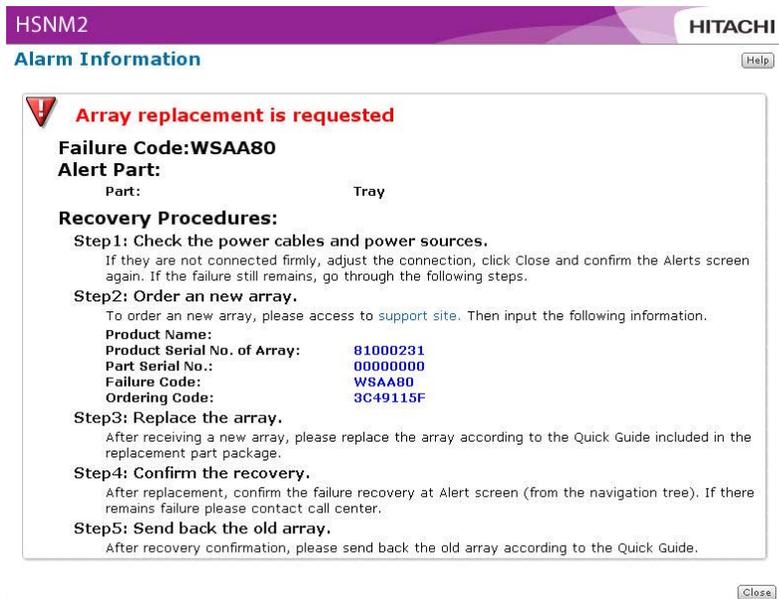


Figure 4-4: Example of Alarm Information Window

Installing the Spare Drives

To install the spare drives:

1. Wear an anti-static wristband connected to chassis ground.
2. Remove the new drive from its anti-static bag.
3. If you are replacing the drive due to a failure code you received, verify that the failure code in the Failed Part List window matches the model of the disk drive shown on the disk drive label (see [Figure 4-5](#)):
 - WSx100 = Model AJH146xxx (142.63 Gbyte drive)
 - WSx10a = Model AJH300xxx (287.62 Gbyte drive)

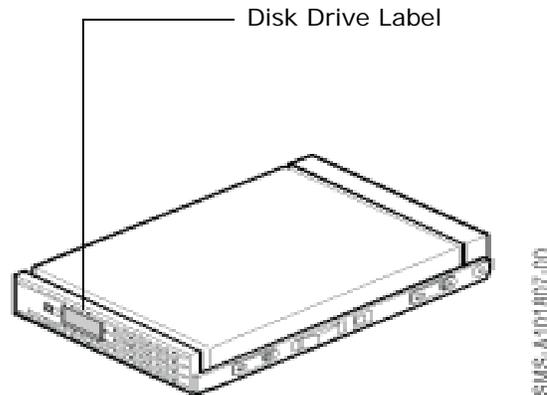


Figure 4-5: Label on Disk Drive

4. With your Hitachi Simple Modular Storage 100 running, remove the front panel bezel to gain access to the front of your Hitachi Simple Modular Storage 100 (see [Removing the Front Panel Bezel on page 3-13](#)).
5. Locate the drive slot into which you will install the drive. Facing the front of your Hitachi Simple Modular Storage 100, one slot appears on the left side of the array and the other slot appears on the right.
6. Loosen the two screws on the selected drive slot.
7. Remove the repair slot cover and remove the “dummy” drive from the slot.
8. Slide the new drive into the spare drive slot until the locking handle engages (see [Figure 4-6 on page 4-6](#)). When the drive is firmly installed, it begins to spin up automatically.

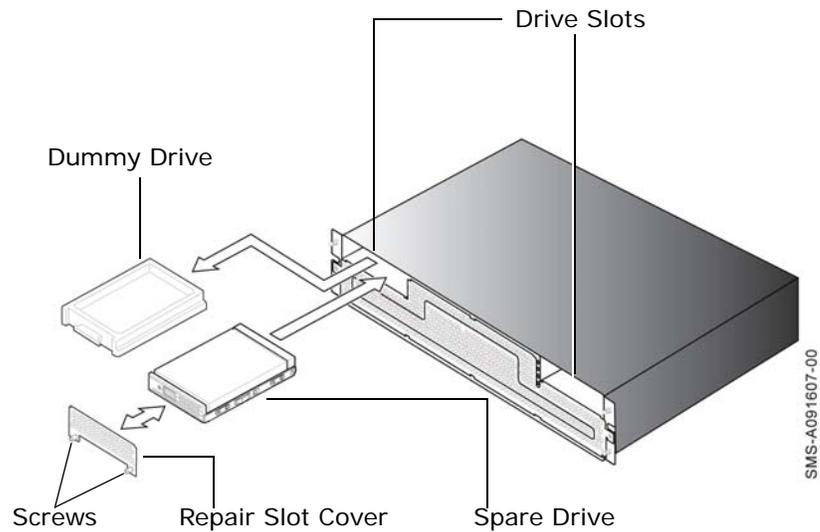


Figure 4-6: Installing the Spare Drives

9. Be sure the drive is installed securely in the slot.
10. Attach the repair slot cover, then secure it by tightening the two screws you loosened in step 4.
11. Verify that the **Warning** LED goes OFF.
12. Replace the front panel bezel (see [Attaching the Front Panel Bezel on page 3-12](#)).
13. Click the **Refresh Information** button to clear the Failed status and verify that **No Object** appears in the Failed Part List (see s).

Refresh Information Button

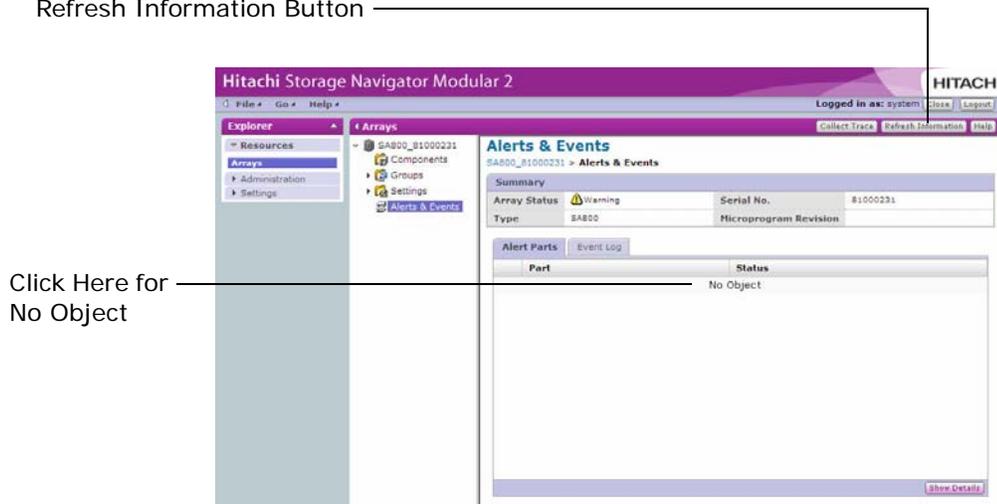


Figure 4-7: Confirming No Object Status

14. In the Arrays window, verify that the array status is **Normal**.
15. Remove the anti-static wristband.

Caring for Your Hitachi Simple Storage Modular

To keep your Hitachi Simple Modular Storage 100 operating at peak performance, we recommend that you perform the following simple maintenance tasks on a regular basis.



CAUTION! Do not pour or spray liquids directly onto your Hitachi Simple Modular Storage 100.

- Clean the outside of your Hitachi Simple Modular Storage 100 with a dry, lint-free cloth. Keep the cloth away from the array fans.



CAUTION! It is important to keep the front panel bezel and rear panel clean. Otherwise, the array's internal temperature can increase, causing the array to fail.

- Remove the front bezel (see [Removing the Front Panel Bezel on page 3-13](#)). Then clean it with a dry, lint-free cloth and reattach the bezel (see [Attaching the Front Panel Bezel on page 3-12](#)).
- Keep the air vents clean and free from dust.

Migrating Data

Your Hitachi Simple Modular Storage 100 supports RAID 6. RAID 6 delivers enhanced data protection compared by allowing for two simultaneous drive failures without downtime or data loss.

In the unlikely event that a sufficient number of drive failures render your Hitachi Simple Modular Storage 100 unusable, you can migrate your data to a replacement array.

Performing array migration is straightforward using the Hitachi Simple Modular Storage 100 Auto Migration Kit. The Kit comes with all the cables and instructions you need to migrate data. For more information, please visit the Hitachi Web Portal at <http://support.hds.com>. Instructions for migrating data can also be found in the **Auto Migration** topic in the Storage Navigator 2 online help.



TIP: Before you migrate data, you may want to print the relevant topics from the Storage Navigator online help for reference.

Moving Your Hitachi Simple Storage Modular

This section contains critical information for avoiding damage when moving your Hitachi Simple Modular Storage 100. Before moving your Hitachi Simple Modular Storage 100 across the room or to another nearby location, be sure to remove all cables from the back panel.

Before You Move Your Hitachi Simple Modular Storage 100

Before moving your Hitachi Simple Modular Storage 100 longer distances, including moves that require an elevator or a ride in a vehicle, use the following checklist as a general guide.

- Do not clean your Hitachi Simple Modular Storage when moving the array.
- Make sure the new location for your Hitachi Simple Modular Storage 100 meets the requirements described under Preparing Your Site on page 3-3.
- Do not disconnect your Hitachi Simple Modular Storage 100's power cable while the power is on or while the array's internal fans are operating.
- After turning off your Hitachi Simple Modular Storage 100, allow the array to cool.
- Disconnect all data and power cables after your Hitachi Simple Modular Storage 100 has cooled.
- Gather the documentation (CD-ROMs, user guide, quick-start guide).
- Have at least three persons move your Hitachi Simple Modular Storage 100 to the new location.
- For long distances, including those involving transportation in a vehicle, place your Hitachi Simple Modular Storage 100 in its original packing material and shipping container.

After Your Array is in the New Location

Complete the following tasks in order.

- Connect all data and power cables to your Hitachi Simple Modular Storage 100.
- Make sure that your Hitachi Simple Modular Storage 100 is set up correctly.
- Make sure your applications and users can access data through your Hitachi Simple Modular Storage 100.
- Make sure your Hitachi Simple Modular Storage 100 can be accessed using Storage Navigator Modular 2.

Storing Your Hitachi Simple Storage Modular 100

Read this section if you turn your Hitachi Simple Modular Storage 100 on and off for extended periods.

If your Hitachi Simple Modular Storage 100 is removed from an AC power supply longer than six months, its internal battery will become over discharged and unrecoverably damaged, and you will need to replace your array. To avoid this situation, connect your Hitachi Simple Modular Storage 100 to an AC outlet for more than six hours at least once every six months so the battery can be charged.



5

Troubleshooting

This chapter provides information to help you identify and resolve problems in the unlikely event you encounter a problem with your Hitachi Simple Modular Storage 100 array.

Recovering from Failures

An array failure may have occurred if one or more of the following occurs:

- Your Hitachi Simple Modular Storage 100 sends an email alerting you to a failure.
- The **Alarm** or **Warning** LED on the front panel goes ON.
- The **Ready** LED on the front panel is OFF.
- You experience performance deterioration with your Hitachi Simple Modular Storage 100.
- A LUN cannot be recognized.
- A host cannot see an iSCSI data port on your Hitachi Simple Modular Storage 100.

If one or more of these actions occurs, perform the following steps to recover from the failure:

1. Log in to Storage Navigator Modular 2:

`http:// <IP address of management console PC> :23015/
StorageNavigatorModular/`

2. Go to the Explorer pane and click **Arrays**.



NOTE: If Storage Navigator Modular 2 does not start, a communication failure with the Storage Navigator Modular 2 server may have occurred or the Storage Navigator Modular 2 server may not be started normally. See "Hitachi Storage Navigator Modular 2 will not start" in [Table 5-1 on page 5-5](#).

3. In the **Arrays** area, check the status and serial number of the array where the failure occurred (see [Figure 5-1 on page 5-3](#)).

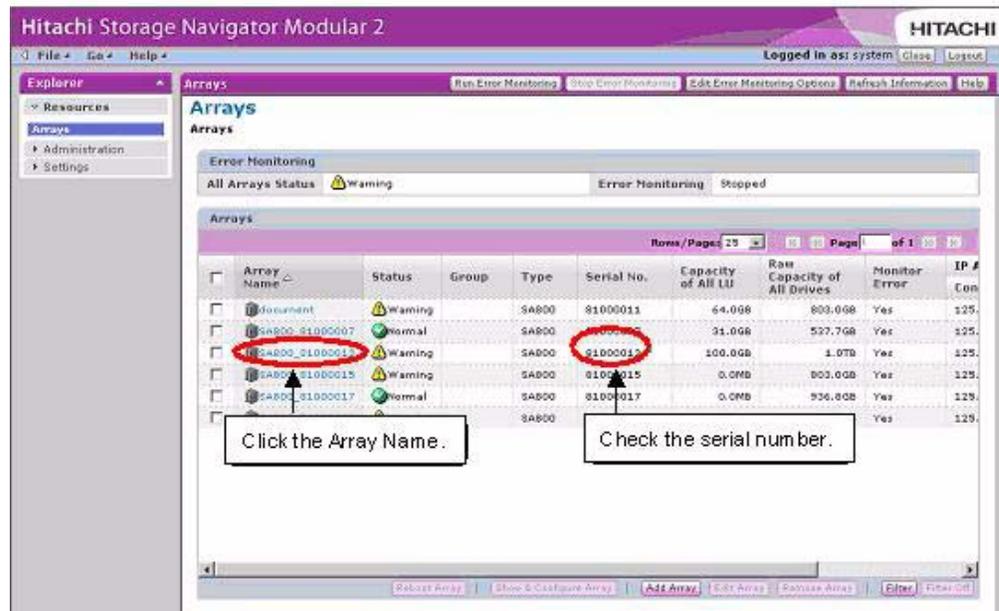


Figure 5-1: Locating the Array Name and Serial Number



NOTE: If Storage Navigator Modular 2 cannot access your Hitachi Simple Modular Storage 100, the array may be turned off or there may be a network failure between Storage Navigator Modular 2 and the array. See “Hitachi Storage Navigator Modular 2 cannot communicate with the array” in [Table 5-1 on page 5-5](#).

4. If you received an email about the failure or used SNMP to detect the failure, check that the hardware serial number in the email/SNMP matches the one on your Hitachi Simple Modular Storage 100 (see [Figure 4-2 on page 4-3](#)).
5. Check the status column of the system that matches the hardware serial number checked in the previous step.
 - **Normal** = Your Hitachi Simple Modular Storage 100 is operating normally. The fault may have occurred between the array and the host. See “A failure other than an array failure occurs” in [Table 5-1 on page 5-5](#).
 - --- = Storage Navigator Modular 2 cannot access your Hitachi Simple Modular Storage 100. The **MAIN SW** switch may be set to the OFF position or a network failure may have occurred between the host and the array. See “Hitachi Storage Navigator Modular 2 cannot communicate with the array” in [Table 5-1 on page 5-5](#).
6. From the Arrays area shown in [Figure 5-1](#), click the name of the array. When the next screen appears, click either **Alerts & Events** in the Arrays pane or **Check for Errors** in the Common Array Tasks area. In the **Alert Parts** tab, check for the failed part, such as a disk drive (see [Figure 5-2 on page 5-4](#)).
 - If a disk drive is shown, do not try to remove the faulty drive. Your Hitachi Simple Modular Storage 100 is designed to prevent drives from being removed. However, you can insert up to two spare drives.

- If your Hitachi Simple Modular Storage 100 is shown, the array is faulty and should be replaced.
- If neither appears in the failure list window, a software failure may have occurred. See “Unidentified failure has occurred” [Table 5-1 on page 5-5](#).

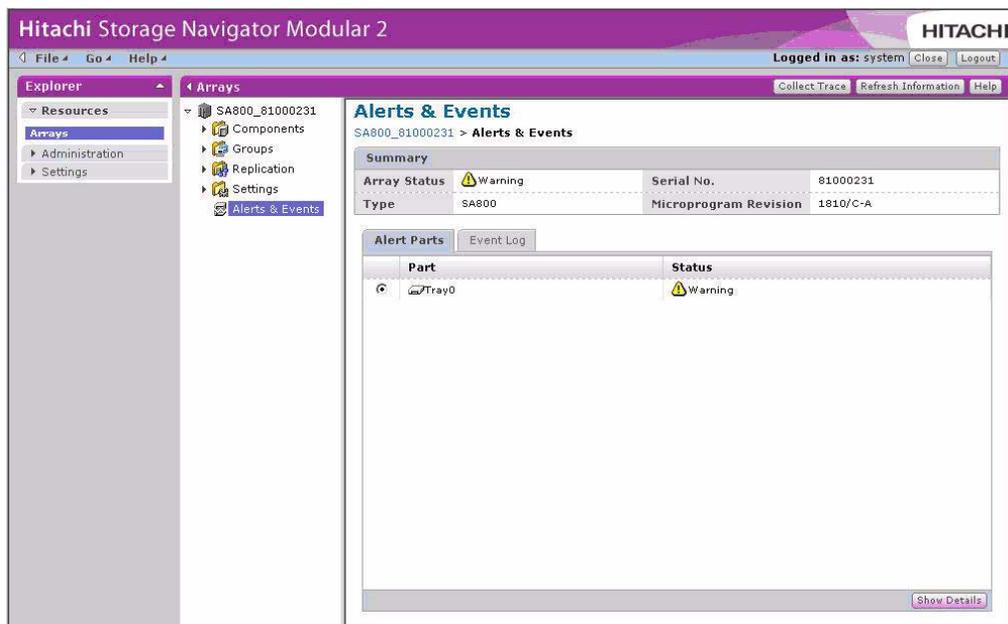


Figure 5-2: Example of the Failure Parts List Tab

7. If an entry appears in the failure parts list window, click **Show Details** in the lower right corner of the screen for detailed information (see [Figure 5-3 on page 5-5](#)). To remove the information, click the **Close** button.

Array replacement is requested

Failure Code: WSAA80
Alert Part:
 Part: Tray

Recovery Procedures:

Step1: Check the power cables and power sources.
 If they are not connected firmly, adjust the connection, click Close and confirm the Alerts screen again. If the failure still remains, go through the following steps.

Step2: Order an new array.
 To order an new array, please access to support site. Then input the following information.

Product Name:
Product Serial No. of Array: 81000231
Part Serial No.: 00000000
Failure Code: WSAA80
Ordering Code: 3C49115F

Step3: Replace the array.
 After receiving a new array, please replace the array according to the Quick Guide included in the replacement part package.

Step4: Confirm the recovery.
 After replacement, confirm the failure recovery at Alert screen (from the navigation tree). If there remains failure please contact call center.

Step5: Send back the old array.
 After recovery confirmation, please send back the old array according to the Quick Guide.

Click
 Information for order

Close

Figure 5-3: Example of an Alarm Information Window

Troubleshooting Your Array

Table 5-1: Troubleshooting

| Symptom | Suggested Actions |
|---------------------------------|--|
| Missing or damaged parts | If any of the contents included with your Hitachi Simple Modular Storage 100 are missing or damaged, contact your place of purchase immediately. |
| Power LED does not go ON | <ol style="list-style-type: none"> 1. Check that the power connections to your Hitachi Simple Modular Storage 100 are secure. 2. Verify that the power outlet is working. Plug a lamp into the outlet to determine whether the outlet is working. 3. If the outlet is controlled by a wall switch, be sure the switch is set to provide power to the outlet. We recommend you use a power outlet not controlled by a wall switch. 4. If these steps do not fix the problem, visit the Hitachi Web Portal at http://support.hds.com. |

Table 5-1: Troubleshooting (Continued)

| Symptom | Suggested Actions |
|--|---|
| Host cannot access storage | <ol style="list-style-type: none"> 1. Verify that the port activity LED on the used iSCSI data ports is ON (see Figure 2-3 on page 2-4). If not, try a different iSCSI data port. 2. Check that all iSCSI cables are connected securely at both ends. 3. Send a ping command from the host to your Hitachi Simple Modular Storage 100. If the ping fails, verify that the host is communicating with your Hitachi Simple Modular Storage 100 at the appropriate IP address. 4. Check whether other devices in your network, such as a router or switch, are the cause of the problem. 5. If these steps do not fix the problem, visit the Hitachi Web Portal at http://support.hds.com. |
| A failure other than an array failure occurs | <ol style="list-style-type: none"> 1. Check that the host is turned on. 2. Verify that the port activity LED on the used iSCSI data ports is ON (see Figure 2-3 on page 2-4). If not, try a different iSCSI data port. 3. Send a ping command from the host to your Hitachi Simple Modular Storage 100. If the ping fails, verify that the host is communicating with your Hitachi Simple Modular Storage 100 at the appropriate IP address. 4. Check your CHAP authentication, LUN Manager, mapping, and LUN settings. |
| Hitachi Storage Navigator Modular 2 will not start | <ol style="list-style-type: none"> 1. Be sure the computer acting as the management console meets the minimum requirements described in Required Items Supplied by the User on page 3-8. 2. Check the settings of your Web browser. 3. Verify that the Storage Navigator Modular 2 server is working. 4. Verify that your host has Java Runtime Environment (JRE) version 1.6 (update 2) installed. This is a free download from http://java.sun.com/javase/downloads/index.jsp. 5. Verify that the correct IP address was entered in the Web browser address bar. 6. If these steps do not fix the problem, you may need to reinstall the Storage Navigator Modular 2 software. |

Table 5-1: Troubleshooting (Continued)

| Symptom | Suggested Actions |
|---|--|
| Hitachi Storage Navigator Modular 2 cannot communicate with the array | <ol style="list-style-type: none"> 1. Check that both power cables are connected to the array and to working AC outlets, and that the Power LEDs above each receptacle on the back panel are blinking. 2. Check that the MAIN SW switch on both arrays is in the ON position. 3. Check that the Power and EXT LEDs on both arrays are ON. 4. Check whether other devices in your network, such as a router or switch, is the cause of the problem. 5. Turn off your Hitachi Simple Modular Storage 100. Verify that the front panel Power LED goes OFF. If the Power LED is ON, disconnect both power cables and verify that the front panel Power LED is OFF. 6. Turn on your Hitachi Simple Modular Storage 100 and verify that the Ready LED goes ON. 7. Repeat steps 4 and 5 again. 8. If these steps do not resolve the problem, see Array or part has failed, below. |
| Array or part has failed | <ol style="list-style-type: none"> 1. Start Storage Navigator Modular 2. If it fails to start, see Unidentified failure has occurred, below. 2. Go to the Explorer pane and select Resources > Arrays. 3. In the Arrays pane, check for a failed array. If you find one, select Components > Trays. 4. From the Alerts screen, click the Details button to check for additional failed parts. 5. Read any detailed information about the failed part. 6. If the failed component is a drive, order a replacement drive from the Hitachi Web Portal at http://support.hds.com. |
| Unidentified failure has occurred | <ol style="list-style-type: none"> 1. If using preinstalled Hitachi software (see Key Features on page 1-2), refer to the documentation for that product. 2. Turn off your Hitachi Simple Modular Storage 100. Verify that the front panel Power LED goes OFF. If the Power LED is ON, disconnect both power cables and verify that the front panel Power LED is OFF. 3. Turn on your Hitachi Simple Modular Storage 100 and verify that the Ready LED goes ON. 4. If these steps do not resolve the problem, see Array or part has failed above. |

Table 5-1: Troubleshooting (Continued)

| Symptom | Suggested Actions |
|---|---|
| Auto migration or data shredding operation has failed | <ol style="list-style-type: none"> 1. If a auto migration or data shredding operation has failed, an error message appears in the Error field of the Array Migration window. 2. Confirm that the auto migration cables are connected properly. 3. Confirm that the target array is in migration mode (MODE switch is in the E position). 4. Connect the target array again. 5. Only one migration operation can be performed on an array. If the array has already been used as a target in an array migration, it cannot be used as a target array again. 6. If the problem persists, visit the Hitachi Web Portal at http://support.hds.com. |
| An error message appears in Storage Navigator Modular 2 during auto migration | Please see Table 5-2 on page 5-10 for troubleshooting suggestions. |
| The array went down during the auto migration procedure. | <ol style="list-style-type: none"> 1. Move the MAIN SW switch on the back panel of the source array to the OFF position. Verify that the POWER LED goes OFF. 2. Move the MAIN SW switch on the back panel of the target array to the OFF position. Verify that the EXT and POWER LEDs go OFF. 3. Remove the migration cable between the source and target arrays. 4. Move the MAIN SW switch on the back panel of the source array to the ON position and verify that the POWER LED goes ON. <p>If array down condition occurs again when starting the source array, turn off the source array again and then turn it on. Check that the READY LED goes ON after a few minutes. If the READY LED does not go ON after 20 minutes, visit the Hitachi Web Portal at http://support.hds.com.</p> |

Table 5-1: Troubleshooting (Continued)

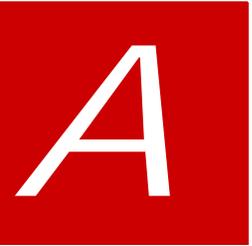
| Symptom | Suggested Actions |
|---|---|
| <p>Before you perform an array migration, you may want to test the new target array by writing data to it. When you write data to the array, the array's migration guard becomes enabled automatically. This safety feature prevents an array that contains data from being overwritten. Therefore, to use an array with data as a target array in a data migration operation, you must first release the migration guard using the suggested actions to the right to allow the data on that array to be overwritten.</p> | <ol style="list-style-type: none"> 1. Move the MAIN SW switch on the back panel of the source array to the OFF position. Verify that the POWER LED goes OFF. 2. Move the MAIN SW switch on the back panel of the target array to the OFF position. Verify that the EXT and POWER LEDs go OFF. 3. Remove the migration cable between the source and target arrays. 4. Connect your storage network to the management port on the target array. 5. On the target array, set the MODE switch to N. 6. Move the MAIN SW switch on the back panel of the source array to the ON position. Verify that the POWER LED goes ON and that the READY LED goes ON in a few minutes. 7. Log in to Storage Navigator Modular 2. 8. In the Arrays area, click the Add Array button and add the array to the Storage Navigator Modular 2 database. 9. Go to Settings > Replacement of Array and select Check for New Array. 10. A status of Guarded means the release migration guard is enabled. To disable the migration guard, click Release Migration Guard in the Migration Guard Setting to acknowledge that the array can be overwritten. A confirmation dialog box appears. 11. Click the checkbox, then click OK to continue. 12. Move the MAIN SW switch on the back panel of the target array to the OFF position. Verify that the POWER LED goes OFF. 13. Remove the cable from the management port of the target array. 14. Return the MODE switch on the target array to the E position. 15. Connect the auto migration cables to the source and target arrays. 16. Move the MAIN SW switch on the back panel of the target array to the ON position. Verify that the EXT and POWER LEDs go ON. 17. Move the MAIN SW switch on the back panel of the source array to the ON position. Verify that the POWER LED goes ON and that the READY LED goes ON in a few minutes. 18. Perform the auto migration operation described in the <i>Hitachi Simple Modular Storage 100 Auto Migration Assistant Guide</i> (MK-97DF8066). |

Table 5-2: Auto Migration Troubleshooting

| Error Message | Suggested Actions |
|---|---|
| Restore is in progress on Shadow/Image pairs | Wait until restore is completed and try Create Copy again. |
| Restore is in progress on SnapShot pairs | Wait until restore is completed and try Create Copy again. |
| Unreadable PIN exists in the source array | Auto migration cannot be performed. Visit the Hitachi Web Portal at http://support.hds.com . |
| Quick Format is in progress | Wait until the quick format is completed and try Create Copy again. |
| No DM-LUN exists in the source array | Auto migration cannot be performed. Visit the Hitachi Web Portal at http://support.hds.com . |
| Cache resident LUN exists in the source array | Disable Cache Resident LUN and try the auto migration again. |
| Change on cache partition is reserved | Shut down and restart the source array. Then try the auto migration again. |
| PIN over has occurred in the source array | Auto migration cannot be performed. Visit the Hitachi Web Portal at http://support.hds.com . |
| FAN in the target array is in Alarm status | Disconnect the target array as described on the next page and start it in normal mode to see if the alarm disappears. If the alarm message disappears, try the auto migration again. Otherwise, visit the Hitachi Web Portal at http://support.hds.com . |
| The power supply in the target array is in Alarm status | Disconnect the target array as described on the next page and start it in normal mode to see if the alarm disappears. If the alarm message disappears, try the auto migration again. Otherwise, visit the Hitachi Web Portal at http://support.hds.com . |
| HDU in the target array is in Alarm status | Disconnect the target array as described on the next page and start it in normal mode to see if the alarm disappears. If the alarm message disappears, try the auto migration again. Otherwise, visit the Hitachi Web Portal at http://support.hds.com . |
| ENC in the target array is in Alarm status | Disconnect the target array as described on the next page and start it in normal mode to see if the alarm remains. If the alarm message disappears, try Array Migration again. Otherwise, visit the Hitachi Web Portal at http://support.hds.com . |
| The type of HDDs in the target array is incorrect | Visit the Hitachi Web Portal at http://support.hds.com . |
| The number of HDDs in the target array is incorrect | Visit the Hitachi Web Portal at http://support.hds.com . |
| The capacity of HDDs in the target array is insufficient | Visit the Hitachi Web Portal at http://support.hds.com . |
| The target array is guarded against array migration | Disconnect the target array as described on the next page and start it in normal mode to confirm if it can be the target array. If it can, try the auto migration again. |
| The controller configuration of the target array is incorrect | Visit the Hitachi Web Portal at http://support.hds.com . |

Table 5-2: Auto Migration Troubleshooting

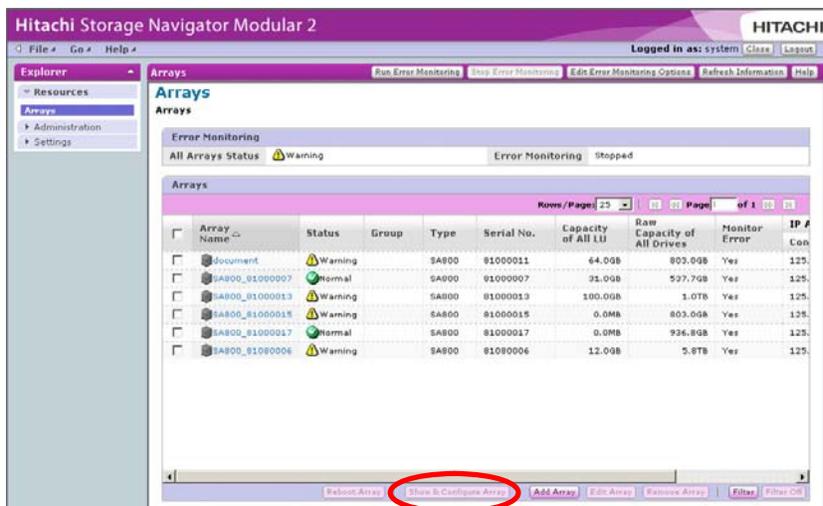
| Error Message | Suggested Actions |
|--|---|
| The new target array has an earlier firmware version than the source array | Disconnect the target array as described below and start it in normal mode to upgrade the firmware to the same or later version as the source array. Then try the auto migration again. |
| The type of interface boards in the target array is incorrect | Visit the Hitachi Web Portal at http://support.hds.com . |
| The number of interface boards in the target array is incorrect | Visit the Hitachi Web Portal at http://support.hds.com . |
| The bandwidth of interface boards in the target array is insufficient | Visit the Hitachi Web Portal at http://support.hds.com . |
| An incorrect array is connected | Visit the Hitachi Web Portal at http://support.hds.com . |
| Failure has occurred in the source array | Shut down and restart the source array. Restart the source array. When the Ready LED goes ON, perform the migration again. If the Ready LED does not go ON, visit the Hitachi Web Portal at http://support.hds.com . |
| Failure has occurred in the target array | Shut down and restart the source array. It is possible to use the source array after reboot. If the problem persists, visit the Hitachi Web Portal at http://support.hds.com to obtain a target array. |
| Intermittent failure has occurred in the source array | Click Switch Array in the Array Migration window. |
| Failure has occurred in the source array | The data shredding operation has failed. Return the source array, without trying to shred the data. |
| Unexpected error has occurred | Visit the Hitachi Web Portal at http://support.hds.com . |



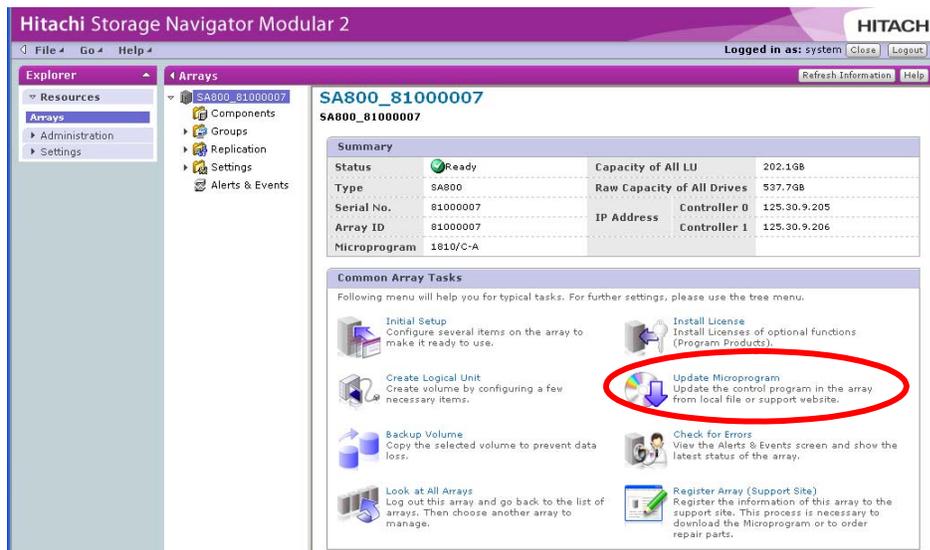
Upgrading Firmware

Your Hitachi Simple Modular Storage 100 array can use newer versions of its firmware as they become available. This appendix describes how to upgrade the firmware on your Hitachi Simple Modular Storage 100. This procedure requires the use of Storage Navigator Modular 2.

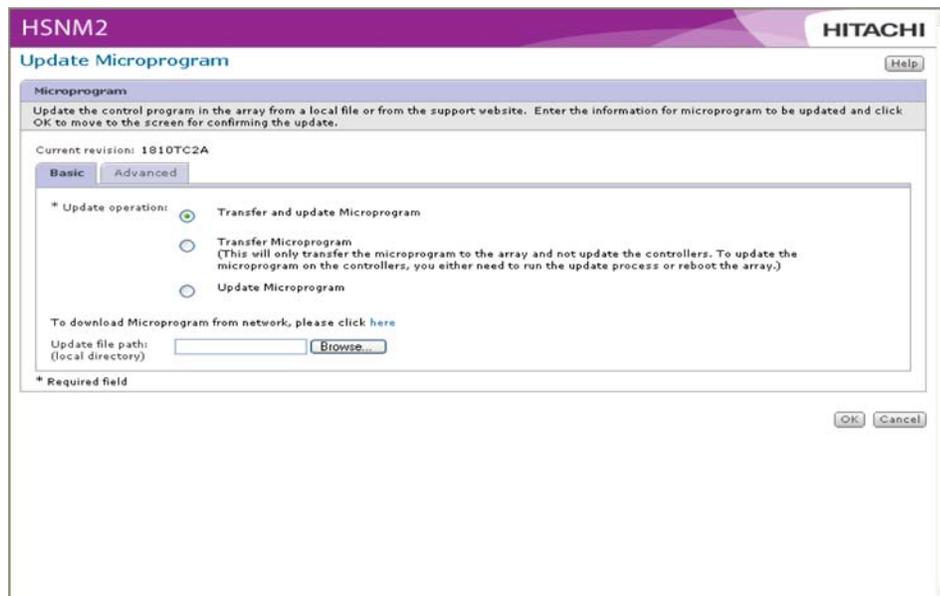
1. Download the latest firmware.
2. Start your web browser and log in to Storage Navigator Modular 2:
`http://<IP address of management console PC>:23015/StorageNavigatorModular/`
3. In the Explorer pane, click **Resources > Arrays**.
4. In the Arrays area, check the array whose firmware you want to upgrade, then click **Show & Configure Array**.



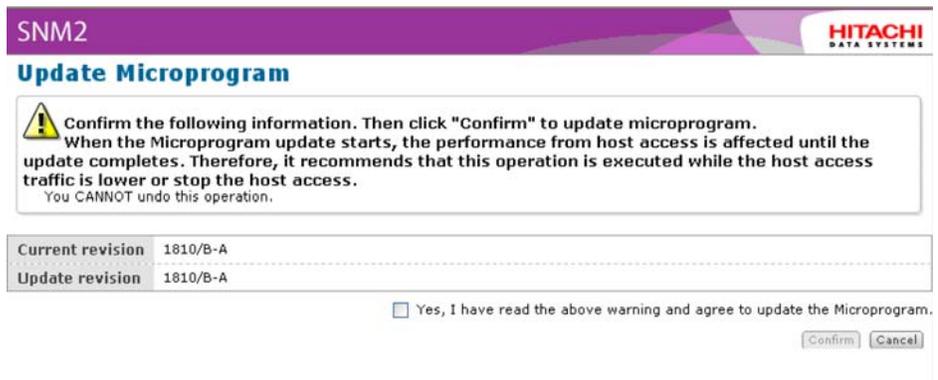
A screen similar to the following appears.



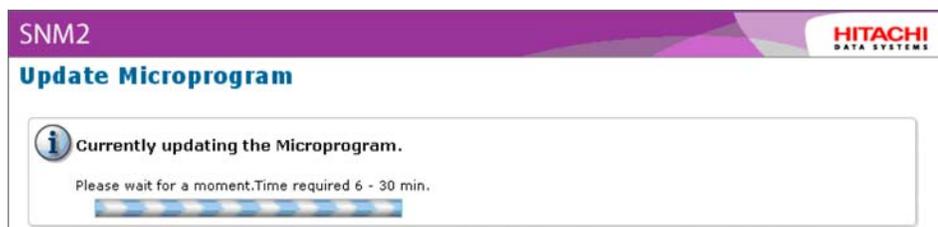
5. Under **Common Array Tasks**, click **Update Microprogram**. The following window appears.



6. Next to **Update operation**, click **Update microprogram**.
7. Next to **Update file path**, click the **Browse** button, navigate to the location where the firmware file resides, click the file, and click the **Open** button. The path and filename appear in the **Browse** field.
8. Click **OK**. The following confirmation window appears.



9. Read the information in the window. Then check **Yes, I have read the above warning and agree to update the Microprogram.**
10. Click the **Confirm** button to proceed. A window similar to the following appears as the firmware is updated. The window shows the approximate duration required to update the firmware.



NOTE: On arrays with one controller, the **Warning** LED flashes when the firmware is being updated.



CAUTION! Do not cancel or have your Hitachi Simple Modular Storage 100 perform I/O operations while the firmware is being upgraded.

11. After the firmware has been updated, a message informs you that the operation has been completed successfully. Click the **Close** button to remove the message. You can then return to normal operation.

Specifications

This appendix lists the specifications for your Hitachi Simple Modular Storage 100 array.

This chapter covers the following key topics:

- [Mechanical Specifications](#)
- [Electrical Specifications](#)
- [Environmental Specifications](#)
- [Power Cables](#)
- [Ethernet Specifications](#)

Mechanical Specifications

The following table describes the mechanical specifications for the Hitachi Simple Modular Storage.

Table B-1: Disk Drive

| Parameter | Specification |
|------------------------------------|---|
| Height | 1.02 inches (26.1 mm) |
| Width | 4.0 inches (101.6 mm) |
| Depth | 5.78 inches (147 mm) |
| Drive Capacity (GB) | 142.63/287.62/491.27/737.49 |
| Rotational Speed | 142.63/287.62 G bytes: 15,000 491.27/737.49 G bytes: 7,200 |
| Maximum Number of Mountable Drives | 12 including two repair slots |
| Spare Disk | 1 |

Table B-2: Host Interface

| Parameter | Specification |
|-------------------------------------|---|
| Interface Type | 1 Gbps Ethernet |
| Maximum Data Transfer Speed to Host | 100 Mbytes/Ethernet |
| Number of iSCSI data ports | 1-controller array: 2 2-controller array: 4 |
| Transferred Block Size | 512 |
| RAID Level | 6 |
| RAID Configuration | 4D+2P, 6D+2P, 9D+2P |
| Flash Memory | 16 Mbytes |
| L2 Cache Memory | 512 kbytes |
| DDR2 SDRAM | 512 Mbytes |
| Data Assurance Method | Data Bus: Parity Cache Memory: ECC (1 bit for correction, 2 bits for detection) Disk drive: Data assurance code |

Table B-3: Physical Specifications

| Parameter | Specification |
|---------------------------------|--|
| Chassis Size | Height: 3.4 inches (87 mm) Width: 18.9 inches (482.6 mm) Depth: 28.7 inches (731.4 mm) |
| Weight | Approx 72.6 pounds (33 kg) |
| Acoustic Noise | Approximately 60 dB |
| Insulation to Withstand Voltage | AC 1,500 V (10 mA, 1 min) |
| Insulation Resistance | DC 500 V, 10 M Ω or more |

Table B-4: Cache Specifications

| Parameter | Specification |
|-----------------|---|
| Capacity | 1,024 Mbytes |
| Control Method | Read LRU/Write after |
| Battery Backup | Provided |
| Backup Duration | 24 hours with 1 G bytes cache /controller |

Electrical Specifications

The following table describes the electrical specifications for the Hitachi Simple Modular Storage.

Table B-5: Input Specifications

| Parameter | Specification |
|---------------------------|--|
| Input Voltage | AC 100/200 V (100 V to 120/200 V to 240 V) |
| Frequency | 50/60 Hz \pm 1 |
| Number of Phases, Cabling | Single-phase with Protective Grounding |
| Steady-state Current | 3.2 2/1.6 2 |
| Breaking Current | 10.0 |
| Heat Value | 2,160 kJ/h or less |
| Required Power | Steady State (VA): 640 or less Starting State (VA): 640 or less |

Environmental Specifications

The following table describes the environmental specifications for the Hitachi Simple Modular Storage.

Table B-6: Environmental Specifications

| Parameter | Specification |
|---|--|
| Temperature, Operating | 50° F to 104° F (10° to 40° C) |
| Temperature, Storage | 14° F to 122° F (-10° to 50° C) |
| Temperature, Transporting | -22° F to 140° F (-30° to 60° C) |
| Temperature Change Rate | 50° F (10°C) per hour |
| Humidity, Operating | 46° F to 176° F (8° to 80° C) |
| Humidity, Storage | 46° F to 194° F (8° to 90° C) |
| Maximum Wet Bulb Temperature | 84° F (29° C) noncondensing |
| Vibration, Operating (m/s ²) | 2.5 or less (5 to 300Hz) (within 5 seconds) |
| Vibration, Storage (m/s ²) | 5.0 or less (5 to 300Hz) |
| Vibration, Transporting (m/s ²) | 5.0 or less |
| Impact, Operating (m/s ²) | 20 or less (10 ms, half sine wave impact) |
| Impact, Storage (m/s ²) | 50 or less (10 ms, half sine wave impact) |
| Impact, Transporting (m/s ²) | 80 or less (10 ms, half sine wave impact) |
| Altitude, Operating | -984.25 to 9842 feet (-300 to 3,000 m) |
| Altitude, Storage | -300 to 12,000 |
| Acoustic Noise | 60 dB (environmental temperature: 32° C or less) |

Power Cables

Table B-7: Power Cable and Plug Identification

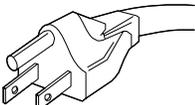
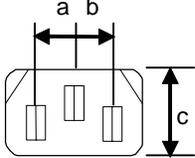
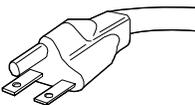
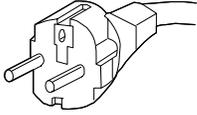
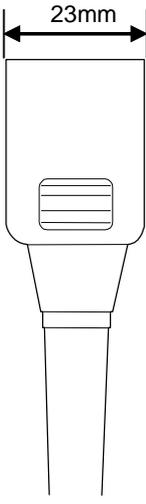
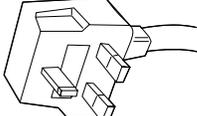
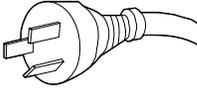
| Input Rating | Plug Configuration | Reference Standards | Cable and Connector | |
|------------------------------------|--|---|---|--|
| 100V-120V (standard attachment) |  North America | 1 ANSI C73.11 2 NEMA 5-15P 3 IEC 83 |  | |
| 200V-240V |  North America | 1 ANSI C73.11 2 NEMA 6-15P 3 IEC 83 | $\left[\begin{array}{l} a=7\pm 0.05\text{mm} \\ b=7\pm 0.05\text{mm} \\ c=15.8\text{mm} \end{array} \right]$ | Three wire power cable with a two-pole, three-terminal grounding-type connector. |

Table B-7: Power Cable and Plug Identification

| Input Rating | Plug Configuration | Reference Standards | Cable and Connector | |
|--------------|---|---|--|--|
| |  <p data-bbox="451 426 630 457">Universal Euro</p> | <p data-bbox="678 258 816 342">4 CEE (7) II, IV, VII 3 IEC 83</p> |  | |
| |  <p data-bbox="451 653 646 684">United Kingdom</p> | <p data-bbox="678 474 808 527">5 BS 1365 3 IEC 83</p> | | |
| |  <p data-bbox="451 846 565 877">Australia</p> | <p data-bbox="678 699 808 730">6 AS C112</p> | | |

Ethernet Specifications

The following table describes the Ethernet specifications for the Hitachi Simple Modular Storage.

Table B-8: Ethernet Specifications

| Parameter | Specification |
|---|--|
| Works with switches that comply to the following standards: | IEEE 802.1D STP IEEE 802.1w RSTP IEEE 802.3 CSMA/CD IEEE 802.3u Fast Ethernet IEEE 802.3z 1000BaseX IEEE 802.1Q Virtual LANs IEEE 802.3ad Dynamic LACP |
| | RFC 768 UDP RFC 783 TFTP RFC 791 IP RFC 793 TCP RFC 1157 SNMP v1 RFC 1213 MIB II RFC 1757 RMON RFC 1901 SNMP v2 |
| Cable Type | RJ-45 1000BASE-TX UTP or STP (STP is recommended) |

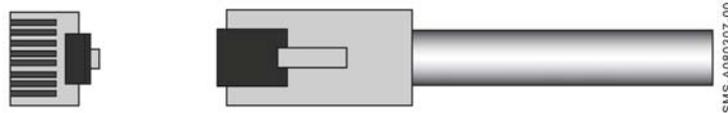


Figure B-1: RJ-45 Jack on Ethernet Cable



Figure B-2: RJ-45 Jack on the Hitachi Simple Modular Storage 100



Glossary

This glossary provides definitions of general storage networking terms as well as specific terms related to the technology that supports your Hitachi Simple Modular Storage 100 array. Click the letter of the glossary section to display that page

| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

#

1000Base-T

A specification for Gigabit Ethernet over copper wire. The standard defines 1 Gbps data transfer over distances of up to 100 meters using four pairs of Category 5 balanced copper cabling and a 5-level coding scheme.

A

Array

A set of hard disks grouped logically together to function as one contiguous storage space.

ATA

Advanced Technology Attachment, a disk drive implementation that integrates the controller on the disk drive.

B

BIOS

Basic Input Output System, built-in software code that determines the functions that a computing device can perform without accessing programs from a disk.

Bps

Bits per second, the standard measure of data transmission speeds.

C

Cache

A temporary, high-speed storage mechanism. It is a reserved section of main memory or an independent high-speed storage device. Two types of caching are found in computers: memory caching and disk caching. Memory caches are built into the architecture of microprocessors and often computers have external cache memory. Disk caching works like memory caching; however, it uses slower, conventional main memory that on some devices is called a memory buffer.

Capacity

The amount of information (usually expressed in megabytes) that can be stored on a disk drive. It is the measure of the potential contents of a device; the volume it can contain or hold. In communications, capacity refers to the maximum possible data transfer rate of a communications channel under ideal conditions.

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

Challenge Handshake Authentication Protocol

A security protocol that requires users to enter a secret for access.

CHAP

See Challenge Handshake Authentication Protocol.

D

DHCP

Dynamic Host Configuration Protocol, allows a computer to join an IP-based network without having a pre-configured IP address. DHCP is a protocol that assigns unique IP addresses to devices, then releases and renews these addresses as devices leave and re-join the network.

Duplex

The transmission of data in either one or two directions. Duplex modes are full-duplex and half-duplex. Full-duplex is the simultaneous transmission of data in two direction. For example, a telephone is a full-duplex device, because both parties can talk at once. In contrast, a walkie-talkie is a half-duplex device because only one party can transmit at a time.

F

Fabric

The hardware that connects workstations and servers to storage devices in a SAN. The SAN fabric enables any-server-to-any-storage device connectivity through the use of Fibre Channel switching technology.

Firmware

Software embedded into a storage device. It may also be referred to as Microcode.

Full-duplex

The concurrent transmission and the reception of data on a single link.

G

Gbps

Gigabit per second.

| | | | | | | | | | | | | | | | | | | | | | | | | | | |
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H

HBA

Host bus adapter, a circuit board and/or integrated circuit adapter installed in a workstation or server that provides input/output processing and physical connectivity between a server and a storage device. An iSCSI HBA implements the iSCSI and TCP/IP protocols in a combination of a software storage driver and hardware.

HDD

Hard disk drive.

I

Initiator

A system component that originates an I/O command over an I/O bus or network, such as an I/O adapters or network interface cards.

I/O

Input/output.

IP

Internet Protocol, specifies the format of packets and addressing scheme. Most networks combine IP with a higher-level protocol called Transmission Control Protocol (TCP), which establishes a virtual connection between a destination and a source.

IP address

An identifier for a computer or device on a TCP/IP network. Networks using the TCP/IP protocol route messages based on the IP address of the destination. The format of an IP address is a 32-bit numeric address written as four numbers separated by periods. Each number can be zero to 255 (for example, 192.168.0.200).

IP-SAN

Block-level Storage Area Networks over TCP/IP using the iSCSI protocol.

iSCSI

Internet SCSI, an IP-based standard for connecting data storage devices over a network and transferring data using SCSI commands over IP networks. iSCSI enables a Storage Area Network to be deployed in a Local Area Network.

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iSNS

Internet Storage Name Service, a protocol that allows automated discovery, management and configuration of iSCSI devices on a TCP/IP network.

L

LAN

Local Area Network, a computer network that spans a relatively small area, such as a single building or group of buildings.

LU

Logical unit.

LUN

Logical unit number.

M

Middleware

Software that connects two otherwise separate applications. For example, a middleware product can be used to link a database system to a Web server. Using forms, users request data from the database; then, based on the user's requests and profile, the Web server returns dynamic Web pages to the user.

N

NIC

Network Interface Card, an expansion board in a computer that allows the computer to connect to a network

R

RAID

Redundant Array of Independent Disks, a disk array in which part of the physical storage capacity is used to store redundant information about user data stored on the remainder of the storage capacity. The redundant information enables regeneration of user data in the event that one of the array's member disks or the access path to it fails. SNIA.

| | | | | | | | | | | | | | | | | | | | | | | | | | | |
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RAID 6

An extension of the RAID 5 array, that allows for two simultaneous drive failures without downtime or data loss. recovery point objective (RPO)

After a recovery operation, the recovery point objective (RPO) is the maximum desired time period, prior to a disaster, in which changes to data may be lost. This measure determines up to what point in time data should be recovered. Data changes preceding the disaster are preserved by recovery.

S

SAN

Storage Area Network, a network of shared storage devices that contain disks for storing data.

SAS

Serial Attached SCSI, an evolution of parallel SCSI into a point-to-point serial peripheral interface in which controllers are linked directly to disk drives. SAS delivers improved performance over traditional SCSI because SAS enables up to 128 devices of different sizes and types to be connected simultaneously.

SATA

Serial ATA is a computer bus technology primarily designed for the transfer of data to and from hard disks and optical drives. SATA is the evolution of the legacy Advanced Technology Attachment (ATA) interface from a parallel bus to serial connection architecture.

SCSI

Small Computer System Interface, a parallel interface standard that provides faster data transmission rates than standard serial and parallel ports.

Session

A series of communications or exchanges of data between two end points that occurs during the span of a single connection. The session begins when the connection is established at both ends, and terminates when the connection is ended. For some applications each session is related to a particular port. In this document a session is the exchange of data between groups of primary and secondary volumes.

SMTP

Simple Mail Transfer Protocol, a protocol used to receive and store email data directly from email servers.

| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
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Software initiator

A software application initiator communicates with a target device. A software initiator does not require specialized hardware because all processing is done in software, using standard network adapters.

Storage Navigator Modular 2

A multi-featured scalable storage management application that is used to configure and manage the storage functions of Hitachi arrays. Also referred to as "Navigator 2".

Subnet

In computer networks, a subnet or subnetwork is a range of logical addresses within the address space that is assigned to an organization. Subnetting is a hierarchical partitioning of the network address space of an organization (and of the network nodes of an autonomous system) into several subnets. Routers constitute borders between subnets. Communication to and from a subnet is mediated by one specific port of one specific router, at least momentarily. SNIA.

Switch

A network infrastructure component to which multiple nodes attach. Unlike hubs, switches typically have internal bandwidth that is a multiple of link bandwidth, and the ability to rapidly switch node connections from one to another. A typical switch can accommodate several simultaneous full link bandwidth transmissions between different pairs of nodes. SNIA.

T

Target

Devices that receive iSCSI requests that originate from an iSCSI initiator.

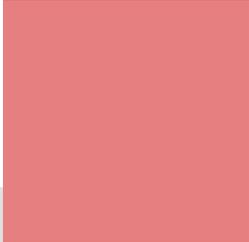
TOE

A dedicated chip or adapter that handles much of the TCP/IP processing directly in hardware. TCP/IP transmission is inherently a CPU-intensive operation. Therefore, using dedicated hardware that can operate in parallel with the main processor allows for superior system performance. Although all iSCSI HBAs have a TOE, a generic TOE only implements TCP/IP, while an iSCSI HBA implements the iSCSI protocol in addition to TCP/IP.

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Glossary–8



Index

Numerics

- 10/100 Ethernet maintenance ports 6, 13
- 10/100 Ethernet management ports 5, 13

A

- Add Array wizard 18
- Adding arrays 18
- Alarm LED 2
- Array drives, configuring 19
- Arrays, adding 18
- Attaching bezel 11, 12
- Auto migration 7
 - error messages 10

B

- Back panel
 - 10/100 Ethernet maintenance ports 6, 13
 - 10/100 Ethernet management ports 5, 13
 - fans 6
 - iSCSI Gigabit Ethernet data ports 4, 14
 - ON/OFF switch 8
 - power supplies 7
- Bezel
 - attaching 11, 12
 - removing 12
- Bottom components 9

C

- Caring for your Hitachi Simple Modular Storage 7
- Configuring
 - array drives 19
 - storage 17
- Connections
 - iSCSI Gigabit Ethernet data ports 14
 - management ports 13
 - power 15
- Considerations
 - rack mount 4
 - safety 5
 - server 4

- site 3

- topology 3

- Creating logical units 19
- Customer benefits 3

D

- Data ports 4, 14
- Drive installation 2
- Drive slots 2

E

- Electrical specifications 3
- Environmental specifications 4
- Ethernet specifications 6

F

- Fans 6
- Features
 - customer 3
 - key 2
 - storage 3
- Front panel
 - bezel 11, 12
 - drive slots 2
 - LEDs 2

G

- Gigabit Ethernet data ports 4, 14

H

- Hitachi Simple Modular Storage
 - caring for 7
 - installation roadmap 2
 - migrating data 7
 - overview 1
 - product description 2
 - startup 16
 - storage features 3
 - transporting 8
 - troubleshooting 1

Host operating systems 5

I

Initial Setup wizard 19

Installation

- iSCSI data port connections 14
- maintenance port connections 13
- management port connections 13
- power cable connections 15
- rack mount 9
- rack-mount considerations 4
- roadmap 2
- safety considerations 5
- server considerations 4
- site considerations 3
- site preparation 3
- spares 2
- Storage Navigator Modular 2 17
- table or shelf 9
- topology considerations 3
- unpacking 7
- user-supplied items 8

iSCSI

- Gigabit Ethernet data ports 4, 14
- initiator software 21

Items supplied by user 8

K

Key features 2

L

LEDs

- Alarm 2
- back panel 7
- front panel 2
- Power 2
- Ready 2
- Warning 3

Logging in to Storage Navigator Modular 2 18

Logical units 19

M

Maintenance ports 6, 13

Management ports 5

- connections 13

Mechanical specifications 2

Migrating data 7

- error messages 10

Mode parameters 20

O

ON/OFF switch 8

Operating systems 5

P

Power cable connections 15

Power cable specifications 4

Power LED 2

Power supplies 7

Preparing your site 3

Product description 2

R

Rack-mount

- considerations 4
- installation 9

Ready LED 2

Removing bezel 12

Required items supplied by user 8

Roadmap for installation 2

S

Safety considerations 5

Server considerations 4

Shelf installation 9

Site

- considerations 3
- preparation 3

Spare drives 2

Specifications

- electrical 3
- environmental 4
- Ethernet 6
- mechanical 2
- power cables 4

Startup operations 16

Storage

- configuring 17
- features 3

Storage Navigator Modular 2

- Add Array wizard 18
- Initial Setup wizard 19
- installing 17
- logging in 18
- mode parameters 20

Supported

- host operating systems 5

T

Table installation 9

Topology considerations 3

Transporting your Hitachi Simple Modular
Storage 8

Troubleshooting 1

U

Unpacking 7

User-supplied items 8

W

Warning LED 3

Wizards

- Add Array 18
- Initial Setup 19

Index-2

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