

Optima3600

User's Guide

StoreWay Optima



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StoreWay Optima

Optima3600

User's Guide

Hardware

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Introduction

Thank you for purchasing Bull's product.

This document is intended for users who have ability to build server systems and configure networks. The following systems are supported:

- Supported connection servers and operating systems:



For details about Windows and Linux Storage Manager products, see *Storage Manager User's Manual*, *StoreWay Multipath User's Manual (Windows version)*, and *StoreWay Multipath for Linux User's Manual* that come with the disk array unit.

- Supported configurations: Storage Area Network (SAN) configurations and Direct Attached Storage (DAS) configurations including a recommended configuration shown in [Figure 1: Example of Recommended Configuration](#).
- Others: FC switches, network switches, and modems are not supported. They must be set up by maintenance personnel.

This document is intended for use in a Windows or Linux environment.

For use in other OS environments, StoreWay disk array system must be set up by maintenance service provider. Please contact your maintenance service provider.

This document provides a general setup method of StoreWay disk array system.

Before you start the setup, make sure to have products whose license sheets are shipped together with the system and the license sheets ready.

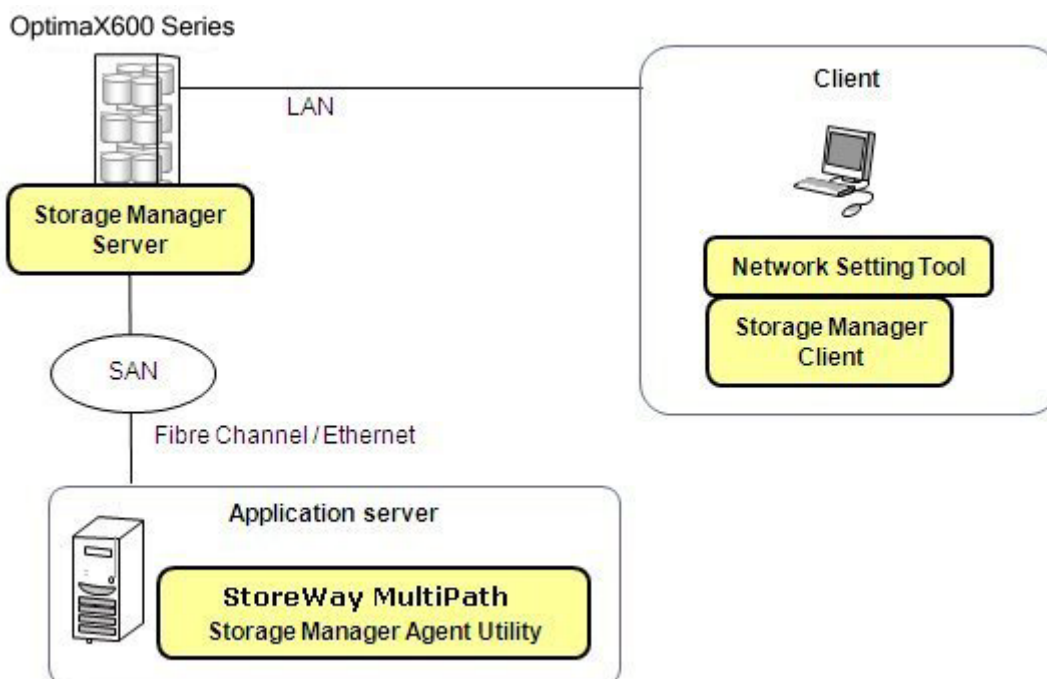


Figure 1: Example of Recommended Configuration

This document describes how to set up the StoreWay OptimaX600 series for the first time in the recommended configuration illustrated in Figure i. For use in a different environment, modify the setup procedure as needed.

For details about software products, see manuals attached to the software products.

You may ask your maintenance service provider to perform the setup described in this document.

Remarks

This document provides information on functions achieved by the following program products:

- Storage Manager Express
- StoreWay Multipath

This document supports the following versions of the program products.

- Storage Manager Version 7.1
- StoreWay Multipath 5.0 for Windows
- StoreWay Multipath for Linux

If you are using a product of an older version, see the user's guide of the product.

Unless otherwise specified, 1 KB stands for 1024 bytes in this document.

Keep this document nearby as a handy reference.

Notes on use in countries other than Japan

This product, including software program, is an export control product designated by Export Trade Control Order, which requires permission or any appropriate procedure for export from Japan. Contact your sales agent or nearest Bull sales office if you need special material for the permission procedures.



About Voluntary Control for Interference

This disk array system is the Class A category information technology equipment based on the rules of Voluntary Control Council for Interference Information Technology Equipment (VCCI). When used in a residential environment, the equipment may cause radio interference. In this case, user may be required to take corrective actions appropriately.



In using this disk array system, inconvenience may occur when a temporary power failure due to a cause such as lightning is experienced.

As a measure for temporary power failures, it is recommended to use devices such as AC un-interruptible power supply units.



JIS C 61000-3-2 conforming item

JIS C 61000-3-2 conforming item is a product designed and manufactured to conform to the target level of harmonic current environment for commercial electrical grid based on Electromagnetic compatibility (EMC) -- Part 3-2: Limits -- Limits for harmonic current emissions (equipment input current ≤ 20 A per phase).





About This Document

This chapter describes the terms and conventions used in this document. It also provides the references required while reading about Storage Manager product.

Conventions in This Document

[Table 1](#) lists the conventions used in this document.

Table 1: Conventions

Convention	Description
	Provides information of particular importance in operation.
	Provides supplementary information.
	Provides information that advises users that failure to take or avoid a specified action could result in loss of data.
	Provides information that advises users that failure to take or avoid a specific action could result in physical harm to the user or the hardware.

[Table 2](#) lists the terms used in this document.

Table 2: Terms Used

Term	Description
Disk array unit	Refers to a set configuration of DAC and DE. Or, if the DAC is used alone, this denotes the DAC.
Disk Array Controller (DAC)	This is a unit that controls the disk array functions. This denotes a configuration consisting of a DAC enclosure and a CONT.
Disk Enclosure (DE)	Refers to a unit that is connected to the DAC and used to expand or add a disk drive.
Disk drive	Refers to a hard disk drive (HDD) or a solid state drive (SDD) with a dedicated carrier.
Dummy carrier	Refers to a dedicated dummy carrier, which is used when a disk drive is not installed.
Host bus adapter (HBA)	Refers to a Fibre Channel (FC) controller.
Network Interface Card (NIC)	Refers to an interface control device connected to a client's LAN port or an application server's Ethernet port.
Controller (CONT)	Refers to a controller in a DAC.

Table 2: Terms Used (Contd.)

Term	Description
Power Supply (PS)	Refers to a power supply unit.
FC cable	Refers to a Fibre Channel cable.
FC switch	Refers to a Fibre Channel switch.
Physical Disk (PD)	Refers to a physical disk.

Document Organization

Table 3 shows the documentation organization.

Table 3: Document Organization

Chapter/ Appendix	Description
<i>Chapter 1: "1Overview"</i>	This chapter describes features, components, and the basic operation of this disk array system.
<i>Chapter 2: "Workflow - Installation to Operation"</i>	This chapter explains the flow from the installation to operation of this disk array system.
<i>Chapter 3: "Installing the Disk Array System"</i>	This chapter explains how to install and connect this disk array system.
<i>Chapter 4: "Storage Manager"</i>	This chapter explains Storage Manager used for managing this disk array system.
<i>Chapter 5: "Initializing a Disk Array (FC)"</i>	This chapter explains the initialization of this disk array system in an FC environment.
<i>Chapter 6: "Initializing a Disk Array (iSCSI)"</i>	This chapter explains the initialization of this disk array system in an iSCSI environment.
<i>Chapter 7: "Installing Optional Parts"</i>	This chapter describes the preparation and installation of the optional parts of a disk array unit.
<i>Chapter 8: "Changes to the Configuration"</i>	This chapter explains how to modify the configuration and the settings of this disk array system.
<i>Chapter 9: "Troubleshooting"</i>	This chapter describes possible problems and how to solve them.
<i>Appendix A: "Specifications"</i>	This appendix provides the specifications of the disk array.
<i>Appendix B: "How to Set/Check Application Server (Windows) (FC)"</i>	This appendix provides the steps you should follow while setting or checking application server in the Windows environment, when this disk array is configured for the FC connection.
<i>Appendix C: "How to Set/Check Application Server (Windows) (iSCSI)"</i>	This appendix provides the steps you should follow while setting or checking application server in the Windows environment, when this disk array is configured for the iSCSI connection.
<i>Appendix D: "How to Set/Check Application Server (Linux) (FC)"</i>	This appendix provides the steps you should follow while setting or checking application server in the Linux environment, when this disk array is configured for the FC connection.
<i>Appendix E: "How to Set/Check Application Server (Linux) (iSCSI)"</i>	This appendix provides the steps you should follow while setting or checking application server in the Linux environment, when this disk array is configured for the iSCSI connection.

Table 3: Document Organization (Contd.)

Chapter/ Appendix	Description
<i>Appendix F: "How to Set/Check Application Server (VMware) (iSCSI)"</i>	This appendix provides the steps you should follow while setting or checking application server in the VMware environment, when this disk array is configured for the iSCSI connection.
<i>Appendix G: "Installing StoreWay Multipath"</i>	This appendix provides the steps you should follow for installing StoreWay Multipath in a Windows or Linux environment.
<i>Appendix H: "Notes-Using Microsoft Cluster Service in Windows Server 2003 Environment"</i>	This appendix provides notes on using MSCS (Microsoft Cluster Service) in Windows Server 2003 environment.
<i>Appendix I: "Notes-Connecting FC Switches in Express5800/FT Server Environment"</i>	This appendix provides LED inspection checksheet.
<i>Appendix I: "LED Inspection Checksheet"</i>	This appendix provides notes on using iSCSI supported disk array unit.
<i>Appendix J: "Notes-Using iSCSI Supported Disk Array Unit"</i>	This appendix provides examples of iSCSI connection configuration.
<i>Appendix K: "iSCSI Connection Configuration-Examples"</i>	This appendix provides script for reporting information registered with iSNS server.
<i>Appendix L: "Script for Reporting Information Registered with iSNS Server"</i>	This appendix describes how to retrieve initiator information on application servers registered with iSNS server.
<i>Appendix M: "Retrieve Initiator Information on Application Servers Registered with iSNS Server"</i>	This appendix describes the CHAP authentication and its settings.

About Other Documents

In addition to this document, information is provided to customers through the following documents. The information provided in these documents is important and necessary for installation and stable operation. Make sure to check the documents as well.

Table 4: Reference Documents

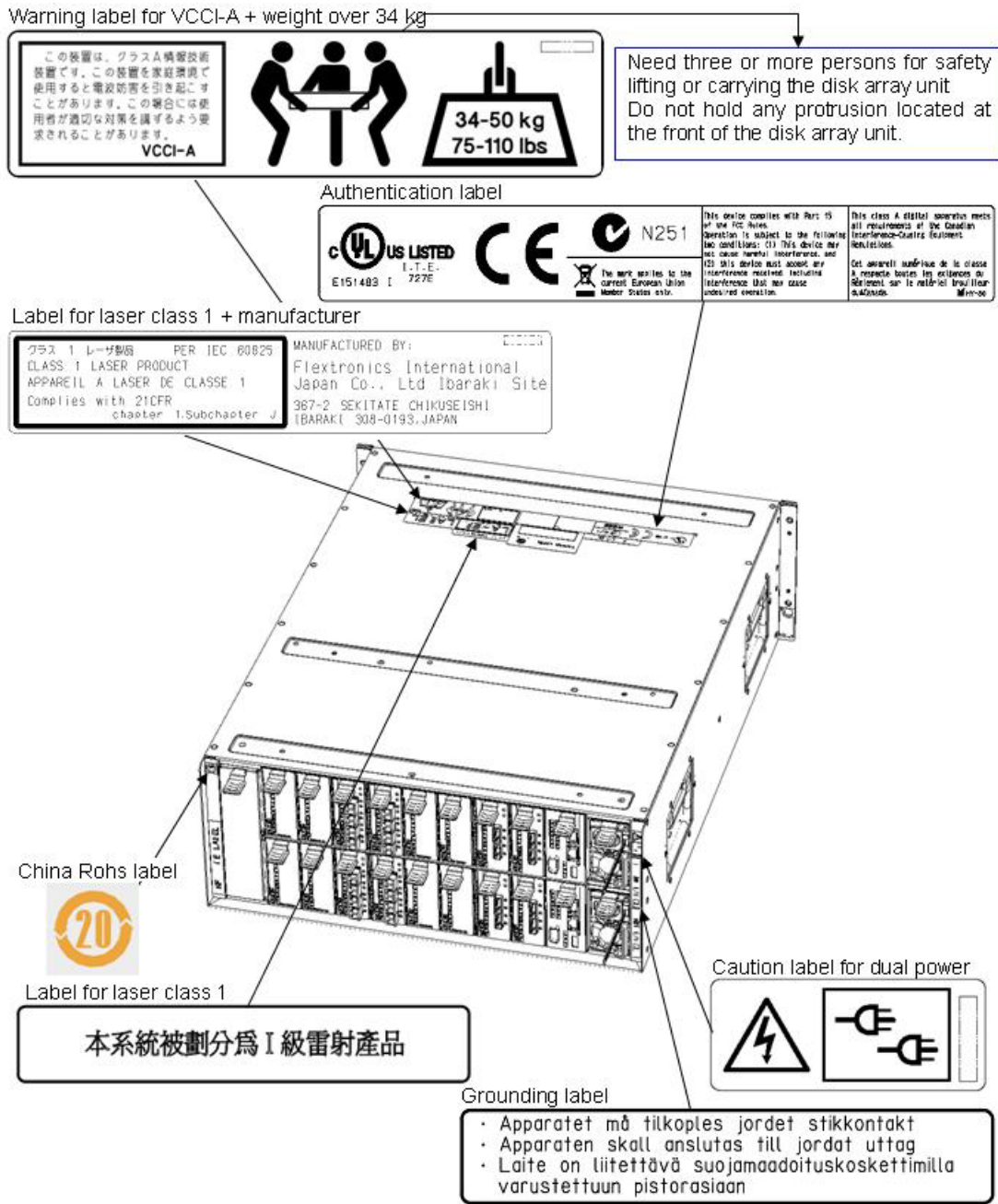
Document	Description
Setup guide	This document is shipped together with this disk array system. The document describes how to set up the disk array system.
Installation guide	This document is shipped together with this disk array system. The document describes how to install the disk array system.
Storage Manager User's Manual	This document provides information about basic functions for using Storage Manager.
Storage Manager Configuration Setting Tool User's Manual (GUI) for the OptimaX600 Series	This document provides information about how to set disk array configurations and how to view configuration information by using the Graphical User Interface (GUI).
Storage Manager Messages Handbook	This document lists messages (error, warning, caution, and information) displayed by Storage Manager in ID order and actions to be taken for the messages.
Storage Manager Command Reference	This document provides information about how to set disk array configurations and how to view configuration information by using the Command Line Interface (CLI).
StoreWay Multipath User's Manual (Windows version)	This document describes how to use StoreWay Multipath (Windows version).
StoreWay Multipath for Linux User's Manual	This document describes how to use Storeway Multipath (Linux version).

About Warning Labels

Warning labels are attached to components that may be hazardous to their nearby areas. The labels are intended for users to always be aware of any conceivable hazards when they use this disk array system. Do not remove or damage the labels.

If any label is not attached, coming off, or unreadable, contact your sales agent or maintenance personnel.

Disk Array Controller



The disk array unit might use two power supplies. When disconnecting power, be sure to disconnect both the power supplies to prevent an electrical shock.



Disposing of your used product

In the European Union

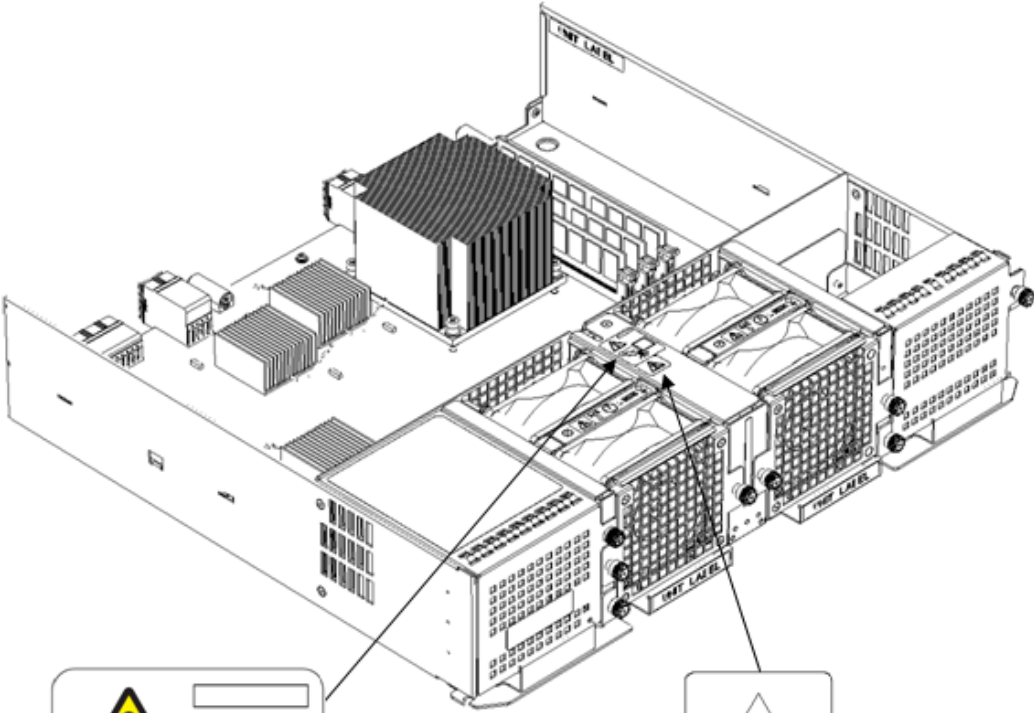
EU-wide legislation as implemented in each Member State requires that used electrical and electronic products carrying the mark (left) must be disposed of separately from normal household waste. This includes Disk Array Unit or electrical accessories, such as cables or CDs.

When disposing of used products, you should comply with applicable legislation or agreements you may have. The mark on the electrical and electronic products only applies to the current European Union Member States.

Outside the European Union

If you wish to dispose of used electrical and electronic products outside the European Union, please contact your local authority and ask for the correct method of disposal.

Controller (CONT)



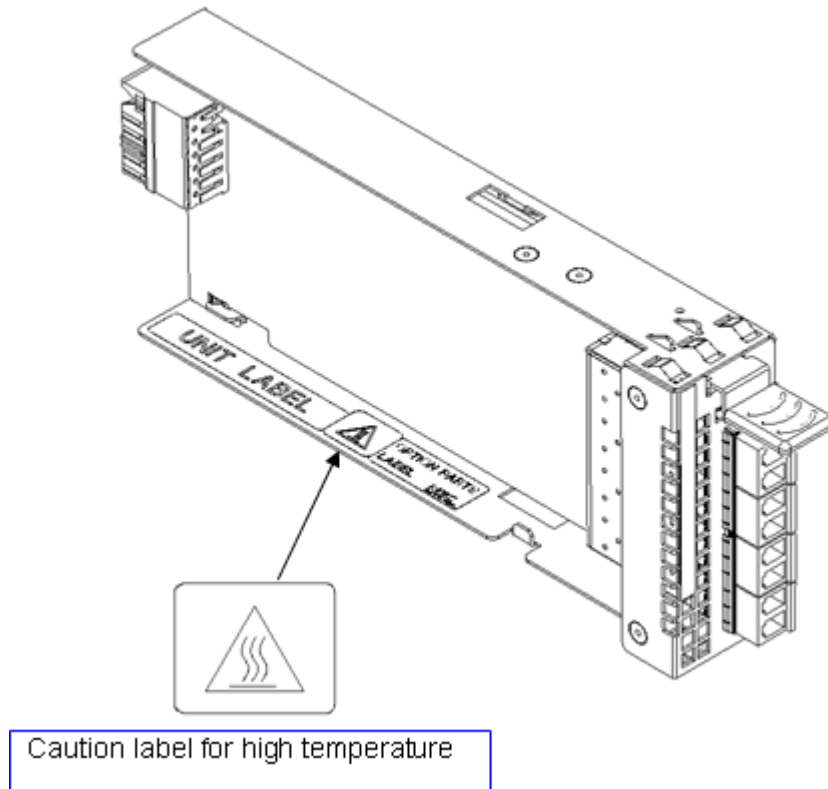
Be careful about drops.
Hold the bottom of the unit well when it is removed.



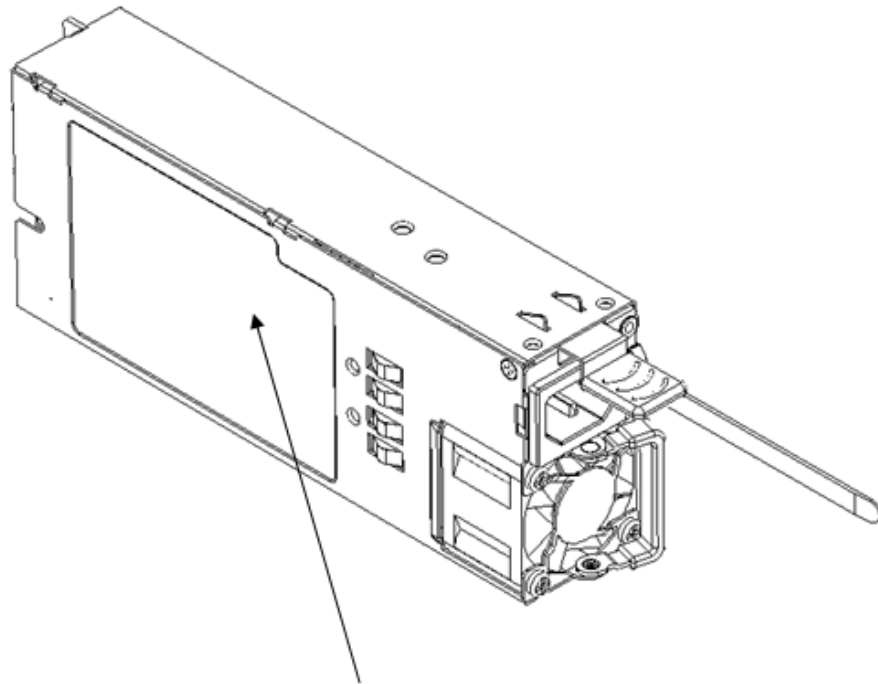
Caution label for high temperature

HPE, DPE

The following illustration shows the label for HPE, DPE. The label is attached to the same location in other modules.



Power Supply

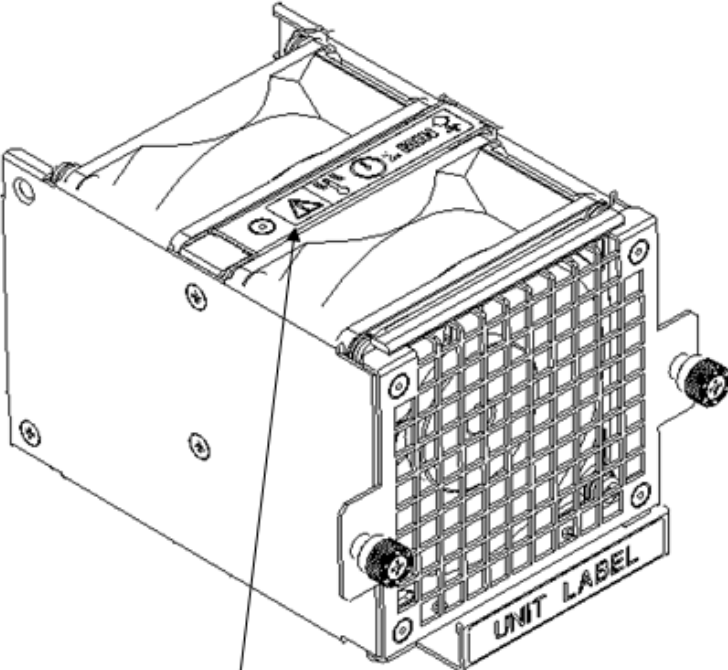


 台達電子工業股份有限公司 台达电子工业股份有限公司 DELTA ELECTRONICS, INC.		SWITCHING POWER SUPPLY 交換式電源供應器 开关电源			
MODEL (型號 / 型号): DPS-800QB A REV (版本): S3F					
AUTORANGE INPUT (自動調整輸入 / 自动调整输入) 47-63Hz					
INPUT (輸入 / 输入): 100-127V~/ 9.2A 200-240V~/ 4.4A					
OUTPUT (輸出 / 输出) 800W MAX. (最大輸出800W / 最大输出800W) +12V == / 65A +12VSB == / 2A					
P/N	 856-851445-002-A	A2.	警告使用者: 這是中壓的資訊產品, 在這樣的環境中使用時, 可能會造成磁場干擾, 在這種情況下, 使用者應採取必要防護的對策。 声明: 此為A級產品, 在生活環境中, 此產品可能會造成無線電干擾, 在這種情況下, 可能影響用戶對其干擾減輕切实可行的措施。		
S/N	 XXXX1043000001	MADE IN CHINA.(DCGP) (製造地:中國 / 制造地:中国)			



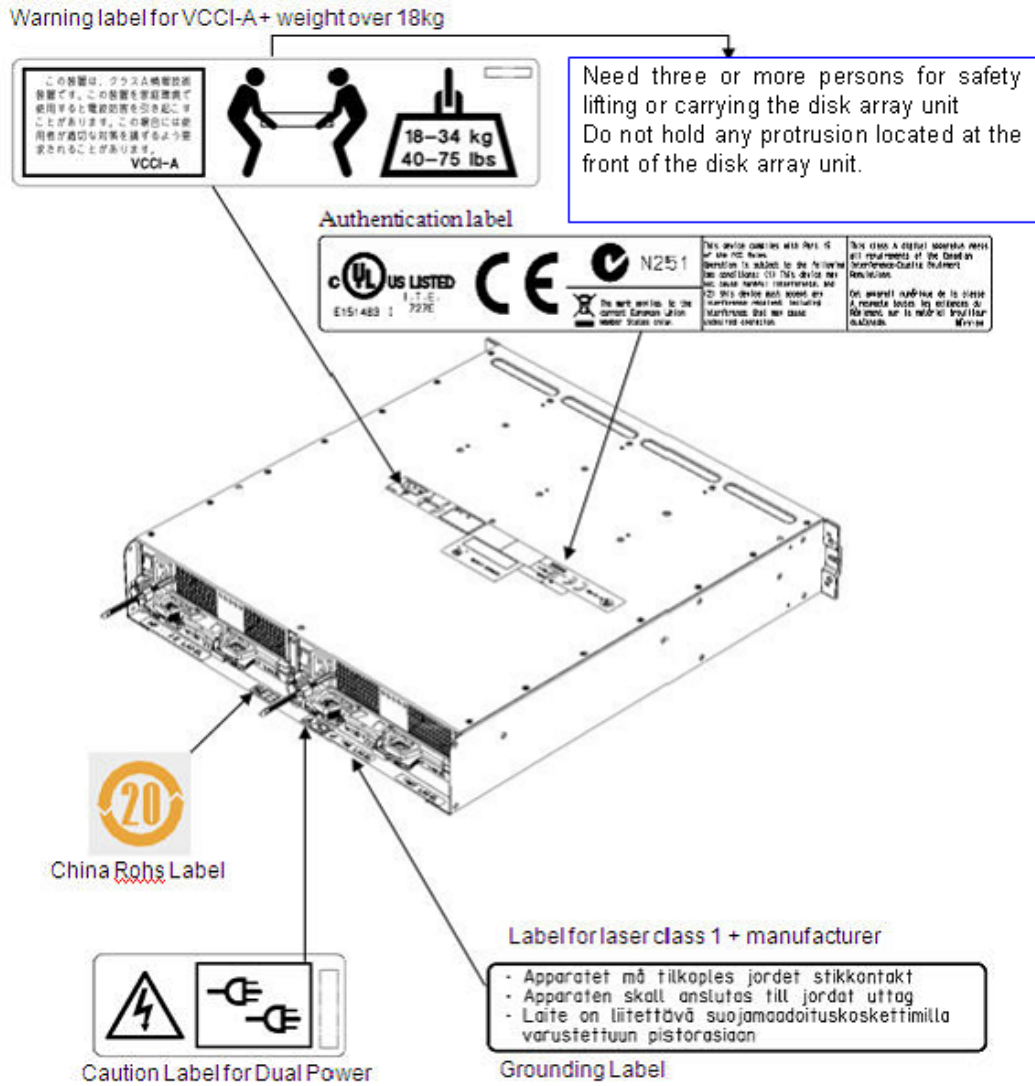
 注意 CAUTION	
	感電の危険あり、開くな。 Risk▲of▲electric▲shock. Do▲not▲open.
	请勿打开、有导电触电危险 (請勿打開、有導電觸電危險)

Fan



Exchange the fan within two minutes because a device becomes the high temperature.

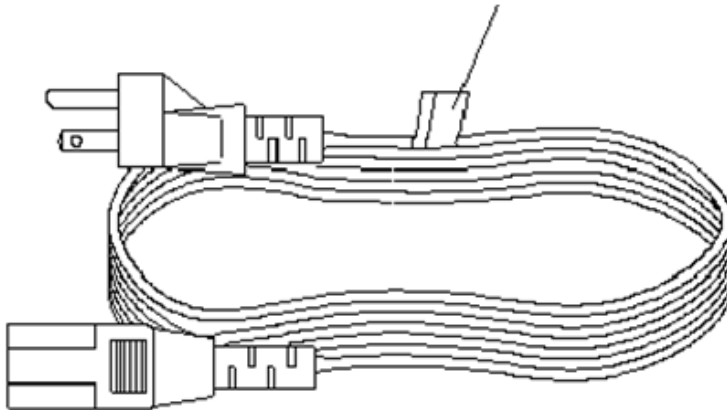
Disk Enclosure



The disk enclosure might use two power supplies. When disconnecting power, be sure to disconnect the two power supplies to prevent an electrical shock.

Power Cable

警告		WARNING
	本電源ケーブルでは電源電圧AC100-120V (50/60Hz)にて使用してください。異なる電圧で使用すると、感電、発煙、火災の原因となります。	Use the power cord at the source voltage between 100 and 120 VAC (50/60Hz). Otherwise, it may cause electric shock, smoke and fire.
		



For overseas use, please use appropriate AC cord set, which is certified by each countries' wiring rule.

Disposal of the Unit

This disk array system uses lithium batteries and nickel batteries.

The batteries are installed as follows:

Controller: lithium (button) battery

Controller: nickel metal hydride battery

The unit must be recycled or discarded according to applicable local and national regulations. Bull encourages owners of informational technology (IT) equipment to responsibly recycle their equipment when it is no longer needed.

Chapter 1 Overview

This chapter provides an overview of the Bull Storage Disk Array Unit.

In this chapter

[“Features” on page 2](#)

[“Components” on page 3](#)

[“Basic Operation” on page 34](#)

1.1 Features

The following describes features of this disk array unit.

1.1.1 High Performance and Large Capacity

- The following host interfaces are supported:
 - Fibre channel (FC-AL/Fabric, 8Gbps)
 - iSCSI (1Gbps, 10Gbps)
 - SAS (6Gbps)
- The following disk drive types are supported:
 - 300 GB (15Krpm), 450 GB (15Krpm), 600 GB (15Krpm), and encryption 600 GB (15Krpm) 3.5 inch SAS disk drives
 - 300 GB (10Krpm), 450 GB (10Krpm), 600 GB (10Krpm), and encryption 600 GB (10Krpm) 2.5 inch SAS disk drives
 - 1 TB (7.2Krpm) and 2 TB (7.2Krpm) 3.5 inch NL-SAS disk drives
 - 1 TB (7.2Krpm) 2.5 inch NL-SAS disk drive
 - 400 GB 3.5 inch SSD
 - 100 GB 2.5 inch SSD
- Up to 384 disk drives (up to 96 disk drives per disk port) can be installed.
- SAS disk drives, NL-SAS disk drives and SSDs
- can be installed together on a disk enclosure.
- The disk array can be connected as a storage system for Blade, NovaScale, extreme computing, and AIX servers.

1.1.2 High Reliability and High Availability

- Key components such as controllers, cache memories, power supplies and fans are redundantly configured.
- Cache data is dually written to controllers. Even if a controller fails, integrity of the data on the caches of the other controller is maintained.
- Data on caches is automatically saved in the internal flash memory by using the battery power when a power outage occurs.
- The disk array supports RAID-1, 5, 6, 10, 50, 60, and TM by default. Even if a disk drive fails, operation can be continued without causing data loss.
- Multiple hot spare disks can be configured.

1.1.3 Operation Management

Storage Manager allows for basic configuration settings, status display and status monitoring easily. Storage Manager Suite program product, which needs to be purchased separately, allows for centralized management of multiple disk array units and using function extension programs.

1.2 Components

1.2.1 Disk Array Controller

This section describes names and functions of disk array components.

For more details about LED lighting patterns, see [Section 1.2.3: “LED Display”](#).

1.2.1.1 Appearance

(1) Disk array configuration (Perspective view)

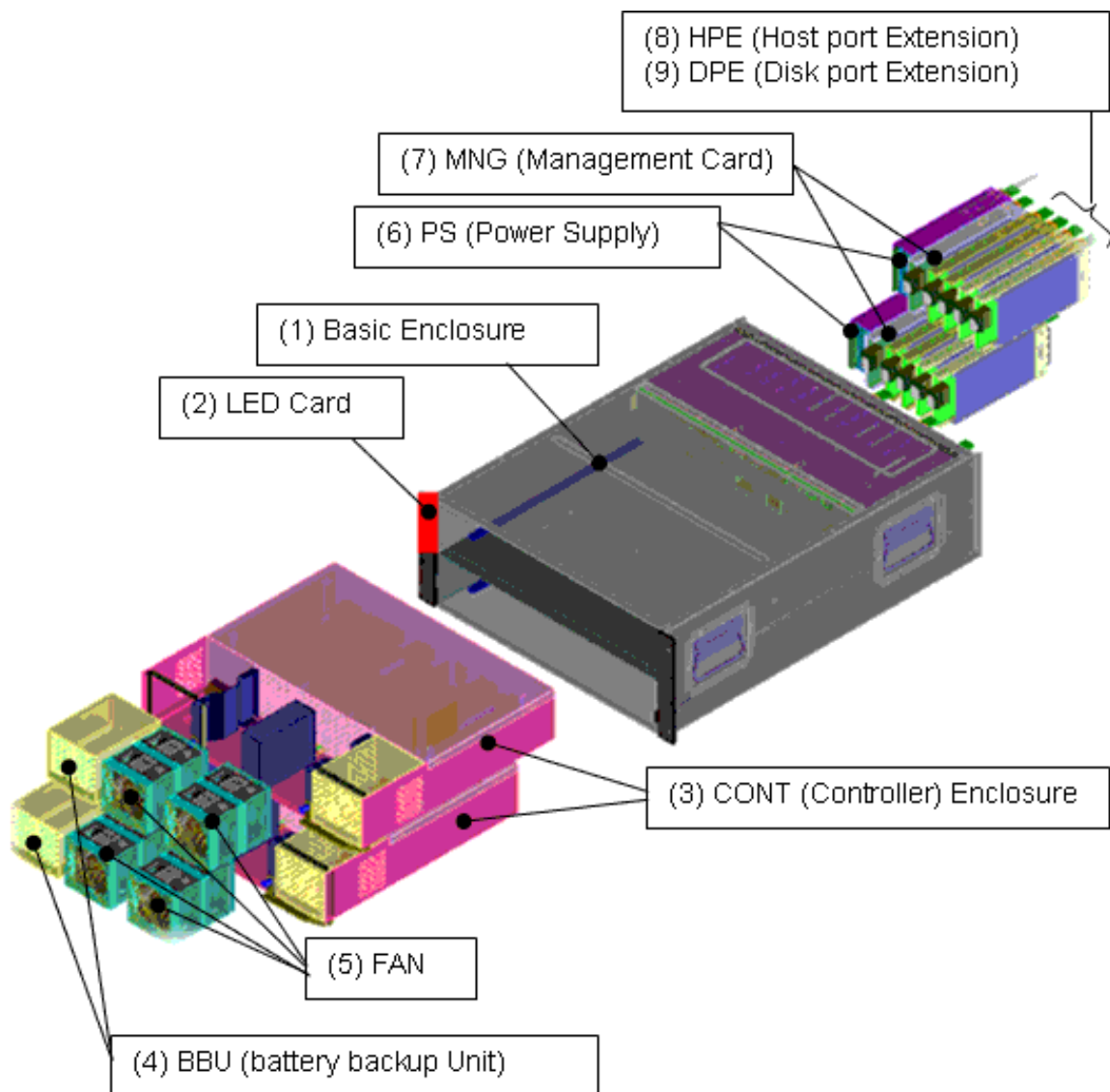


Figure 1-1: Disk Array Configuration (Perspective View)

(2) Front view

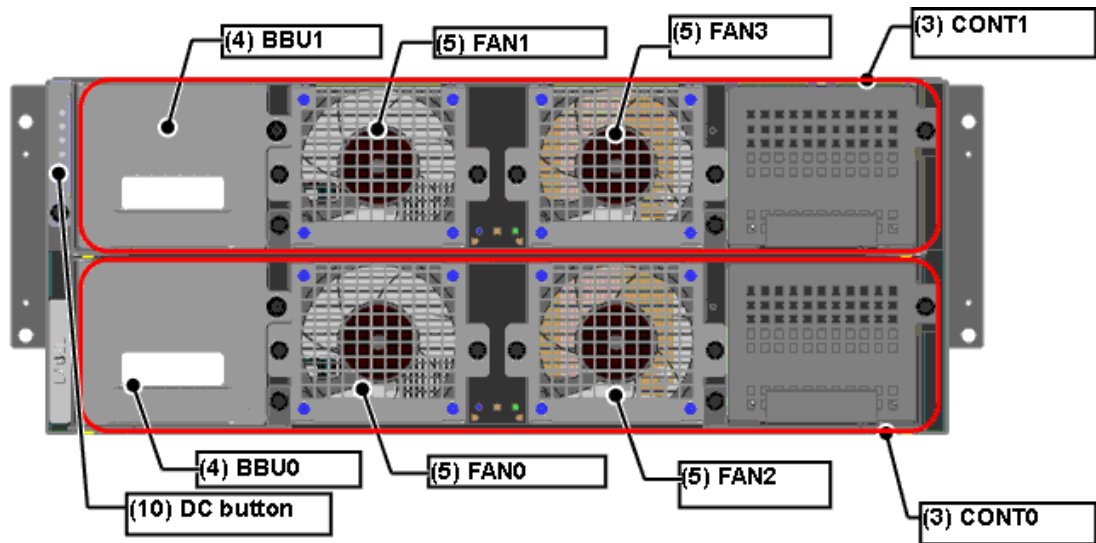


Figure 1-2: Front View (Without Front Bezel)

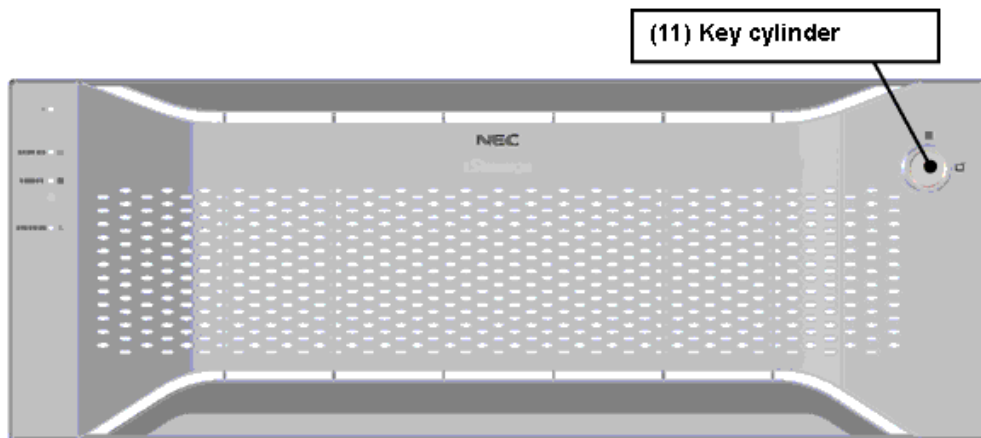


Figure 1-3: Front View (With Front Bezel)



For information on removing the front bezel, see [Section 7.3.1: "Front Bezel"](#).

(3) Rear view



Figure 1-4: Configuration Example (Two FC 4-Port HPEs Installed)

Location name

Free	Free	Free	(8) HPE #3	(8) HPE #1	Free	Free	(9) DPE #3	(9) DPE #1	(7) MNG #1	(6) PS #1
	Free	Free	(8) HPE #2	(8) HPE #0	Free	Free	(9) DPE #2	(9) DPE #0	(7) MNG #0	(6) PS #0

Label	Description
(1) Basic enclosure	This is a cabinet in which disk array components are installed.
(2) LED card	This shows the disk array status.
(3) CONT (Controller)	This is a unit that controls main disk array functions. Two controllers are installed on a disk array.
(4) BBU (Battery backup unit)	This provides power required to back up cache data in case of power outage. Two battery backup units are installed on a disk array.
(5) Fan	The fan is used to cool the components in a disk array. Four fans are installed on a disk array.

Label	Description
(6) PS (Power supply)	The power supply provides power to the disk array. Two power supplies are installed on a disk array.
(7) MNG (Management card)	The management card is used to control and maintain a disk array. Two management cards are installed on a disk array.
(8) HPE (Host port extension)	This is an interface between a disk array and host machine. Two to four HPEs are installed on a disk array.
(9) DPE (Disk Port Extension)	This is an interface between a disk array and enclosures. Four DPEs are installed on a disk array.
(10) DC button	This button is used to start or shut down the disk array. There are two types of shutdown; normal shutdown and forced shutdown. The disk array is forcibly shut down by holding down this button for eight or more seconds.
(11) Key cylinder	The key cylinder is used to lock the front bezel when it is attached to the unit.

1.2.1.2 CONT (Controller), BBU (Battery Backup Unit), and Fan

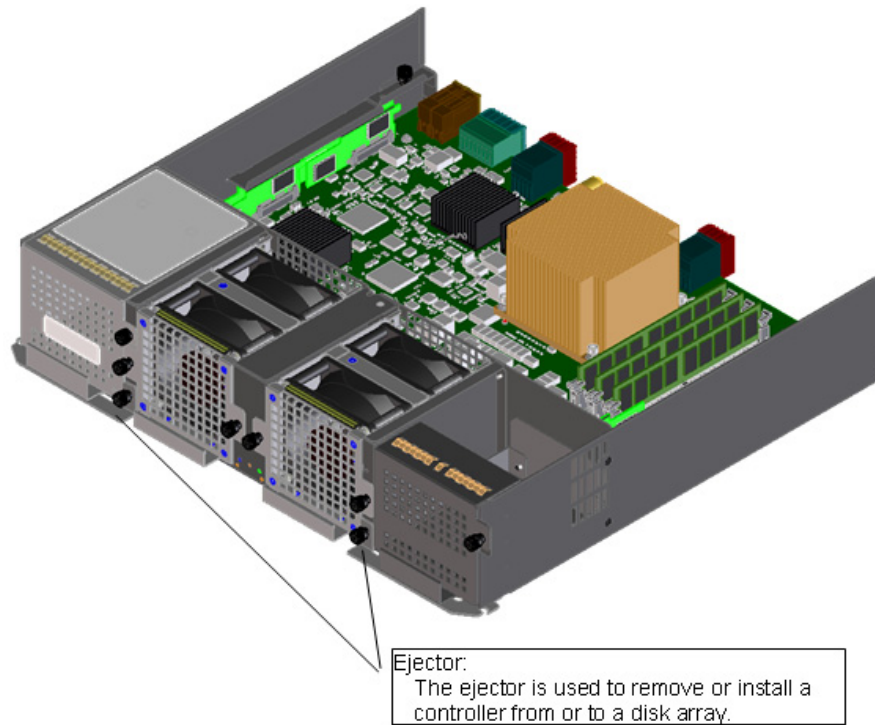


Figure 1-5: Controller Installed with BBUs and Fans



BBUs and fans are installed on a disk array. They can be replaced individually.

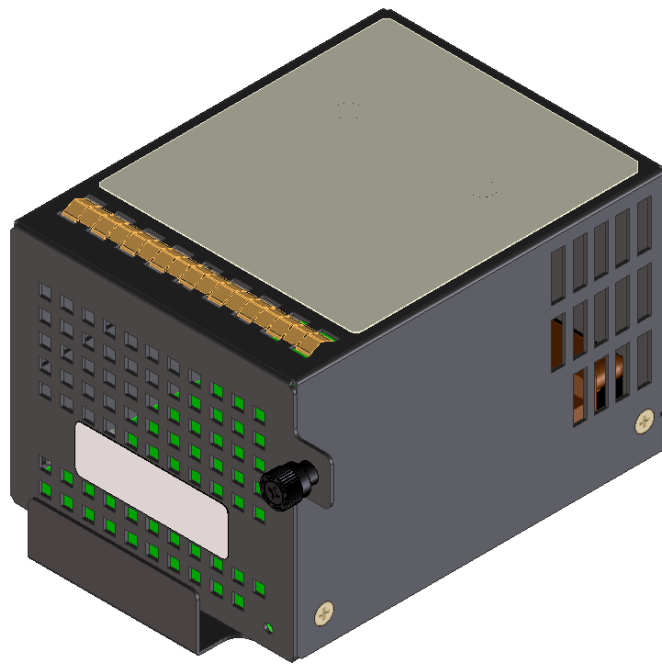


Figure 1-6: BBU

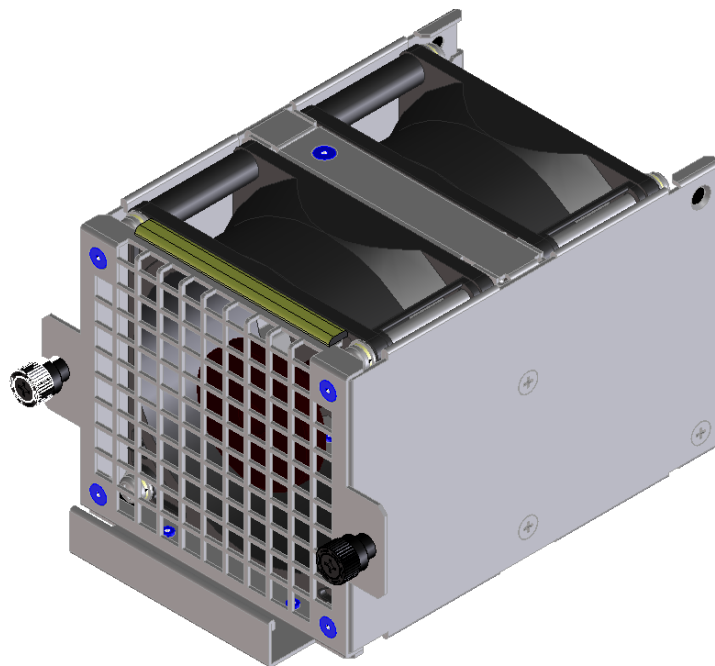


Figure 1-7: Fan

1.2.1.3 PS (Power Supply)

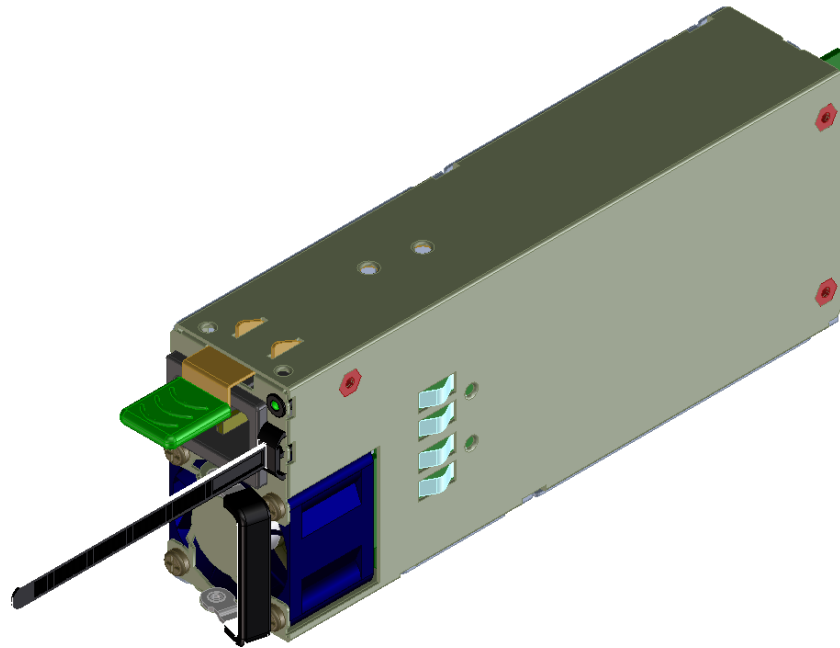


Figure 1-8: Perspective View of Power Supply

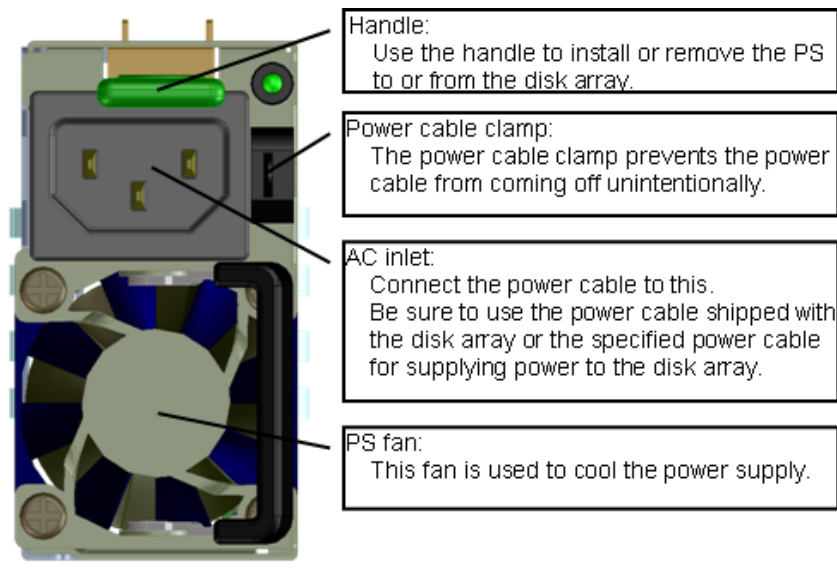


Figure 1-9: Front View of Power Supply

1.2.1.4 MNG (Management Card)

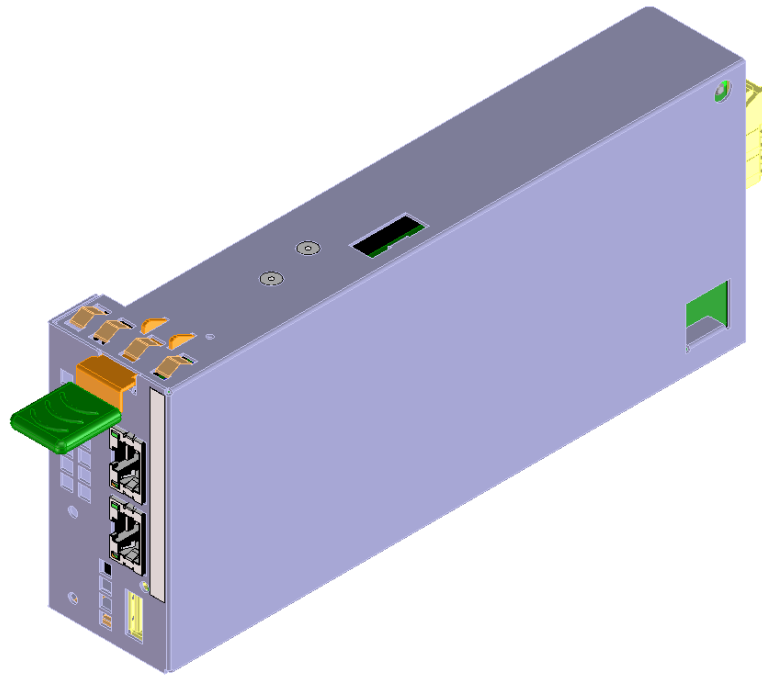


Figure 1-10: Perspective View of Management Card

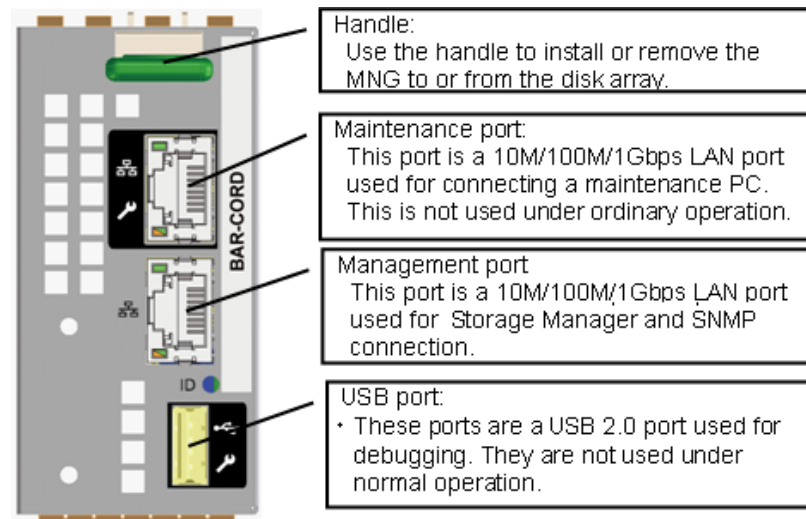


Figure 1-11: Front View of Management Card

1.2.1.5 HPE (Host Port Extension)

(1) FC-HPE

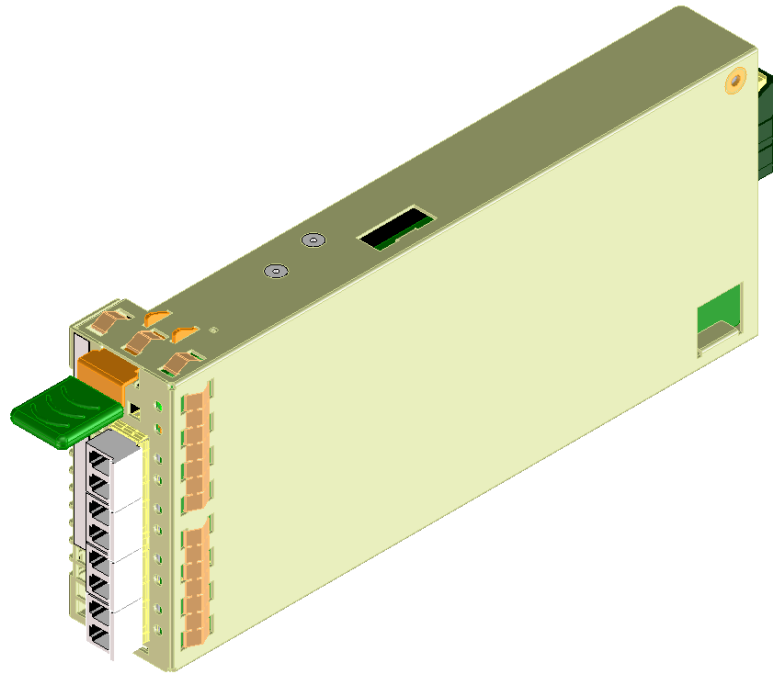


Figure 1-12: Perspective View of FC-HPE

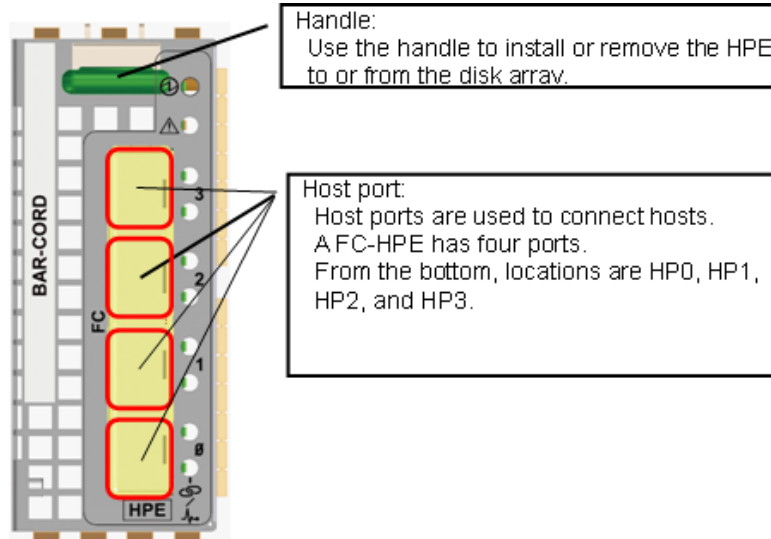


Figure 1-13: Front View of FC-HPE

(2) 1G-iSCSI-HPE

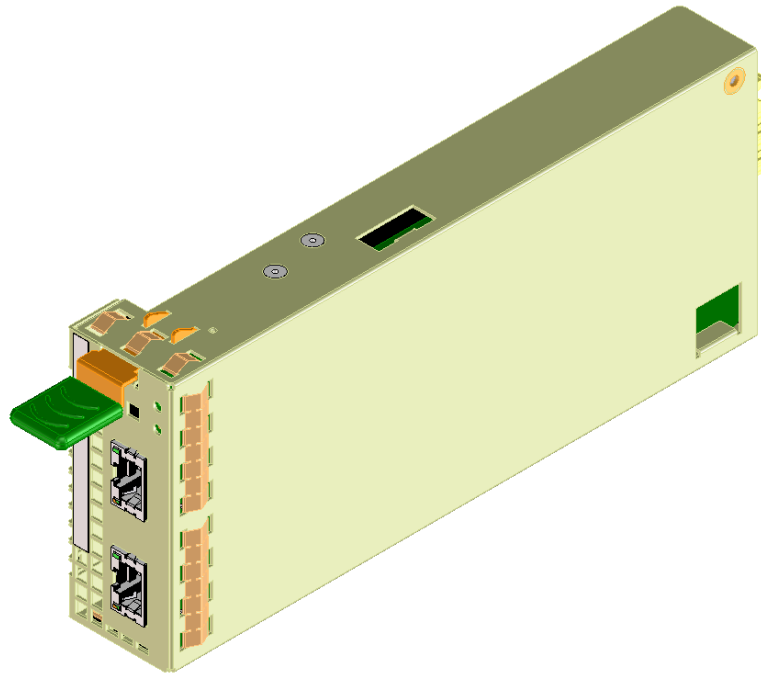


Figure 1-14: Perspective View of 1G-iSCSI-HPE

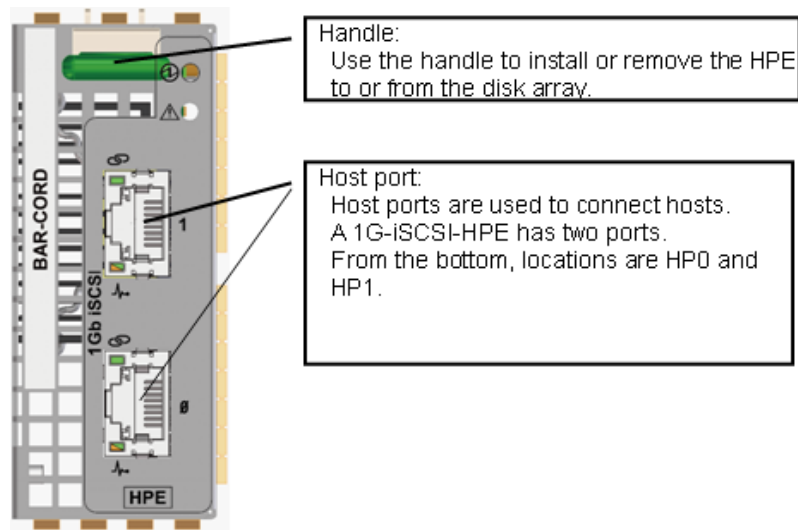


Figure 1-15: Front View of 1G-iSCSI-HPE

(3) 10G-iSCSI-HPE

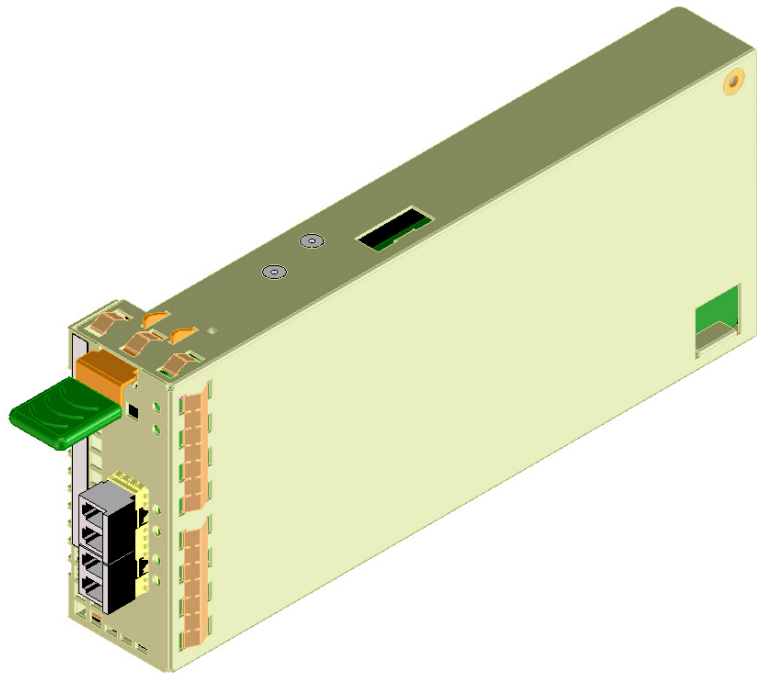


Figure 1-16: Perspective View of 10G-iSCSI-HPE

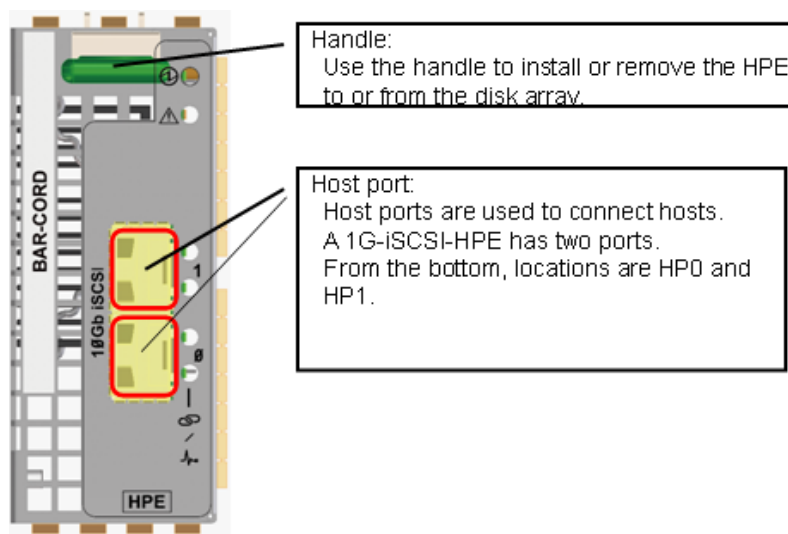


Figure 1-17: Front View of 10G-iSCSI-HPE

(4) SAS-HPE

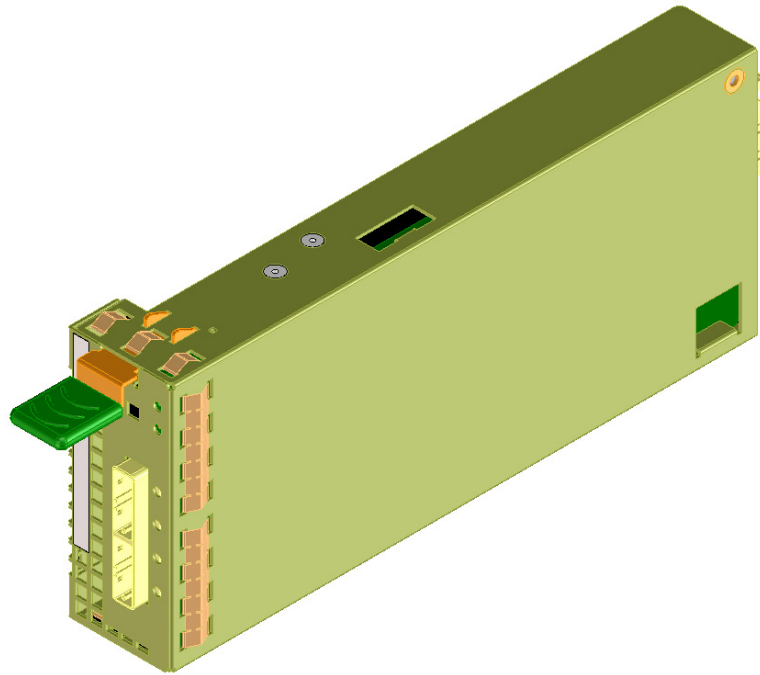


Figure 1-18: Perspective View of SAS-HPE

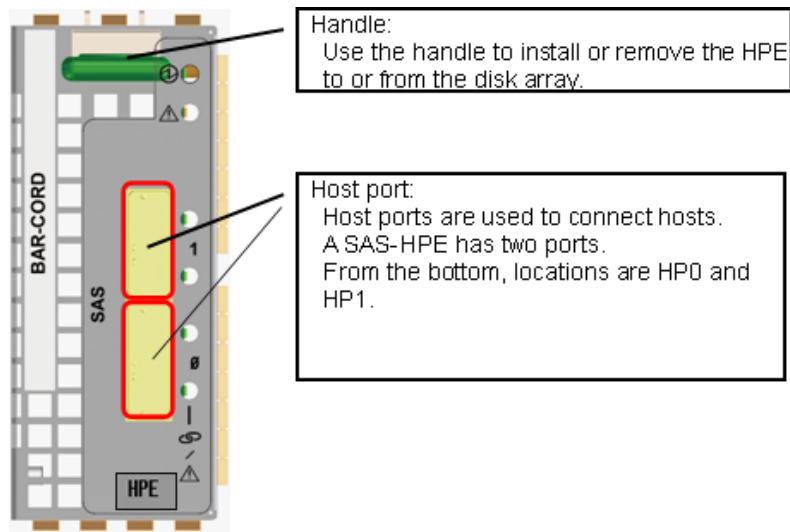


Figure 1-19: Front View of SAS-HPE

1.2.1.6 DPE (Disk Port Extension)

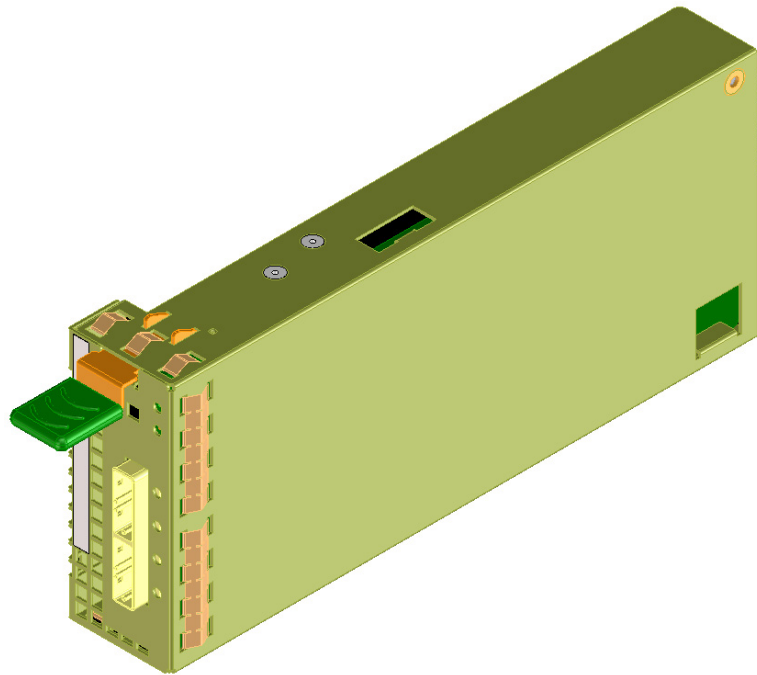


Figure 1-20: Perspective View of DPE

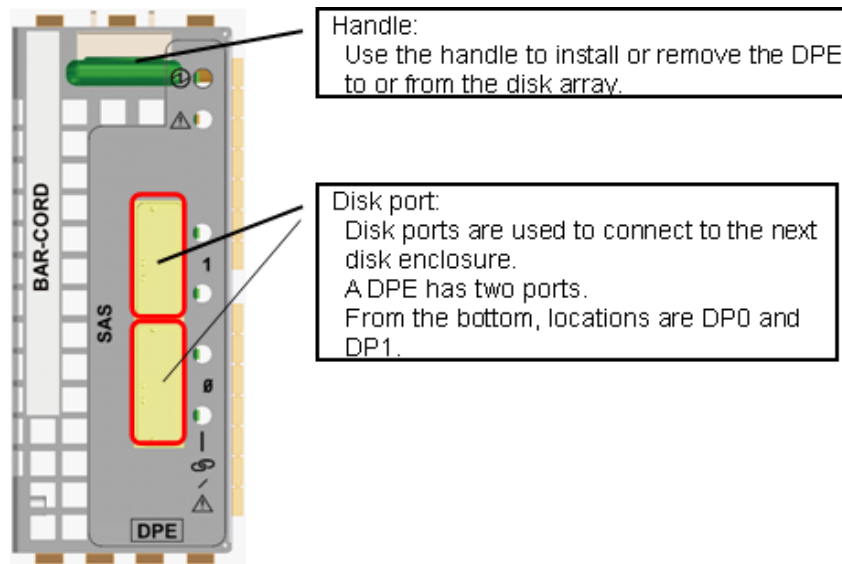


Figure 1-21: Front View of DPE

1.2.2 Disk Enclosure

This section describes names and functions of disk enclosure components.

1.2.2.1 Front View

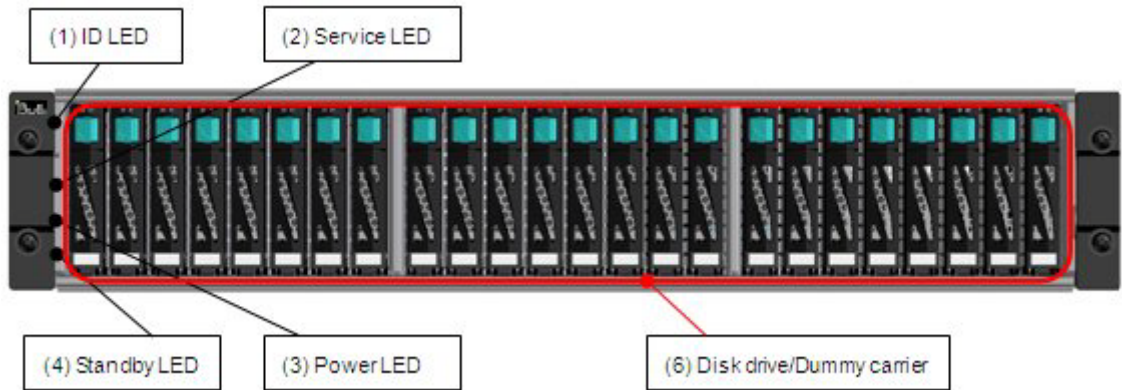


Figure 1-22: 2.5 Inch Disk Drive Model

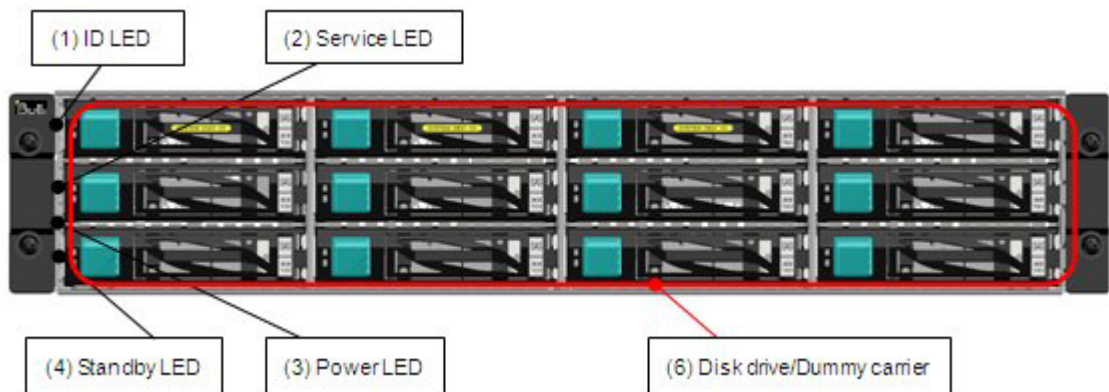


Figure 1-23: 3.5 Inch Disk Drive Model

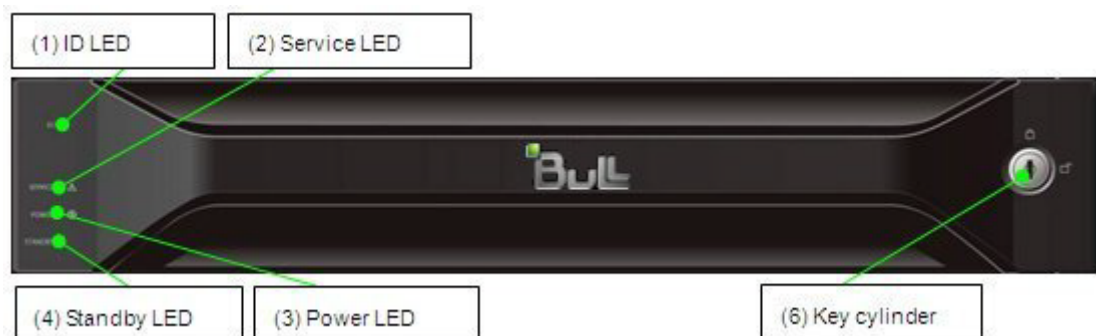


Figure 1-24: Front Bezel (Option)



For information on removing the front bezel, see [Section 7.3.1: “Front Bezel”](#).

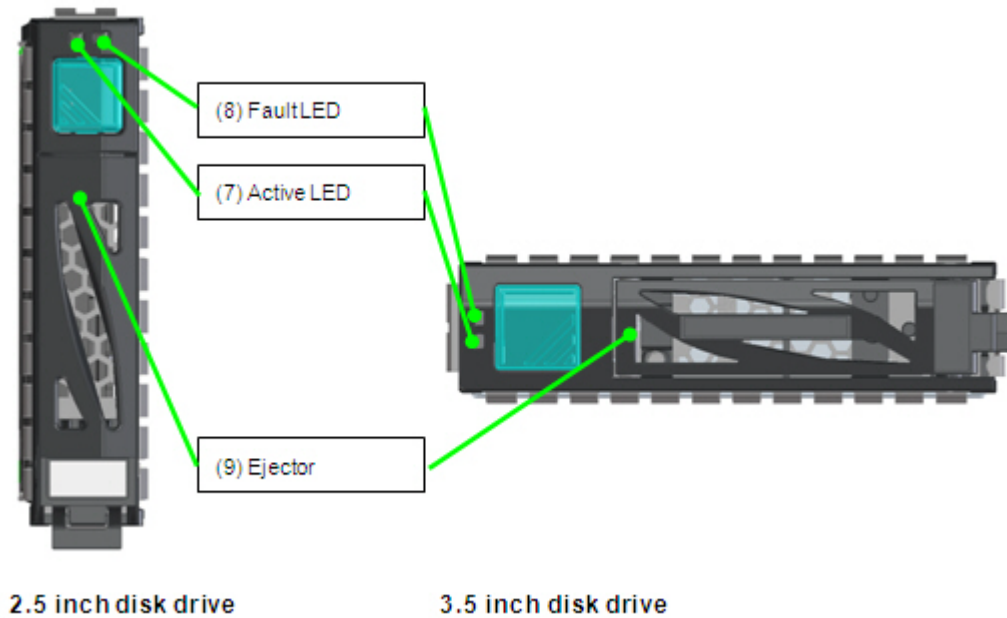


Figure 1-25: Disk Drive Front View

Label	Description
(1) ID LED (blue)	This LED is used to identify the unit.
(2) Service LED (amber)	These LEDs indicate the status of the disk array controller.
(3) Power LED (green)	
(4) Standby LED (white)	This LED indicates the DC off and on operation is available.
(5) Disk drive/Dummy carrier	Up to 24 disk drives/dummy carriers can be installed on the 2.5 inch disk drive model. Upto 12 disk drives/dummy carriers can be installed on the 3.5 inch disk drive model. <ul style="list-style-type: none"> ■ Disk drive: Hard disk drive with a dedicated carrier (HDD) or SSD. ■ Dummy carrier: Dummy to prevent wind blow.
(6) Key cylinder	The key cylinder is used to lock the front bezel when it is attached to the unit.

Label	Description
(7) Active LED (green)	Each disk drive has one each of these LEDs. The LEDs indicate the disk drive status.
(8) Fault LED (amber)	
(9) Ejector	The ejector is used to remove and attach the disk drive from or to a disk array controller or a disk enclosure.

1.2.2.2 Rear View

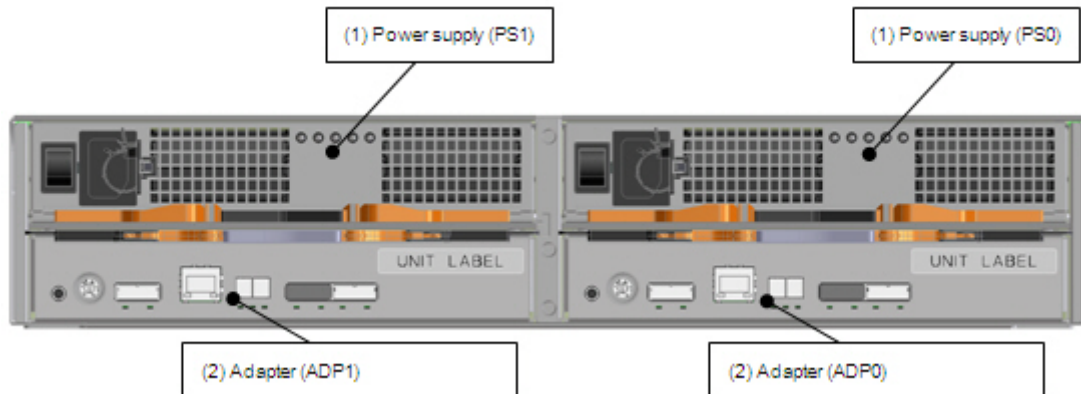


Figure 1-26: Disk Enclosure Rear View (with AC Power Supplies)

Label	Description
(1) Power supply (PS0/PS1)	Two power supplies are installed on a disk enclosure.
(2) Adapter (ADP0/ADP1)	Two adapters are installed on a disk enclosure.

1.2.2.3 Power Supply

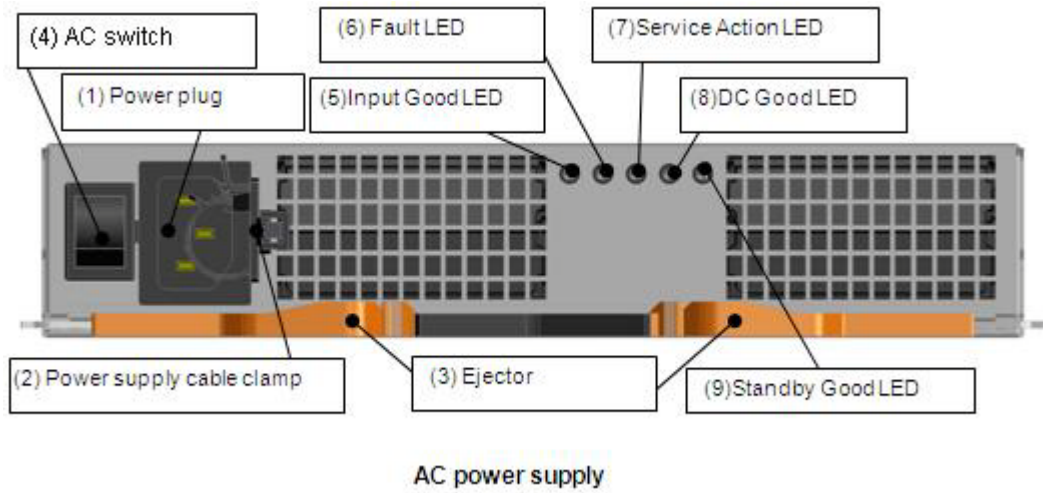


Figure 1-27: Power Supply

Label	Description
(1) Power plug	Use the power cable shipped together with the disk array for supplying power to the disk array.
(2) Power cable clamp	The power cable clamp prevents the power cable from coming off unintentionally.
(3) Ejector	The ejector is used to install and remove a power supply.
(4) AC switch	The AC switch is used to power on and off input of power supply.
(5) Input Good LED (green)	This LED is lit if power is supplied when the AC switch is turned on.
(6) Fault LED (amber)	This LED is lit when an error is detected.
(7) Service Action LED (blue)	This LED is not used in this disk array system. The LED is not lit all the time.
(8) DC Good LED (green)	This LED is lit when DC output is normal.
(9) Standby Power Good LED (green)	This LED is lit when DC output is in the waiting status.

1.2.2.4 Adapter

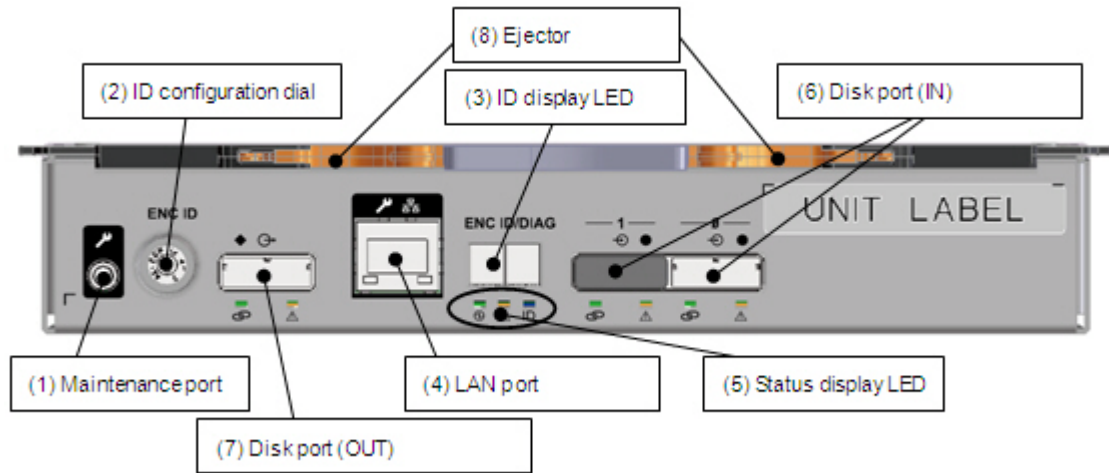


Figure 1-28: Adapter

Label	Description
(1) Maintenance port	This port is for maintenance. This port is not used under normal conditions.
(2) ID configuration dial	The ID configuration dial is not used.
(3) ID display LED	The ID display LED is not used.
(4) LAN port	The LAN port is used for maintenance. It is not used under normal operation.
(5) Status display LED	For details about the status display LED, see Section 1.2.3: "LED Display" .
(6) Disk port (IN)	A disk port (IN) is used to connect the disk array controller or disk enclosure located before the given enclosure. Each adapter has two disk ports for (IN). Typically, only the right (IN) port is used. Each port has a fault LED (right) and a link LED (left).
(7) Disk port (OUT)	The disk port (OUT) is used to connect the disk enclosure behind the given enclosure. Each adapter has one disk port (OUT). Each port has a fault LED (right) and a link LED (left).
(8) Ejector	The ejector is used to attach and remove the adapter.

1.2.3 LED Display

1.2.3.1 Disk Array Controller: Front View

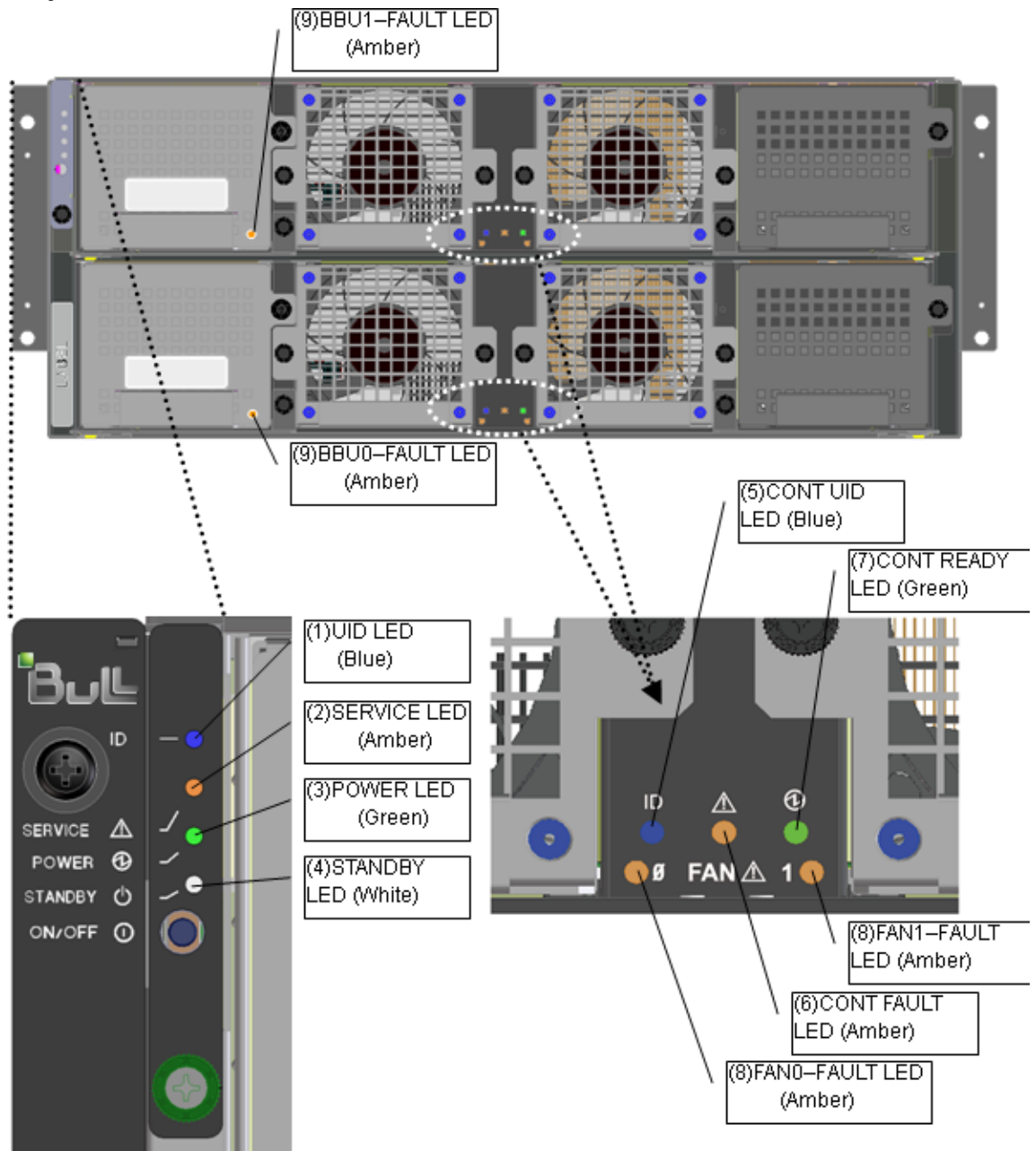


Figure 1-29: Disk Array Controller: Front View

Table 1-1: UID LED (blue)

(1) UID LED	Meaning
Not lit	Not selected
Lit	Selected

Table 1-2: Service LED/Power LED (amber/green)

(2) Service LED	(3) Power LED	Meaning
Not lit	Lit	Running successfully.
Lit	Lit	Maintenance being required or performed (such as in the course of recovery)
Lit 0.2 seconds Not lit 0.8 seconds	Lit	In the course of power on
Lit 4 seconds Not lit 8 seconds	Lit	Maintenance being required (Backup has failed. Written data may have vanished.)
Lit 1 second Not lit 1 second	Lit	Firmware being update online..
Not lit	Lit 0.2 seconds Not lit 0.2 seconds	Auto flushing (*) has finished and power can be turned off.
Not lit	Not lit	Powered off.



When access to a host connection port is disconnected for five minutes, transition to this mode takes place automatically to be prepared for power-off. When access from the host connection port is restored, ordinary status is restored.

Table 1-3: Standby LED (white)

(4) Standby LED	Status
Not lit	DC on and off operation is not available.
Lit	DC on and off operation is available.

Table 1-4: CONT UID LED (blue)

(4) Standby LED	Status
Not lit	CONT not selected.
Lit	CONT selected.

Table 1-5: CONT Fault LED/CONT Ready LED (amber/green)

(6) CONT Fault LED	(7) CONT Ready LED	Status
Not lit	Lit 1 second Not lit 1 second	Running successfully.
Not lit	Blinking fast	Shutting down or backing up data in the memory.
Not lit	Lit	Starting up or rebooting.
Lit 1 second Not lit 1 second	Lit	Waiting for the disk enclosure to be powered on.

(6) CONT Fault LED	(7) CONT Ready LED	Status
Lit	Lit	Failure has occurred.
Lit	Blinking fast	Failure has occurred (log collectable).
Lit	Lit 1 second Not lit 1 second	Retrying as disk enclosure shortage has been detected. Disk Port blocked.
Blinking fast	Lit 1 second Not lit 1 second	Updating firmware online.

Table 1-6: FAN-Fault LED (amber)

(4) Standby LED	Status
Not lit	Running successfully.
Lit	Failure

Table 1-7: BBU-Fault LED (amber)

(4) Standby LED	Status
Not lit	Running successfully.
Lit	Detected BBU failure.
Blinking	Warning for the end of the BBU life cycle

1.2.3.2 Disk Array Controller: PS (Power Supply)

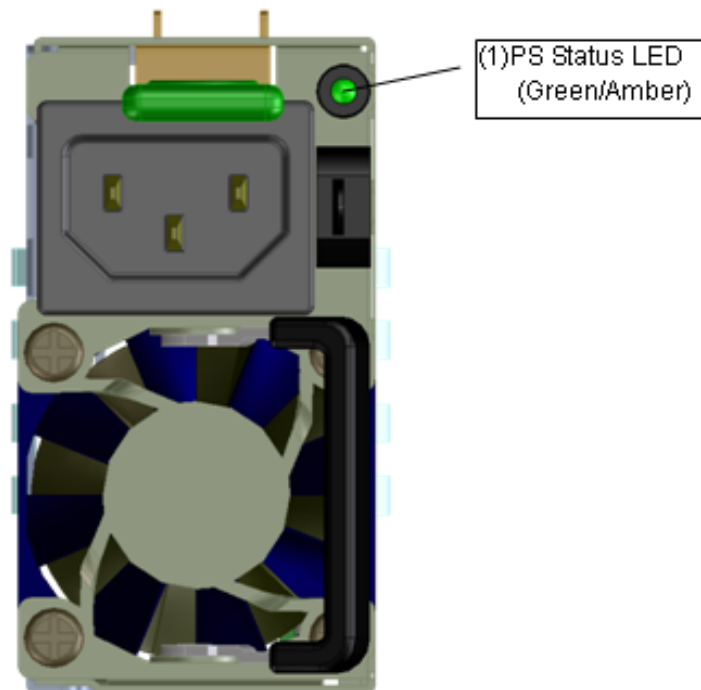



Figure 1-30: Disk Array Controller: PS (Power Supply)

Table 1-8: PS Status LED (green/amber)

(1) PS Status LED	Status
Not lit	No AC-Power AC power is not provided to the power supply.
Lit in amber	Fault (Critical)
Lit in amber 0.5 seconds Not lit 0.5 seconds	Fault (Warning)
Lit in green 0.5 seconds Not lit 0.5 seconds	AC-ON, DC output OFF Indicates the disk array controller DC-OFF state.
Lit in green 0.5 seconds	AC-ON, DC output ON Indicates the disk array controller DC-ON state.
Lit in amber	AC input disconnected When the AC input is disconnected, the PS Status LED is lit in amber about for 30 seconds, and then enters No AC-Power.
	<div style="display: flex; align-items: center;">  <div style="font-weight: bold; font-size: 1.2em;">CAUTION</div> </div> <p>Even if AC input is fed again in this status, DC is not output. Therefore, disconnect AC input, and then provide AC input again when LED went out.</p>

1.2.3.3 Disk Array Controller: MNG

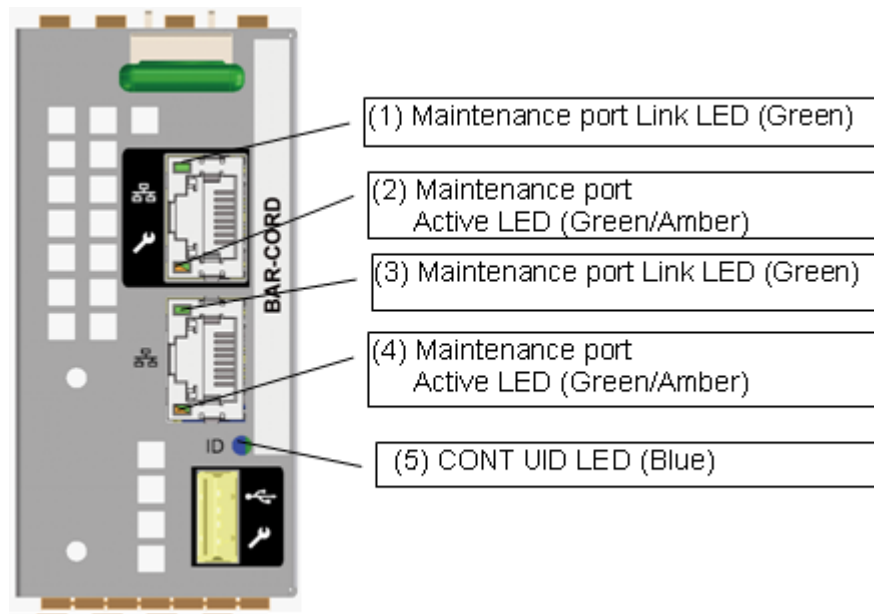


Figure 1-31: Disk Array Controller: MNG

Table 1-9: Maintenance Port/Management Port

LED	Status
(1) Maintenance port Link LED (Green) (3) Management port Link LED (Green)	Lit = connected Blinking = data is being transferred
(2) Maintenance port Active LED (Green/Amber) (4) Management port Active LED (Green/Amber)	Lit in amber = link speed is 1Gbps Lit in green = link speed is 100Mbps Not lit = link speed is 10Mbps

Table 1-10: CONT UID LED (blue)

(5) CONT UID LED	Status
Not lit	CONT not selected
Lit	CONT selected



The function of CONT UID LED on the management card is the same as that of CONT UID LED on the front of the disk array controller.

1.2.3.4 Disk Array Controller: HPE

(1) FC-HPE

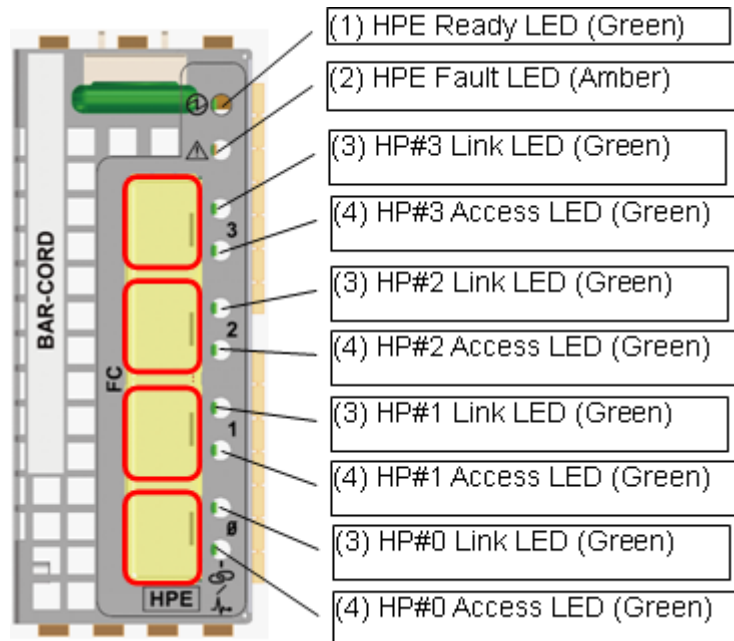


Figure 1-32: Disk Array Controller: FC-HPE

(2) 1G-iSCSI-HPE

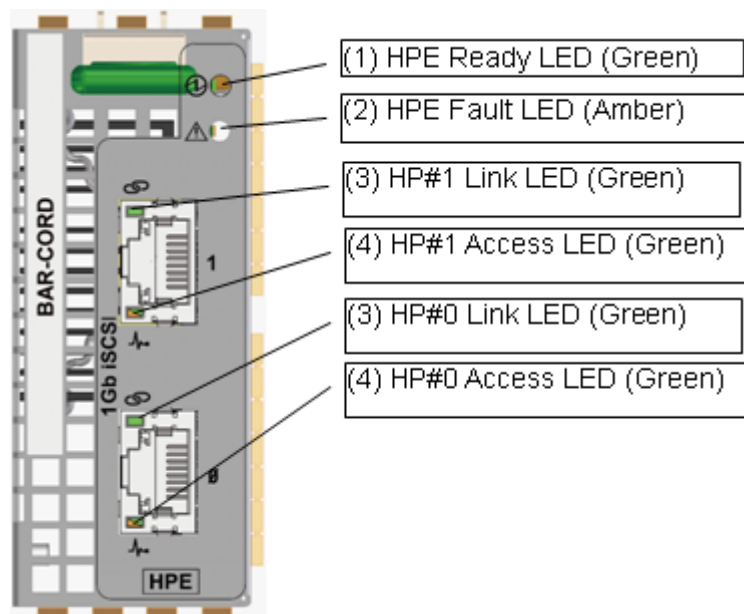


Figure 1-33: Disk Array Controller: 1G-iSCSI-HPE

(3) 10G-iSCSI-HPE

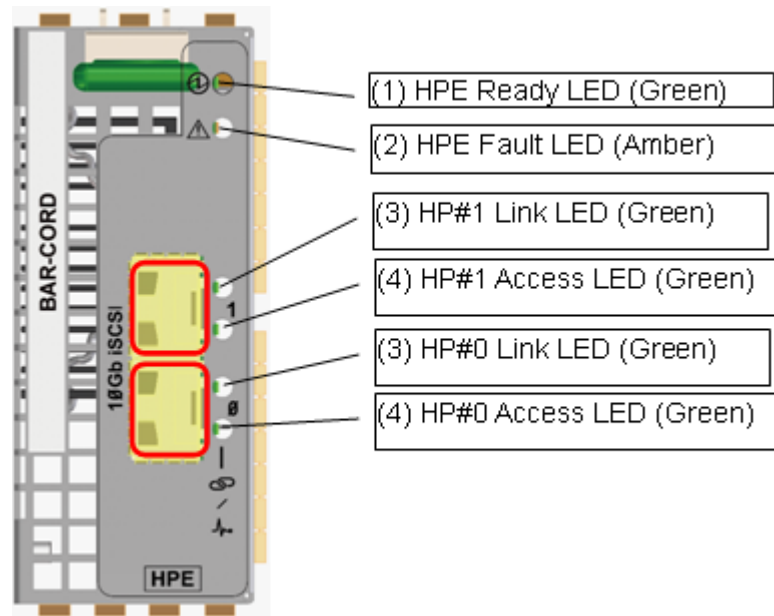


Figure 1-34: Disk Array Controller: 10G-iSCSI-HPE

(4) SAS-HPE

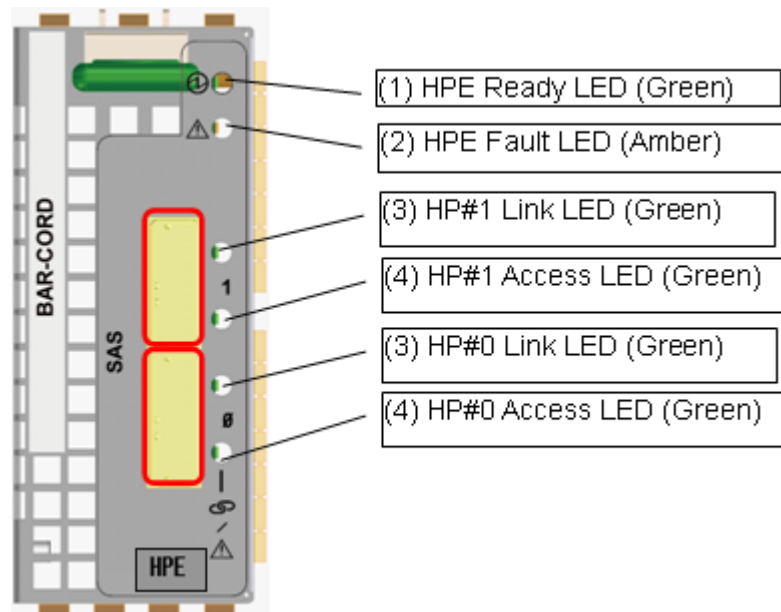


Figure 1-35: Disk Array Controller: SAS-HPE

Table 1-11: HPE Ready LED/HPE Fault LED (green/amber)

(1) HPE Ready LED	(2) HPE Fault LED	Meaning
Lit 1 second Not lit 1 second	Not lit	Running successfully.
Not lit	Lit	Failure

Table 1-12: HP Link LED/HP Fault LED (green)

LED	Status
(3) HP Link LED (Green)	Lit = linkup Not lit = link down
(4) HP Access LED (Green)	Lit or blinking during I/O access
(3) and (4) blinking at the same time	Every two seconds = offline Every one second = being powered off Other = invalid port settings

1.2.3.5 Disk Array Controller: DPE

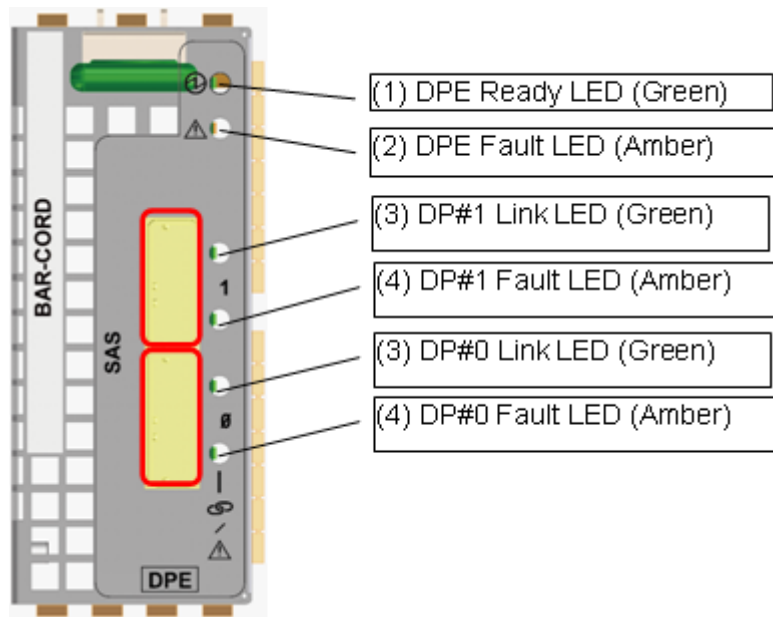


Figure 1-36: Disk Array Controller: DPE

Table 1-13: DPE Ready LED/DPE Fault LED (green/amber)

(1) DPE Ready LED	(2) DPE Fault LED	Meaning
Lit 1 second Not lit 1 second	Not lit	Running successfully.
Not lit	Lit	Failure

Table 1-14: DP Link LED/DP Fault LED (green/amber)

LED	Status
(3) DP Link LED (Green)	Lit = linkup Not lit = link down
(4) DP Fault LED (Amber)	Lit = An error is detected Not lit= Normal

1.2.3.6 Disk Array Controller, Disk Enclosure, and Disk Drives

The front view of a disk array controller, a disk enclosure and disk drives (without the front bezel).

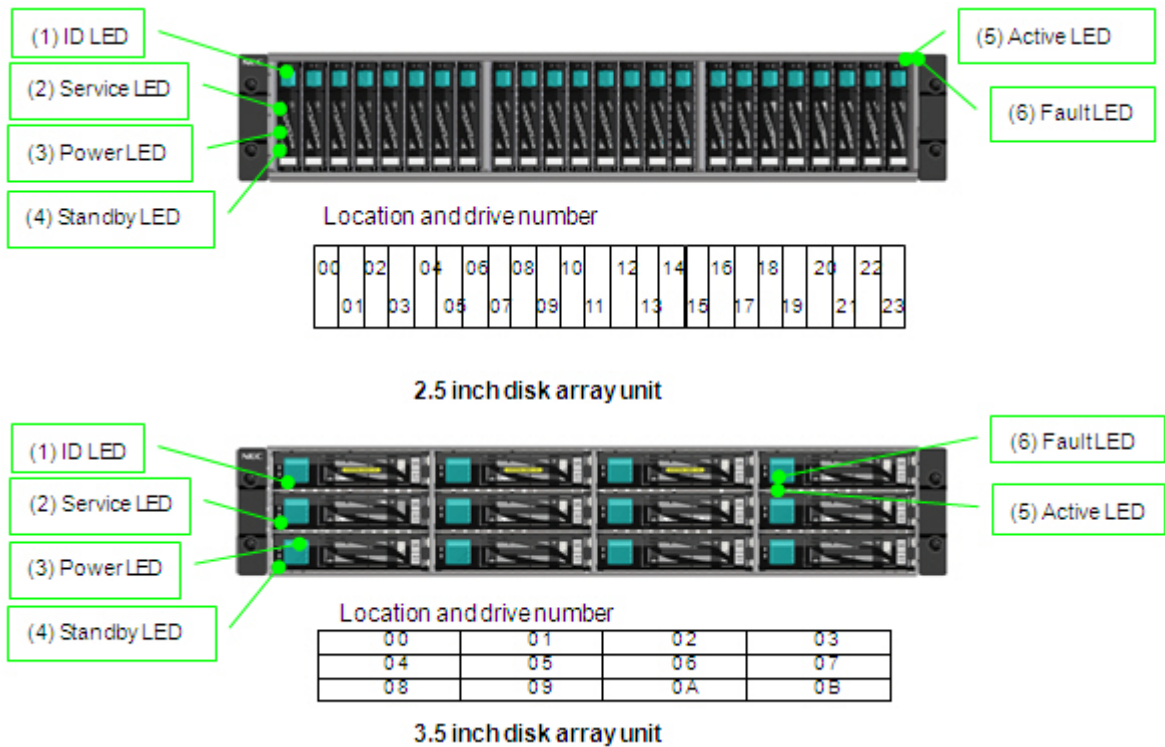


Figure 1-37: LED Display - Disk Array Unit, Disk Enclosure, and Disk Drives

Table 1-15: ID LED (blue)

(1) ID LED	Status
Not lit	Not selected
Lit	Selected

Table 1-16: Service LED/Power LED (amber/green)

(2) Service LED	(3) Power LED	Meaning
Not lit	Lit	Running successfully.
Lit	Lit	Maintenance being required or being performed (such as in the course of recovery).

Table 1-16: Service LED/Power LED (amber/green) (Contd.)

(2) Service LED	(3) Power LED	Meaning
Lit 1second Not lit 1second	Lit	In the course of power on. Firmware being updated online.
Lit 4 seconds Not lit 8 seconds	Lit	Maintenance being required (Backup has failed. Written data may have vanished.)
Not lit	Lit 0.2 seconds Not lit 0.2 seconds	Auto flushing (*) has finished and power can be turned off.
Not lit	Not lit	Powered off.



When access to a host connection port is disconnected for five minutes, transition to this mode takes place automatically to be prepared for power-off. When access from the host connection port is restored, ordinary status is restored.

Table 1-17: Standby LED (white)

(4) Standby LED	Status
Not lit	DC on and off operation is not available
Lit	DC on and off operation is available

Table 1-18: Active/Fault LED (green/amber) of Disk Drive

(5) Active LED	(6) Fault LED	Status
Not lit	Not lit	Powered off.
Lit	Not lit	Ordinary (READY)
Flashing	Not lit	Ordinary (in the course of ACCESS)
Flashing	Flashing	Recovered
Lit	Flashing	Hard disk drive save-energy mode
Lit	Lit	Failure

1.2.3.7 Disk Array Controller Power and Disk Enclosure Power

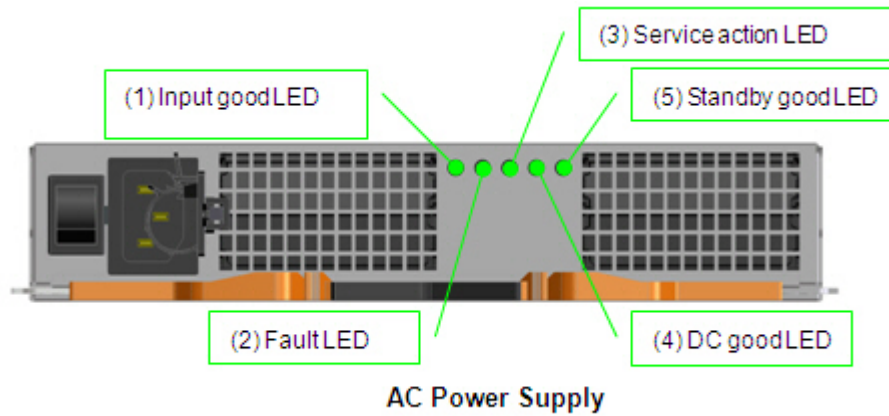


Figure 1-38: LED Display - Disk Array Controller Power and Disk Enclosure Power

Table 1-19: LED Status for Disk Array Controller Power and Disk Enclosure Power

(1) Input good LED	(2) Fault LED	(3) Service action LED	(4) DC good LED	(5) Standby good LED	Status
Green	Amber	Blue	Green	Green	
Lit	Not lit	-	Lit	-	Running successfully.
Lit	Lit	-	Lit	-	Problem in power supply fan. Power supply temperature warning.
Lit	Lit	-	Not lit	-	Power supply output problem. Power supply temperature problem.
Lit	-	-	-	Lit	INPUT-ON (12V and 5V no output, 5Vstb output).
Not lit	-	-	-	-	Input problem.



The service action LED is lit when directed by a device connected to a port or the system.

1.2.3.8 Adapter (ADP)

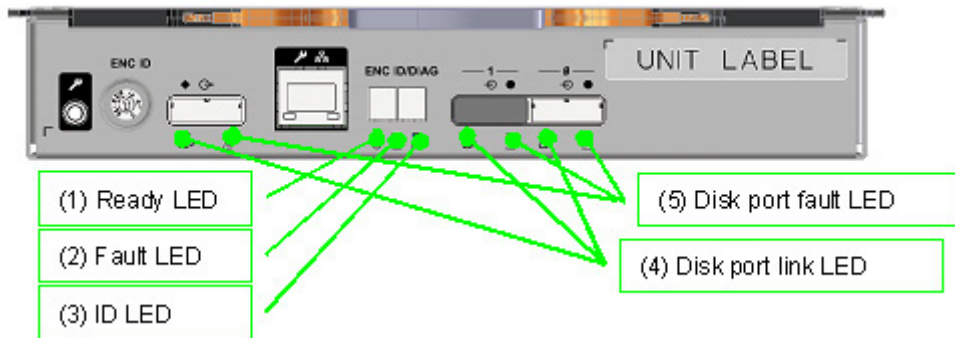


Figure 1-39: LED Display - Disk Array Enclosure Adapter

Table 1-20: Status Display LED

(1) Ready LED	(2) Fault LED	(3) ID LED	Status
Green	Amber	Blue	
Not lit	Not lit	-	Not connected or, not powered on.
Flashing	Not lit	-	Running successfully.
Flashing	Flashing in a cycle of 0.5 second	-	Initializing firmware.
Flashing	Flashing in a cycle of 1 second	-	Error between adapters has been detected.
Flashing	Lit	-	Error in the adapter has been detected. (Operation continued).
Not lit	Lit	-	Error in the adapter has been detected. (Unable to continue operation).
-	-	Lit	The device is selected.

Table 1-21: Disk Port Status

Disk port	Status
(4) Link LED (LNK) (Green)	Lit = linkup Not lit = link down
(5) Fault LED (FLT) (Amber)	Lit = An error is detected Not lit = Normal

Location and port number

DP0-OUT

DP-OUT

DP1-IN	DP0-IN
--------	--------

DP-IN



DP1-IN is not used under normal operation.

1.3 Basic Operation

1.3.1 Powering On the Disk Array System

1.3.1.1 AC Operating Mode

The disk array unit has a mechanism that powers the unit itself on automatically, not through operation of the power switch, according to power supply to AC.

AC operating mode is enabled in the factory default settings. AC operating mode can be disabled by issuing a certain command to the disk array unit. When AC operating mode is disabled, you need to use the power switch to control the power of the disk array unit.








When AC operating mode is disabled, the power control function through ESM/PRO/AC is not available because the control circuits on the controllers are not powered on. Make sure to enable AC operating mode when you use the power control function through the ESM/PRO/AC.

For information on how to change the factory default settings to disable AC operating mode, see *Storage Manager Configuration Setting Tool User's Manual (GUI) for the OptimaX600 Series*.

1.3.1.2 Powering On the Disk Array System

Follow the steps below to power on the disk array system:

Step	Operation
0	<p>Check the disk array controller and the disk enclosures are connected correctly. In this step, do not connect the power supply input cable to the disk array controller or power on the disk array unit.</p>
1	<p>Connect the power supply input cable to the units, in the order of the disk enclosure and the disk array controller, or power on the units at the same time or in the order of the disk enclosure and the disk array controller.</p> <hr/> <div data-bbox="427 611 497 689">  </div> <p>When AC operating mode is enabled (factory default settings), the disk array system with AC power supplies is automatically powered on at the time the power supply input cable is connected to the disk array controller or the disk array unit is powered on. Disk enclosures are sequentially powered on in association with the disk array controller. Proceed to step 3.</p> <p>If AC operating mode is disabled, proceed to step 2, otherwise proceed to step 3.</p> <hr/>
2	<p>Step 2 should be performed only when AC operating mode is disabled.</p> <p>Press the power button of a controller (CONT), which is located at the front of the disk array controller, for approximately one second until fans start to rotate, by using the attached stick. The disk array controller will be powered on. The disk enclosures will be powered on sequentially as the disk array controller is powered on. Proceed to step 3.</p> <hr/> <div data-bbox="427 1189 497 1267">  </div> <p>Press the DC button of either of the controllers (CONT). You do not need to press buttons of both controllers.</p> <hr/> <div data-bbox="427 1339 667 1406">  </div> <p>If your press the power buttons for 8 seconds or more, power is forcefully turned off, which may give negative impact on the disk array system.</p> <hr/>

Step	Operation
3	<p>Do not operate the disk array system until the Power LED (green) located at the front of the disk array unit is lit and the Service LED (amber) goes off after cyclic flashing.</p>  <ul style="list-style-type: none"> ■ It takes approximately six (for minimum configuration) to eight (maximum configuration) minutes for initialization and the self test after the power on. During this period, the Service LED (amber) flashes cyclically. ■ If the Service LED (amber) does not go off and the Power LED (green) is not lit after 10 minutes (both LEDs are located at the front of the disk array unit), the disk array system may be failing. See Chapter 9, "Troubleshooting" . ■ If the snapshot function or the data replication function is used, initialization and the self test described above take longer.
4	<p>Power on the application servers (hosts).</p>  <p>Make sure to power on the application servers after the disk array system is successfully started.</p>

1.3.1.3 Notes on Powering On the Disk Array System


1. When powered on from the battery backup status

If the disk array system stopped due to an unexpected power outage, backed up cache data to the internal flash memory, and then restarted, high-speed writing by using cache (Cache Fast Write) will not be performed until charging the batteries used for the backup is complete, which makes performance of the disk array system degrade. This is because next backup is not guaranteed while batteries are not fully charged, and data is written to nonvolatile disk drives but not to caches that may get volatilized.

It takes a maximum of eight hours to complete charging discharged batteries.

2. Restarting the disk array system after user data loss

If a loss of data in caches has been experienced and then the disk array controller is powered on, the Service LED on the disk array unit repeats flashing for four seconds and then not lit for eight seconds. Follow the steps below to start the disk array system.

Step	Operation
1	Perform power off according to the steps in Section 1.3.2: "Powering Off the Disk Array System" .
2	<p>Perform power on according to the steps in Section 1.3.1: "Powering On the Disk Array System".</p>  <ul style="list-style-type: none"> ■ If the disk array system does not start up successfully, it may be failing. ■ Performance of the disk array system degrades until battery charging is complete, which takes a maximum of eight hours.

3. When the snapshot function is used

If the snapshot function is used, updated information is copied from disk drives to the cache memory when the disk array unit is started.

Because of this, the disk array unit's start up time is delayed by 10 seconds per 1 TB of the updated information.

1.3.1.4 Power control systems without using power switches

1. Control Systems

[Table 1-22: About Control Systems](#) describes power control systems that do not use power switches.

Table 1-22: About Control Systems

Control system	Host OS	Feature
ESMPRO/AC (Works together with UPS)	Windows Linux	This control system uses a server for power control, which can be associated with hosts. For details, see <i>ESMPRO/AC manual</i> .
ESMPRO/AC (Automatic operation)	Windows Linux	This control system uses a server for power control and allows for automatic operation. For details, see <i>ESMPRO/AC manual</i> .
UPS (Does not work with UPS)	Not specified	This control system is for instantaneous power interruption. Because there is no association, when the retention period of UPS elapses, temporary power-off followed by reboot takes place. Cached data, however, is protected.



Association is a mechanism to notify the disk array system of interruption of power supply to the UPS and to start shutdown.



- If you use the UPS control system, establish redundancy by providing a UPS for each power supply of a device.
- Make sure that a failure of a single UPS does not cause simultaneous power failure of PS0 and PS1.

2. Notes on using a UPS and automatic operation

Where ESMPRO/AC association is used together with the disk array system, power must be turned off in a certain order.

AC power off sequence

1 Application server → 2 FC switch → 3 Disk array unit → 4 Disk enclosure → 5 Management server (Only ESMPRO/AC)

If multiple disk enclosures are used, you do not need to specify the sequence of power off among the disk enclosures.

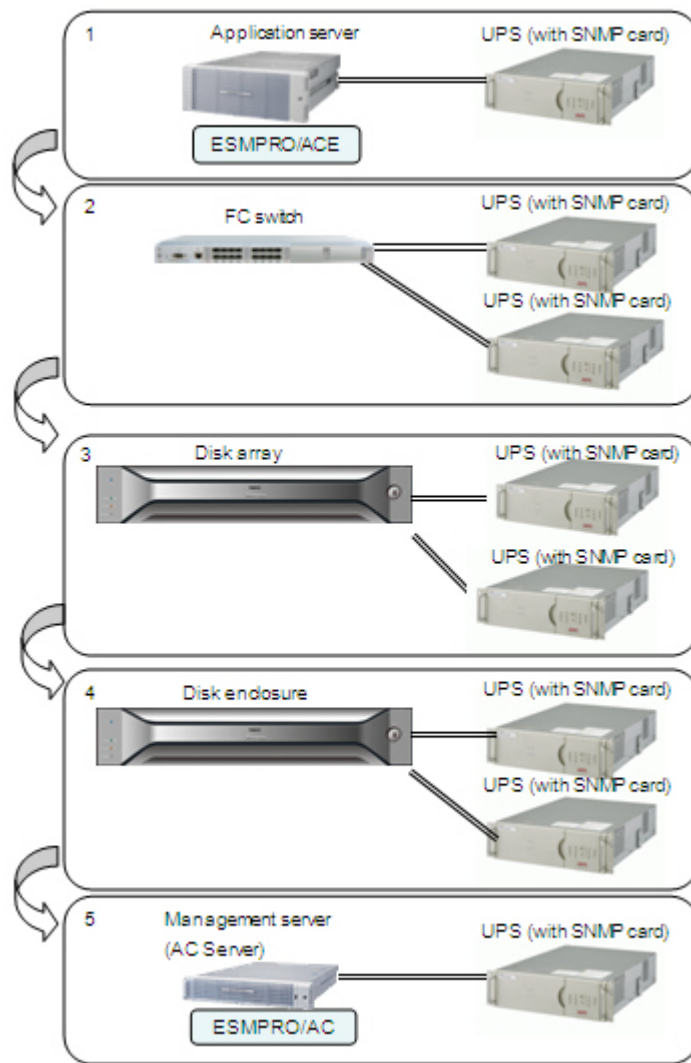






Figure 1-40: AC Power Off Sequence (FC Port Connection)

1.3.2 Powering Off the Disk Array System

1.3.2.1 Powering Off the Disk Array System

Follow the steps below to power off the disk array system:

Step	Operation
1	<p>Stop or power off application servers (hosts).</p> <p> Make sure to check application servers (hosts) are stopped or powered off.</p>
2	<p>Press the power button of a controller (CONT) located at the front of the disk array unit by using the attached stick. Then confirm that the Service LED starts to flash rapidly.</p> <p> Press the power button of either of the controllers (CONT). You do not need to press buttons of both controllers.</p>
3	<p>Wait for the Power LED (green) located at the front of the disk array unit to go off.</p> <p> <ul style="list-style-type: none"> ■ With this process, the disk array unit writes data that is on caches and has not been written to disks to disks. <p>When writing the data is complete, the disk array system is automatically powered off.</p> <ul style="list-style-type: none"> ■ If the Power LED (green) located at the front of the disk array unit does not go off after 10 minutes, the disk array system may be failing. <p>See Chapter 9, "Troubleshooting" .</p> </p>
4	<p>The power supply of the disk array system can now be stopped.</p> <p> Unlike power on, there is no rules for sequence of stopping.</p>

1.3.2.2 Notes on Turning Off the AC Power

1. Backing up user data

If the power of this disk array system is turned off without going through the power off procedure described in [Section 1.3.2: "Powering Off the Disk Array System"](#), or the power control systems without using power buttons section described in [Section 1.3.1: "Powering On the Disk Array System"](#), the user data on caches will be backed up on the flash memory of the unit.

Data will not be lost even if the power is turned off without going through the procedures.

2. Notes on using the data replication function

The update information (= storage system information) managed by the data replication function (DynamicDataReplication or RemoteDataReplication) is created on a replication reserved volume or the cache memory.

If no replication reserved volume has been created, the update information mentioned above is created only on the cache memory. In these circumstances, even if the disk array system is powered off according to the procedure described in [Section 1.3.2: "Powering Off the Disk Array System"](#), the status of the disk array system becomes backup status when the disk array system is stopped. If the backup fails, the storage system information is lost and the status of the disk array system becomes one of the following six statuses.

Activity	Synchronization	Pair Status
Separate	Separated	All spaces are different. There is no change in the status.
	Separating	The status becomes fault, where copying is stopped.
Replicate	Replicating	All spaces are different. Replication is automatically restarted from the beginning. There is no change in the status.
	Synchronized	
Restore	Restoring	The status becomes fault, where copying is stopped.
	Synchronized	All spaces are different. Replication is automatically restarted from the beginning. There is no change in the status.

For recovery of a pair whose status is fault, perform the following steps for replication.

- a. Perform Forced Separate for the RV target.
- b. Perform the steps to restore the previous status (Replicate → Separate, or Restore) again.



Copy is started again. All the spaces of logical disks are targeted, which means full copy is performed.

- When the replication function is used, it is strongly recommended that a user use the storage system information saving function and create a replication reserved volume by Storage Manager. The capacity of the replication reserved volume will be 8.9 GB.
- Powering off by performing the ordinary steps backs up storage system information (differential map, etc.) in a replication reserved volume. If the disk array system is powered off while no replication reserved volume has been created, the state of the disk array system becomes backup. If no replication reserved volume is used, it is recommended to power on the unit 24 hours.



The storage system information saving function is a function to back up the storage system information such as differential map for business volumes (MV) and replication volumes (RV) to disk drives.

1.3.2.3 Auto Cache Flush Function

This is a function to automatically save user data, difference map, configuration information and the like on caches to disk drives when host IO is not issued for five minutes.

If power off takes place without going through the ordinary procedure while data that has not been written is left on caches, the backup function works to protect the data on caches. However, because this backup function saves cached data in the flash memory by using batteries in the disk array system, the data may get lost if battery power is not sufficient and saving data fails.

Auto Cache Flush Function assures data on caches to be written to disk drives and prevents data loss even if a situation mentioned above arises.

Completion of Auto Cache Flush can be checked from high-speed flashing of POWER LED that flashes every 0.2 seconds.

Chapter 2 Workflow - Installation to Operation

This chapter explains the flow of disk array unit from installation to operation.

1

Disk Array Unit Installation

1. Installation Preparation

- Prepare the following:
 - Machines - Client machine to run the Storage Manager client and the application server.
 - Cables - LAN cable (shielded), interface cables (FC and/or iSCSI), and power supply cable.
 - IP addresses, subnet masks, and gateway addresses for the disk array unit.
 - Network devices (as necessary).
 - Disk drives.
 - Tools and accessories like Phillips screwdriver and installation CDs.
- Perform the preliminary setup of the application server.

See [Section 3.1: "Preparation"](#)

2. Hardware Installation

- Install disk array unit in the rack.
- Install disk enclosure in the rack.
- Install disk drive.

See [Section 3.2: "Installation"](#)

3. Cable Connections

Connect the following cables:

- SAS cable to connect disk array unit and disk enclosure.
- FC cable to connect disk array unit and application server (for FC).
- LAN cable or optical Ethernet cable to connect disk array unit and application server (for iSCSI).
- LAN cable to connect disk array unit, application server, and client.
- Power supply cable to connect disk enclosure to power supply.
- Power supply cable to connect disk array unit to power supply.

See [Section 3.3: "Connection"](#)

2

Software Installation and Configuration

Perform the following installation and configuration settings:

1. **Pre-requisites**

- Configure the web browser to start Storage Manager client (Web GUI).
See [Section 4.2: "Before Starting Storage Manager Client"](#)

2. **Setup**

- Install Network Setting Tool on Storage Manager client machine.
- Configure the IP address of the disk array using Network Setting Tool.
- Set the time zone of the disk array.
See [Section 4.3: "Setup"](#)

3. **Storage Manager Agent Utility**

- Install the Storage Manager Agent Utility on an application server.
See [Section 4.4: "Installing Storage Manager Agent Utility on Application Server"](#)

4. **Storage Manager Client**

- Enter the name or IP address of the disk array in the address bar of the web browser to start the Storage Manager client.
See [Section 4.5: "Starting Storage Manager Client"](#)

3

Disk Array Unit Initialization

Perform the following initialization methods based on how the disk array is configured:

- If the disk array is configured for only FC connection, initialize it using FC method.
- If the disk array is configured for only iSCSI connection, initialize it using iSCSI method.
- If the disk array is configured for both FC and iSCSI connection, then perform one of the following methods:
 - Use the FC method to initialize the disk array and then use the iSCSI method.
 - Use the iSCSI method to initialize the disk array and then use the FC method.

Initialize using FC method

1. Collect host information from the application server.
See [Section 5.2: "Collecting Host Information From Application Servers"](#)
2. Initialize disk array using the Storage Manager.
 - a. Start the Initialization Wizard and follow the instructions.
 - b. Bind Pool.
 - c. (*Optional*) Bind Hot Spare.
 - d. Bind Logical Disk.
 - e. Set the application server (host) to which logical disk will be assigned.
 - f. Assign logical disk to the application server.See [Section 5.3: "Initialization by Storage Manager"](#)
3. Check if the application server to which the logical disk has been assigned is connected to the disk array.
See [Section 5.4: "Checking Connection from Application Servers"](#)

Initialize using iSCSI method

1. Initialize disk array using the Storage Manager.
 - a. Start the Initialization Wizard and follow the instructions.
 - b. Perform iSCSI initiator setting on the application server using iSCSI Setup Tool.
 - c. Bind Pool.
 - d. (*Optional*) Bind Hot Spare.
 - e. Bind Logical Disk.
 - f. Assign logical disk to the application server.See [Section 6.2: "Initialization by Storage Manager"](#)
2. Check if the application server to which the logical disk has been assigned is connected to the disk array.

Chapter 3 Installing the Disk Array System

This chapter describes how to prepare, install, and connect a disk array unit.

In this chapter

[“Preparation” on page 48](#)

[“Installation” on page 51](#)

[“Connection” on page 62](#)

3.1 Preparation

The following accessories and tools are required for setup. Also the following preparation must to be completed for the application servers to which a disk array unit will be connected.

1. Prepare the following items:

- Application servers, client, installation CD-ROM
- LAN cables (shielded)
 - Use a crossover cable to connect a unit and a client directly.
 - Use straight cables to connect a unit and a client via hub, etc.
- Interface cables to connect application servers
- IP addresses to be assigned to the disk array unit as many as ports to be connected
Also contact the network administrator to obtain subnet masks and gateway addresses.
- Network devices (as necessary)
- Phillips screwdriver (No. 1) (for screwing)
- Three or more disk drives. Purchase new disk drive products



It is recommended to move a unit by two or more persons.

2. Implement the following setup preliminarily on the application server to which the disk array unit will be connected:

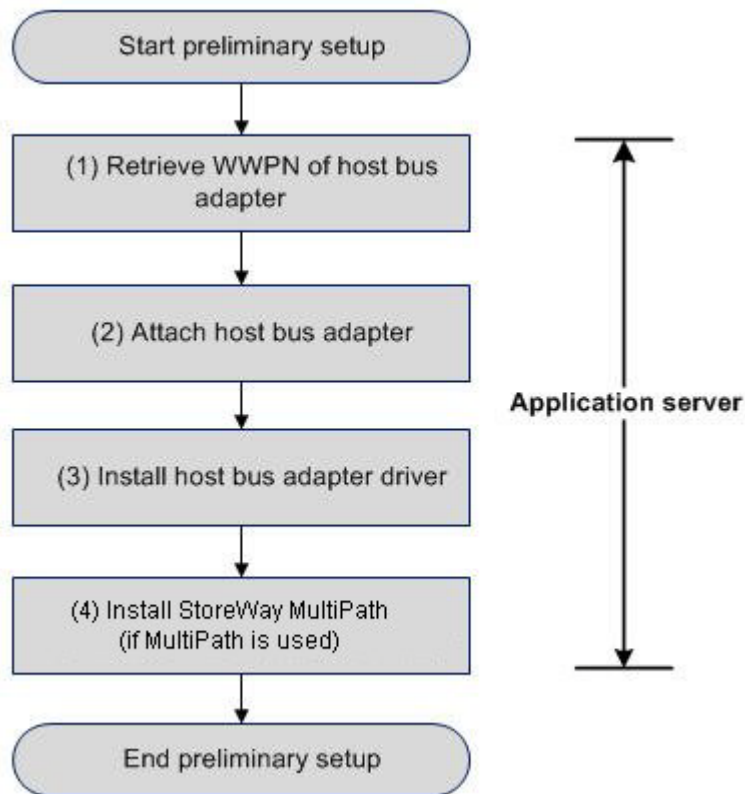


Figure 3-1: Flow of Preliminary Setups

For FC Interface

- a. Retrieve World Wide Port Name (WWPNs) assigned to host bus adapters (FC controllers).
This setup procedure is applicable only when WWN mode (WWPNs of host bus adapters are used to assign to LUNs to application servers) is set for AccessControl. During the setup, the WWPNs of the host bus adapters attached to the application servers are retrieved by using software. It is recommended to make a note of the WWPNs (i.e. checking the host bus adapter locations at the server extension slots and taking a note of the WWPNs) because they will be useful for replacement (for checking the host bus adapters location at the server extension slot and the WWPN) if the host bus adapter fails.
In case the WWPNs of the host bus adapters cannot be retrieved by using software, you may need to enter the WWPNs manually.
- b. Attach the host bus adapters.
Skip this step when host bus adapters have already been attached to the application servers. Attach the host bus adapters to the application servers by following the user's manuals of the host bus adapters and the application servers.
- c. Install the host bus adapter drivers.
Skip this step when the drivers of the host bus adapters attached to the application servers have already been installed and set up on the application servers.
Install and set up the drivers by following the setup procedures described in the manuals that come with the host bus adapter products to be installed on the servers or the information offered on the Web sites.
- d. Install StoreWay Multipath (Windows/Linux).

Skip this step when StoreWay Multipath has already been installed and set up on the application servers or no Storage Multipath will be installed.



Complete step c before implementing step d.

For information about how to install Storage Multipath, see [Appendix G: "Installing StoreWay Multipath"](#).

3.2 Installation

3.2.1 Mounting a Disk Array Unit on a Rack

This section describes how to install a disk array unit and a disk enclosure in a rack.



- Follow the descriptions in Installation Guide.
- A disk array unit weighs up to 31Kg (when 3.5-inch hard disk drives are installed). A disk enclosure weighs up to 29Kg (when 3.5-inch disk drives are installed). They must be mounted on a rack by two or more persons.
- Mount disk enclosure(s) and then a disk array unit from the top of a rack.

The following describes how to attach the rack mount kit that has come with this disk array system to a rack:

Table 3-1: Components of Rack Mount Kit

No.	Component name	Quantity
1	Rail (L)	1
2	Rail (R)	1
3	M5 screw	12
4	Cable clamp	4
5	Repeat tie	5

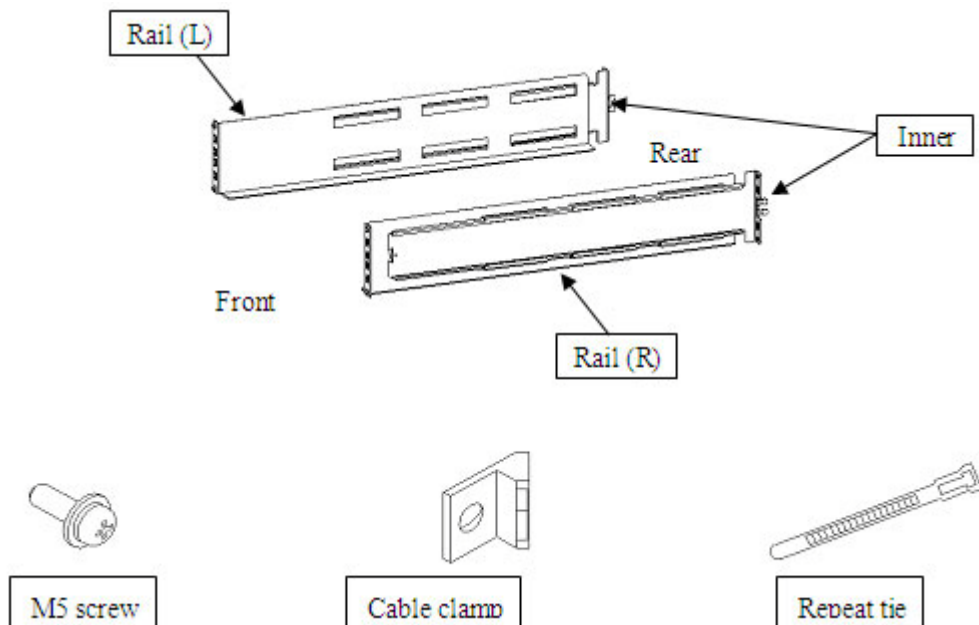


Figure 3-2: Rack Mount Kit

1. Check the rail (L)

The side with the inner is rear.

The rail (L) looks L-shaped when it is seen from the front side.

Attach the rail to the left side of the rack which is seen from its front side.

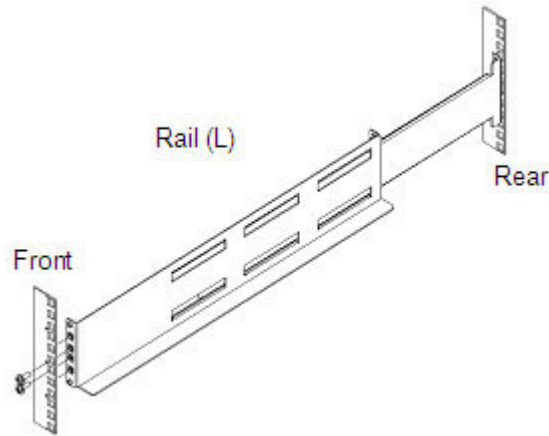


Figure 3-3: Rail

2. Align both sides of the bottom of the rail with the 1U delimiting marks on the rear pole of the rack and then let the two projections on the inner into the holes on the pole.

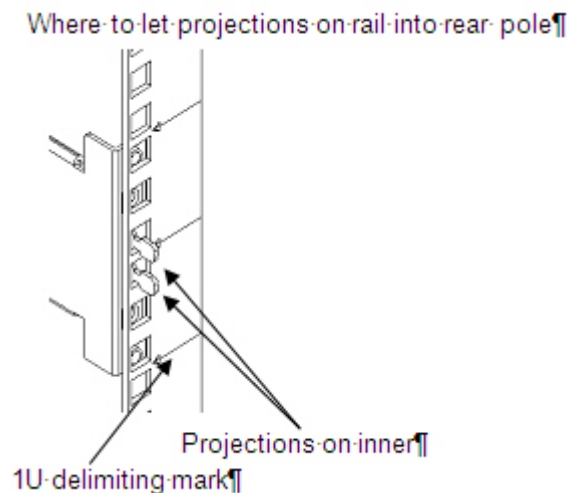


Figure 3-4: Attaching Rail to Rear Pole

3. Align both side of the bottom of the rail with the 1U delimiting marks on the front pole of the rack and let the two projections on the rail into the holes on the pole.

There are two types of rack, rectangular-hole rack and circular-hole rack. Each of them has a different type of projection on the rail.

Insert M5 screws into the two central screw holes on the front pole of the rack to screw the rail.

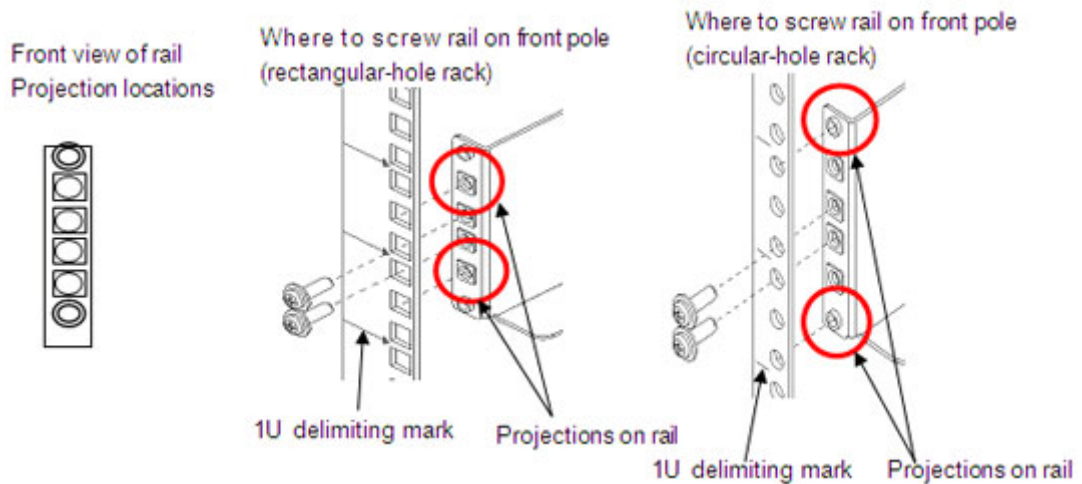


Figure 3-5: Screwing Rail on Front Pole

4. Move the inner towards the rear pole of the rack and let the two projections in the holes on the pole.

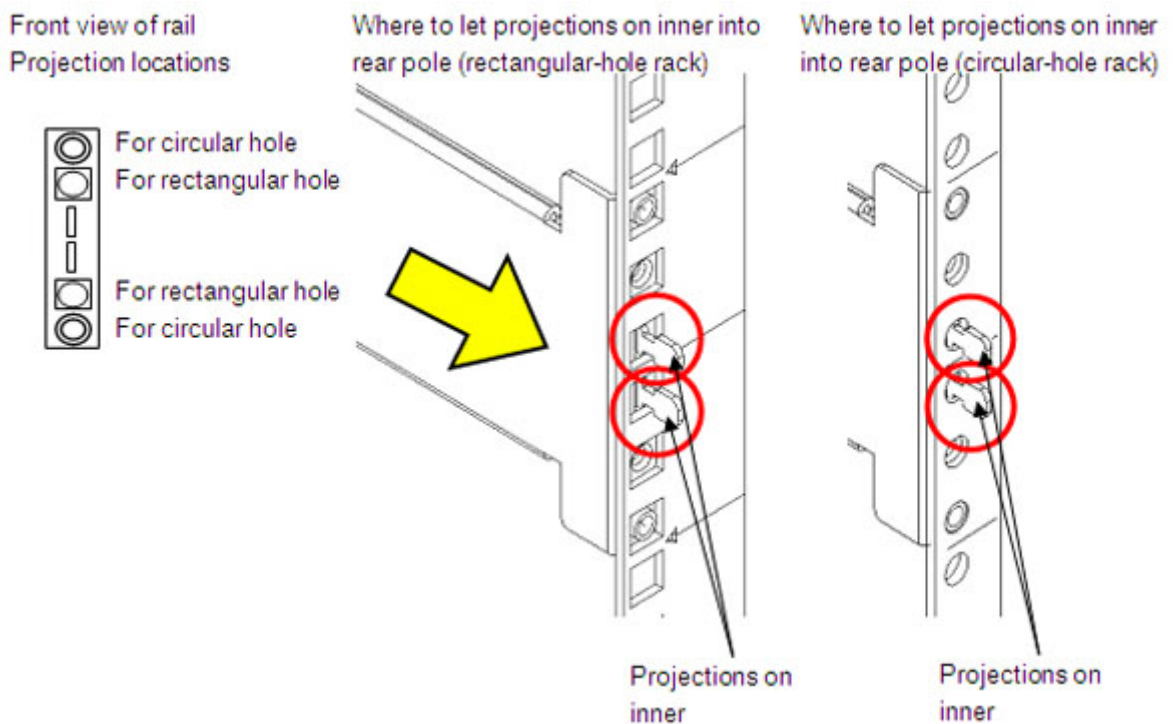


Figure 3-6: Attaching Rail to Rear Pole

5. Insert an M5 screw through a cable clamp into each of two screw holes on the rear pole of the rack to screw the inner.

Orient cable clamps as shown in the figure on the right when attaching them.

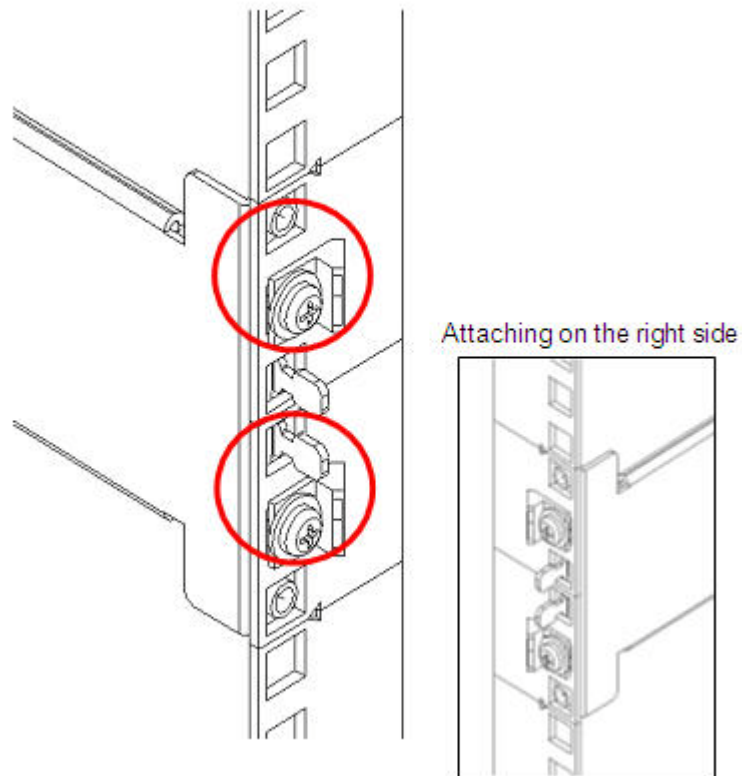


Figure 3-7: Attaching Inner Rail

6. Attach the rail (R) on the right side of the rack by using the same procedure as above.
Installation of rack mount kit is now complete.
7. Before mounting a unit, attach ear bezels or front bezel clips. If you use an optional front bezel, attach the bezel clips that come with the front bezel as shown in the following illustration. If no front bezel is used, attach the ear bezels that come with the unit.
Both can be attached to the unit by sliding from the side of the unit.

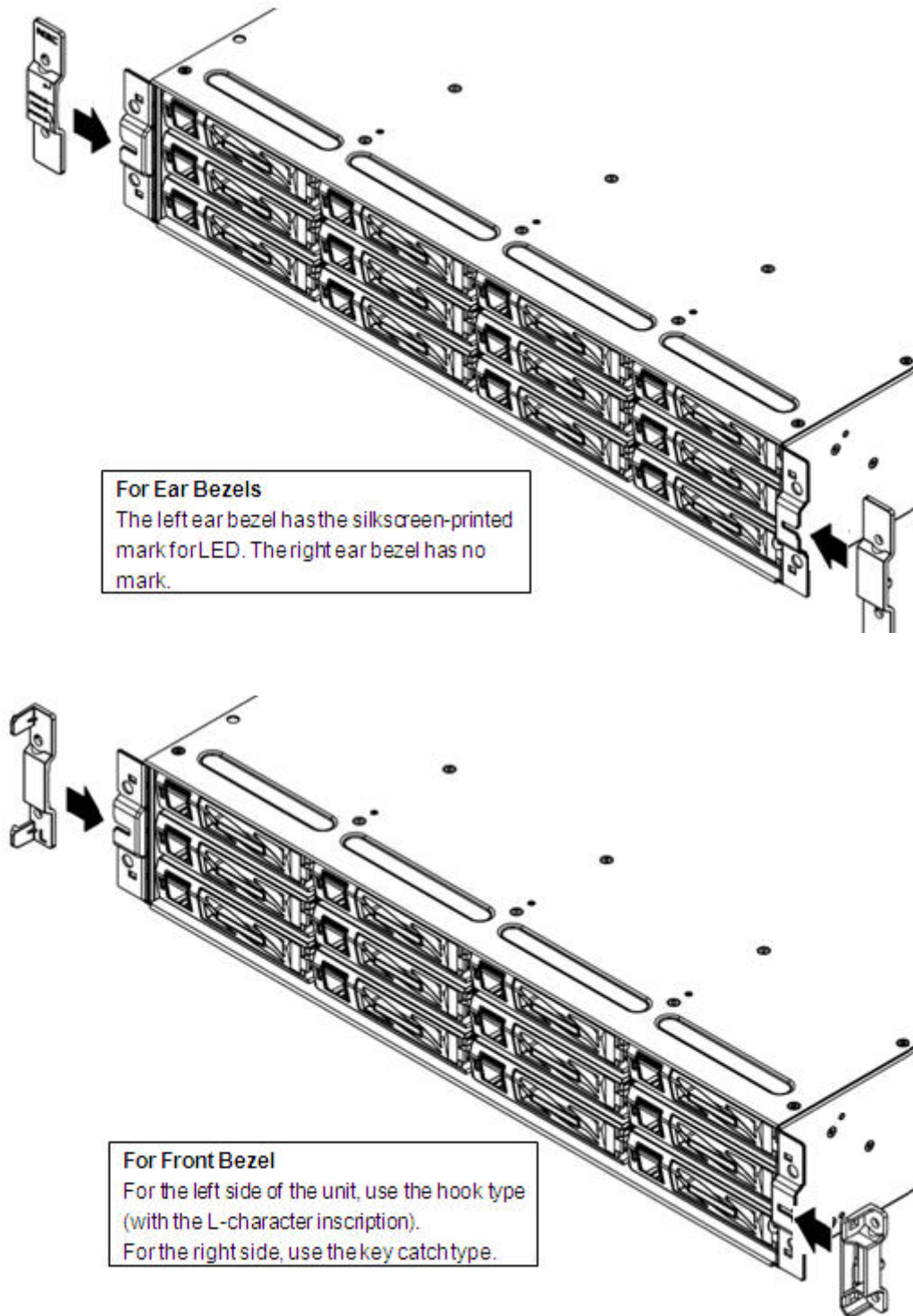


Figure 3-8: Attaching Ear Bezels or Front Bezel Clips

8. Mount the unit. Put the front part of the unit on the front part of the rack. Then lift up the unit, put the rear part of the unit on the rail and slide the rail.



- Mounting a unit on a rack should be implemented by two or more persons.
- Take care not to injure your fingers, etc. when moving a unit because it is heavy.
- Take care not to drop a unit when moving it.

9. Secure the unit on the front side of the rack.
Screw two points on each of the right and left sides of the front side of the unit by using M5 screws. Mounting the unit on the rack is now complete.

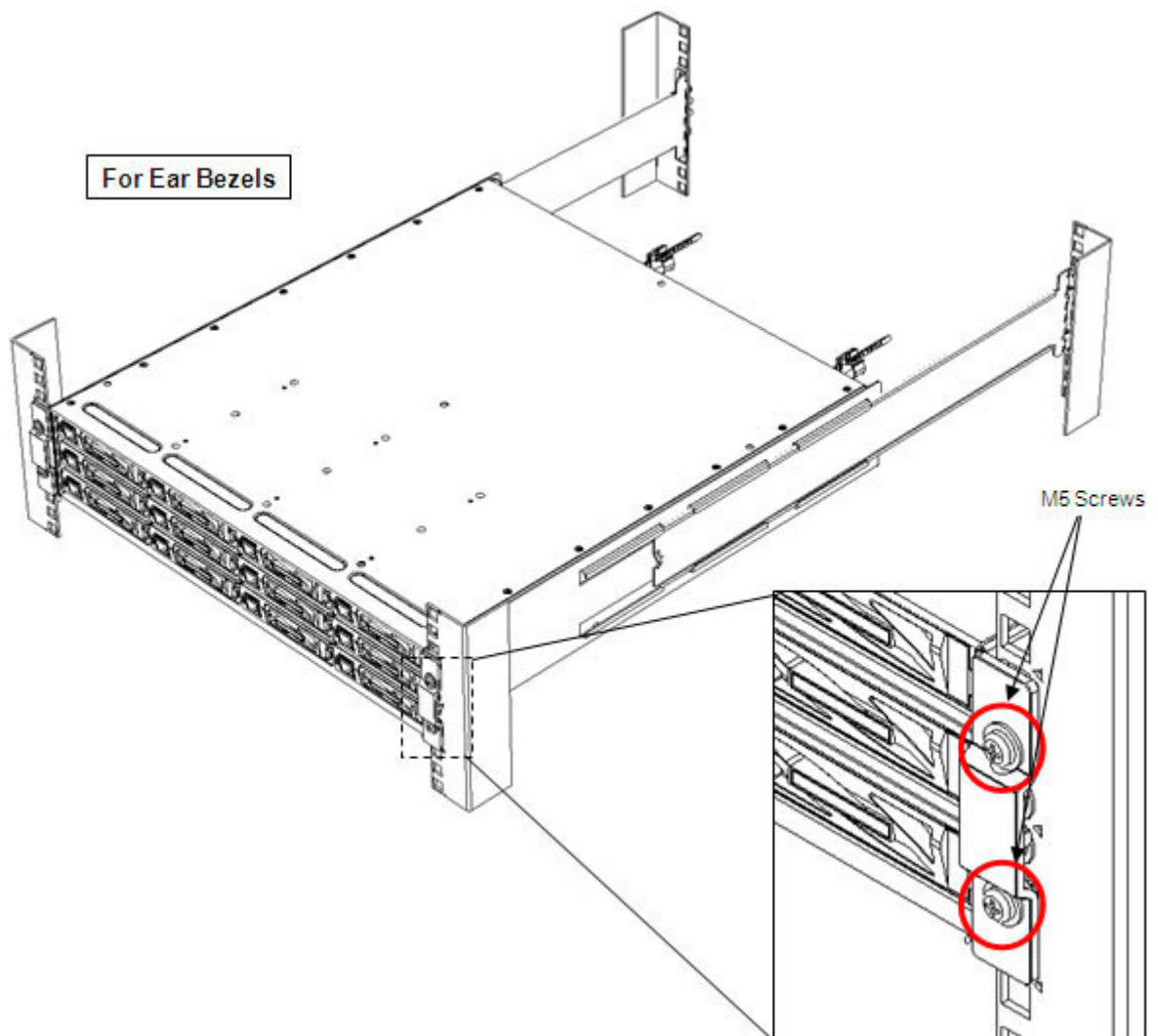


Figure 3-9: Securing Unit 1

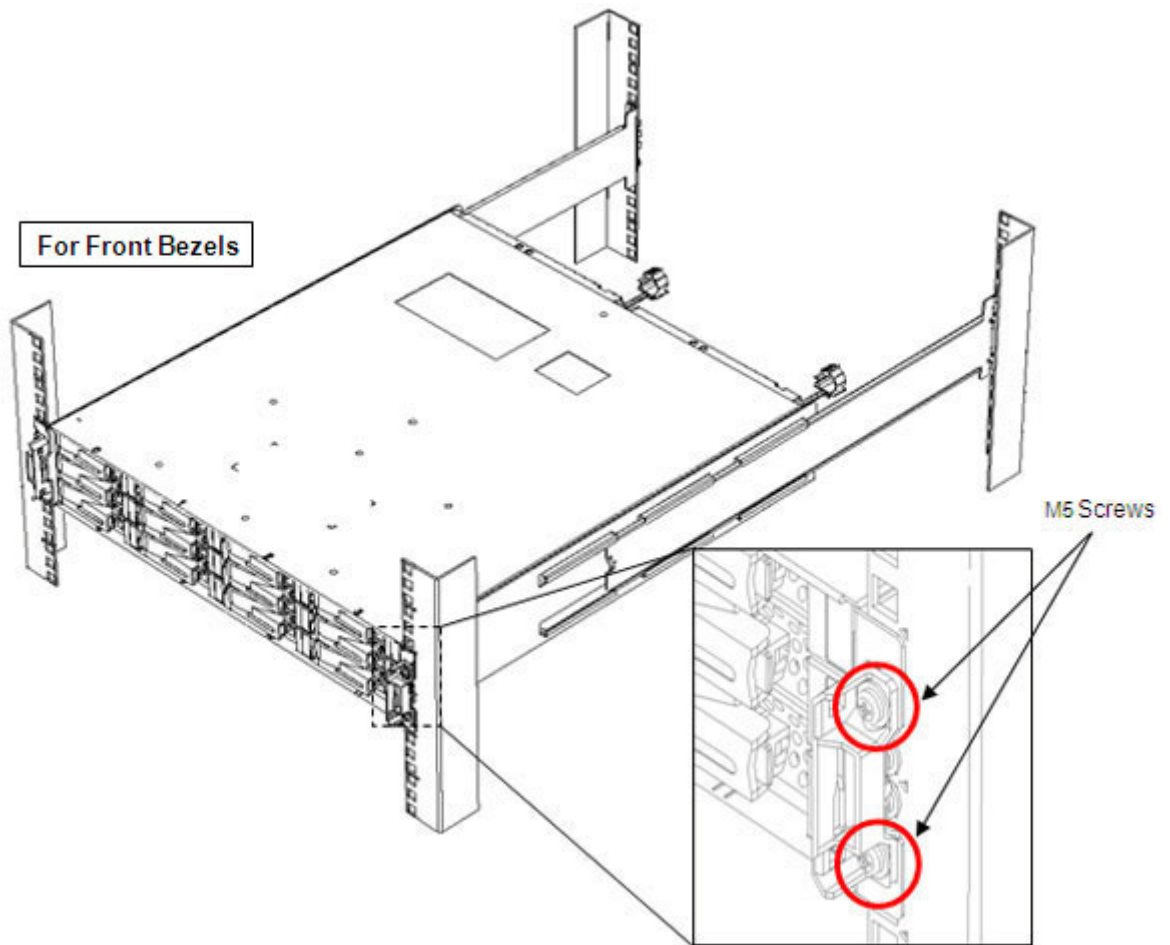


Figure 3-10: Securing Unit 2

3.2.2 Mounting a Disk Enclosure on a Rack

When you have purchased a disk enclosure optionally, install the enclosure in the rack.

The installation procedure is the same as the procedure for mounting a disk array unit in a rack. See [Section 3.2.1: "Mounting a Disk Array Unit on a Rack"](#) for more details about the procedure.

3.2.3 Installing Disk Drives

Follow the procedure below.

1. When a front bezel has been attached, detach it.
2. Remove dummy carriers from the slots where disk drives will be installed.
3. Mount disk drives. (For the detailed procedure, see the next page.)

4. Repeat steps (2) and (3) as many times as the number of disk drives you want to install.



- Insert a disk drive slowly because it has a plug-in structure.
 - Mount disk drives carefully, one by one.

When the power is on, confirm that an inserted disk drive becomes READY state before inserting the next disk drive.
 - Use a new disk drive you have purchased as a product.

The operation of a diverted or a reused disk drive is not guaranteed. Do not use a disk drive that has been diverted from or used in other system.
 - For more information on how to attach/detach a front bezel, see [Section 7.3.1: “Front Bezel”](#).
 - Disk drives are electrical parts. When handling them, take an anti-static measure such as using a wrist strap.
 - Disk drives are precision machines. Protect them from any shock or vibration.
 - When replacing a disk drive with a new drive, confirm that both of them have the same model number.
 - Install dummy carriers for cooling the unit in the slots where disk drives are not installed.
-



- Three disk drives that will serve as system disks always need to be installed on the slots 00, 01, and 02.
 - When 3.5 inch disk drives are used, place system disk labels that come with the disk drives on the system disks to prevent operation errors. Also, place location labels on disk drives to prevent a wrong disk drive from being installed during drive replacement (when 3.5-inch hard disk drives are installed).
 - Remove system disks from the unit one by one.
-

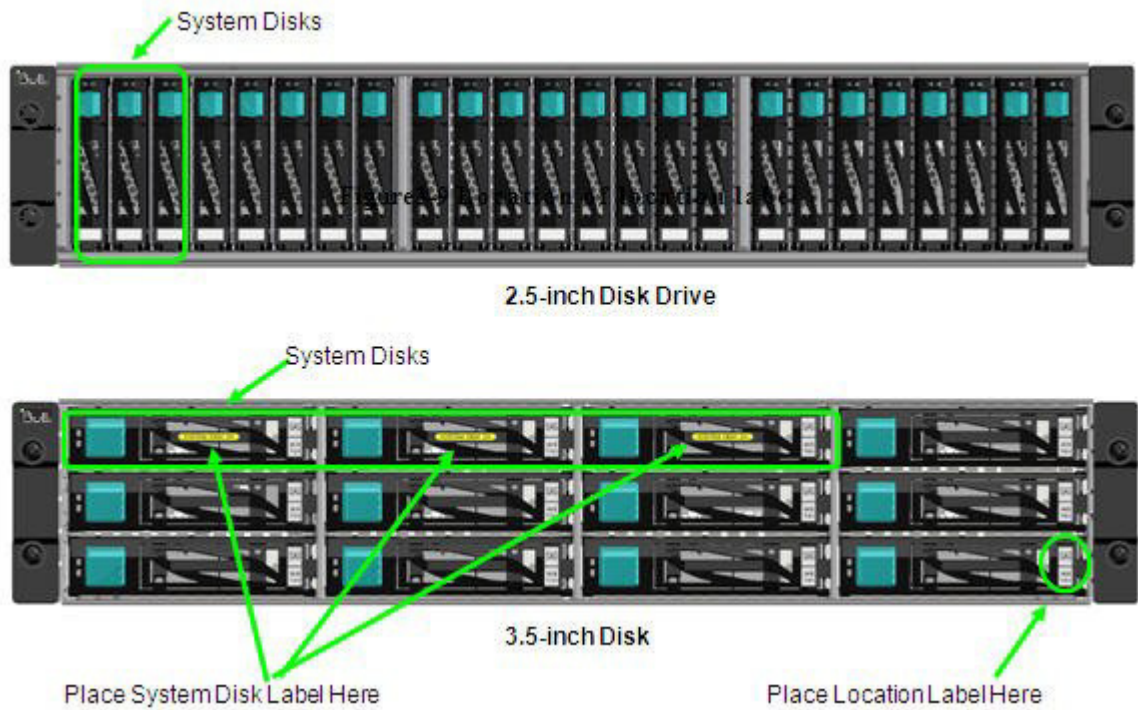
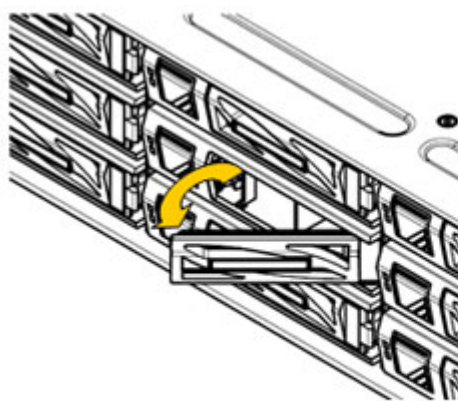


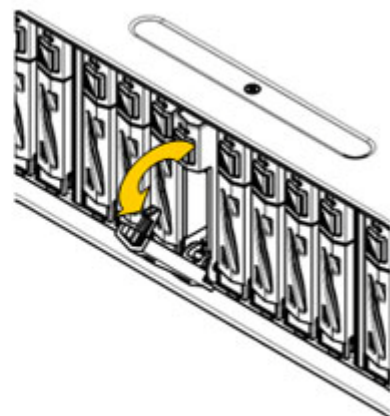
Figure 3-11: Attaching Location Label

Procedure for Removing a Dummy Carrier

Pull the eject lever on a dummy carrier until the angle is about 40 degrees.



3.5-Inch Dummy Carrier



2.5-Inch Dummy Carrier

Pull out the dummy carrier straight to the direction as the arrows in the following illustration shows. Put back the eject lever to the original position after removing the dummy carrier.

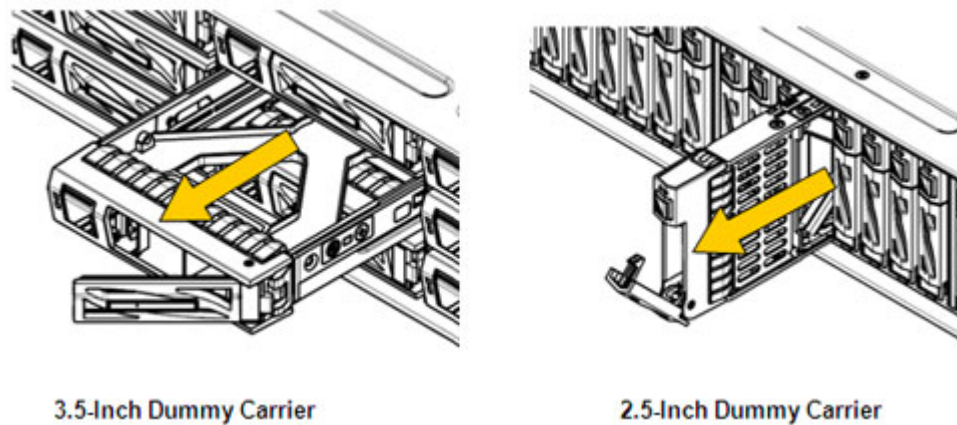


Figure 3-12: Removing Dummy Carrier



Do not dispose of the dummy carriers you removed.

There are two types of disk drive, 3.5-inch and 2.5-inch.

Each of them has three types, SAS drive, NL-SAS drive, and SSD.

The front label on a disk drive (shown by red circles on the figures below) indicates the type of the drive.

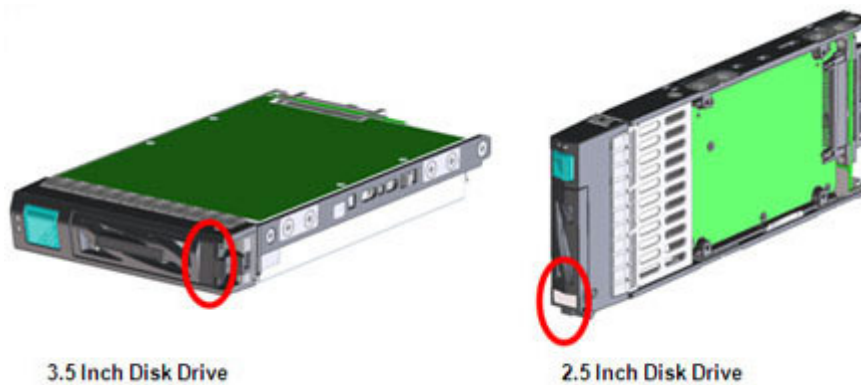


Figure 3-13: Disk Drive

Procedure for Mounting a Disk Drive

1. Pull the eject lever on a disk drive until the angle is about 40 degrees.
The eject lever is closed by default on the disk drive.

2. Hold the disk drive steadily and insert it to the middle of the slot in the disk drive unit or a disk enclosure.

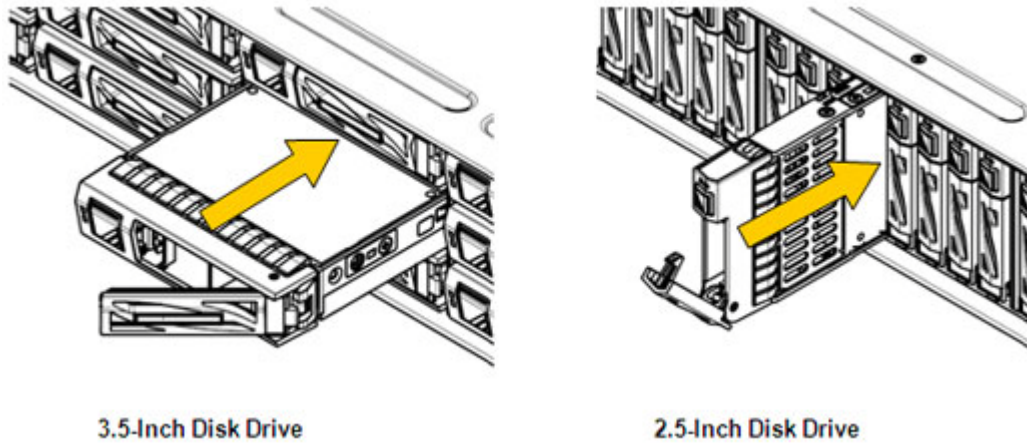


Figure 3-14: Inserting Disk Drive

3. With the eject lever on the disk drive open, slowly insert the disk drive until it stops while holding the eject lever.
4. Press the eject lever into the disk drive to lock the drive.

3.3 Connection

3.3.1 Overview

Check the following before connecting the disk array unit:

1. Connection cables

- To connect the disk array unit and a disk enclosure, be sure to use the cables that come with the disk enclosure or SAS cables specified by Bull.
- (For FC) To connect a host bus adapter or FC switch on an application server to the disk array unit, be sure to use an FC cable specified by Bull.
- (For 1Gbps iSCSI) To connect an NIC or switch on an application server to the disk array unit, be sure to use a LAN cable in the category 5e or over.
- (For 10Gbps iSCSI) To connect an NIC or switch on an application server to the disk array unit, be sure to use an optical Ethernet cable (conforming to 10GBASE-SR).
- To connect the disk array to power supply, use the power supply cables that come with the disk array unit.

2. Maximum cable length

a. FC cable

Table 3-2: FC Cable Length

Host Interface	Max. Cable Length	Remarks
2 Gbps	300 m	Optical cable
4 Gbps	150 m	Optical cable
8 Gbps	50 m	Optical cable

b. iSCSI cable

Table 3-3: iSCSI Cable Length

Host Interface	Max. Cable Length	Remarks
1 Gbps	100 m	1000BASE-T
10 Gbps	50 m (*1)	Optical cable Connector: LC-LC Core: 50 um Type: MMF/OM2 cable (All mode excitation bandwidth: 1500 MHz.km)



* 1. Connection of 50m or more is possible depending on the devices to be connected. For more information, contact the technical division of Bull.



To prevent a wrong cable from being connected during cable replacement at the system start or after a failure, attach the cable labels that come with units on to the cables.

3.3.2 Connecting a Disk Enclosure

If you have purchased a disk enclosure optionally, use SAS cables to connect the disk array unit and the disk enclosure.

For details about how to connect them, see [Section 7.3.4: “Disk Enclosures”](#).

3.3.3 Connecting an Application Server

For FC Port Connection

Use FC cables, to connect an application server and host connection ports on the disk array unit.

The figure below shows an example of recommended connection, which is a redundant-paths configuration that works together with StoreWay Multipath.

To implement this recommended connection, two host bus adapters need to be installed on the application server.

Two FC cables are also required for connecting the disk array unit and the host bus adapters.

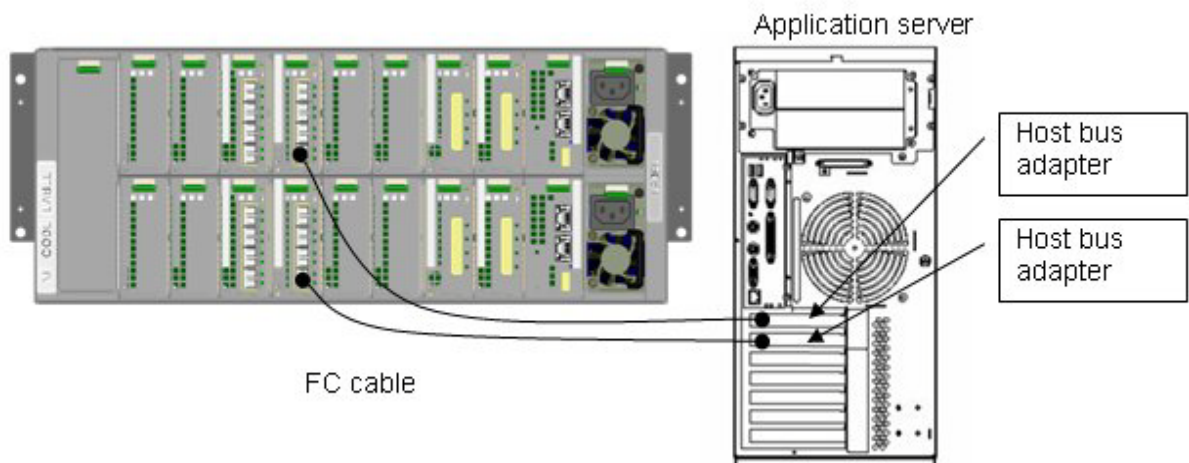


Figure 3-15: Connection Example



The dustproof covers on the host port on the controllers will be required for system relocation, etc. in the future. Do not dispose of the covers after removing them from the controllers.

Following is the procedure for connecting the disk array unit and the application server by using FC cables:

1. Check the power.

Make sure the power of the disk array unit is off.

2. Connect the application server.

Insert the connector on one end of an FC cable (LC-LC cable) into a host connection port (HPx) on the controller (CONT0 or CONT1) in the disk array unit until the connector clicks. The connectors on both ends of an FC cable have the same shape.

Connect the connector on the other end of the FC cable to the connector of a host bus adapter installed on the application server. In the same way, connect the other controller to the connector on another host bus adapter.



If you press an FC-cable connector hard when inserting it, the end face of the cable may be scratched and light output may be decreased, which may cause malfunction.

For iSCSI Port Connection

See the "Preparation" section in one of the following sections:

- [Section C.1: Initializing Application Server](#) (on Windows)
- [Section E.1: Initializing Application Server](#) (on Linux)
- [Section F.1: Initializing Application Server](#) (on VMware)

3.3.4 Connecting LAN Cables

Use a LAN cable to connect the disk array unit, servers and the clients to a LAN. The disk array and the client must be connected to a LAN for initialization and monitoring of the disk array unit.

Use Storage Manager as software for initializing and monitoring the disk array unit. The Storage Manager is requisite for using the disk array unit.

Purchase shielded LAN cables and connect them to the management ports (LAN ports) on the controllers.

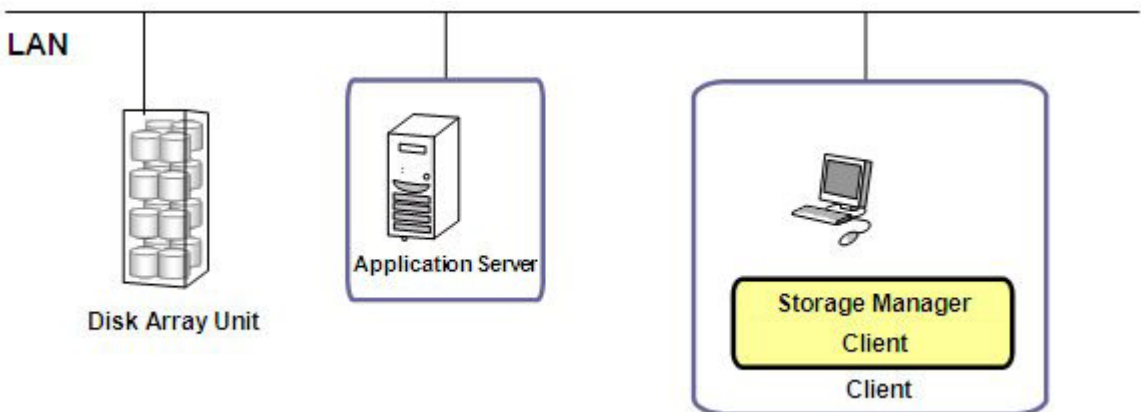


Figure 3-16: Example of LAN Cable Connection

Storage Manager Server can be connected to CONT0 and 1. When it is connected to either of them, connect it to CNT0 in general. It is recommended to employ a redundant configuration where an IP address is set for the LAN port on each controller and connection via an Ethernet hub is set.



To initialize the disk array unit by using the initialization wizard on Storage Manager, the disk array unit and the client need to be connected by using a LAN cable.



LAN cable for connection with the client

- Use a shielded cross cable to directly connect the disk array unit and the client.
- Use shielded straight cables to connect the disk array unit and the client through a hub, etc.

3.3.5 Connecting Power Supply Cables



- Avoid overloading on an electrical circuit to prevent fire.
- Do not plug in a power supply cable to an outlet and panel board with a wet hand. Doing so may cause an electric shock.
- Do not place a heavy item on a power supply cable. Doing so may damage the shield of the cable, which may cause a fire or an electric shock.



- Connect the power supply cables of the disk array unit after all other processes are finished.
- Use the power supply cables that come with the disk array unit.
- The disk array unit and a disk enclosure have a dual-power configuration to prevent the unit or the enclosure from being stopped when one of the power supplies fails. To use the disk array system, connect two power supply cables individually to the disk array unit and the disk enclosure for ensuring two lines to receive power.
- Make sure to connect the cables to both the power supply PS0 and PS1.

Preliminary Checking: Press each of disk drives to make sure that they are not loose.

1. Connecting power supply cables of a disk enclosure

Confirm the AC switches are set to off and then connect the power supply cables of the disk enclosures. (Only for AC power supply.)

Check the power-supply cable connections of all the installed disk enclosures.

2. Connecting power supply cables of the disk array unit

Confirm the AC switches are set to off and then connect the power supply cables of the disk array unit. (Only for AC power supply.)

The AC operating mode is enabled by default so when the power supply cables are connected while power is being fed, the power supply is turned on. When power is not fed, connect the power supply cables and then start feeding power.

Connection Procedure

For AC Power Supply

1. Open the clamp part of the power supply cable clamp, set the power supply cable in the clamp and lightly lock the clamp part.
2. Move the clamp part in the direction shown by the arrow below close to the lowest part of the plug and then fix the clamp part steadily.

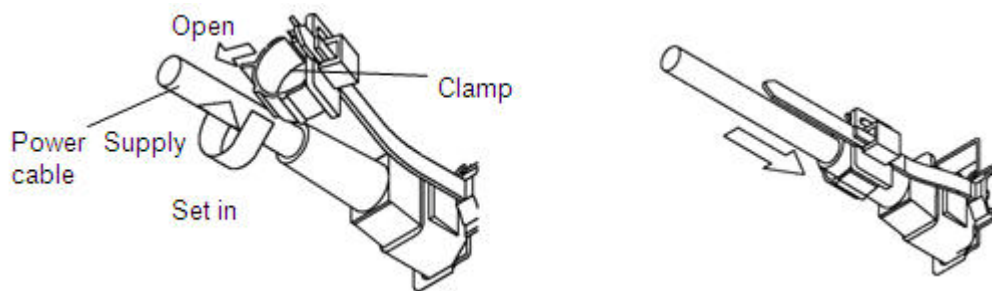


Figure 3-17: AC Cable



A loosely-locked clamp part may cause the power supply cable to come off.

Fix the power supply cable clamp steadily at a location close to the lowest part of the power supply cable.

Chapter 4 Storage Manager

This chapter describes how to install Network Setting Tool, how to install the Storage Manager Agent Utility on application servers, how Storage Manager is provided, and how to start Storage Client.

In this chapter

[“How Storage Manager is provided” on page 68](#)

[“Before Starting Storage Manager Client” on page 73](#)

[“Setup” on page 81](#)

[“Installing Storage Manager Agent Utility on Application Server” on page 101](#)

[“Starting Storage Manager Client” on page 102](#)

4.1 How Storage Manager is provided

4.1.1 How Storage Manager is Provided and Its Configuration

Storage Manager, a disk array management software program, is provided in two types:

- **Storage Manager Express**

Storage Manager Express allows for configuring and managing only a single target disk array.

You can quickly start using Storage Manager Express through a Web browser on a client machine with no management server needed.

- **Storage Manager**

Storage Manager Suite allows for centralized configuration and management of multiple disk arrays, including the old D/S series, by a single management server.

Storage Manager Suite also allows for integrated management of the entire system by working together with middleware products (such as WebSAM, ESMPRO, or SSC).

This document describes initialization and settings of a disk array using Storage Manager Express.



For information on initialization and settings of disk arrays using Storage Manager, see:

- *Storage Manager Installation Guide*
 - *Storage Manager User's Manual*
 - *Storage Manager Configuration Setting Tool User's Manual (GUI) for the OptimaX600 series*
-

The descriptions in the rest of this chapter are based on the recommended configuration example shown in [Figure 4-1: Example of Recommended Configuration](#).

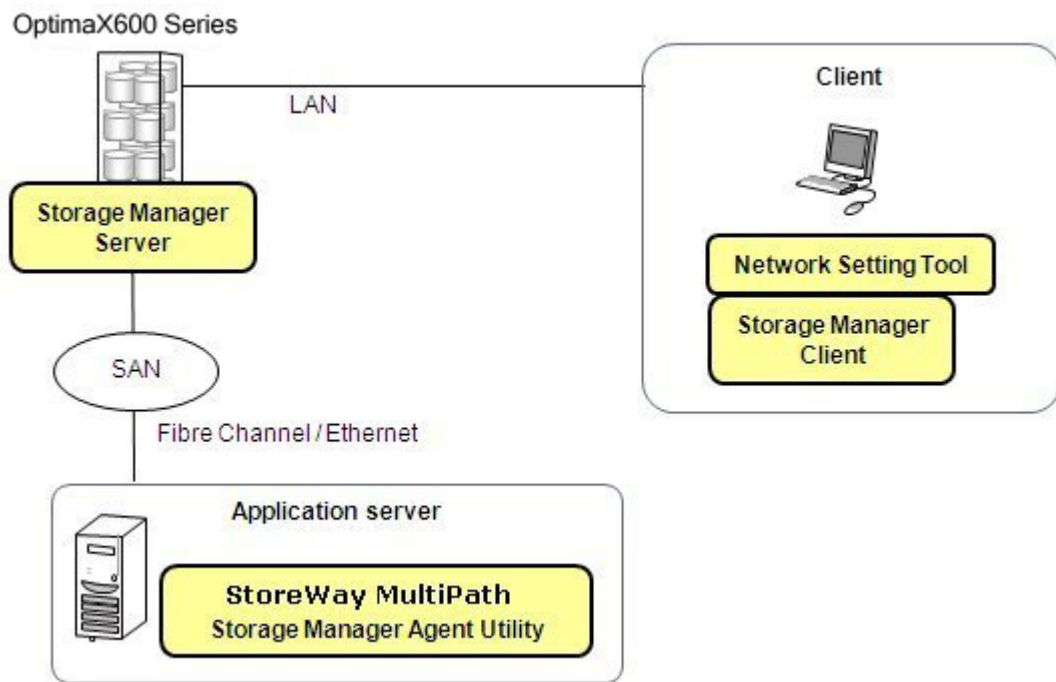


Figure 4-1: Example of Recommended Configuration

4.1.2 The Operating Environment of Storage Manager Client

[Table 4-1](#) shows the operating environment of Storage Manager Client. A Web browser and Java Runtime Environment (JRE) must be installed in the system before you start using Storage Manager Client.

Table 4-1: Operating Environment of Storage Manager Client

Configuration	Description
Hardware	<p>Machine on which one of the OSES in the next column run</p> <ul style="list-style-type: none"> ■ Blade series ■ NovaScale series ■ extreme computing series ■ PC/AT compatibles
Operating System	<p>Microsoft Windows XP Professional Edition (from without any Service Pack to Service Pack 3)</p> <p>Microsoft Windows XP Professional x64 Edition (without any Service Pack and Service Pack 2)</p> <p>Microsoft Windows Vista Business (from without any Service Pack to Service Pack 2)</p> <p>Microsoft Windows 7 Ultimate (without any Service Pack and Service Pack 1)</p> <p>Microsoft Windows 7 Ultimate x64 (without any Service Pack and Service Pack 1)</p> <p>Microsoft Windows 7 Enterprise (without any Service Pack and Service Pack 1)</p> <p>Microsoft Windows 7 Enterprise x64 (without any Service Pack and Service Pack 1)</p> <p>Microsoft Windows 7 Professional (without any Service Pack and Service Pack 1)</p> <p>Microsoft Windows 7 Professional x64 (without any Service Pack and Service Pack 1)</p> <p>Microsoft Windows Server 2003, Standard Edition (from without any Service Pack to Service Pack 2)</p> <p>Microsoft Windows Server 2003 R2, Standard Edition (without any Service Pack and Service Pack 2)</p> <p>Microsoft Windows Server 2003, Standard x64 Edition (without any Service Pack and Service Pack 2)</p> <p>Microsoft Windows Server 2003 R2, Standard x64 Edition (without any Service Pack and Service Pack 2)</p> <p>Microsoft Windows Server 2003, Enterprise Edition (from without any Service Pack to Service Pack 2)</p> <p>Microsoft Windows Server 2003 R2, Enterprise Edition (without any Service Pack and Service Pack 2)</p>

Table 4-1: Operating Environment of Storage Manager Client (Contd.)

Configuration	Description
	<p>Microsoft Windows Server 2003, Enterprise x64 Edition (without any Service Pack and Service Pack 2)</p> <p>Microsoft Windows Server 2003 R2, Enterprise x64 Edition (without any Service Pack and Service Pack 2)</p> <p>Microsoft Windows Server 2008 Standard (without any Service Pack and Service Pack 2) (*)</p> <p>Microsoft Windows Server 2008 R2 Standard (without any Service Pack and Service Pack 1) (*)</p> <p>Microsoft Windows Server 2008 Enterprise (without any Service Pack and Service Pack 2) (*)</p> <p>Microsoft Windows Server 2008 R2 Enterprise (without any Service Pack and Service Pack 1)(*)</p> <p>Red Hat Enterprise Linux 5.5 to 5.7 (IA32/EM64T)</p> <p>Red Hat Enterprise Linux 5.5 to 5.7 Advanced Platform (IA32/EM64T)</p> <p>(*) Products without Hyper-V are also supported. The Server Core installation option is not supported.</p>
Web browser	<p>Windows</p> <p>Microsoft Internet Explorer Version 6 to 9 (32 bit version)</p> <p>*For Windows Vista or Windows Server 2008, only Version 7 or later are supported.</p> <p>*For Windows 7 and Windows Server 2008 R2, only Version 8 or later are supported.</p> <p>Linux</p> <p>Firefox 3.0, 3.5 and 3.6</p>
Java Runtime Environment (JRE)	<p>One of the following JREs (32 bit version) is necessary.</p> <ul style="list-style-type: none"> ■ From JRE 6 update 17 to 29 <p>See Table 4-2 for information on combinations of supported JREs and OSes.</p> <p>When using Internet Explorer 9, be sure to use JRE 6 update or later.</p>
Memory	<p>Windows</p> <p>67 MB or more</p> <p>Linux</p> <p>70 MB or more</p>
Disk capacity	<p>No program needs to be installed. Note that a maximum of 30 MB is used for reporting log files.</p>
Display	<p>XGA (resolution 1024 × 768) or greater</p>

The information above is the supported operating environment for the default settings of Storage Manager V7.

The latest information is available through PP Support Service, which is provided through registration before start of the service.

Table 4-2: Operating Environment of Storage Manager Client (JRE and OS Combinations)

Operating System	JRE6 (32 bit version) * From JRE 6 update 17 to 29
Windows XP Professional Edition	Supported
Windows XP Professional x64 Edition	Supported
Windows Vista Business	Supported
Windows 7 Ultimate	Supported
Windows 7 Enterprise	Supported
Windows 7 Professional	Supported
Windows 7 Ultimate x64	Supported
Windows 7 Enterprise x64	Supported
Windows 7 Professional x64	Supported
Windows Server 2003, Standard Edition	Supported
Windows Server 2003 R2, Standard Edition	Supported
Windows Server 2003, Standard x64 Edition	Supported
Windows Server 2003 R2, Standard x64 Edition	Supported
Windows Server 2003, Enterprise Edition	Supported
Windows Server 2003 R2, Enterprise Edition	Supported
Windows Server 2003 Enterprise x64 Edition	Supported
Windows Server 2003 R2, Enterprise x64 Edition	Supported
Windows Server 2008 Standard	Supported
Windows Server 2008 R2 Standard	Supported
Windows Server 2008 Enterprise	Supported
Windows Server 2008 R2 Enterprise	Supported
Red Hat Enterprise Linux 5.5	Supported
Red Hat Enterprise Linux 5.5 Advanced Platform	Supported



Do not use any unsupported OS and JRE combinations.



- When any product that uses Java Runtime Environment (JRE) is already installed in the environment where Storage Manager Client (WebGUI) is used, the product and Storage Manager Client can live together if the following condition is satisfied. If not, either Storage Manager Client (WebGUI) or the product must be operated on another server or PC.
 - The latest version of JRE installed in the environment supports Storage Manager Client (WebGUI) as well as the product.
- Use the JRE contained in the Storage Manager Express Setup and Utility CD-ROM or Storage Manager CD-ROM for first installation. However, it is recommended to use the latest version among the supported JRE versions after the installation because the supported versions may include a version for which security vulnerability issue is reported.

For information about the latest supported JRE version, see PP Support Service (which is available by registration).

For details about security vulnerability, see the following web pages.

- US-CERT (<http://www.us-cert.gov>)
 - My Oracle Support (<https://support.oracle.com/CSP/ui/flash.html>)
-

4.2 Before Starting Storage Manager Client

When you use Storage Manager Client (Web GUI) in a Windows environment, configure the Web browser (Internet Explorer) as described below. Once the configuration is complete, you do not need to configure the Web browser in subsequent startups of Storage Manager Client.

1. Follow the steps below to configure the disk array to be connected as “Trusted Sites.”
(The following screenshot is for Internet Explorer 8 on Windows 7)
 - a. From **Control Panel**, select **Internet Options**, and click the **Security** tab.
 - b. Select the **Trusted sites** icon and click **Sites**.

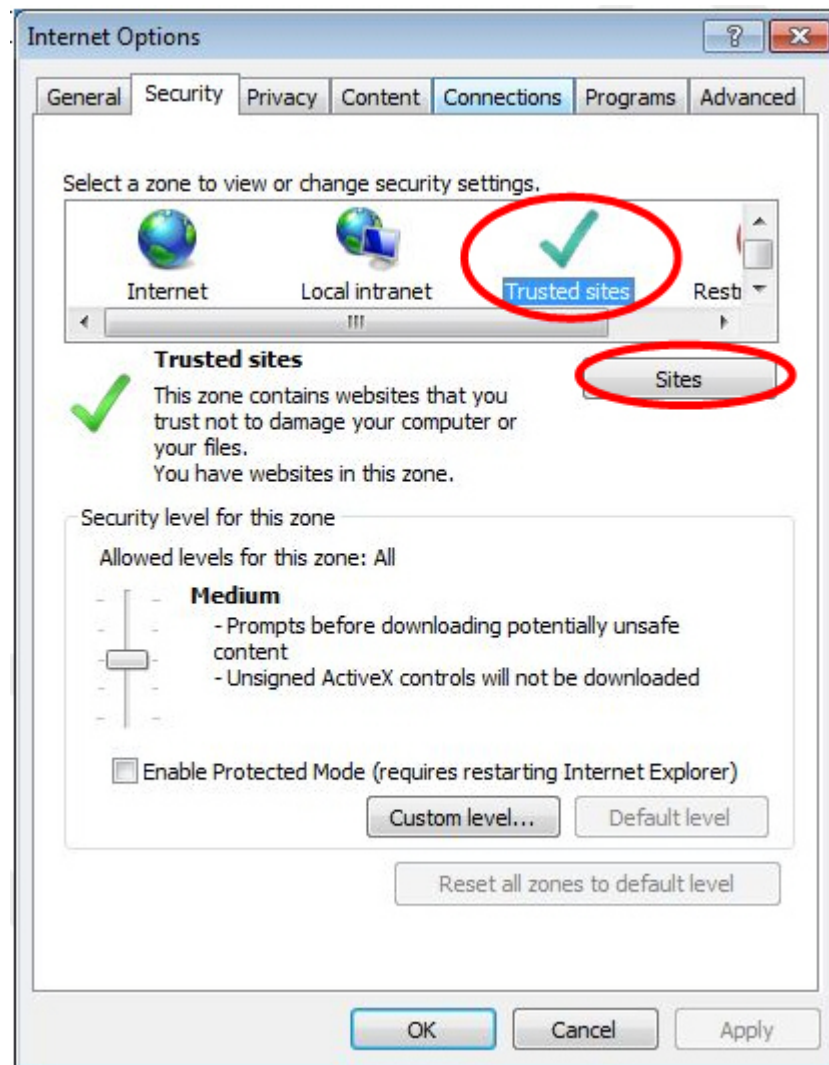


Figure 4-2: Internet Options Window

- c. Enter the URL of the disk array to be connected (for example, http: the IP address (host name) of the disk array to be connected) in the **Add this website to the zone box**, and click **Add**. The **Require server verification (https:) for all sites in this zone** check box should be cleared.

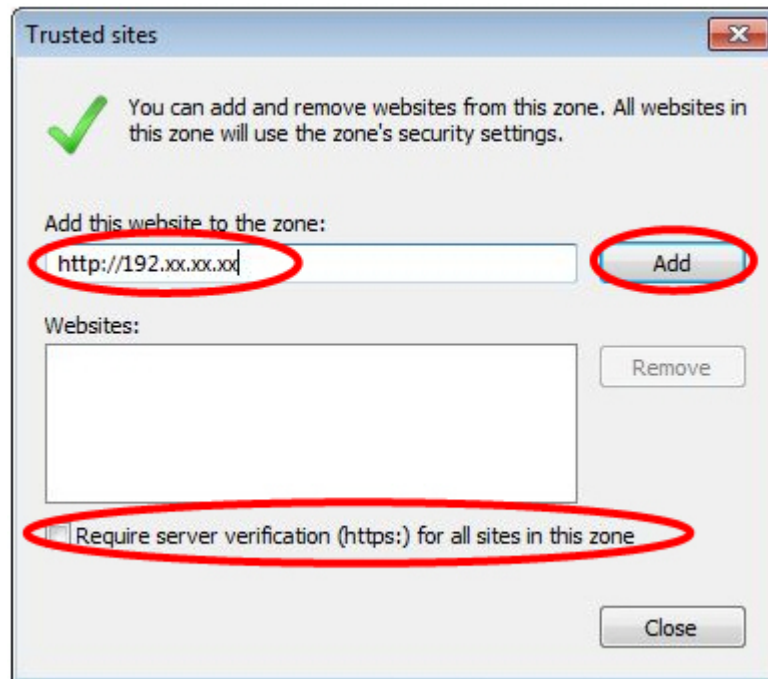


Figure 4-3: Trusted Sites Window

- d. Click **OK** to close the window.
2. Follow the steps below to configure the security level of **Trusted sites**.
 - a. From **Control Panel**, select **Internet Options**, and click the **Security** tab.
 - b. Select the **Trusted sites** icon and click **Custom level**.

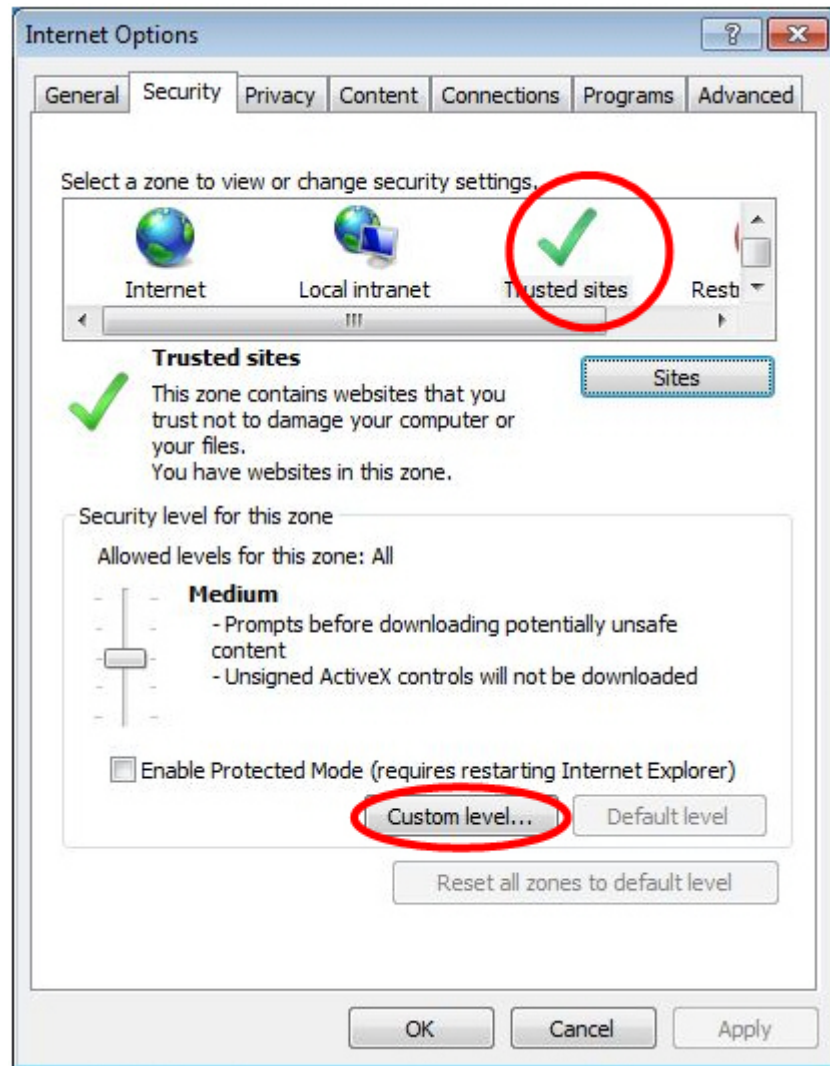


Figure 4-4: Internet Options Window

3. Select **Enable** under **Run ActiveX controls and plug-ins**.

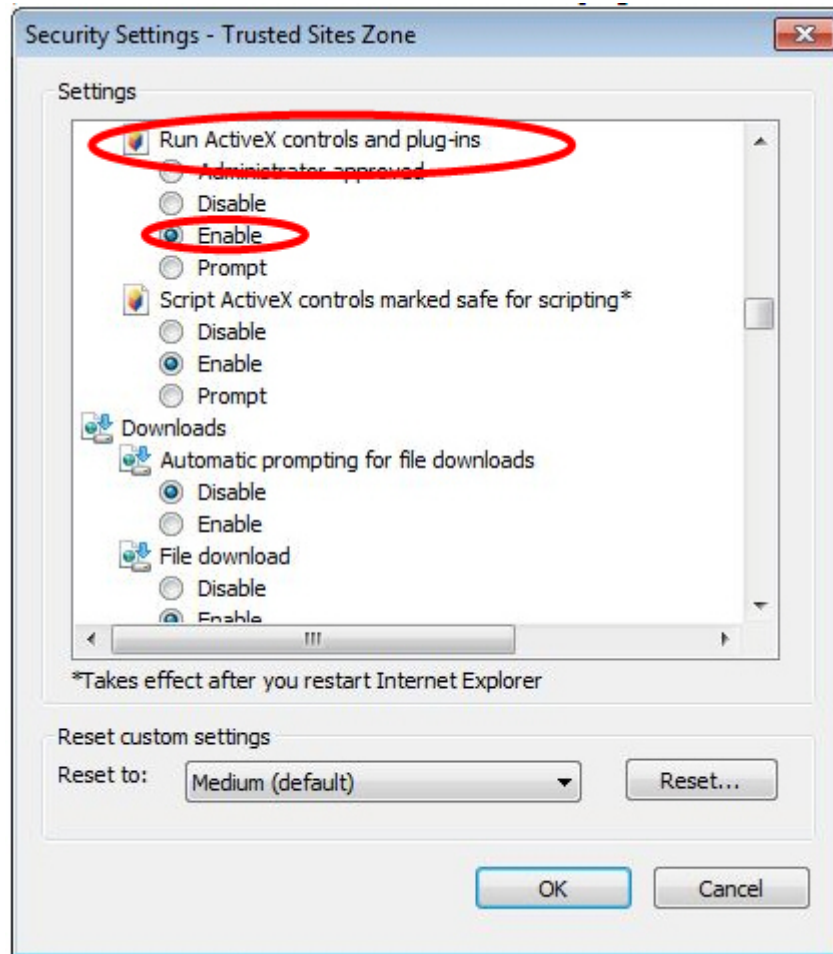


Figure 4-5: Security Settings Window

4. Click **OK** to close the window.



When you are using Internet Explorer Version 7 or later, do not enable Protected Mode of the Trusted sites.

When your environment is Windows, configure Java as well before you start using Storage Manager Client (Web GUI). Once the configuration is complete, you do not need to configure Java again in subsequent startups of Storage Manager Client.

Disable the auto update function of Java according to the following procedure:

(The example is based on Windows 7.)

1. Open the Java Control Panel.

Use Explorer and execute the following file located in the JRE installation folder. (In a Windows Vista or later environment or a Windows Server 2008 or later environment, right-click the icon to start the Web browser to select **Run as administrator**.)

C:\Program Files\Java\jre6\bin\javacpl.exe (default installation in the 32 bit version OS)

C:\Program Files (x86)\Java\jre6\bin\javacpl.exe (default installation in the 64 bit version)



Alternatively, when you are using a 32-bit version of OS and if Java is in Control Panel, you can use it.

2. Click the **Update** tab and clear the **Check for Updates Automatically** check box.

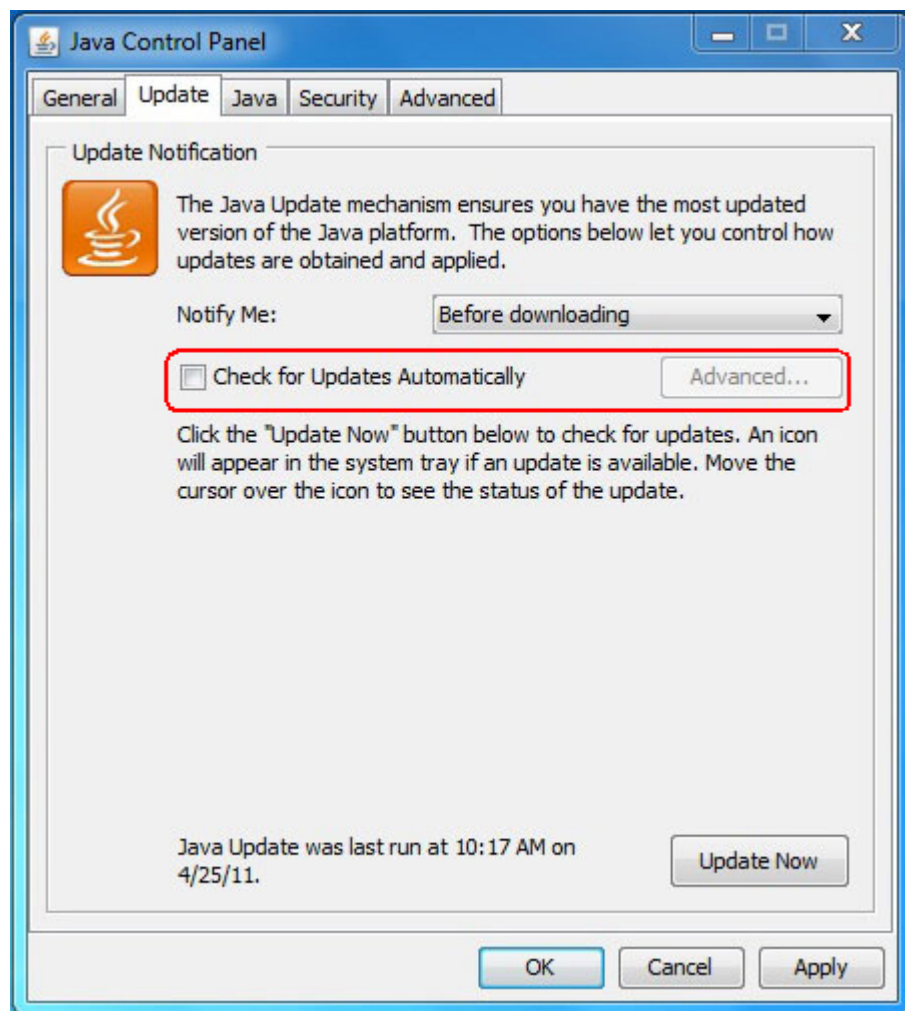


Figure 4-6: Update Tab of Java Control Panel

3. Click **OK** to close the window.

Disable the next generation Java plug-in according to the following procedure.

(The example is based on Windows 7.)

1. Open Java Control Panel.

Use Explorer and execute the following file located in the JRE installation folder. (In a Windows Vista or later environment or a Windows Server 2008 or later environment, right-click the icon to start the Web browser to select **Run as administrator.**)

C:\Program Files\Java\jre6\bin\javacpl.exe (default installation in the 32 bit version OS)

C:\Program Files (x86)\Java\jre6\bin\javacpl.exe (default installation in the 64 bit version)



Alternatively, when you are using a 32-bit version of OS and if Java is in Control Panel, you can use it.

2. Click the **Advanced** tab and clear the **Enable the next-generation Java Plug-in (requires browser restart)** check box.

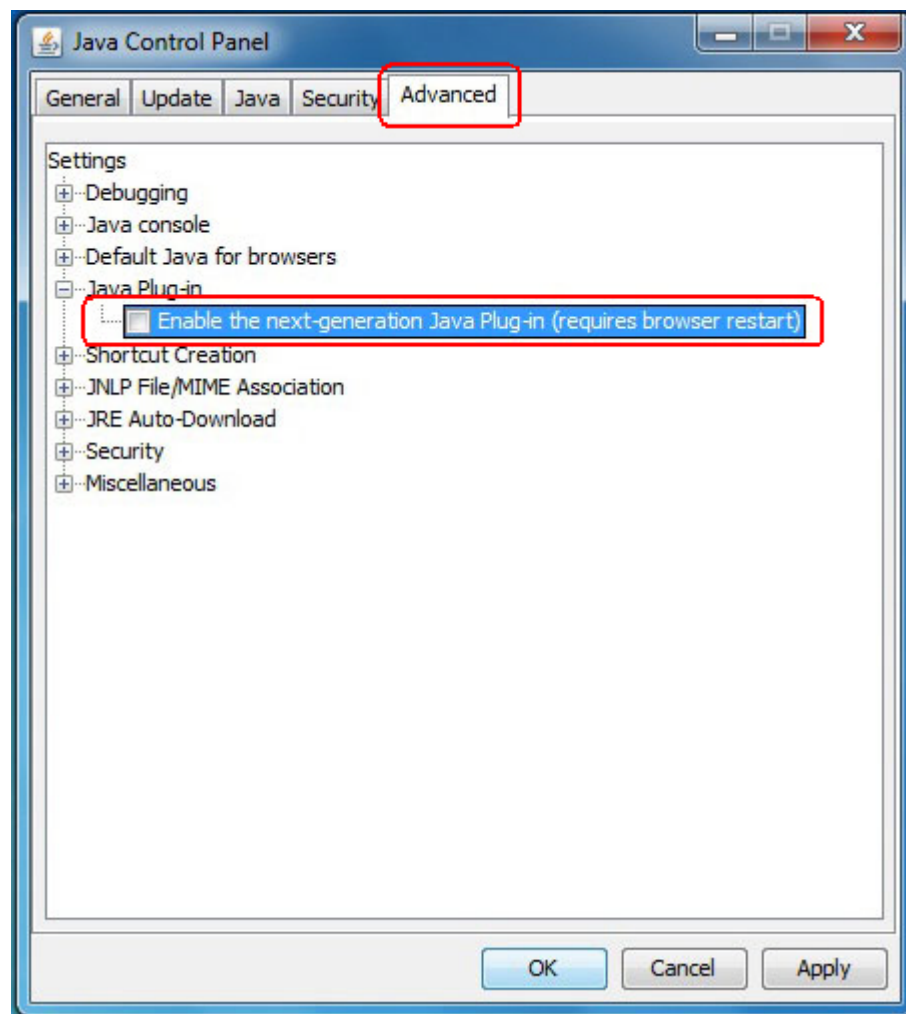


Figure 4-7: Advanced Tab of Control Panel

3. Click **OK** to close the window.

4.3 Setup

4.3.1 Installing Network Setting Tool

This section describes how to install Network Setting Tool on the Storage Manager Client machine. Install Network Setting Tool according to the platform of your Storage Manage Client.

4.3.1.1 For Windows

Use Storage Manager Setup to install Network Setting Tool.

Please prepare the CD-ROM for Optima3600 series. Follow the instruction on the screen to complete the installation.

Follow the steps below to use Storage Manager Setup.

1. Log in as Administrator.
2. Set the CD-ROM in the CD-ROM drive of the client.
3. Storage Manager Setup automatically starts. Follow the instructions on the screen to perform the installation.

Storage Manager Setup may not automatically start in some environments, in which case you need to start the following program in the CD-ROM.

`\INSTALL\WINDOWS\ISMSETUP.EXE`

4. Select **Setup for OptimaX600 series** and click **Next**.

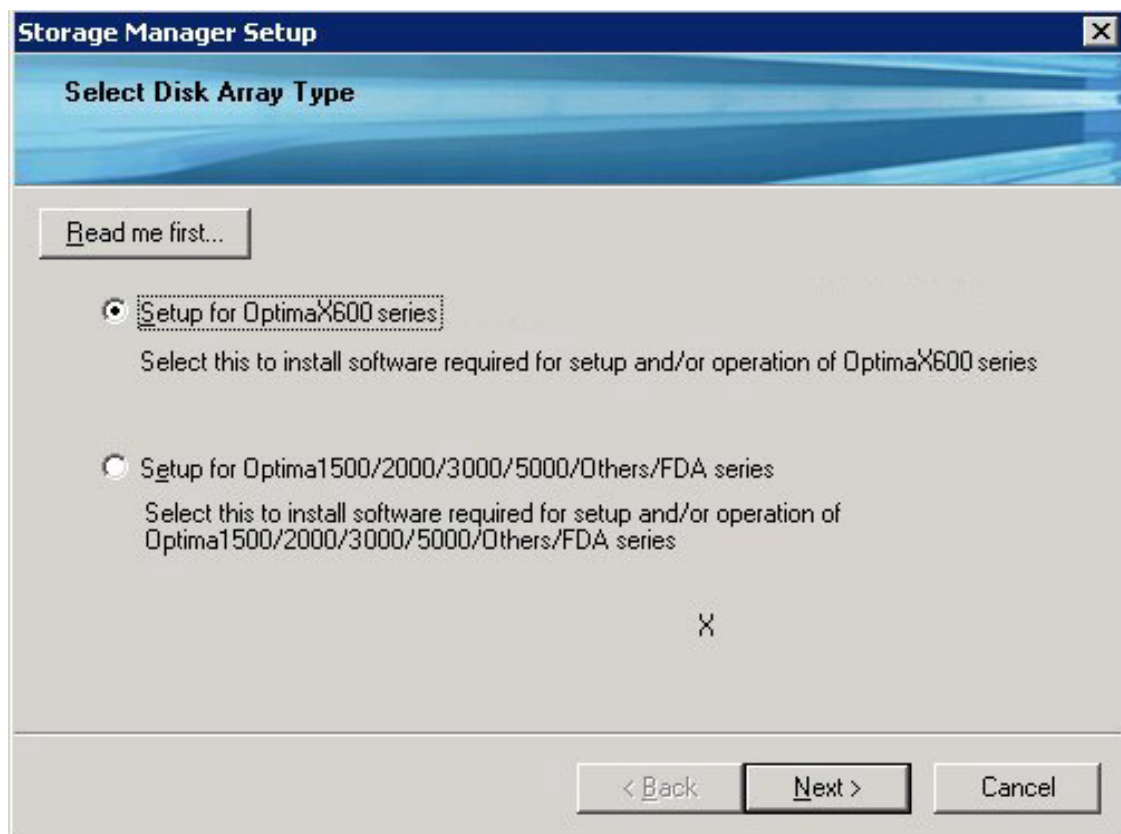


Figure 4-8: Start Page of Setup

5. Select **Setup as a disk array** in **Quick Install**, and then click **Next**.

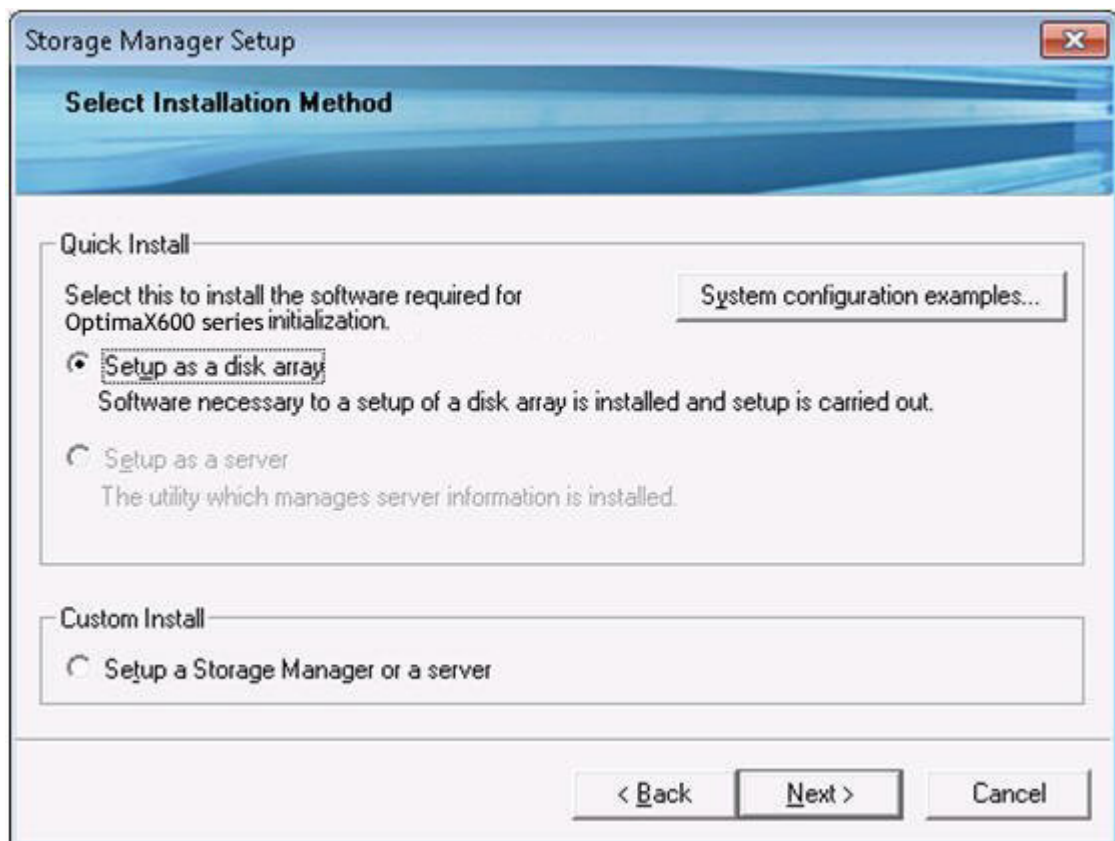


Figure 4-9: Select Installation Method

6. Check the software to be installed and then click **Next**.

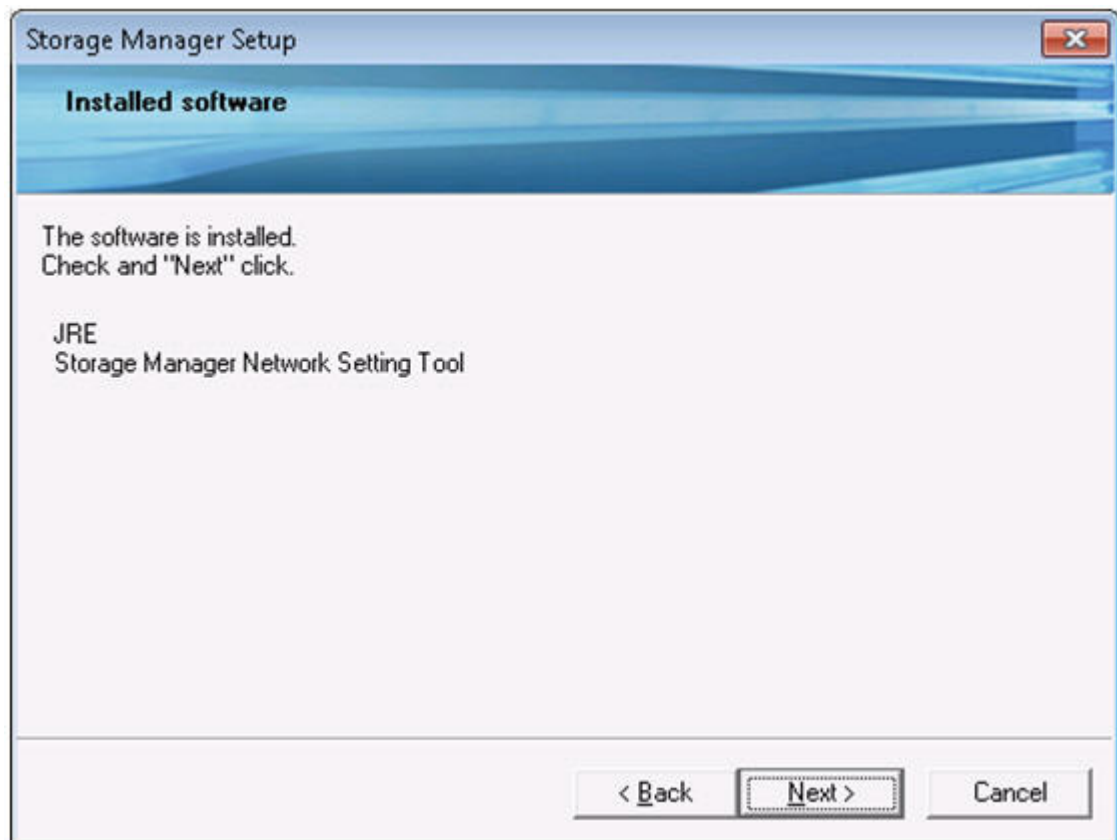


Figure 4-10: Confirm Software

7. Make sure to read all of the software license agreement. If you accept the agreement select **I accept terms of the license agreement** and then click **Next**. If you do not accept the agreement, you cannot use the software.

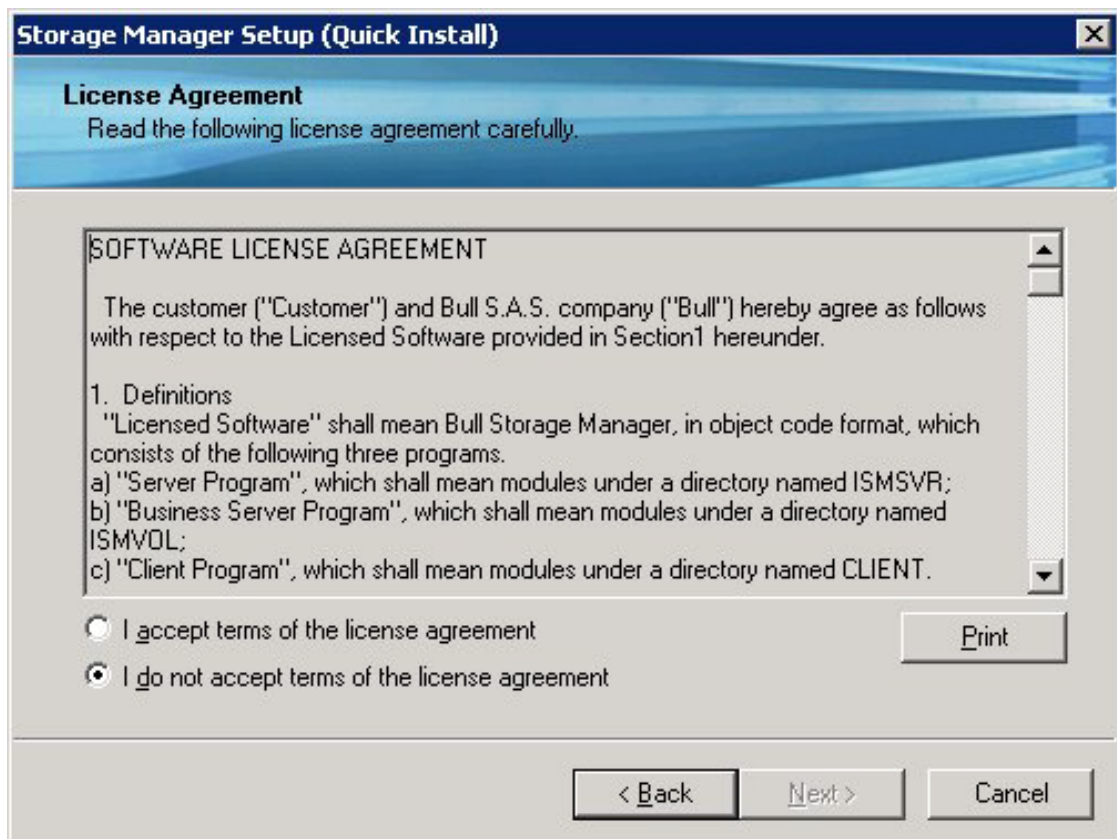


Figure 4-11: License Agreement

8. Select where the software will be installed. If you want to install the software in the shown destination, click **Next**. If you want to install the software in a folder other than the shown destination, click **Browse** to select the folder you want to use.

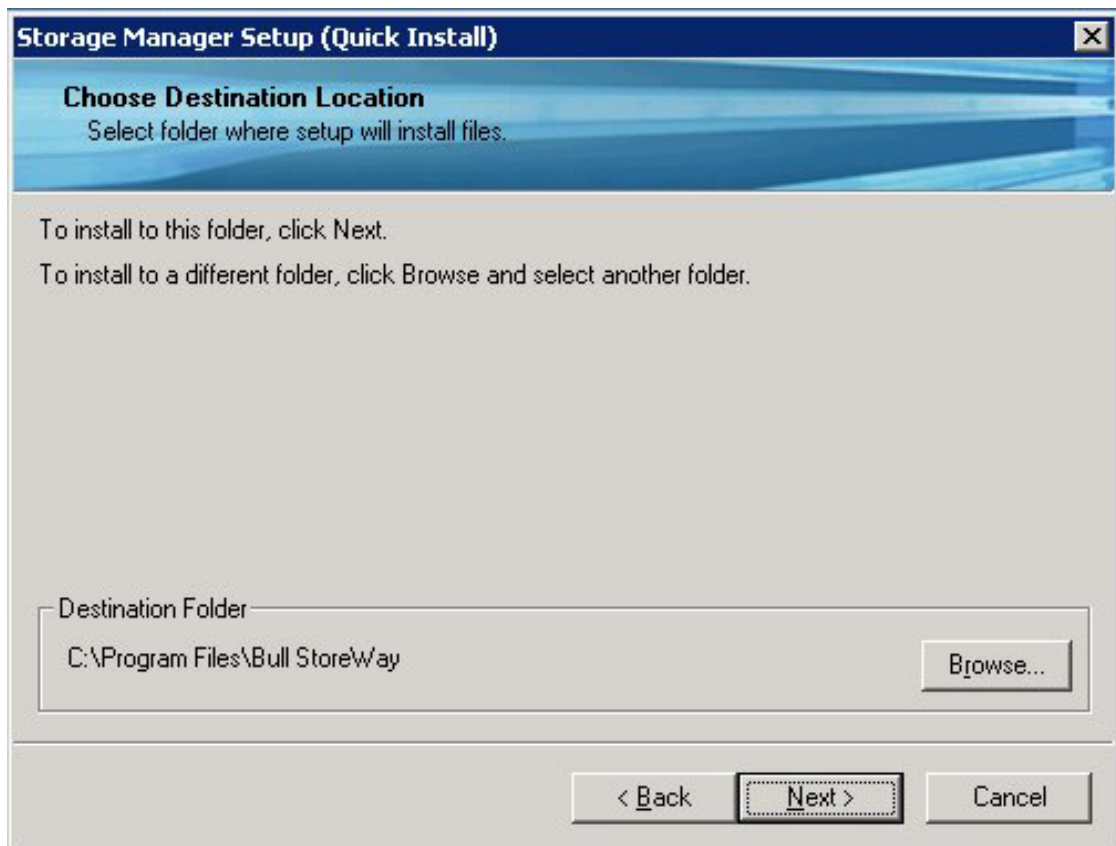


Figure 4-12: Choose Destination Location

9. Install the software as you are prompted by the instructions.



If you install JRE in this step, perform the JRE preparation described in [Section 4.2: "Before Starting Storage Manager Client"](#)

10. Click **Next** to start Network Setting Tool.

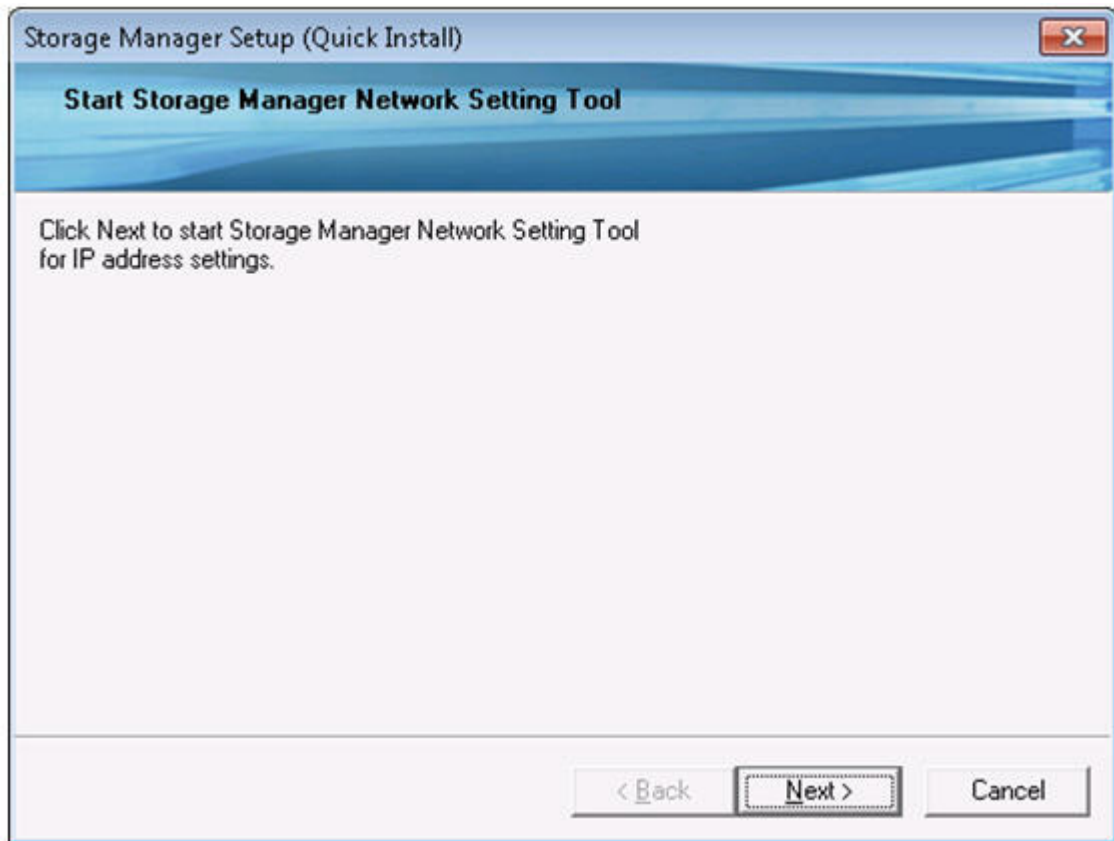


Figure 4-13: Starting Network Setting Tool

11. Proceed to configuration of IP addresses of the disk array. See [Section 4.3.2: “Configuring IP Addresses by Using Network Setting Tool”](#).

Configure the IP addresses of the disk array during the installation. The IP addresses consist of the IP addresses of controllers, BMC addresses of controllers and a floating address. If Storage Manager Client is used, an IP address should be set to each of controllers.



When the installation is started from by selecting Setup for OptimaX600 series in Storage Manager Setup, JRE and .NET Framework, which are necessary for Network Setting Tool and Storage Manager Client (Web GUI), must be installed.

4.3.1.2 For Linux

Follow the steps below to install Network Setting Tool.

Please prepare the CD-ROM or the Optima3600 series.

1. Log in as root user.
2. Set the CD-ROM in the CD-ROM drive of the client.

If you cannot use the CD-ROM in your environment, send the iSMnetconfig.rpm file from another server.

3. Mount the CD-ROM

- ❑ Create a mount directory (Example: /cdrom)
- ❑ Use the `mount` command.

```
mount -r /dev/cdrom /cdrom
```

4. Install JRE.



If it is already installed on your machine, the installation is not necessary.

- Copy the installer to a directory you want to use (for example, /tmp).

```
cp -r /cdrom/JRE/LINUX/jre-6u21-linux-i586-rpm.bin /tmp/.
```

- Run the installer you have copied.

```
/tmp/ jre-6u21-linux-i586-rpm.bin
```

5. Use the `rpm` command for the installation.

```
rpm -ivh /cdrom/NETCONFIG/LINUX/iSMnetconfig.rpm
```

6. The following message is shown when the installation is complete.

```
Installation of iSMnetconfig was successful.
```

7. Unmount the CD-ROM. Use the `umount` command.

```
umount /cdrom
```

8. Register JRE with the Web browser (Firefox) according to the following procedure.

- a. Exit Firefox.
- b. If any JREs have been registered with the plugins directory of Firefox, delete them. (You cannot register JRE of different versions at a time.)

Remove the symbolic links "javaplugin-oji.so" and "libnpp2.so" from
`/usr/lib/firefox-<version>/plugins` (for the default settings).

- c. Create a symbolic link to JRE in the plugins directory of Firefox.

Run the following command with the `/usr/lib/firefox-<version>/plugins` (for the default settings) as a current directory.

```
ln -s usr/java/jre<version>/plugin/i386/ns7/libjavaplugin_oji.so (for  
Firefox 3.5 or earlier)
```

```
ln -s usr/java/jre<version>/lib/i386/libnpp2.so (for Firefox 3.6 or later)
```



- The disk array must be connected to the Storage Manager Client machine over a LAN to execute Network Setting Tool.
 - Note the following when you connect a disk array for which the network settings have not been configured.
 - The IP addresses, BMC addresses and a floating address of the disk array are 0.0.0.0 by default.
 - Connect the disk array to physically the same network where the Storage Manager Client machine belongs (i.e. the network not beyond a router).
 - User Datagram Protocol (UDP) and port number "2730" are used for searching disk arrays. If any firewall is set, configure the settings of the network for the Storage Manager Client machine and the disk array to allow packets for search to pass.
-

4.3.2 Configuring IP Addresses by Using Network Setting Tool

4.3.2.1 Overview

Network addresses are set to a disk array for monitoring from Storage Manager.

After connecting the disk array (device) to physically the same network where the machine on which Network Setting Tool has been installed (i.e. the network not beyond a router), configure IP addresses having the same segment as the machine on which Network Setting Tool has been installed by referring to the example shown below.

For example:

The address of the machine on which Network Setting Tool is installed is 192.168.0.20/24.

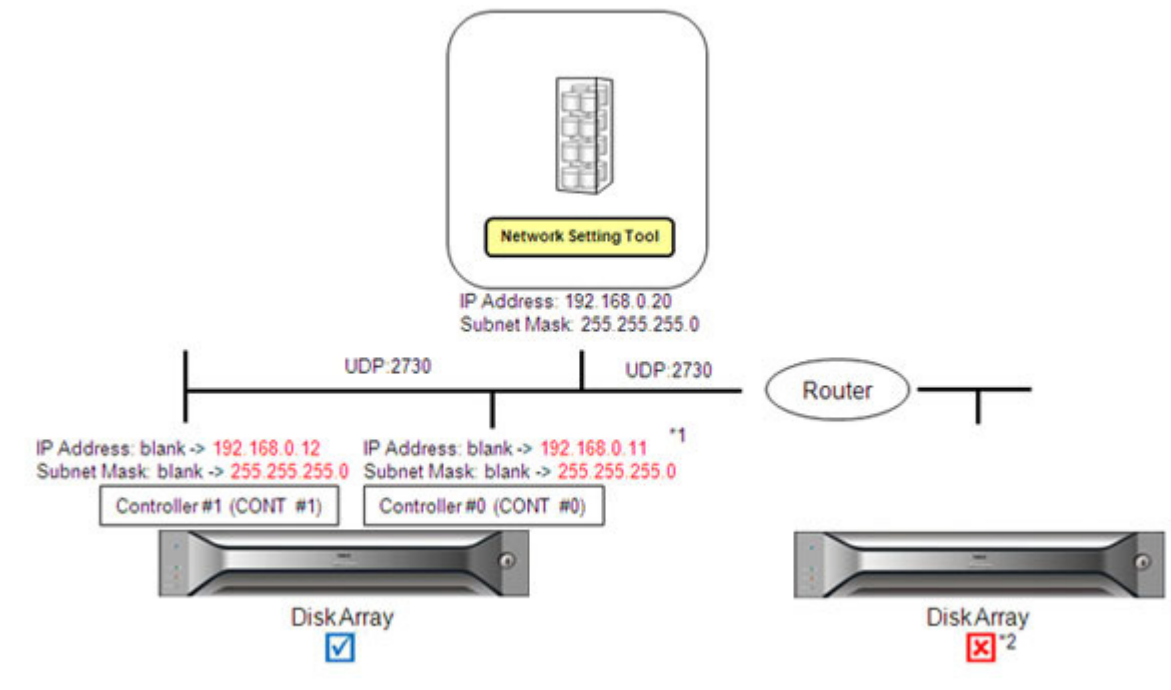


Figure 4-14: Connect Disk Array - Example



- * 1. IP addresses have the same segment as the machine on which Network Setting Tool has been installed.
- * 2. When the disk array and the Storage Manager Client are operated on different segments, configure IP addresses by referring to the example shown above and then move the disk array. When you move the disk array, make sure to remember the gateway address settings.

4.3.2.2 Configuration

In a Windows environment, Network Setting Tool is automatically started after Network Setting Tool is installed by using Storage Manager Setup.

To configure manually, click **Start > All Programs > Storage Manager Network Initialization Tool > Network Setting Tool** to run Network Setting Tool.

In a Linux environment,

1. Run the `iSMinitool` command.

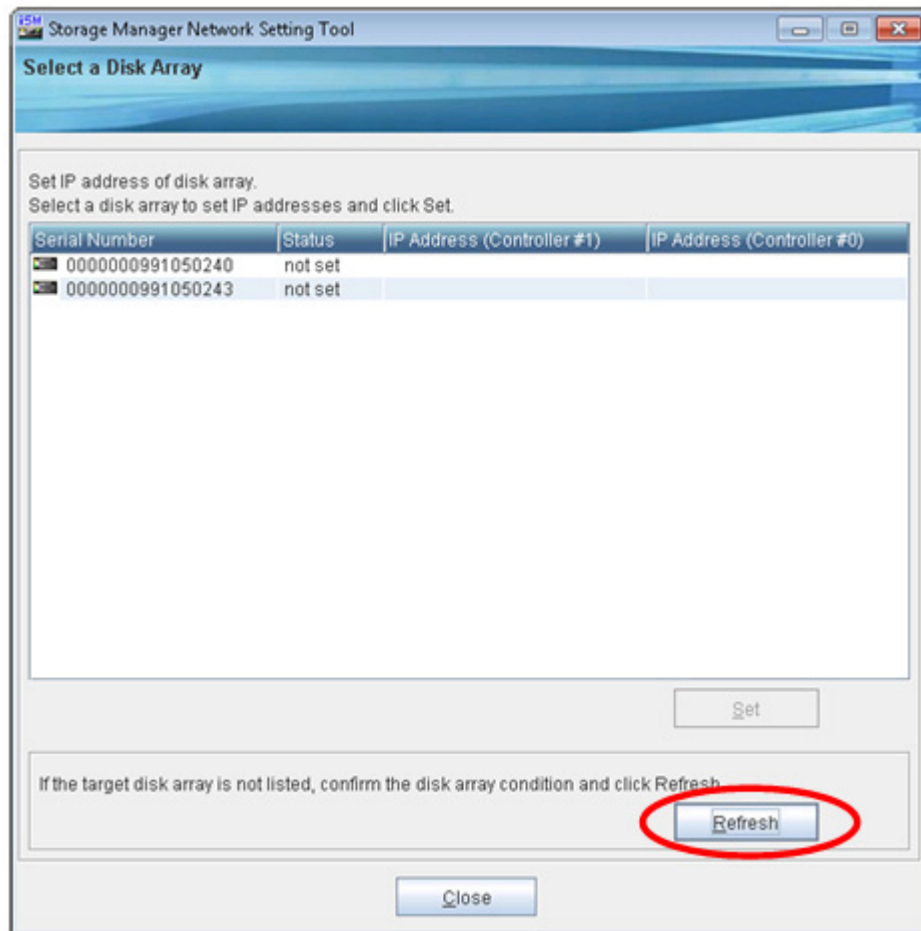


Figure 4-15: Select a Disk Array - Start up

2. Click **Refresh** when Network Setting Tool is started.

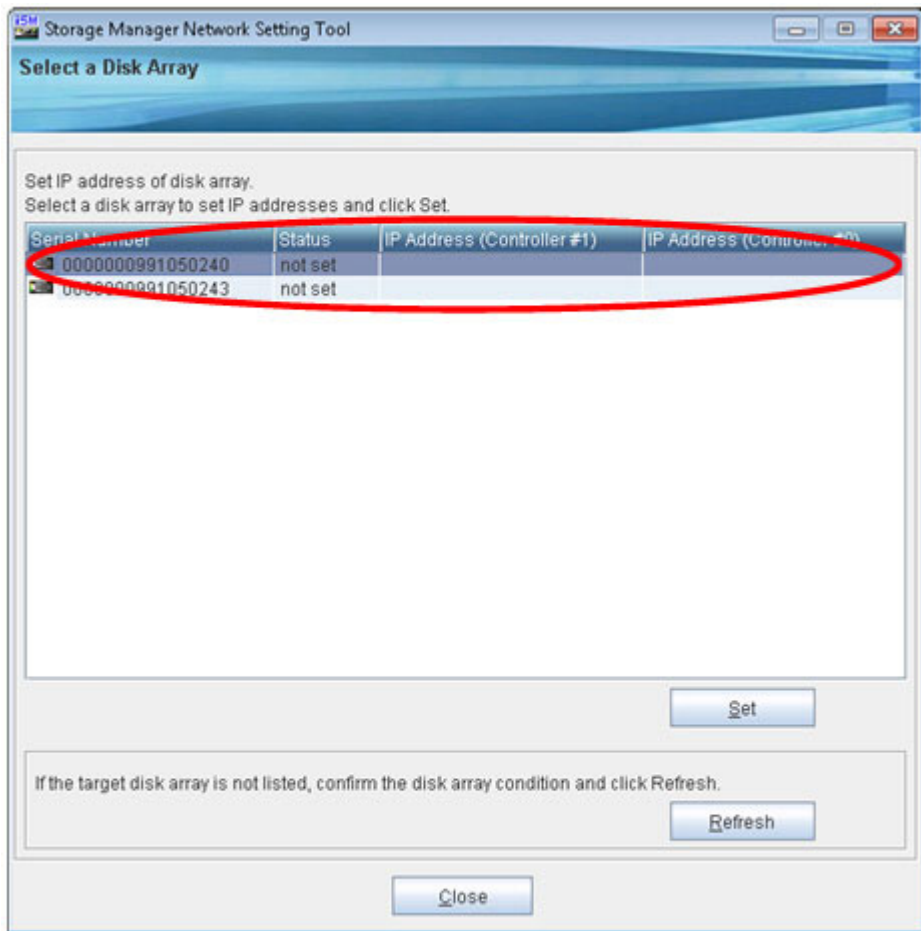


Figure 4-16: Select a Disk Array

Disk arrays detected through search are displayed.

“not set” is shown for Status for disk arrays for which network settings will be performed for the first time.

3. Select the target disk array from the list and click **Set**.

If the Optima X600 series has been installed and IP addresses have been configured, "finished" is shown in the Status column. For details about information shown for the Status column, see [Table 4-3](#).

Table 4-3: Initialization Status of Disk Array

Status	Description
Displayed information	Disk array status
not set	Disk array has just been installed The disk array is not monitored by Storage Manager because the network settings have not been done. IP addresses must be configured by using Network Setting Tool
finished	IP addresses have been configured The disk array can be monitored by Storage Manager.

4. Configure the network addresses to allow monitoring the disk array by Storage Manager.

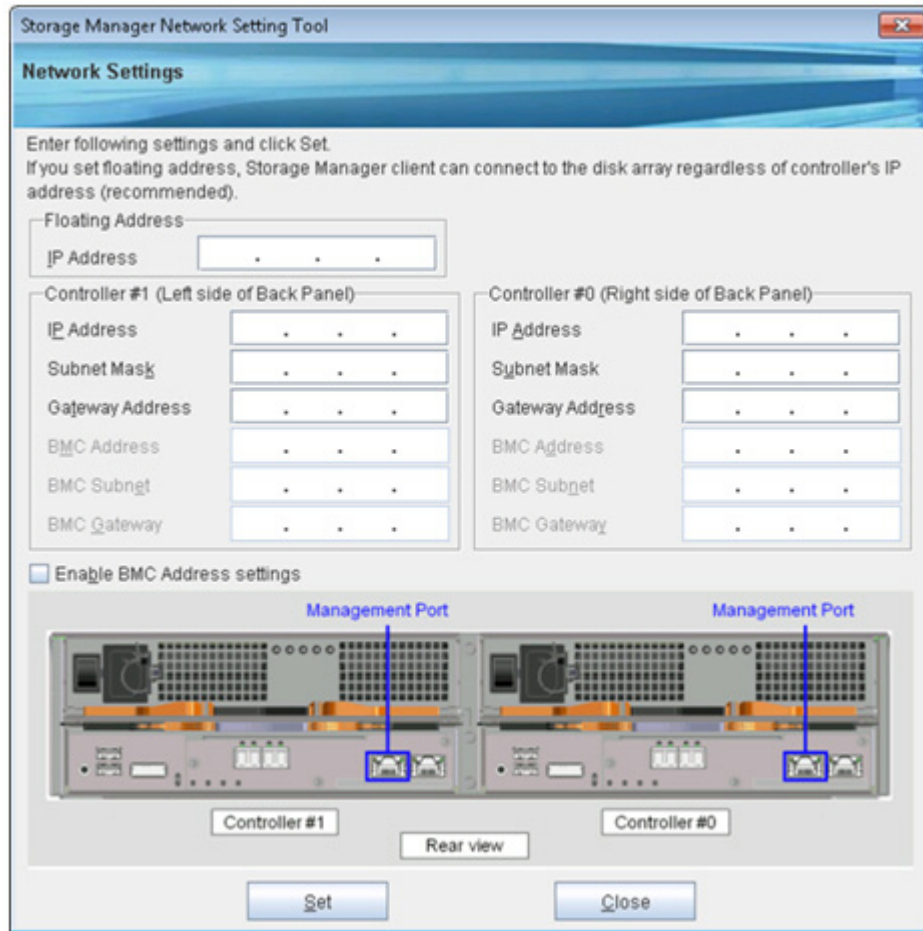


Figure 4-17: Network Settings

5. Configure a floating address for the disk array and the network address, BMC address, and floating address for each of disk array controllers. When the settings are configured for a controller not connected by a LAN cable, monitoring is disabled.
6. Check that the disk array is connected to the client over the LAN and then specify an IP address, a subnet mask, a gateway address, a BMC address, a BMC subnet mask and a BMC gateway address for each of the controllers. IP addresses from 10.1.0.0 through 10.1.0.255 (subnet mask 255.255.255.0) and from 10.2.0.0 through 10.2.0.255 (subnet mask 255.255.255.0) and 0.0.0.0 are reserved. These IP addresses and subnet mask can not be specified. Specify IP addresses for the controller other than these IP addresses and that allow communication with the client. If no gateway address is specified, enter 0.0.0.0.

Floating address is an IP address that can be set to a disk array in addition to the network addresses configured for each controller. Setting a floating address allows you to access a disk array while controllers remain transparent.

It is recommended to configure a floating address for ease of management.

When a floating address is specified, the following conditions must be satisfied for network addresses of controllers and the floating address.

- IP addresses of Controller 0 and Controller 1 belong to the same segment and an unused IP address of the same segment as the controllers is assigned to the floating address.
 - IP addresses of Controller 0 and Controller 1 belong to different segments and an IP address that does not belong to those segments and does not have any conflict with other existing segments is assigned to the floating address.
7. When all the required information is entered, click **Set**. The dialog box for confirmation is displayed.

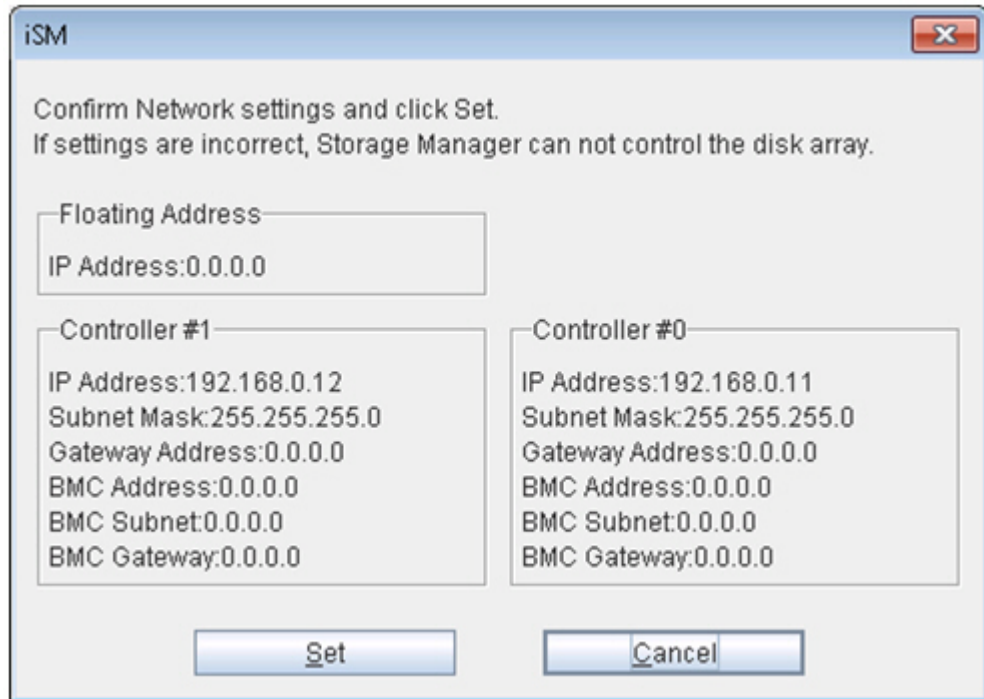
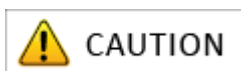


Figure 4-18: Network Setting Tool - Confirmation Dialog Box

8. Click **Set** to set the specified values to the disk array.
9. Click **Cancel** to change the settings.



CAUTION

- If any IP address, subnet mask, or gateway address is not configured correctly, configuring the network settings fails. As a result, monitoring by using Storage Manager is not enabled.
- If the error message “The setting of IP address failed.” is shown, refer to the help of Network Setting Tool.

4.3.3 Setting a Time Zone of the Disk Array

This section describes how to set a time zone of the disk array.

4.3.3.1 For Windows

Use Storage Manager Setup to configure the time zone settings.

Storage Manager Setup is automatically started when you set the Storage Manager Express Setup and Utility CD-ROM, and it allows you to perform the settings as prompted. Depending on your environment, it may not start automatically, in which case, run the following program in the CD-ROM.

\\INSTALL\\WINDOWS\\ISMSETUP.EXE

Follow the steps below by using Storage Manager Setup.

1. After you configure IP addresses as described in [Section 4.3.2: “Configuring IP Addresses by Using Network Setting Tool”](#), the page to set a time zone appears.

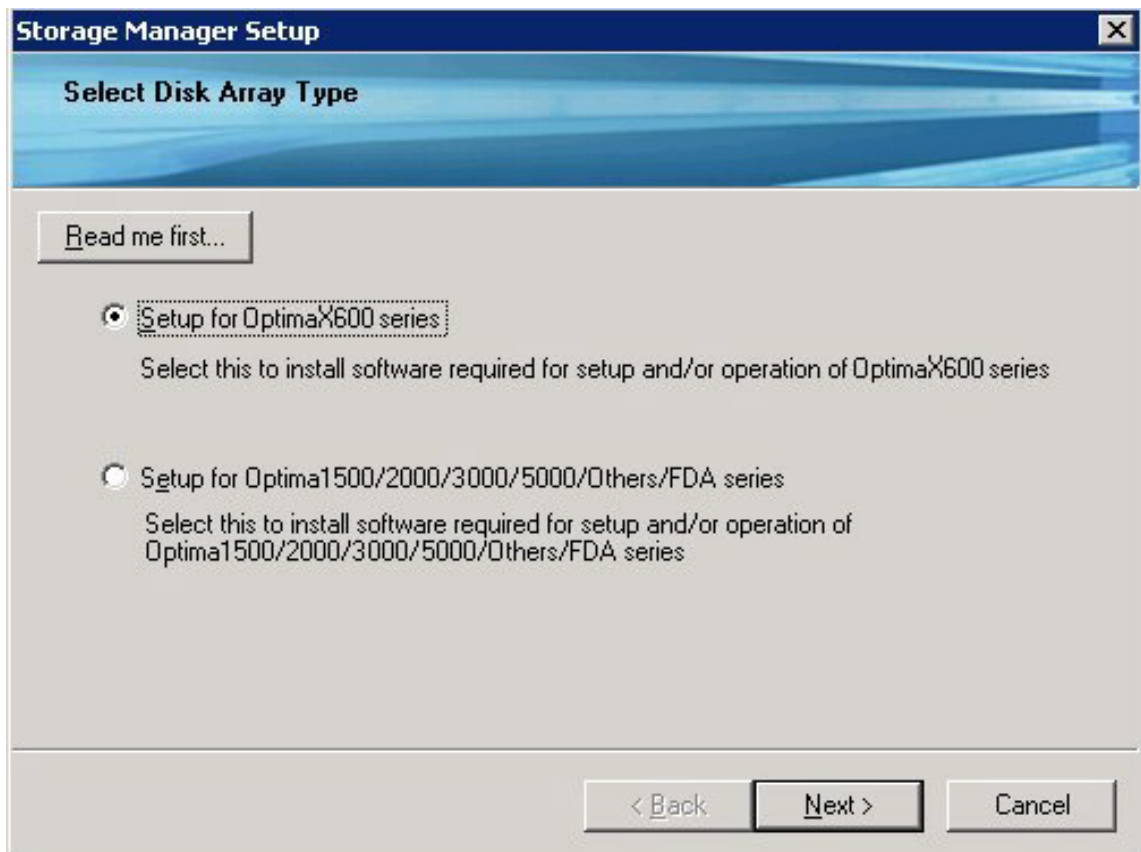


Figure 4-19: Select Disk Array Type

2. Select **Setup for Optima X600 series** and click **Next**. The **Select Installation Method** page appears.

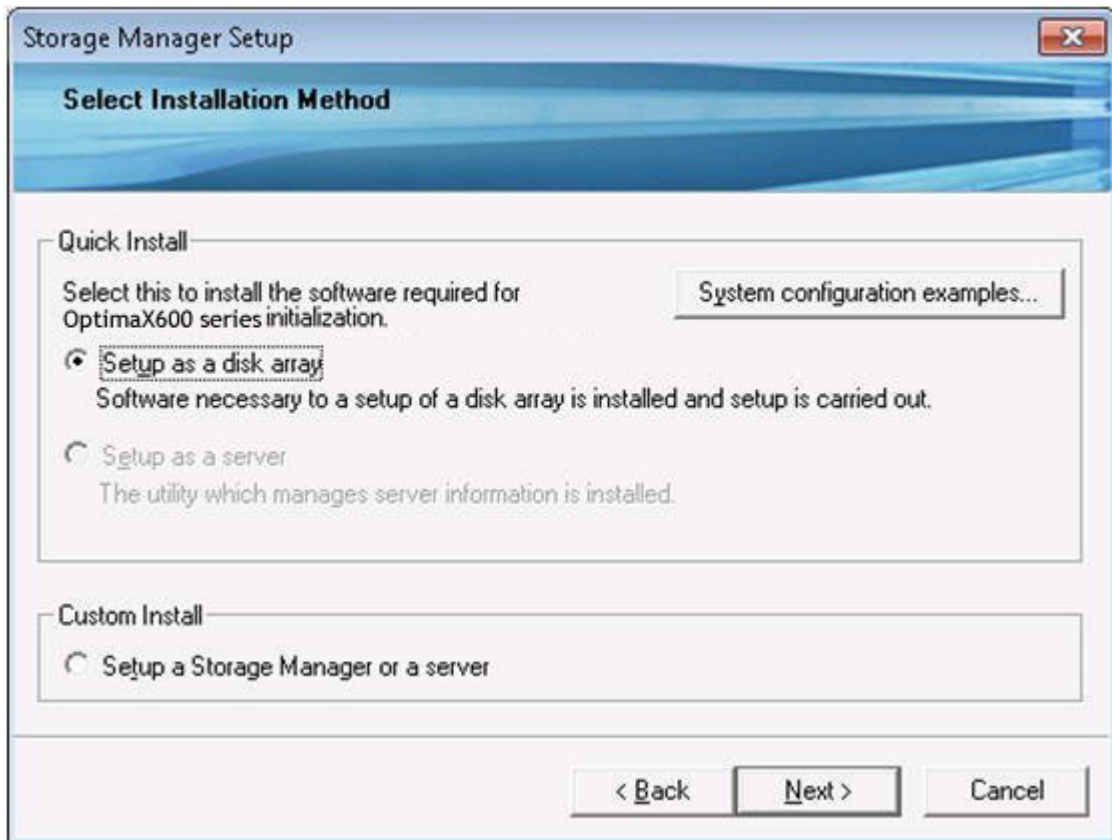


Figure 4-20: Select Installation Method

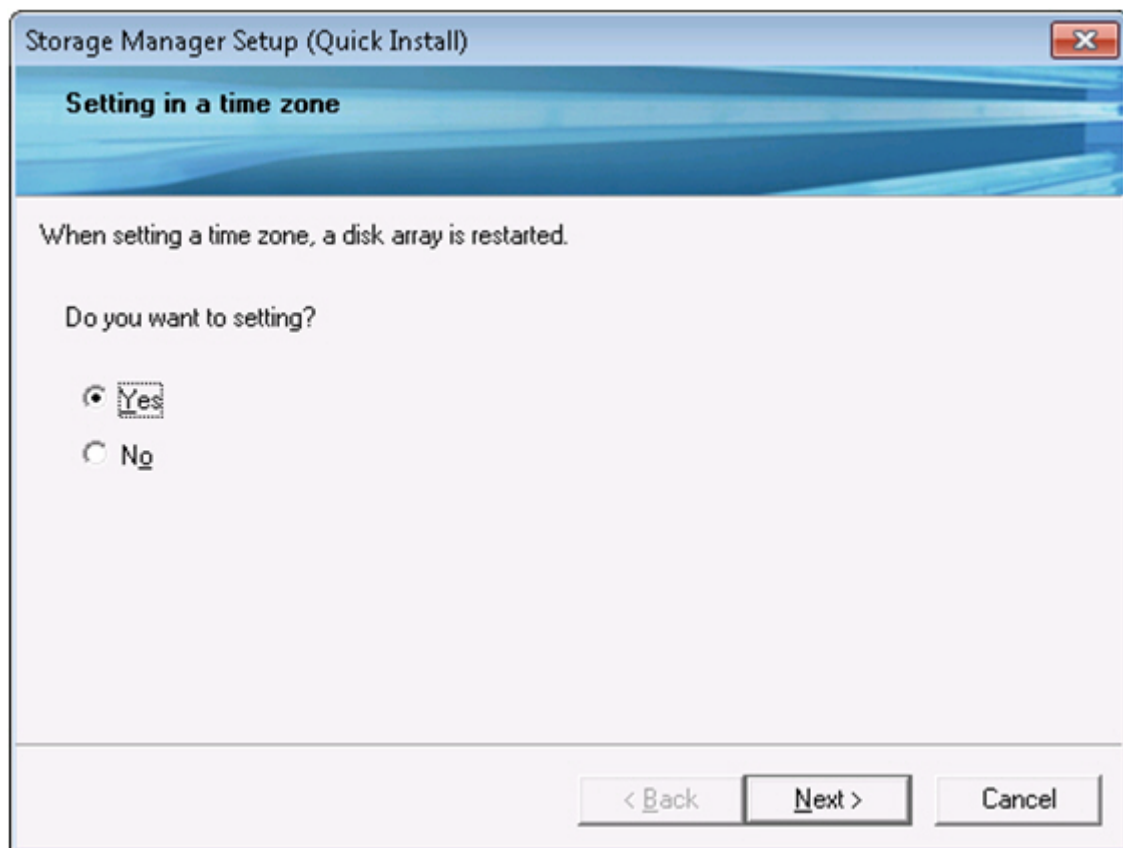


Figure 4-21: Setting in a Time Zone

3. To set a time zone, select **Yes** and click **Next**. By default, Asia and (GMT +9) Tokyo time zone is set. If you want to skip the setting, select **No**.
4. When you select **Yes**, the following page appears.

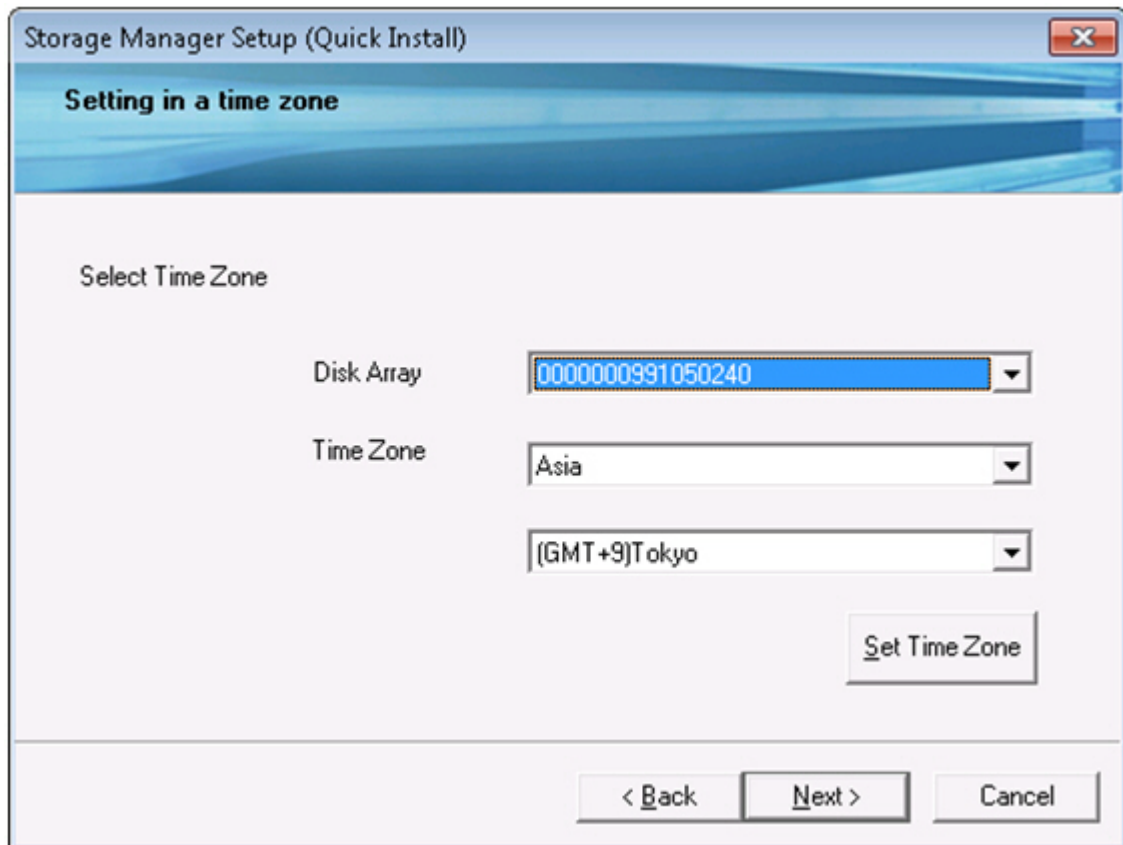


Figure 4-22: Setting in a Time Zone - Select Time Zone

5. Select the Time Zone and click **Set Time Zone**. Click **Next**.
6. Click **Finish** on the setup completion page. The Web browser is started. See [Section 4.5.2: "Starting Storage Manager Client"](#).

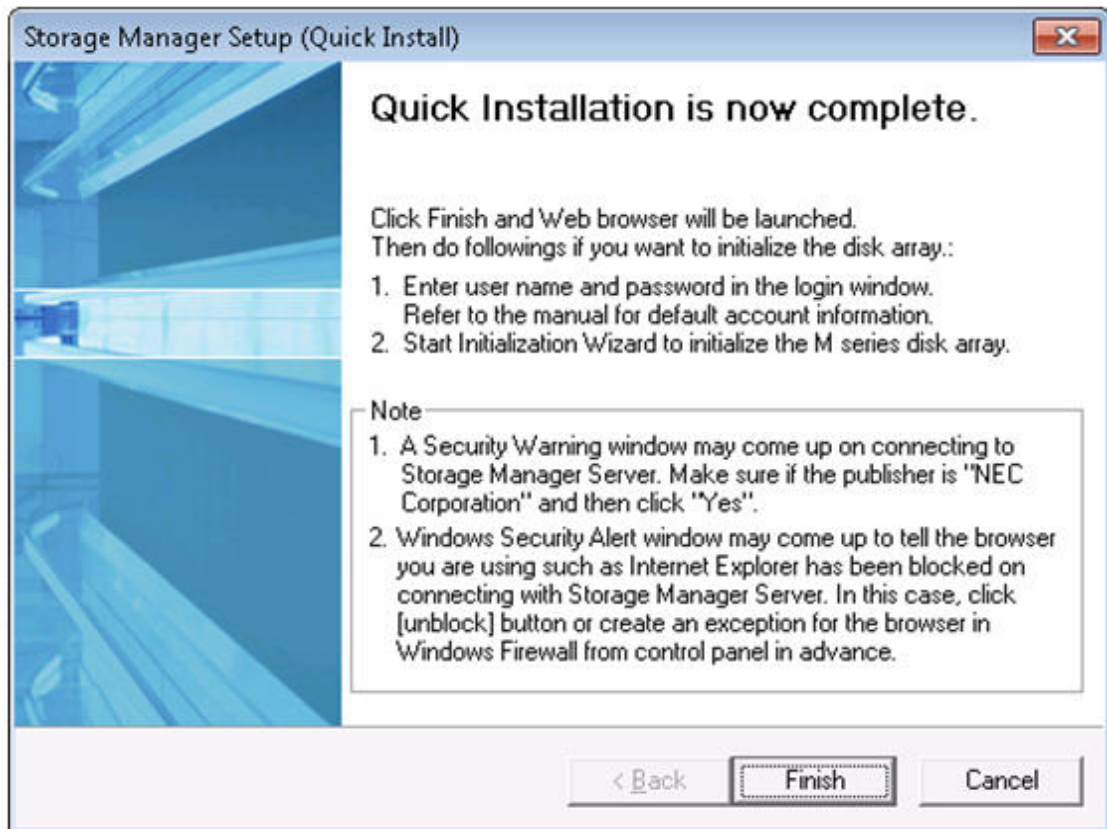


Figure 4-23: Setup Completion

4.3.3.2 For Linux

Follow the steps below and use the time zone setting command to set a time zone of the disk array.

1. Log in as root user.
2. Set the CD-ROM in the CD-ROM drive of the client.
3. Mount the CD-ROM.

- Create a mount directory (Example: /cdrom).
- Use the mount command for mounting

```
mount -r /dev/cdrom /cdrom
```

4. Run the time zone setting command (iSMtzconfig) to obtain the time zone. Run the following program in the CD-Rom for the time setting command.

```
TZCONFIG/LINUX/iSMtzconfig
```

```
# /tmp/TZCONFIG/LINUX/iSMtzconfig show

Serial Number      Time Zone information
0000000991050240  Asia/Tokyo          (GMT+9)

iSMtzconfig: 001 Command has completed successfully.
```

5. Check the result of running the command.

Confirm that the message number 001 is reported and the time zone of the disk array is shown after running the time setting command.

6. To change the time zone, run the time setting command.

```
# /tmp/TZCONFIG/LINUX/iSMtzconfig set -serial 0000000991050240 -zone
Asia/Tokyo -reboot

Serial Number      Time Zone information
0000000991050240  Asia/Tokyo          (GMT+9)

iSMtzconfig: 001 Command has completed successfully.
```

7. Check the result of running the command.

Confirm that the message number 001 is reported and the time zone of the disk array is shown after running the time setting command.

**CAUTION**

When you complete setting a time zone, the disk array is restarted. Before you start setting a time zone, check that it does adversely affect your operations.

When using Red Hat Enterprise Linux Version 6 in an EM64T server environment, the following packages must be installed in advance.

```
glibc-XXXX.i686.rpm
nss-softokn-freebl-XXXX.i686.rpm
```

These packages are included in the OS installation media.

* XXXX indicates the version of the package.

4.4 Installing Storage Manager Agent Utility on Application Server

This section describes how to install the Storage Manager Agent Utility on an application server.

For details about the installation procedure, see either of the following depending on the platform of the application server.

- For Windows application servers, see [Section B.1: “Installing Storage Manager Agent Utility”](#).
- For Linux application servers, see [Section D.1: “Installing Storage Manager Agent Utility”](#).

4.5 Starting Storage Manager Client

This section describes how to start up Storage Manager Client.

4.5.1 Before Starting Storage Manager Client

Before you use Storage Manager Client (Web GUI) in a Windows environment, configure the Web browser (Internet Explorer) and Java. For details see [Section 4.2: "Before Starting Storage Manager Client"](#).

4.5.2 Starting Storage Manager Client

Start the Web browser. (In a Windows Vista or later or Windows Server 2008 or later environment, right-click the icon to start the Web browser to select **Run as administrator**.)

Start up the Storage Manager Client by entering the host name or the IP address (floating address, or if no floating address is assigned, the IP address of Controller 0 or Controller 1) of the disk array to be connected in the address bar of the Web browser.

For example:

http://host name (or http://IP address)



If you enter the IP address in the IPv6 format, the IP address must be enclosed in square brackets [], in which case, you cannot use Internet Explorer 6.

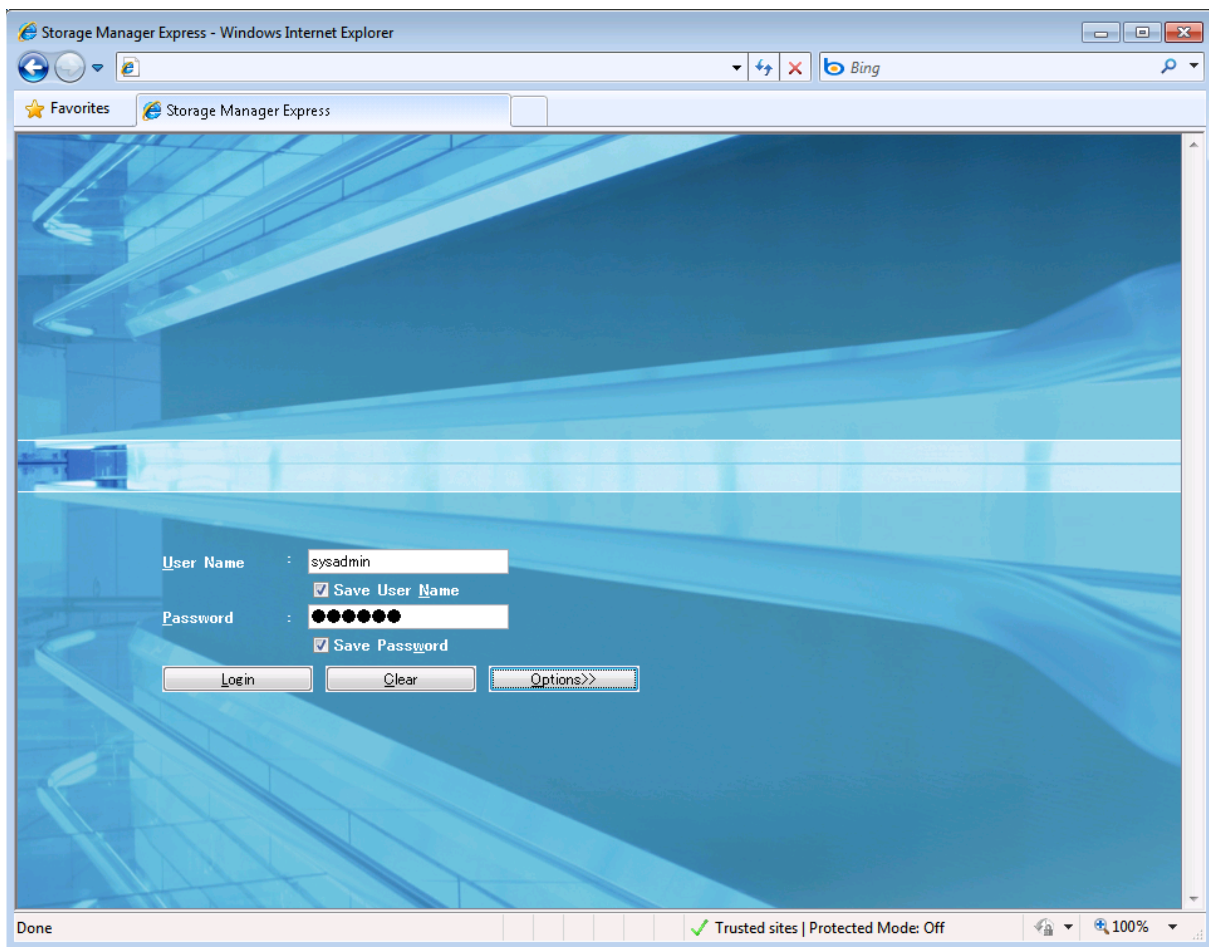
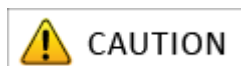


Figure 4-24: Log On Screen

Parameter	Description
User Name	Allows to enter user name.
Save User Name	Allows to save the entered user name.
Password	Allows to enter a password.
Save Password	Allows to save the entered password.

Perform the following steps to logon to Storage Manager client:

1. Enter “sysadmin” in the **User Name** box.
2. Enter “sys123” (default value) in the **Password** box.



Saving the user name and/or the password can lead to allowing access to anyone.

When you click **Options**, the login window is expanded as shown in [Figure 4-25: Log On Screen \(Expanded\)](#), which allows you to configure the behavior after login.



For details, see *Storage Manager User's Manual*.

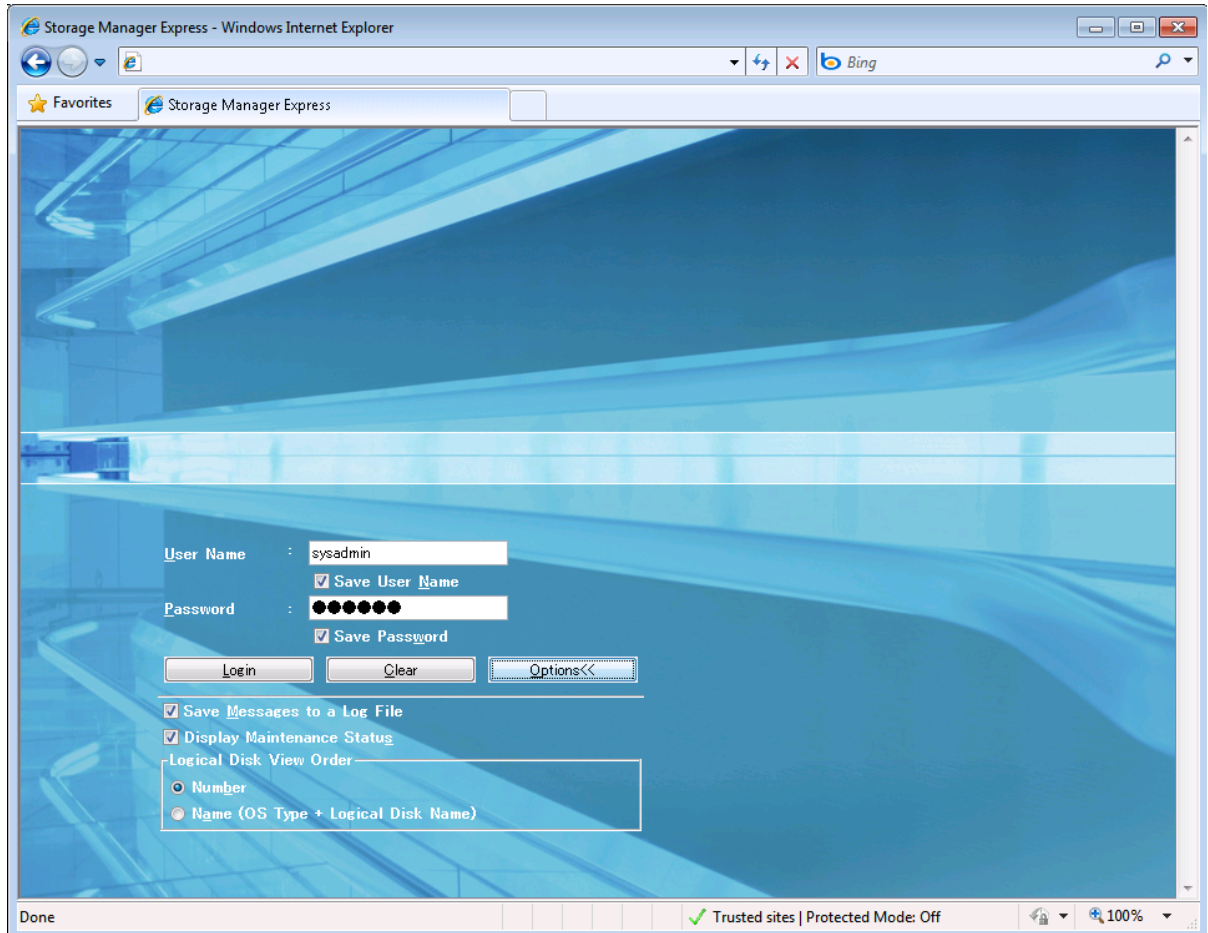


Figure 4-25: Log On Screen (Expanded)

Parameter	Description
Save Messages to a Log File	Allows to saves messages to a log file
Display Maintenance Status	If this option is selected, an error/warning in underlying component will be escalated to higher layer even if there is no affect to the operation.
Logical Disk View Order	Select Number to view the logical disks sorted in logical disk number order. Select Name (OS + Logical Disk Name) to view the logical disks sorted in OS Type and logical disk name order.

d. Click **Login** to open the main screen.

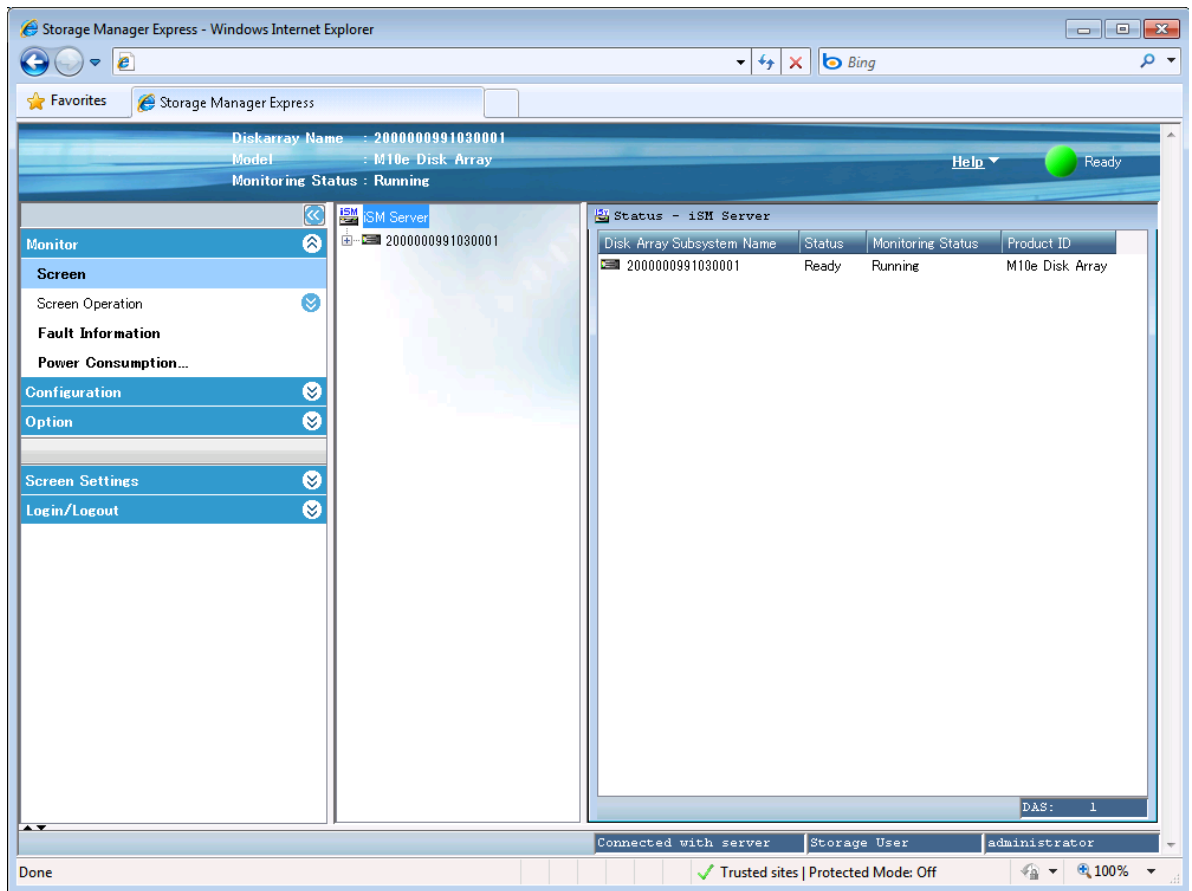


Figure 4-26: Main Screen

Chapter 5 Initializing a Disk Array (FC)

This chapter describes how to initialize a disk array configured for FC connection.

In this chapter

[“Overview” on page 108](#)

[“Collecting Host Information From Application Servers” on page 109](#)

[“Initialization by Storage Manager” on page 111](#)

[“Checking Connection from Application Servers” on page 146](#)

5.1 Overview

To set FC connection first in a disk array configured for both FC and iSCSI connections, do the procedure in this chapter and then see [Chapter 6, "Initializing a Disk Array \(iSCSI\)"](#) to make the settings.

To set iSCSI connection first, see [Chapter 6, "Initializing a Disk Array \(iSCSI\)"](#) to make settings and then do the procedure in this chapter.



To initialize a disk array configured for iSCSI connection, see [Chapter 6, "Initializing a Disk Array \(iSCSI\)"](#).

The initialization consists of:

1. Collecting host information

Collect host information from the application server.

For details about the procedure, see [Section 5.2: "Collecting Host Information From Application Servers"](#).

2. Initializing the disk array by using the initialization wizard

Use the initialization wizard to make the basic settings of the disk array.

For details about the procedure, see [Section 5.3.1: "Initialization Wizard"](#).

3. Binding a pool

Bind a pool in the disk array.

For details about the procedure, see [Section 5.3.2: "Binding a Pool"](#).

4. Binding a hot spare

Bind a hot spare. This step is not required unless a hot spare is bound.

For details about the procedure, see [Section 5.3.3: "Binding a Hot Spare"](#).

5. Binding logical disks

Bind logical disks.

For details about the procedure, see [Section 5.3.4: "Binding Logical Disks"](#).

6. Collection and registration of host information

Collect host information and register it with the disk array.

For details about the procedure, see [Section 5.3.5: "Collecting Host Information"](#).

7. Assigning the logical disks to the application servers

Assign the created logical disk to the application servers.

For details about the procedure, see [Section 5.3.6: "Assigning Logical Disks"](#).

8. Checking connection from the application servers

Check that the application server to which the logical disks have been assigned can access the disk array.

For details about the procedure, see [Section 5.4: "Checking Connection from Application Servers"](#).

5.2 Collecting Host Information From Application Servers

This section describes collection of host information from application servers.

Host information can be automatically collected if the OS used on the application servers is only Windows and servers used in the system are all new (servers that have not begun operating).

When there is any Linux (RHEL5 or later or SLES10 or later) application server and the servers used in the system are all new (servers that have not begun operating), host information can be collected through the disk array.

To collect host information when the disk array is installed in a system that has already begun operating or there is any application server on a different operating system, see [Section B.2.1: "Collecting Host Information by Using File Output"](#) for a Windows environment, or [Section D.2.1: "Collecting Host Information by Using File Output"](#) for a Linux environment.

1. Configurations where host information can be collected automatically or through a disk array

When the OS of new servers to be connected by FC cables is Windows and a disk array is newly installed, host information can be automatically collected by using the Storage Manager Host Agent Service function and FC connection paths between the disk array and Windows servers. When the OS of new servers to be connected by FC cables is Linux (RHEL5 or later or SLES10 or later) and a disk array is newly installed, host information can be collected through the disk array.

For details about the setting, see [Section 5.3.5: "Collecting Host Information"](#).

To collect host information without connecting FC cables in one of the configurations above, see [Section B.2.1: "Collecting Host Information by Using File Output"](#) for a Windows environment, or [Section D.2.1: "Collecting Host Information by Using File Output"](#) for a Linux environment.

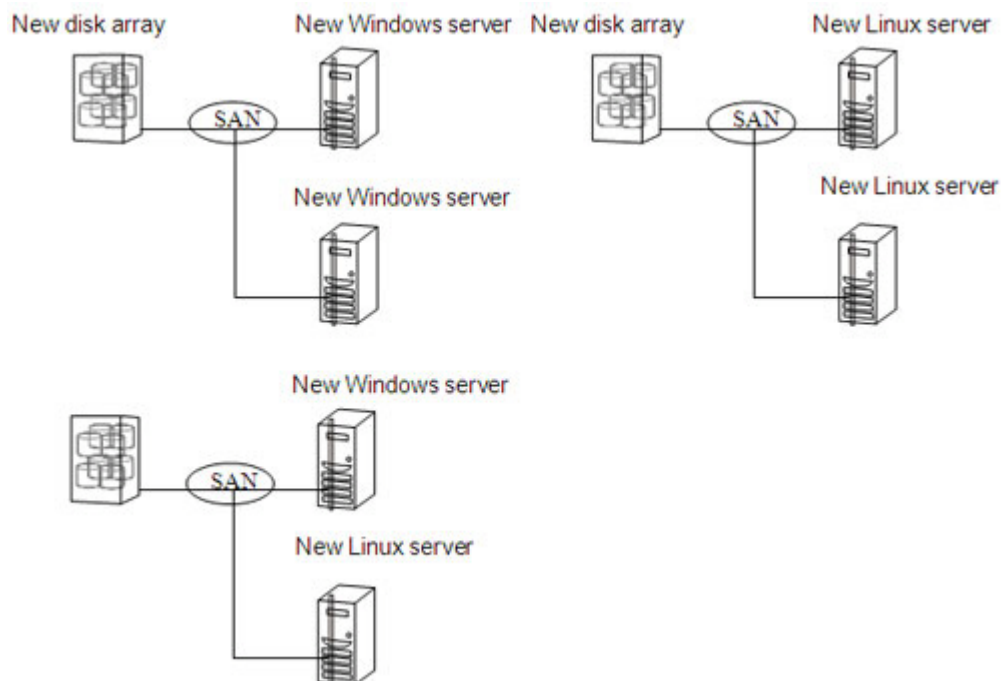


Figure 5-1: Configuration - Auto-Collection of Host Information

2. Collecting host information by using files reported by the host information collection command

When a disk array is installed in a system that has already begun operating or any of the application servers to be connected by FC cables is on an OS other than Windows or Linux (RHEL5 or later or SLES10 or later), use the host information collection command to report files. Registering the reported files allows assigning the application server to created logical disks. For details about how to register reported files, see [Section B.2.2: “Registering Host Information by Using File Output”](#) for a Windows environment, or [Section D.2.2: “Registering Host Information by Using File Output”](#) for a Linux environment.

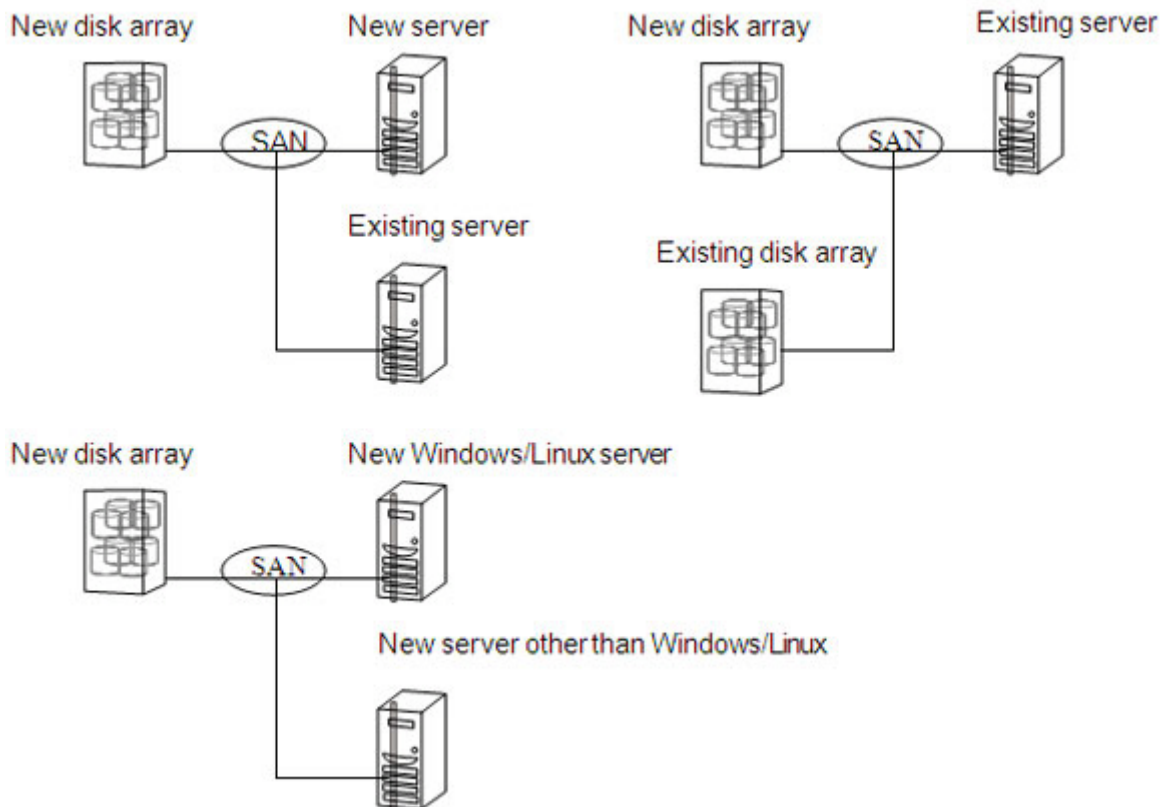


Figure 5-2: Configuration - Collect Host Information Using Host Information Collection Command

5.2.1 Collecting Host Information From Application Server

To make settings for collecting host information automatically or through a disk array, see [Section 5.3.5: “Collecting Host Information”](#).

For details about how to collect host information, see one of the following depending on the platform of the application server:

- For a Windows application server, see [Section B.2: “Collecting/Registering Host Information on Application Server”](#).
- For a Linux application server, see [Section D.2: “Collecting/Registering Host Information on Application Server”](#).

5.3 Initialization by Storage Manager

5.3.1 Initialization Wizard

5.3.1.1 Overview

Use the initialization wizard to make the basic settings of a disk array.

Operations to be performed on the initialization wizard are:

- Set the disk array subsystem name
Change and/or confirm a disk array name.
- Set time
Set time by configuring the NTP server, or manually.
- Unlock licenses
Unlock licenses.
- Host connection port parameters (FC)
Set the host connection port.
- Port mode switching
Change the port mode.

5.3.1.2 Starting the initialization wizard

Click **Configuration** and **Initialization** on the left pane to open the menu. Then click **Start** to start the initialization wizard.

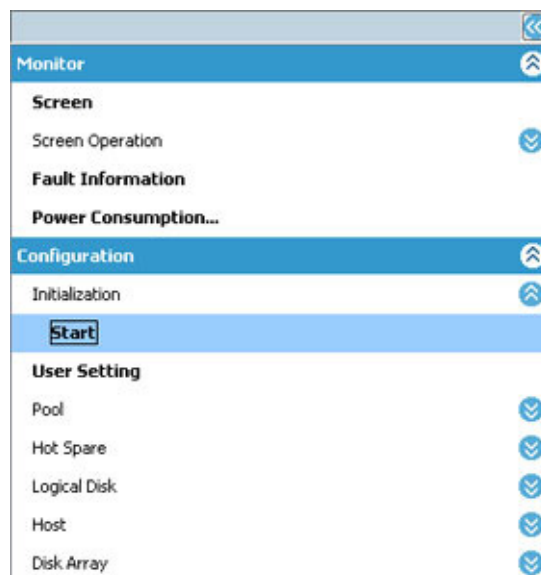


Figure 5-3: Starting Initialization Wizard

Before the initialization starts, the following confirmation message appears.



Click **Yes** to start the initialization wizard.

5.3.1.3 Welcome to Initialization Wizard

When the initialization wizard starts, perform the settings as prompted.

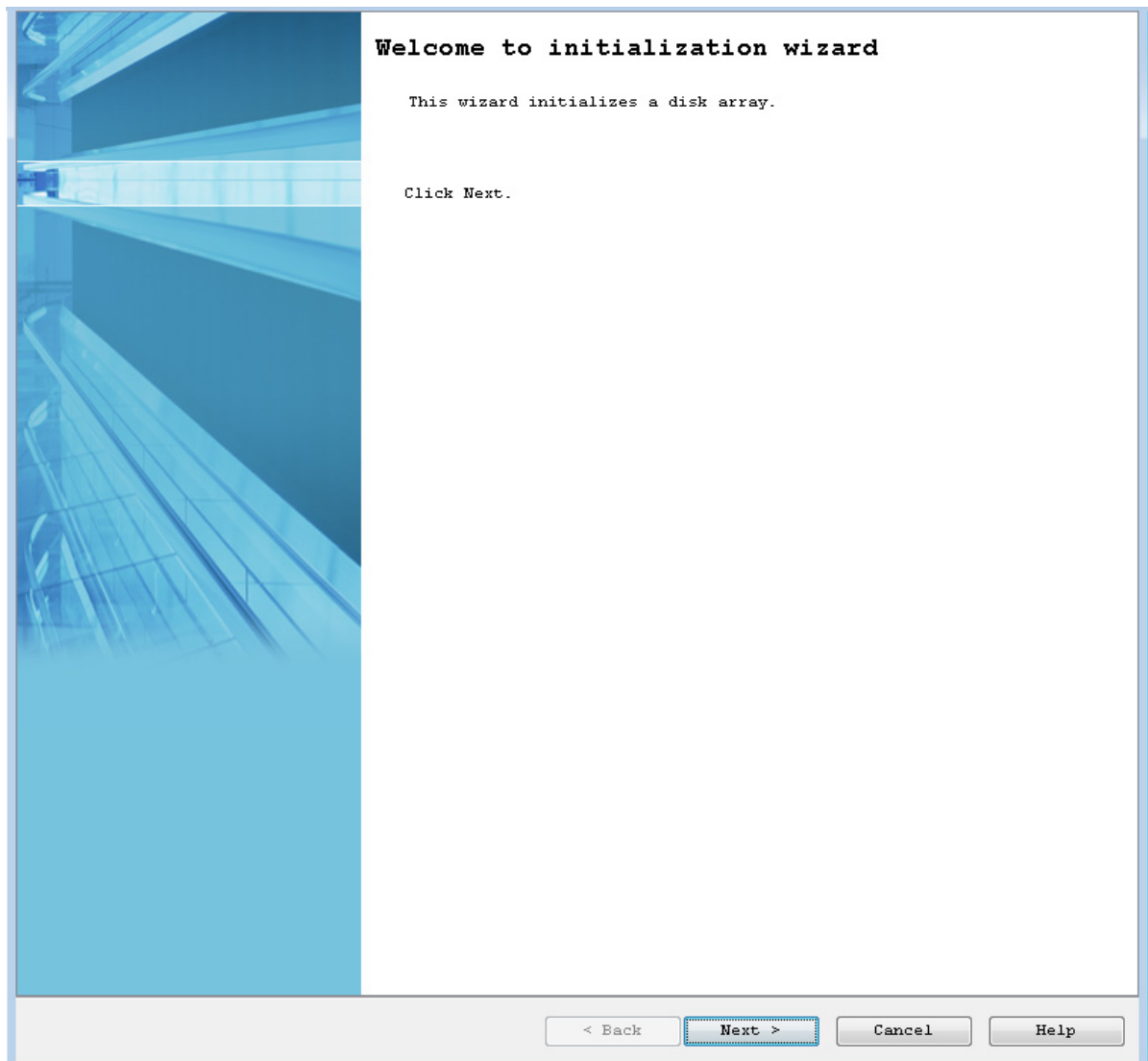


Figure 5-4: Welcome to Initialization Wizard

Click **Next**.

5.3.1.4 Set Disk Array Subsystem Name

You can change the disk array name.

Set Disk Array Subsystem Name > Set Time > Unlock License > Host connection port parameters (FC) > Port Mode Switching > Finish

Set Disk Array Subsystem Name.

Product ID : iStorage M300

Serial Number : 0000000942090000

Disk Array Subsystem Name : diskarray1

New Disk Array Subsystem Name :

< Back Next > Cancel Help

Figure 5-5: Setting Disk Array Subsystem Name

Parameter	Description
Product ID	Displays the product ID of the disk array.
Serial Number	Displays the serial number of the disk array.

Parameter	Description
Disk Array Subsystem Name	Displays a name to identify the disk array subsystem.
New Disk Array Subsystem Name	By default, displays the current disk array subsystem name. To change this name, enter a new disk array subsystem name.

Perform the following steps to change a disk array name:

1. Enter a new name in the **New Disk Array Subsystem Name** box.
2. Confirm the name and click **Next**.

5.3.1.5 Set Time

Set Disk Array Subsystem Name > **Set Time** > Unlock License > Host connection port parameters (FC) > Port Mode Switching > Finish

State

Current time :
Aug 17, 2011 10:20:27 AM

NTP server :
Not synchronized

Select a time setting method.

Synchronize the time with the NTP server.
 Set the time manually.
 Don't set the time now.

Explanation

If you select "Set the time manually" while the time is synchronized with the NTP server, synchronization with the NTP server is cancelled.

Figure 5-6: Set Time

Parameter	Description
State	Displays the date and time currently set for the disk array and the status of synchronization with the NTP server appear.
Synchronize the time with the NTP server.	Select this option to move on to the NTP setting page.
Set the time manually.	Select this option to move on to the manual time setting page.
Don't set the time now.	Select this option to move on to the step to unlock license without setting time.

To configure a time using NTP, select **Synchronize the time with the NTP server** and click **Next**.



For the procedure when the **Set the time manually** option is selected, see *Storage Manager Software Configuration Setting Tool User's Manual (GUI) for the M Series*.

Set Time - NTP server

Configure the NTP settings.

The screenshot shows a configuration window titled "Set Time" with a breadcrumb trail: "Set Disk Array Subsystem Name > Set Time > Unlock License > Host connection port parameters (FC) > Port Mode Switching > Finish". The main heading is "Set the IP addresses with the NTP server." Below this, there are three NTP server configuration sections. Each section has an "NTP server" label, an "IP version" dropdown menu, and an "IP address" text input field. The first section has "IPv4" selected and a dotted IP address field. The second section has "IPv6" selected and a long text input field. The third section has "IPv4" selected and a dotted IP address field. At the bottom left, there is an "Explanation" box containing the text: "You can specify up to three NTP servers." At the bottom right, there are four buttons: "< Back", "Next >", "Cancel", and "Help".

Figure 5-7: Set Time - Setting NTP Server

Parameter	Description
IP Address	Specify an IP address of the NTP server.

To set NTP server, enter the required information and click **Next**.

5.3.1.6 Unlock License

Unlocks the licenses of the disk array.

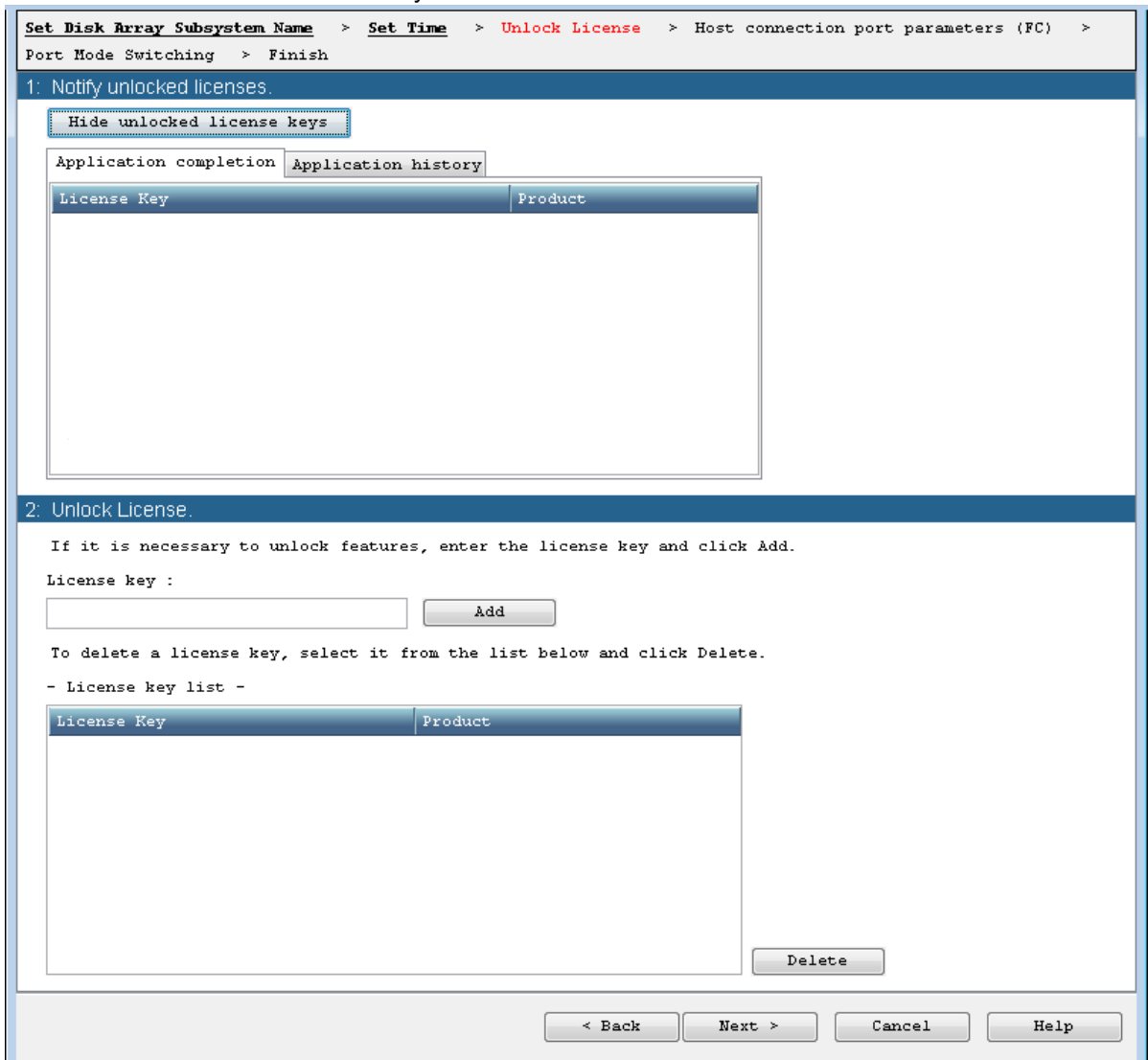


Figure 5-8: Unlocking License

Parameter	Description
Hide unlocked license keys	Click this button to hide unlocked license keys.
Application completion	Displays the licenses which are currently unlocked.
Application history	Displays history of unlocked licenses, deleted licenses, and expired licenses.
License key	Enter a license key and click Add to register the key with the License key list .
Add	Click this button to register the entered License key with the License key list .

Parameter	Description
Licence key list	Displays a list of entered license keys.
Delete	Click this button to remove the selected license keys from the license key list.

To unlock the licenses, enter all the license keys to be unlocked and click **Next**.

5.3.1.7 Host Connection Port Parameters (FC)

Set the host connection port for the disk array supporting FC.

Set Disk Array Subsystem Name > Set Time > Unlock License > Host connection port parameters (FC) > Port Mode Switching > Finish

Set port settings.

Number	Port name	Platform	Data rate	Server connection type
00h-00h	20000011223344550000	Windows (WN)	Auto	Auto negotiation
00h-01h	20000011223344550001	Windows (WN)	Auto	Auto negotiation
00h-02h	20000011223344550002	Windows (WN)	Auto	Auto negotiation
00h-03h	20000011223344550003	Windows (WN)	Auto	Auto negotiation
01h-00h	20000011223344550100	Windows (WN)	Auto	Auto negotiation
01h-01h	20000011223344550101	Windows (WN)	Auto	Auto negotiation
01h-02h	20000011223344550102	Windows (WN)	Auto	Auto negotiation
01h-03h	20000011223344550103abc	Windows (WN)	8Gbps	Auto negotiation

Edit

Controller #1 Controller #0

Rear view

< Back Next > Cancel Help

Figure 5-9: Host Port Connection Parameters (FC)

Parameter	Description
Port list	Select the port you want to set.
Edit button	A dialog box is displayed that lets you edit the settings of the selected port.

Edit dialog

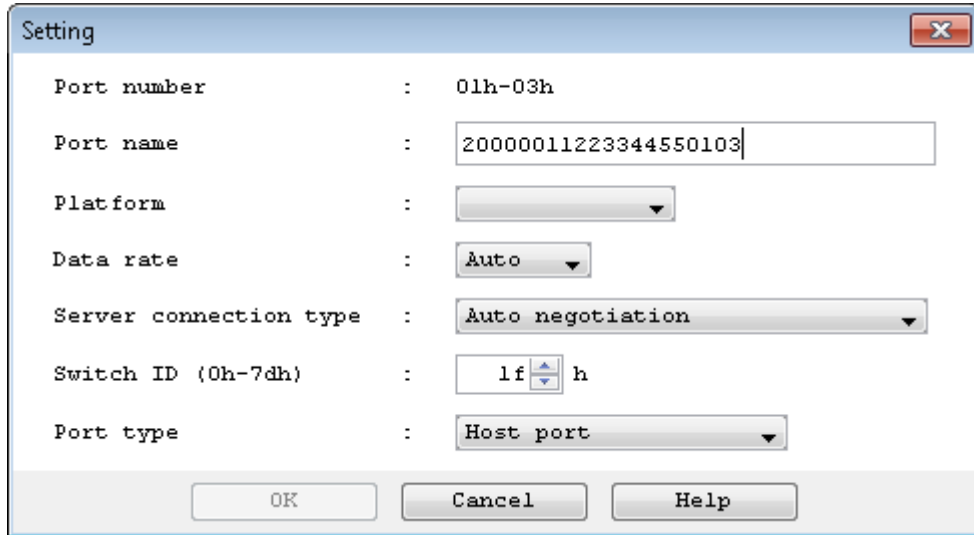


Figure 5-10: Edit Dialog

Parameter	Description
Port number	Unique port number
Port name	Specify the name to be assigned to the port.
Platform	Specify the platform of the host to be connected.
Data rate	Specify the value corresponding to the data transfer rate of the HBA or HUB.
Server connection type	Specify the connection topology between the disk array and the host. Automatic negotiation: The connection type is automatically negotiated. FC-AL: Select this when connecting the host connection port and the application server directly over an FC cable or when using a loop topology FC switch. FC switch connection (Fabric): Select this when using an FC switch other than a loop topology FC switch.
Switch ID	Specify the value of the switch for the port. The specifiable value range is 00h to 7dh. When connecting multiple disk arrays in a loop topology FC switch configuration, make sure that the value of each switch is unique.
Port type	Select the port type. Select the host port or data migration port. This setting is displayed only when the data migration function is usable.

Clicking **OK** applies the change of settings to the list.

When you click **Next** after changing the port settings as needed, the port settings are made.

5.3.1.8 Port Mode Switching

You can change the FC port mode of the disk array.

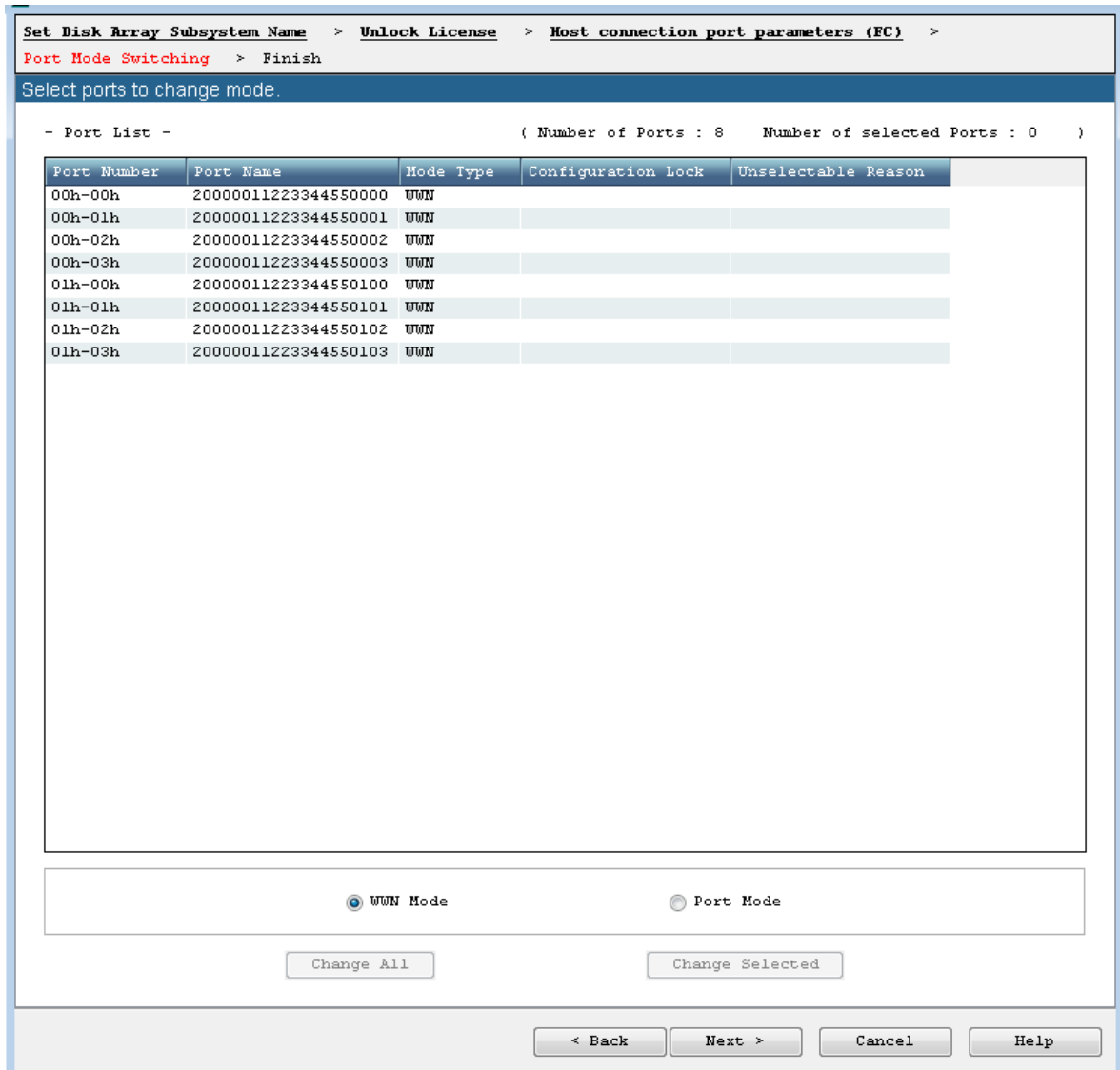


Figure 5-11: Port Mode Switching Screen

(a) Port List view

The Port List view lets you check the information about the disk array ports.

A port number is expressed in the format of "director number-port number".

The following items are displayed.

Port Number

Port Name

Mode

WWN: Port in the WWN mode

Port: Port in the Port mode.

Configuration lock

Lock: Locked port

(Empty): Port not locked

Unselectable Reason

The following items are hidden by default.

Host

To display any of these items, right-click the item name and set **Display** to the relevant item.

(b) WWN Mode and Port Mode radio buttons

WWN Mode: Changes the mode of the port to the WWN mode.

Port Mode: Changes the mode of the port to the port mode.

(c) Change All button

If you click this button, all the ports are changed to the mode selected with **WWN Mode** or **Port Mode**. In this case, you do not need to select a port from the port list. However, you cannot change the mode by using this button if there are any ports locked by the port configuration lock/unlock function. You cannot change to the port mode if the configuration lock function confirms that any target application server is in operation. Stop all the target application servers before performing this operation.

(d) Change Selected button

If you select a port and then click this button, the selected port is changed to the mode selected with **WWN Mode** or **Port Mode**. You can select multiple ports in the port list if they are in the same mode. When a confirmation screen is displayed for checking the settings in advance, check the current mode of the port and the mode you are changing to. However, you cannot change the mode of a port locked by the port configuration lock/unlock function. You cannot change to the port mode if the configuration lock function confirms that any target application server is in operation. Stop all the target application servers before performing this operation.

5.3.1.9 Finish Initialization Wizard

Confirm that the initialization is finished.

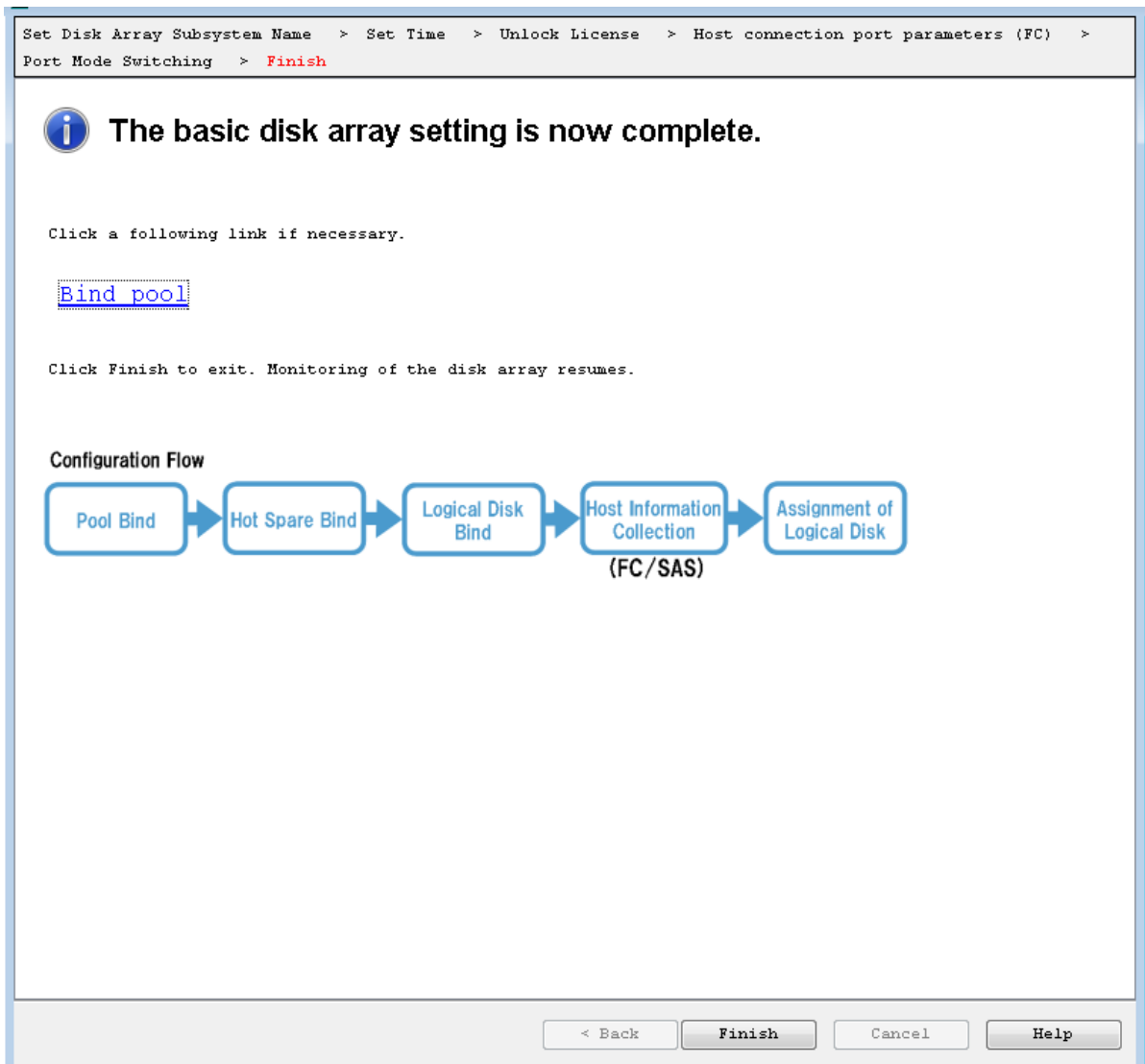


Figure 5-12: Finish Initialization Wizard

Parameter	Description
Bind pool	When you click this hyperlink, the Pool Bind page appears for starting pool binding.

To move on to pool binding, click **Bind pool**.



When the initialization is complete, the Access Control function starts automatically

5.3.2 Binding a Pool

Perform basic settings for binding a pool.

5.3.2.1 Pool Bind

Figure 5-13: Pool Bind

Parameter	Description
Show pool list	Click Show pool list to see the list of existing pools. Click Close pool list to hide the pool list.
Physical disk type	Select the type of physical disks that configure a pool.
RAID type	Select the RAID type of the pool.

Parameter	Description
Auto disk selection	Specify the number of physical disks to be used from the Number of physical disks and the capacity per physical disk from Physical disk capacity . The selectable numbers of physical disks are: <ul style="list-style-type: none"> ■ RAID6(4+PQ): 6 disks or more ■ RAID6(8+PQ): 10 disks or more ■ RAID5(2+P): 3 disks or more ■ RAID5(4+P): 5 disks or more ■ RAID5(8+P): 9 disks or more ■ RAID-TM: 3 disks or more ■ RAID1: 2 disks or more
Manual disk selection	Select this option and click Select physical disks to manually select physical disks to be used for a pool.
Calculate pool capacity	Click this button to see an estimated capacity of a pool in Total capacity of the pool . When Physical disk type , RAID type , Number of physical disks , Physical disk capacity is changed, there is possibility that “calculating” is displayed temporarily under Total capacity of the pool .

Perform the following steps to bind a pool:

1. Select the type of physical disk from **Physical disk type**.
2. Select the type of RAID from the **RAID type** drop-down list menu.
3. Select the number of physical disk that configure the pool and their capacity using either **Auto disk selection** option or **Manual disk selection** option.



- When 61 or more physical disks configure a pool, pool expansion is automatically performed.
- The value for **Total capacity of the pool** displayed for a pool configuration with 61 or more physical disks is rough estimate.

4. Click **Next** to move on to the step for checking settings.

5.3.2.2 Pool Bind- Confirmation

The page for confirming the settings of pool binding appears. This page lists the settings of the pool to be bound.

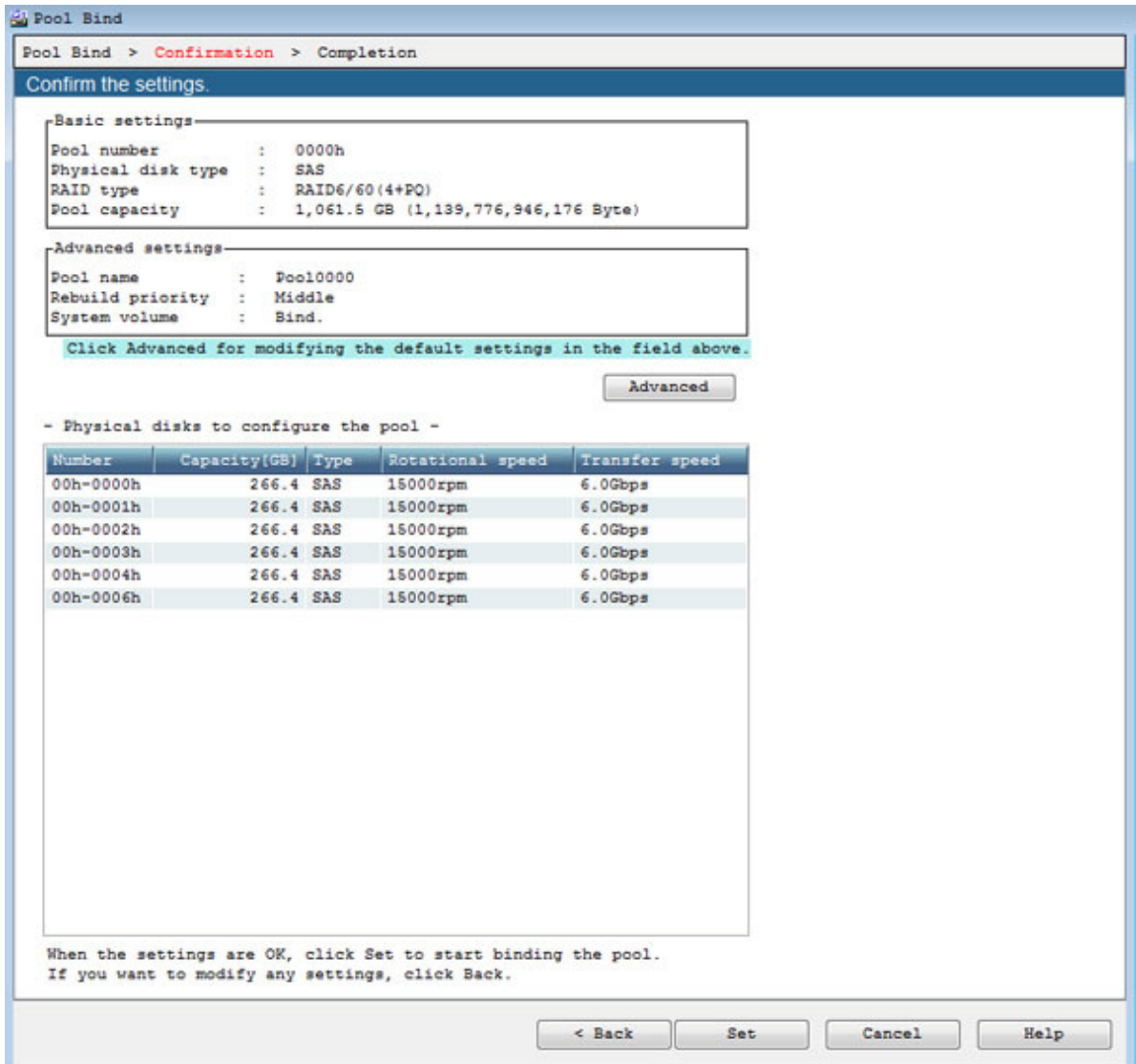
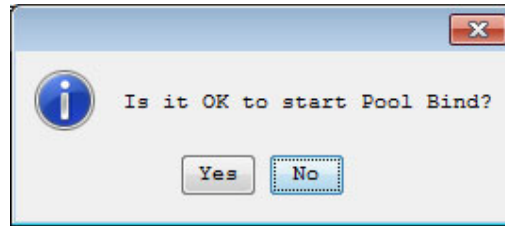


Figure 5-14: Pool Bind - Confirmation

Parameter	Description
Basic Settings	Displays basic settings to be used for binding a pool.
Advanced Settings	Displays default advanced settings to be used for binding a pool.
Advanced	Click Advanced to modify the default settings displayed under Advanced Settings .
Physical disks to configure the pool	Displays details of physical disks used to configure a pool.

Check if the list has any problems. If the list has no problems, click **Set** to display the confirmation message.



Click **Yes** to perform pool binding. When the binding is completed, the completion window appears.



- When a physical disk to be used is stopped with the power saving function on, it takes time to bind the pool
- When the first pool is bound, a system value (8GB) is automatically created.

5.3.2.3 Pool Bind - Completion

When the pool binding is successfully completed, the result of pool binding appears.

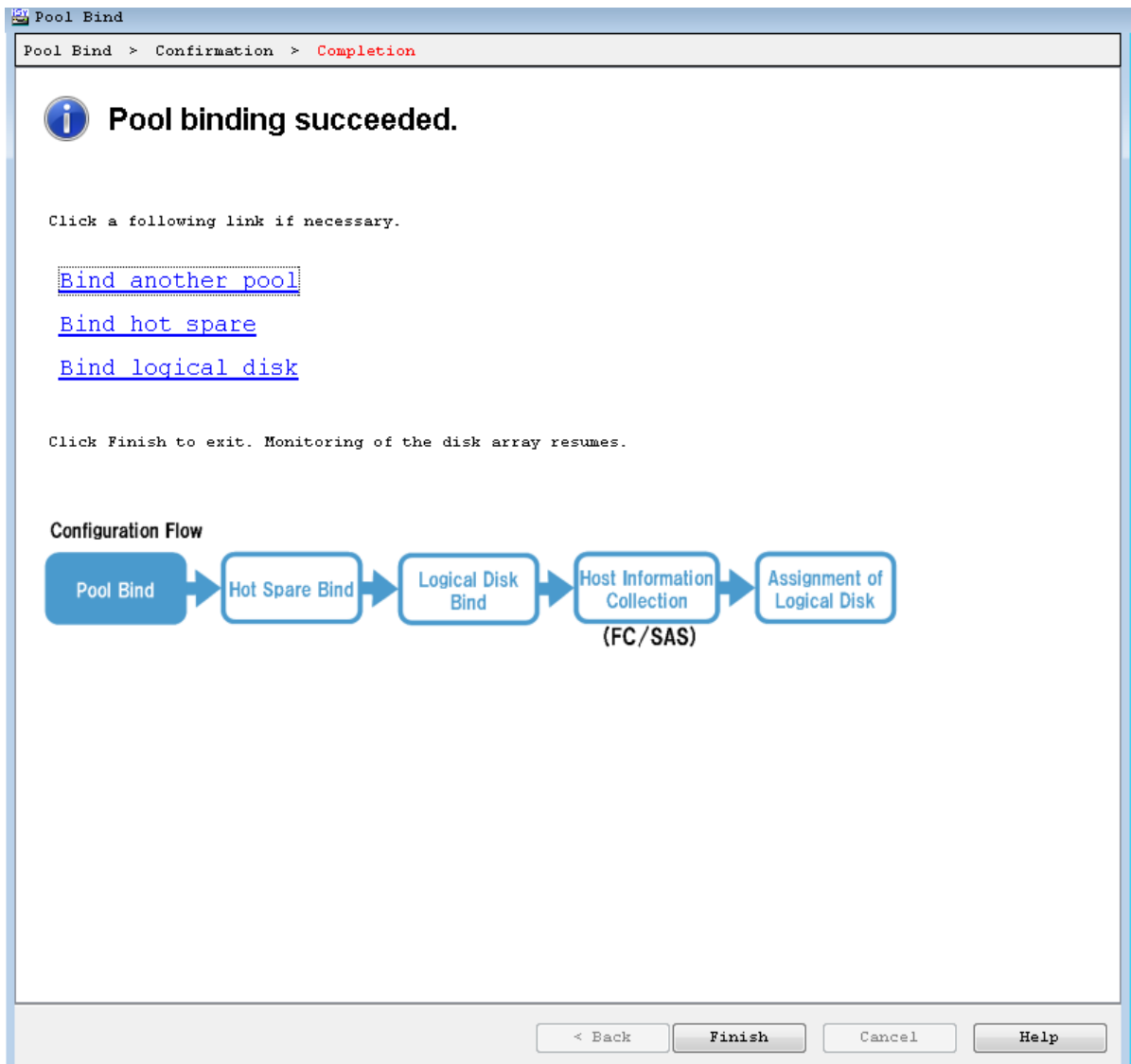


Figure 5-15: Pool Bind - Completion

Parameter	Description
Bind another pool	Click this hyperlink to reopen the Pool Bind page to bind another pool.
Bind hot spare	Click this hyperlink to open the Hot Spare Bind page.
Bind logical disk	Click this hyperlink to open the Logical Disk Bind page.

Perform the following steps:

1. Click **Bind hot spare** to bind hot spare.
2. If you do not want to bind hot spare, click **Bind logical disk** to move on to logical disk binding.

5.3.3 Binding a Hot Spare

This section explains how to bind a hot spare.

5.3.3.1 Hot Spare Bind

The **Hot Spare Bind** page has the view display and the list display. The displays can be switched by clicking the tabs.

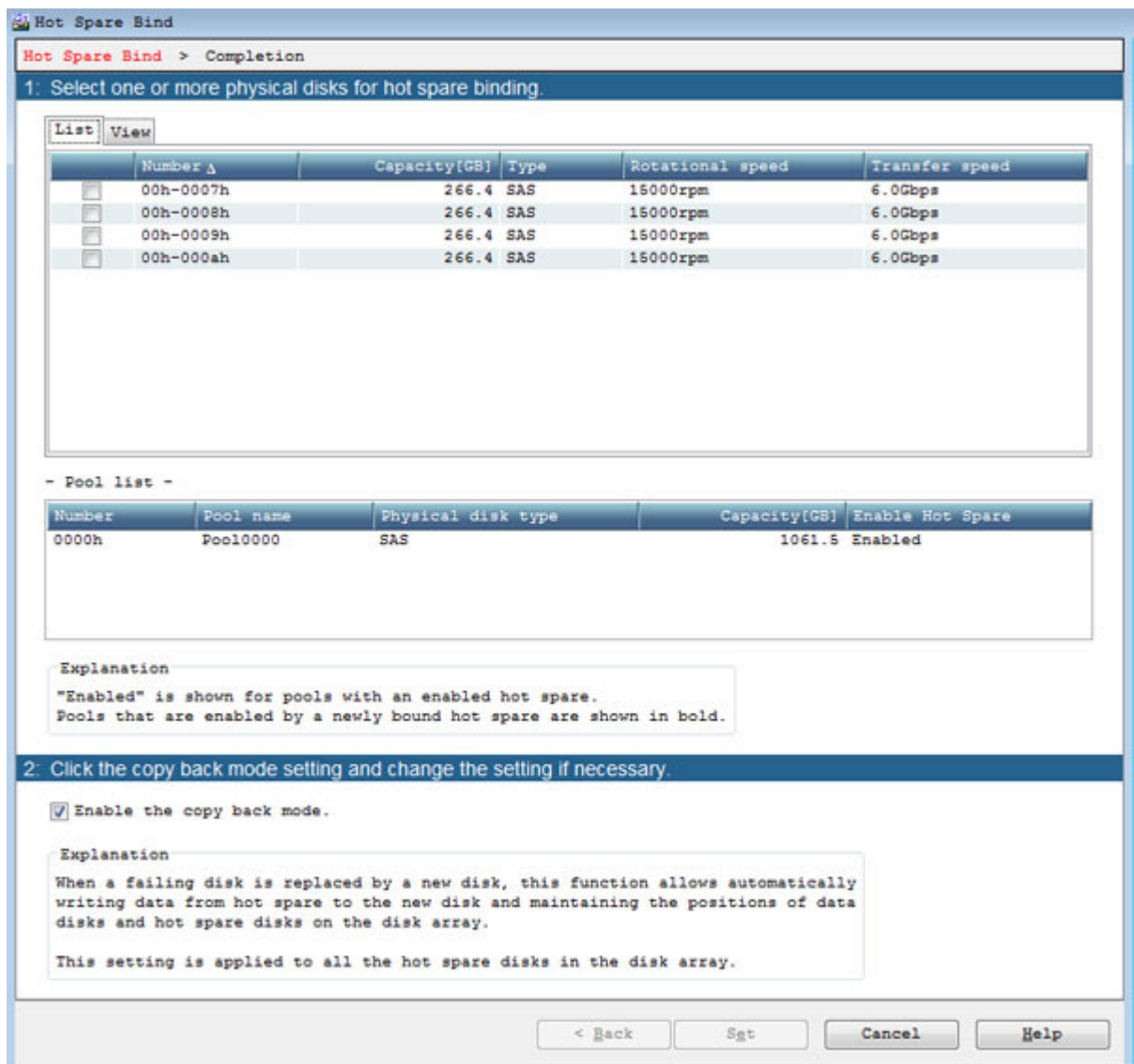


Figure 5-16: Hot Spare Bind - List Display

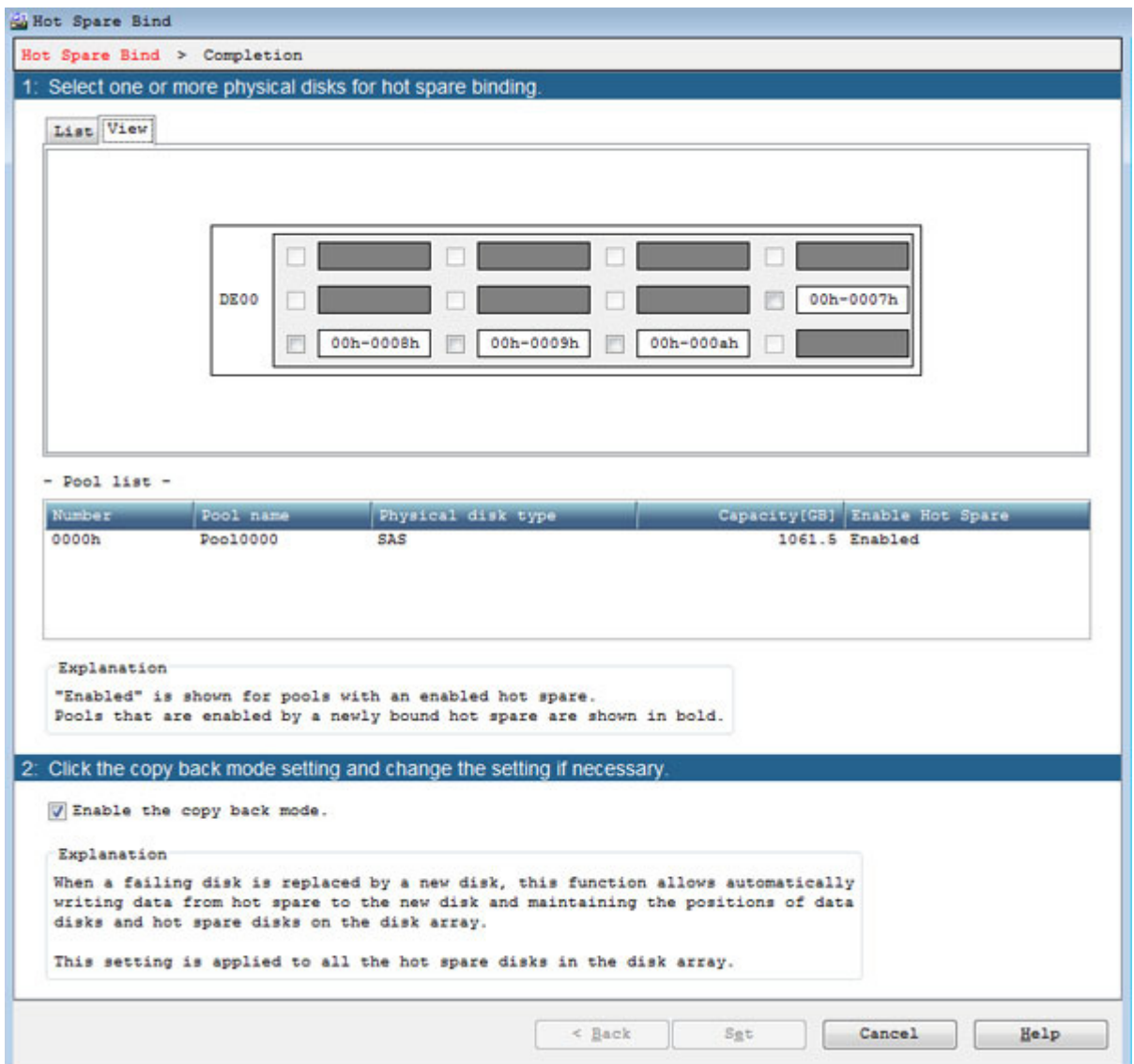


Figure 5-17: Hot Spare Bind - View Display

Parameter	Description
List	By default, the List view is displayed. The List view displays a list of physical disks available to bind a spare. Select the specified check box of the physical disk for which hot spare will be bound.
View	Click this tab for the visual display of physical disks available to bind a spare. Select the specified check box of the physical disk for which hot spare will be bound.

Parameter	Description
Pool list	Select a physical disk to create a hot spare. When you select the physical disk for hot spare binding, Enabled is displayed under the Enable Hot Spare field of the Pool list. Pools that are enabled by a newly bound hot spare are shown in bold.
Enable the copy back mode	Select this option to enable copy back mode. When a faulty disk is replaced by a new disk, copy back mode automatically copies back the data to the new disk.

Perform the following steps to bind a hot spare:

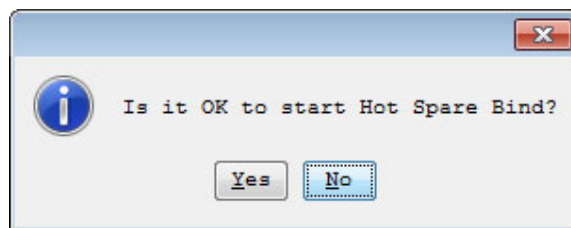
1. Select one or more physical disks for hot spare binding.

When you select the physical disks, pools with **Enable Hot Spare** are displayed in bold letters.



- For slots having no physical disks, the slot names and check boxes are grayed out in the view display, and the slots are not listed in the list display.
- For physical disks for which a pool has been bound, the check boxes are grayed out in the view display, and the disks are not listed in the list display.

2. Click **Set** to display the following confirmation message.



3. Click **Yes** to perform hot spare binding.

5.3.3.2 Hot Spare Bind - Completion

When the hot spare binding is completed, the result dialog box appears.

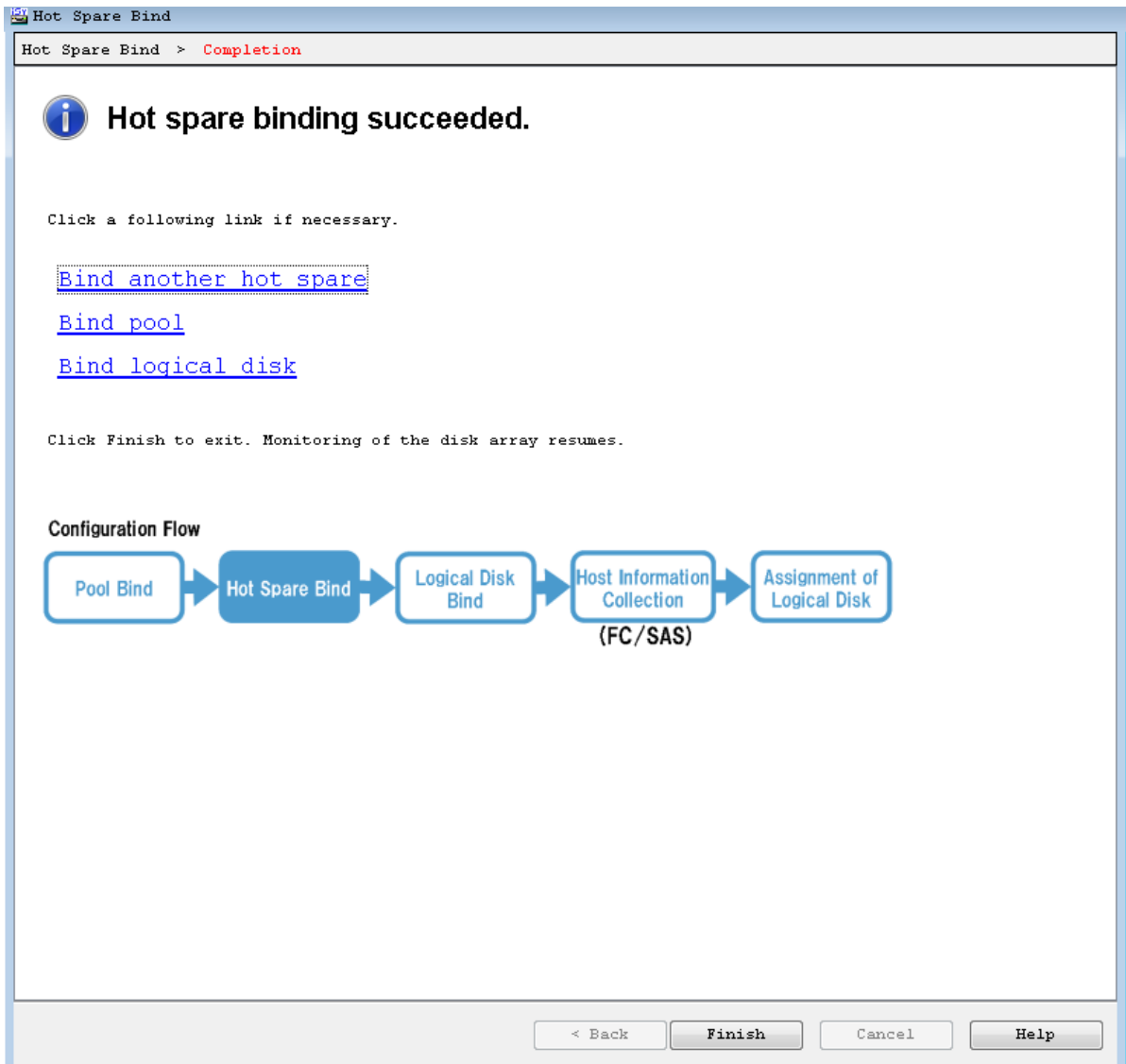


Figure 5-18: Hot Spare Bind - Completion

Parameter	Description
Bind another hot spare	Click this hyperlink to reopen the Hot Spare Bind page to bind another hot spare.
Bind pool	Click this hyperlink to open the Pool Bind page to bind another pool.
Bind logical disk	Click this hyperlink to open the Logical Disk Bind page.

To bind a logical disk, click **Bind logical disk**.

5.3.4 Binding Logical Disks

This section explains how to bind logical disks.

5.3.4.1 Logical Disk Bind

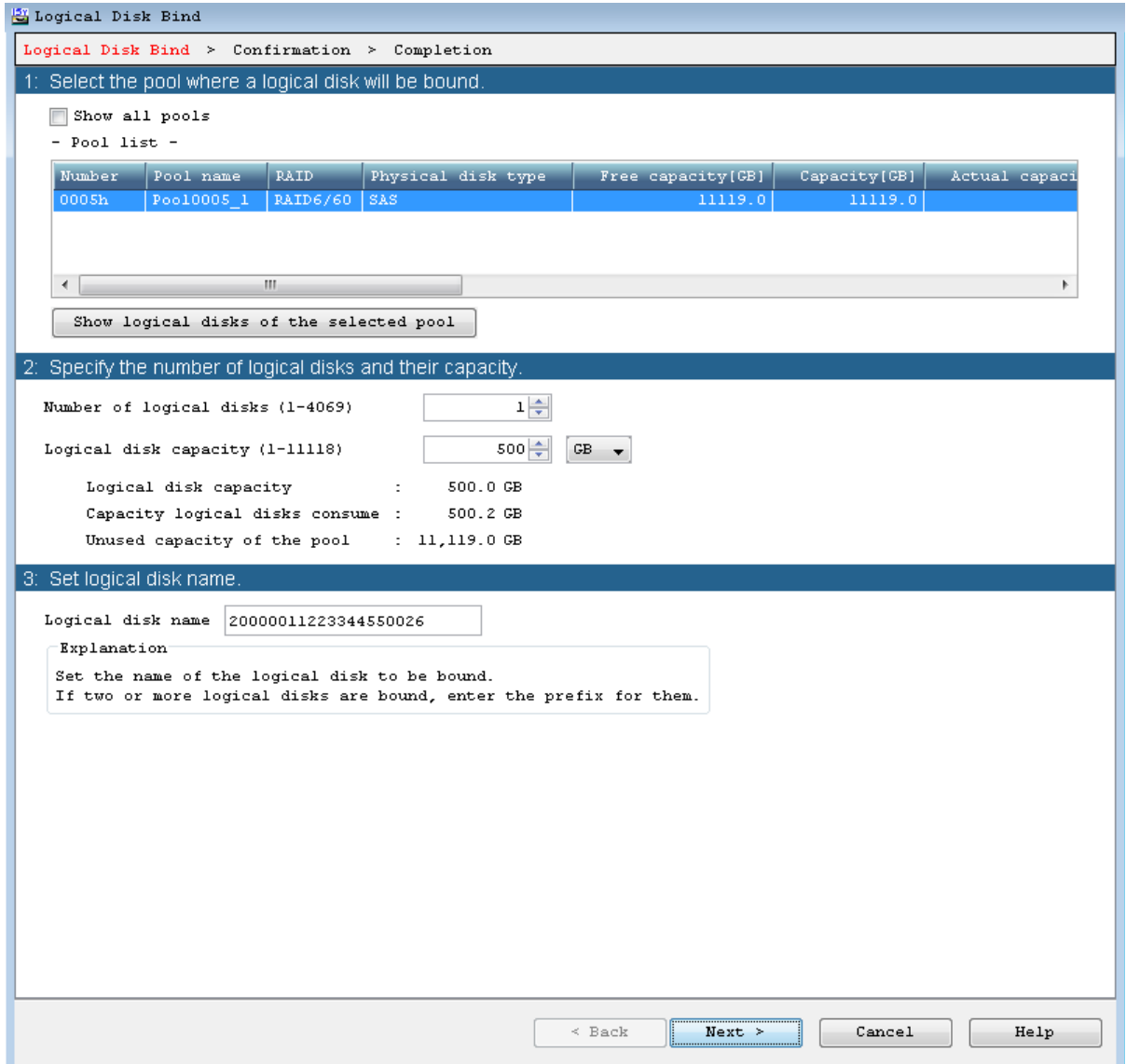


Figure 5-19: Logical Disk Bind

Parameter	Description
Pool list	Displays details of already bound pools. Select a pool in which logical disks will be bound.
Show all pools	By clearing this check box, you can view only the pool that is bound this time.
Show logical disks of the selected pool	Click this button to confirm a list of logical disks that are bound in the currently selected pool.

Parameter	Description
Number of logical disks	Specify the number of logical disks to be bound in the spinner.
Logical disk capacity	Specify the capacity of logical disks to be bound in the spinner.
Logical disk capacity	Indicates the space size consumed by logical disks.
Capacity logical disks consume	Indicates total size of the space occupied by logical disks.
Unused capacity of the pool	Indicates free space available in a pool.
Logical disk name	Displays the automatically assigned logical disk name. To change the logical disk name, enter a new logical disk name. If two or more logical disks are bound, enter a prefix for them.

Select a pool in which logical disks will be bound, enter the number and capacity of logical disks, and click **Next**.

5.3.4.2 Logical Disk Bind - Confirmation

The settings of the logical disk to be bound are listed. Confirm the logical disk binding settings.

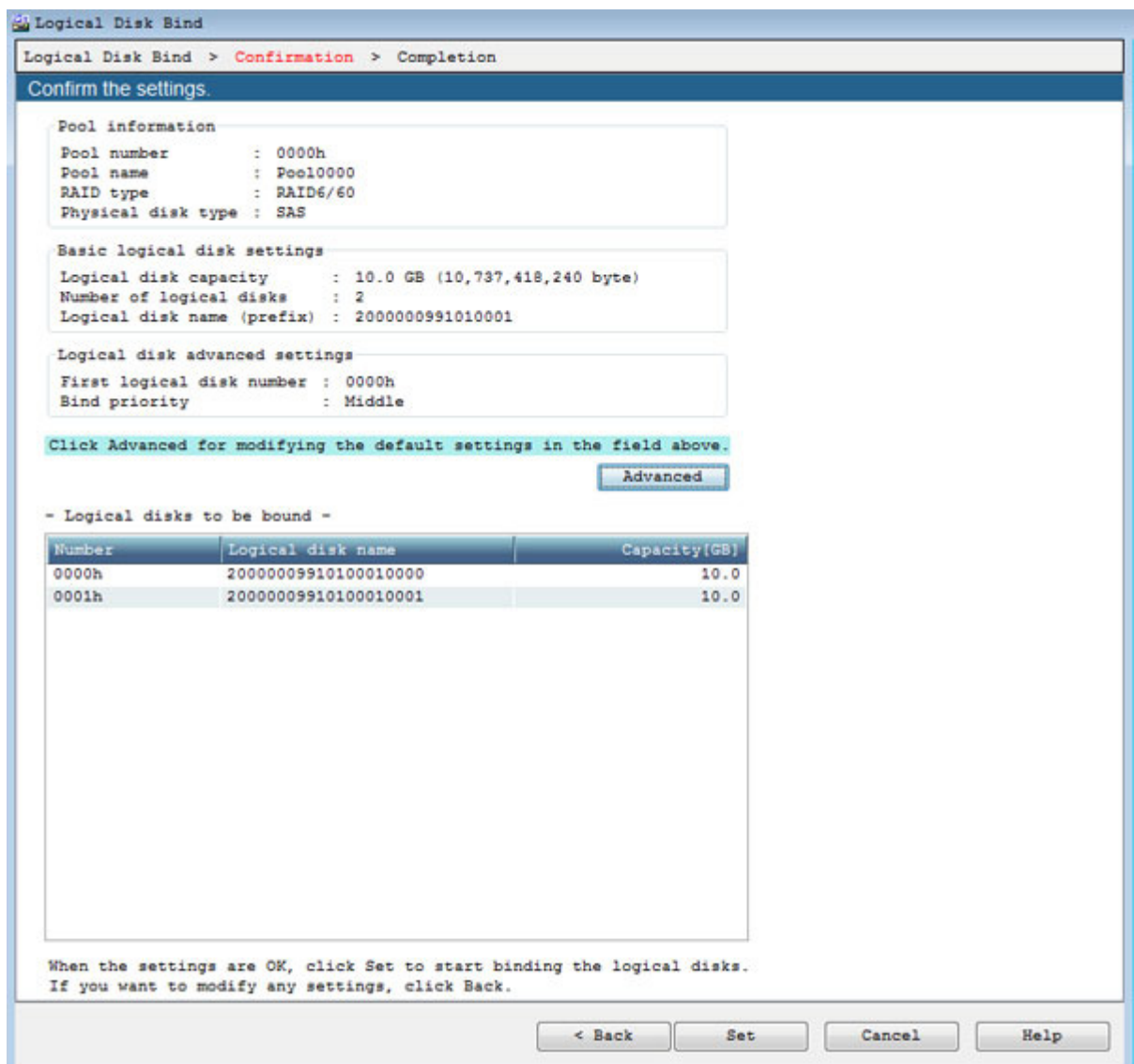
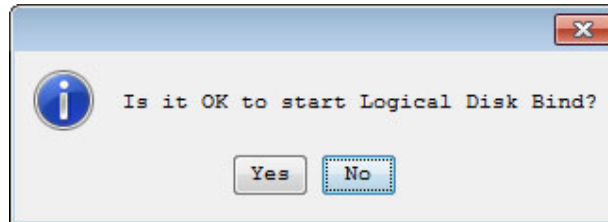


Figure 5-20: Logical Disk Bind - Confirmation

Parameter	Description
Pool information	Displays pool information.
Basic logical disk settings	Displays the basic settings to be used for binding logical disks.
Logical Disk Advanced Settings	Displays default advanced settings to be used for binding a logical disk.
Advanced	Click Advanced to modify the default settings displayed under Logical disk advanced settings .
Logical disks to be bound	Displays the details of the logical disks to be bound.

Perform the following steps for binding a logical disk.

1. The settings of the logical disk to be bound are listed. Confirm the settings.
2. To perform advanced settings, click **Advanced**.
3. After confirming the settings, click **Set** to display the following confirmation message.



4. Click **Yes** to perform the logical-disk binding.

5.3.4.3 Logical Disk Bind - Completion

The result of the logical disk binding appears.

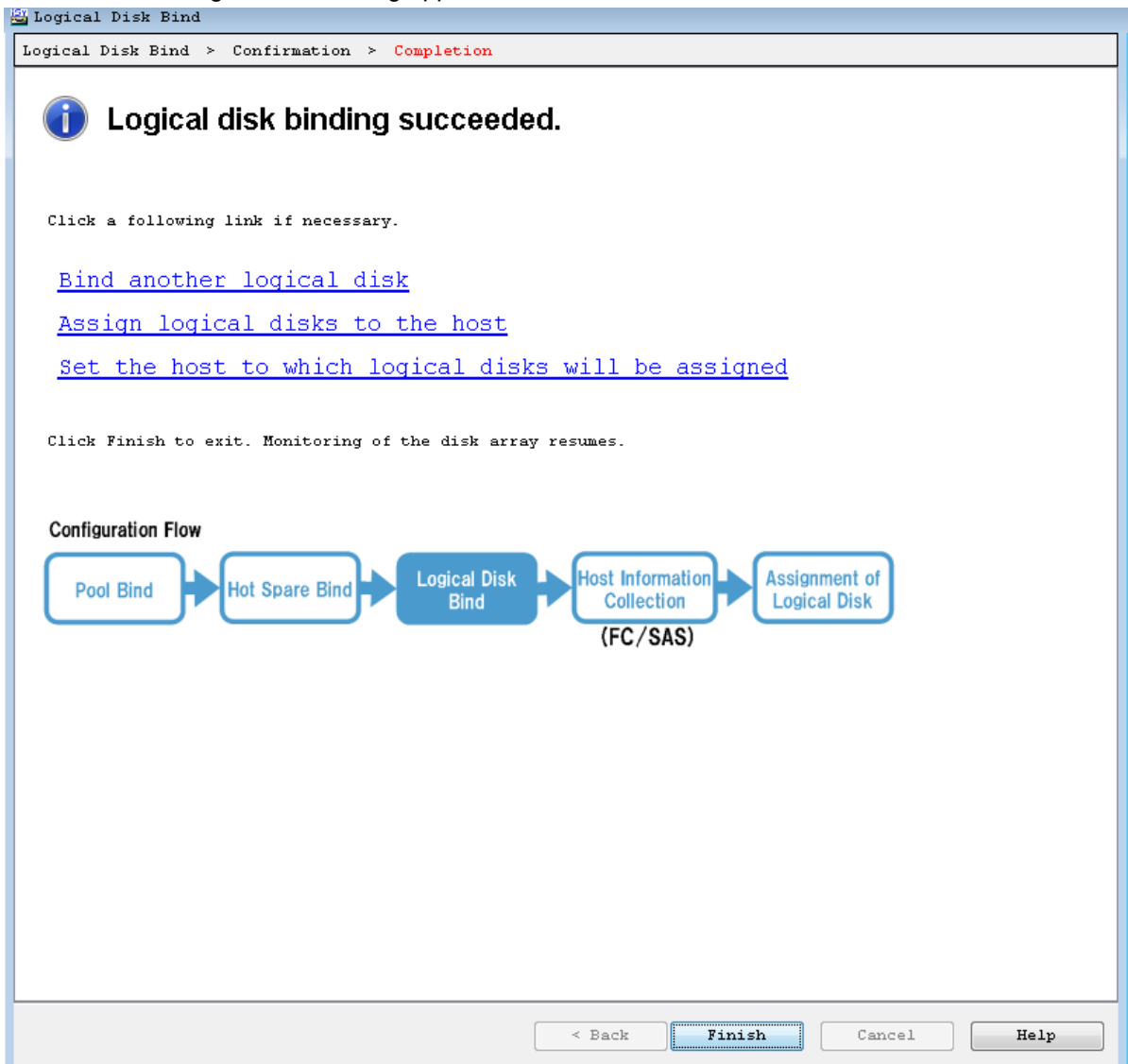


Figure 5-21: Logical Disk Bind - Completion

Parameter	Description
Bind another logical disk	Click this hyperlink to reopen the Logical Disk Bind page for another logical disk binding.
Set the host to which logical disks will be assigned	Click this hyperlink, to open the Host Information Collection page.
Assign logical disks to the host	Click this hyperlink to open the Assignment of Logical Disk page.

Click **Set the host to which logical disks will be assigned** to retrieve the information of the host to which logical disks that have been bound are assigned.

5.3.5 Collecting Host Information

5.3.5.1 Host Information Collection

Select how to collect host information.

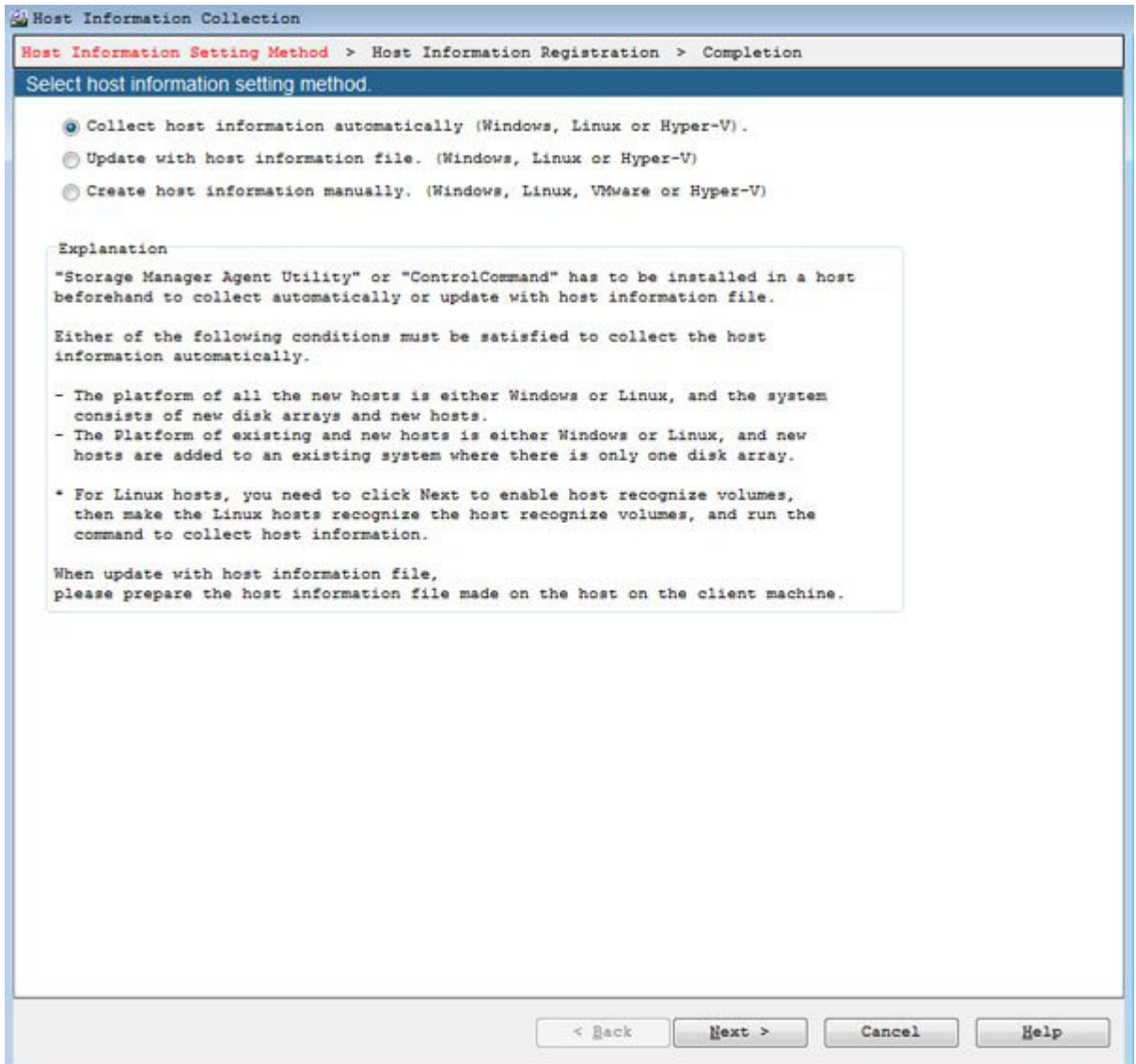
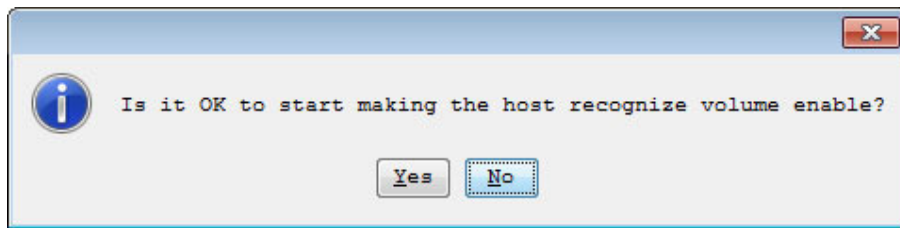


Figure 5-22: Host Information Collection - Setting Method

Parameter	Description
Collect host information automatically (Windows, Linux or Hyper-V).	Select this option to retrieve host information automatically by showing the volume for information retrieval to all hosts.

Parameter	Description
Update with host information file.(Windows, Linux or Hyper-V)	Select this option to configure host information by using the files for host information retrieved on application servers.
Create host information manually. (Windows, Linux, VMware or Hyper-V)	Select this option by manually entering interfaces with hosts, host names, platforms, WWPNs, and port numbers to configure host information.

Select **Collect host information automatically (Windows or Linux)** and click **Next**. The confirmation dialog box appears.



Click **Yes**. The **Host Information Collection - Registration** screen appears.

5.3.5.2 Host Information Collection- Registration

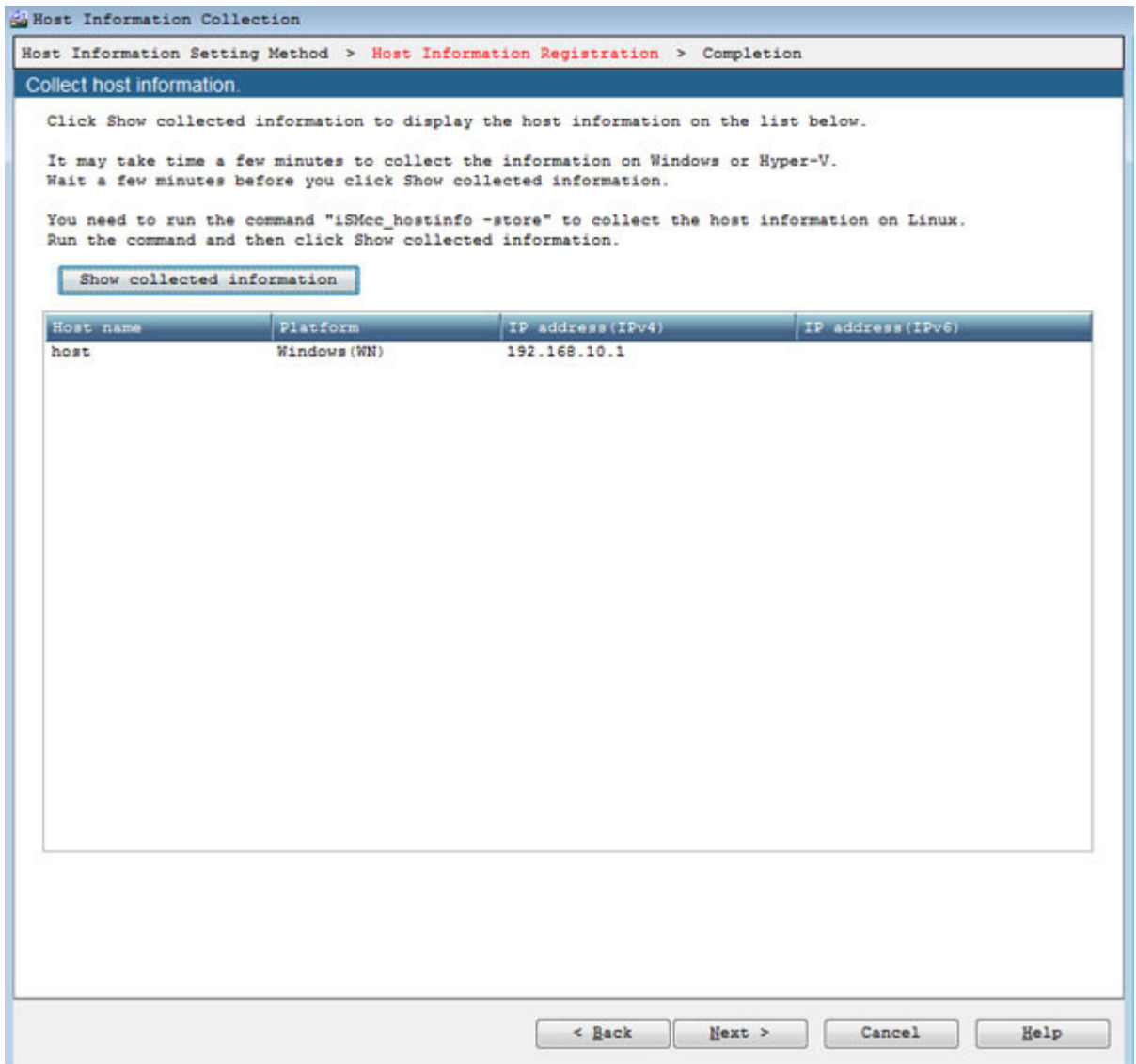


Figure 5-23: Host Information Collection - Registration

Parameter	Description
Show collected information	Click this button to retrieve the host information collected by the disk array unit.

Confirm whether the information on all the hosts is retrieved, and then click **Yes**.



- On Windows, it may take a few minutes to retrieve information. Wait for a few minutes before clicking **Show collected information**.
 - On Linux, run the command to register the host information on hosts before clicking **Show collected information**.
 - Depending on connected switches or HBA settings of hosts, link up may fail or take time, which result in failure of host information retrieval. For more details, see [Section 9.1: "Troubleshooting According to Device Conditions"](#).
-

5.3.5.3 Host Information Collection - Completion

The result of the logical-disk binding appears.

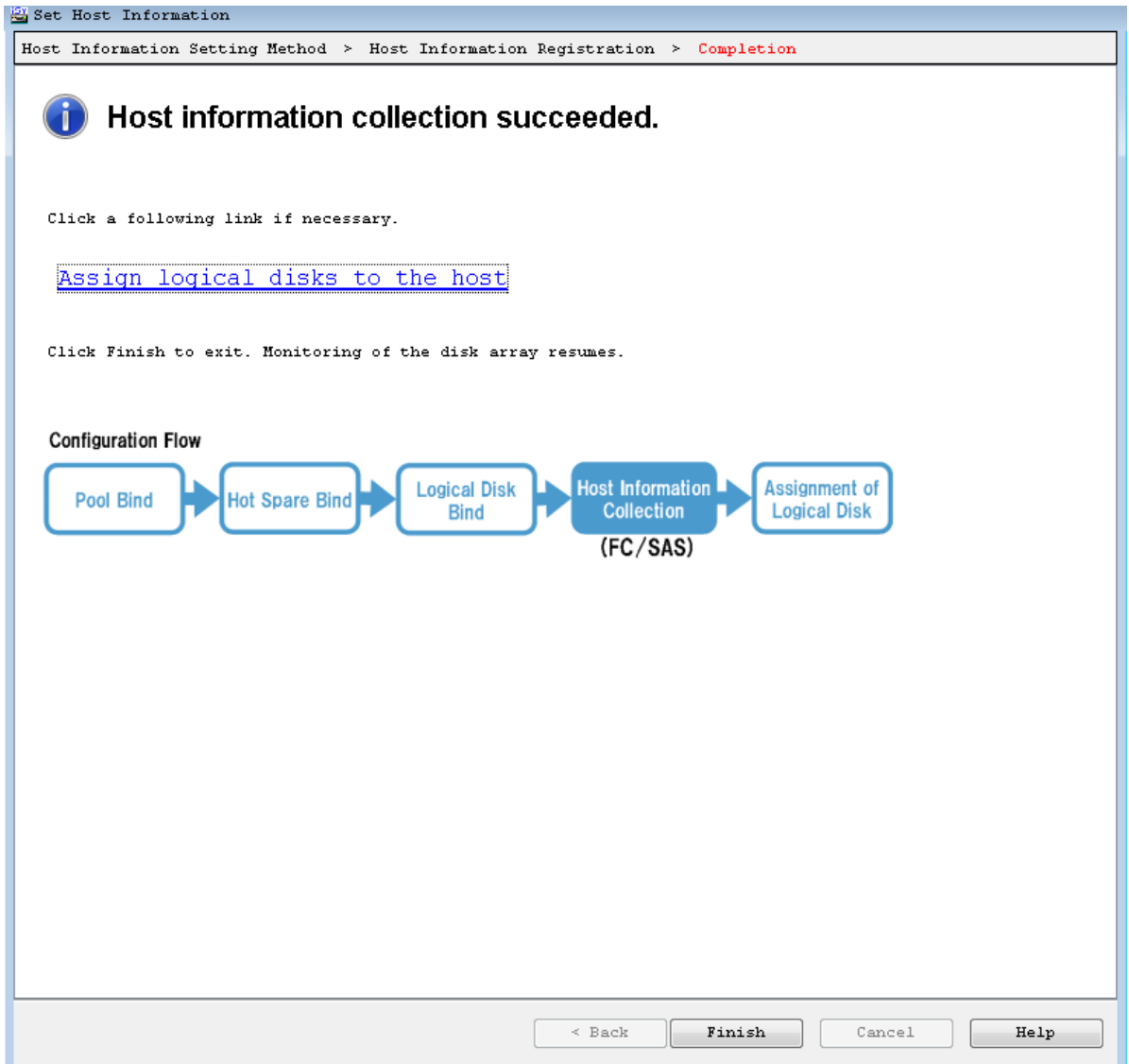


Figure 5-24: Host Information Collection - Completion

Parameter	Description
Assign logical disks to the host	Click this hyperlink to assign the bound logical disks to hosts whose information has been retrieved.

5.3.6 Assigning Logical Disks

5.3.6.1 Assignment of Logical Disk

Assign logical disks to hosts.

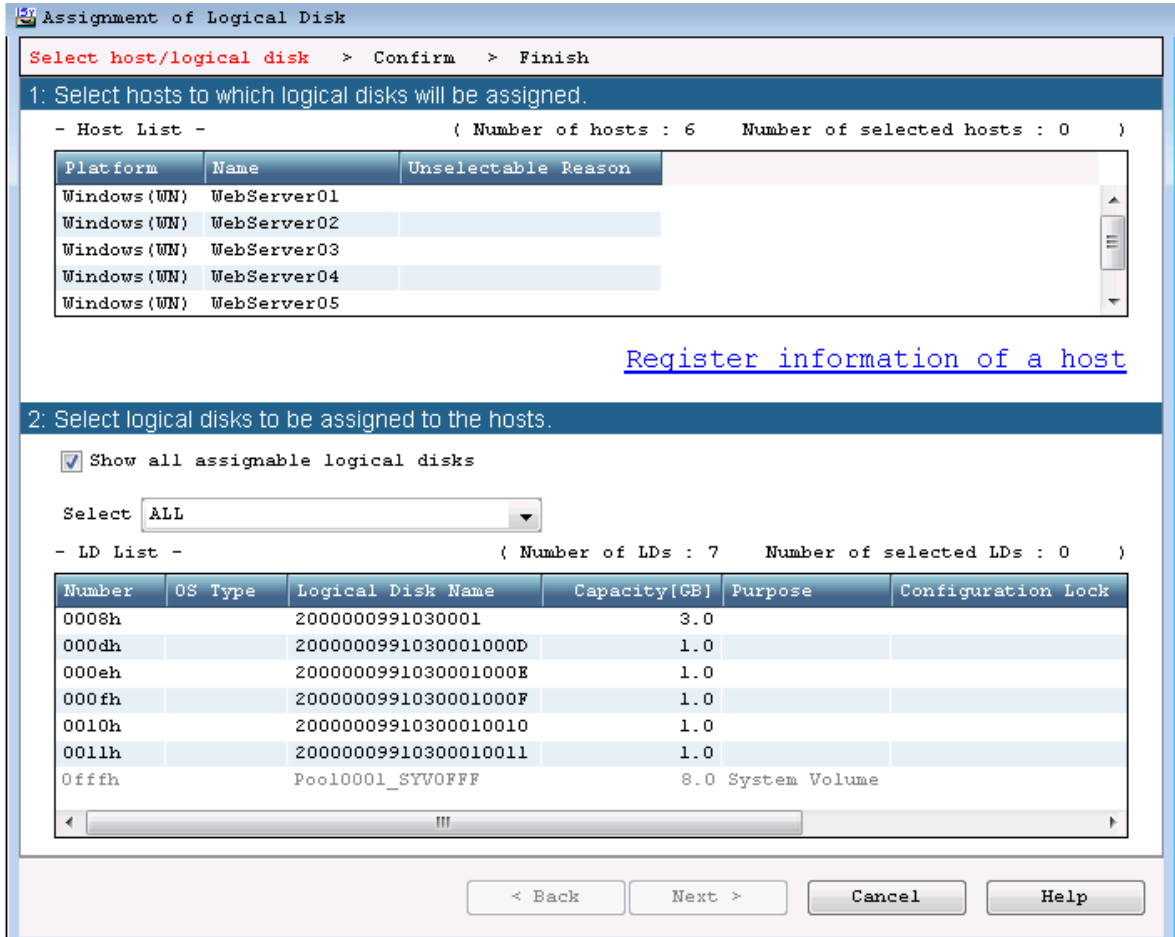


Figure 5-25: Assignment of Logical Disk

Parameter	Description
Host List	Displays hosts registered with the disk array. Click a host to which you want to assign logical disks.
Register information of a host	Click this hyperlink if you cannot find the target host listed in the Host list and want to jump to the Host Information Collection page.
Show all assignable logical disks	Select this check box to display all logical disks that can be assigned.

Parameter	Description
Select drop-down list	Select the logical disk list display type from the drop-down list.
LD List	Displays the list of logical disks bound in the disk array. Click a logical disk you want to assign.



- The display items can be sorted, however, the order cannot be changed.
- Multiple logical disks can be selected at the same time.

Perform the following steps:

1. Select hosts from the **Host List** to which logical disks will be assigned.
2. Select logical disks from the **LD List** to which hosts will be assigned.
3. Click **Next**.

5.3.6.2 Assignment of Logical Disk - Confirm

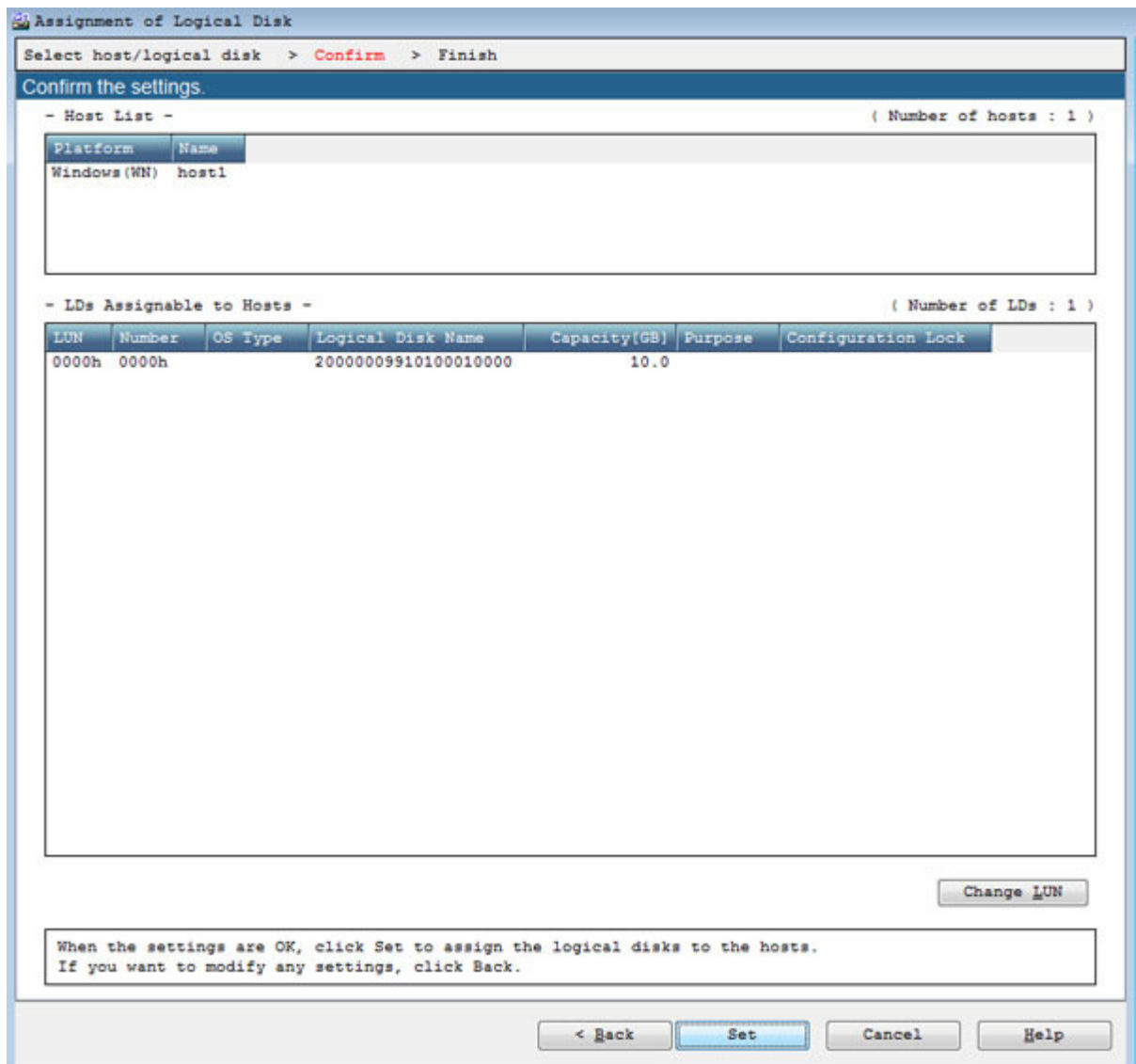


Figure 5-26: Assignment of Logical Disk - Confirm

Parameter	Description
Host List	Displays the hosts to which logical disks will be assigned.
LDs Assignable to Host	Displays logical disks to be assigned to the host.
Change LUN	Click this button to open the LUN Settings page, which allows configuring LUN (Logical Unit Number) setting.

Check the setting and click **Set** to perform the logical disk assignment. When the assignment is completed, the completion page appears.

5.3.6.3 Assignment of Logical Disk - Finish

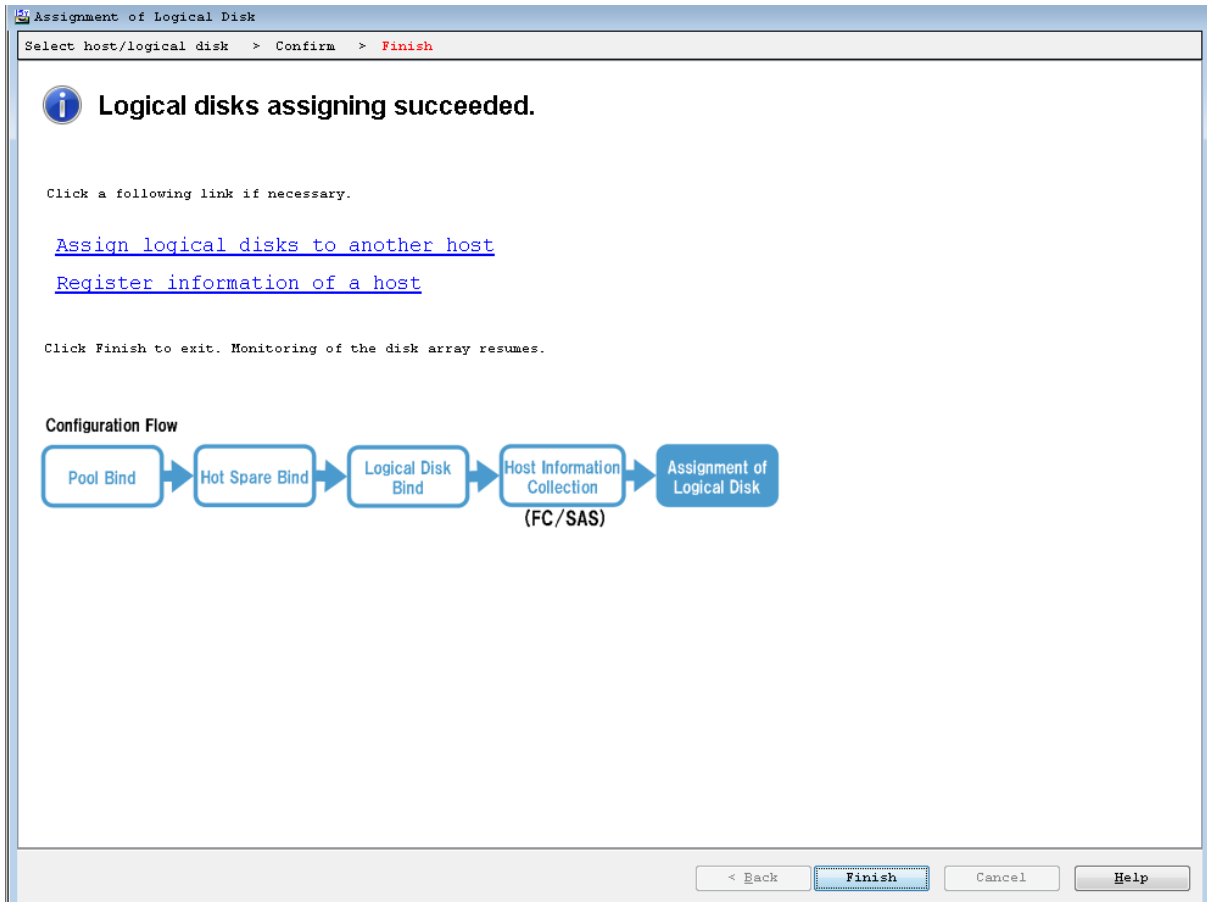


Figure 5-27: Assignment of Logical Disk - Finish

Parameter	Description
Assign logical disks to another host	Click this hyperlink to assign another logical disk to the host.
Register information of a host	Click this hyperlink to open the Host Information Collection page.

The initialization is now complete. Click **Finish**.

5.4 Checking Connection from Application Servers

Check connection from the application servers by following the procedure described in one of the following:

- For a Windows environment, see [Section B.3: “Checking Connection from Application Server”](#).
- For a Linux environment, [Section D.3: “Checking Connection from Application Server”](#).

Chapter 6 Initializing a Disk Array (iSCSI)

This chapter describes how to initialize a disk array configured for iSCSI connection.

In this chapter

[“Overview” on page 148](#)

[“Initialization by Storage Manager” on page 149](#)

6.1 Overview

To set FC connection first in a disk array configured for both FC and iSCSI connections, see [Chapter 5, "Initializing a Disk Array \(FC\)"](#) to make the setting and then perform the procedure in this chapter.

To set iSCSI connection first, perform the procedure in this chapter and then see [Chapter 5, "Initializing a Disk Array \(FC\)"](#) to make setting.



To initialize a disk array configured for FC connection, see [Chapter 5, "Initializing a Disk Array \(FC\)"](#).

The initialization consists of:

1. Initializing the disk array by using the initialization wizard

Use the initialization wizard to make the basic settings of disk array.

For details about the procedure, see [Section 6.2.1: "Initialization Wizard"](#).

2. Setting by using iSCSI Setup Tool

Use the iSCSI Setup Tool to make the setting required for the application server.

For details about the procedure, see [Section 6.2.2: "iSCSI Setup Tool"](#).

3. Binding pool

Bind a pool in the disk array.

For details about the procedure, see [Section 6.2.3: "Binding a Pool"](#).

4. Binding hot spare

Bind hot spare. This step is not required unless a hot spare is bound.

For details about the procedure, see [Section 6.2.4: "Binding a Hot Spare"](#).

5. Binding logical disk

Bind logical disks.

For details about the procedure, see [Section 6.2.5: "Binding Logical Disk"](#).

6. Assigning the logical disks to application servers

Assign the logical disk to the application servers.

For details about the procedure, [Section 6.2.6: "Assigning Logical Disk"](#).

7. Checking connection from the application servers

Check that the application servers to which the logical disk has been assigned can access the disk array.

6.2 Initialization by Storage Manager

6.2.1 Initialization Wizard

6.2.1.1 Overview

Use initialization wizard to make the basic settings of a disk array.

Operations to be performed on the initialization wizard are:

- Set the disk array subsystem name
Change and/or confirm a disk array subsystem name.
- Set time
Set time by configuring the NTP server, or manually.
- Unlock licenses
Unlock the license.
- Set host connection ports
Set host connection ports.
- Set iSNS server
Register the iSNS server information for setting the iSNS server.

6.2.1.2 Start Initialization Wizard

Click **Configuration** and **Initialization** on the left pane to open the menu. Then click **Start** to start the initialization wizard.

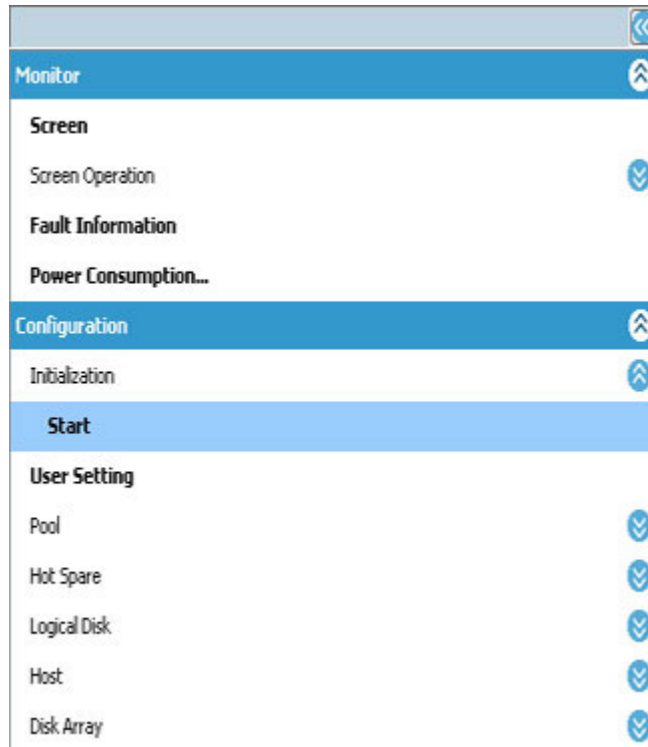
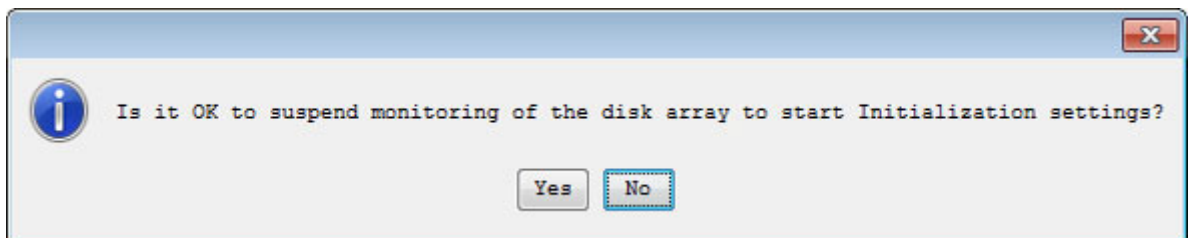


Figure 6-1: Starting Initialization Wizard

Before the initialization starts, the following confirmation message appears.



Click **Yes** to start the Initialization Wizard.

6.2.1.3 Welcome to Initialization Wizard

When the Initialization Wizard starts, perform the settings as prompted.

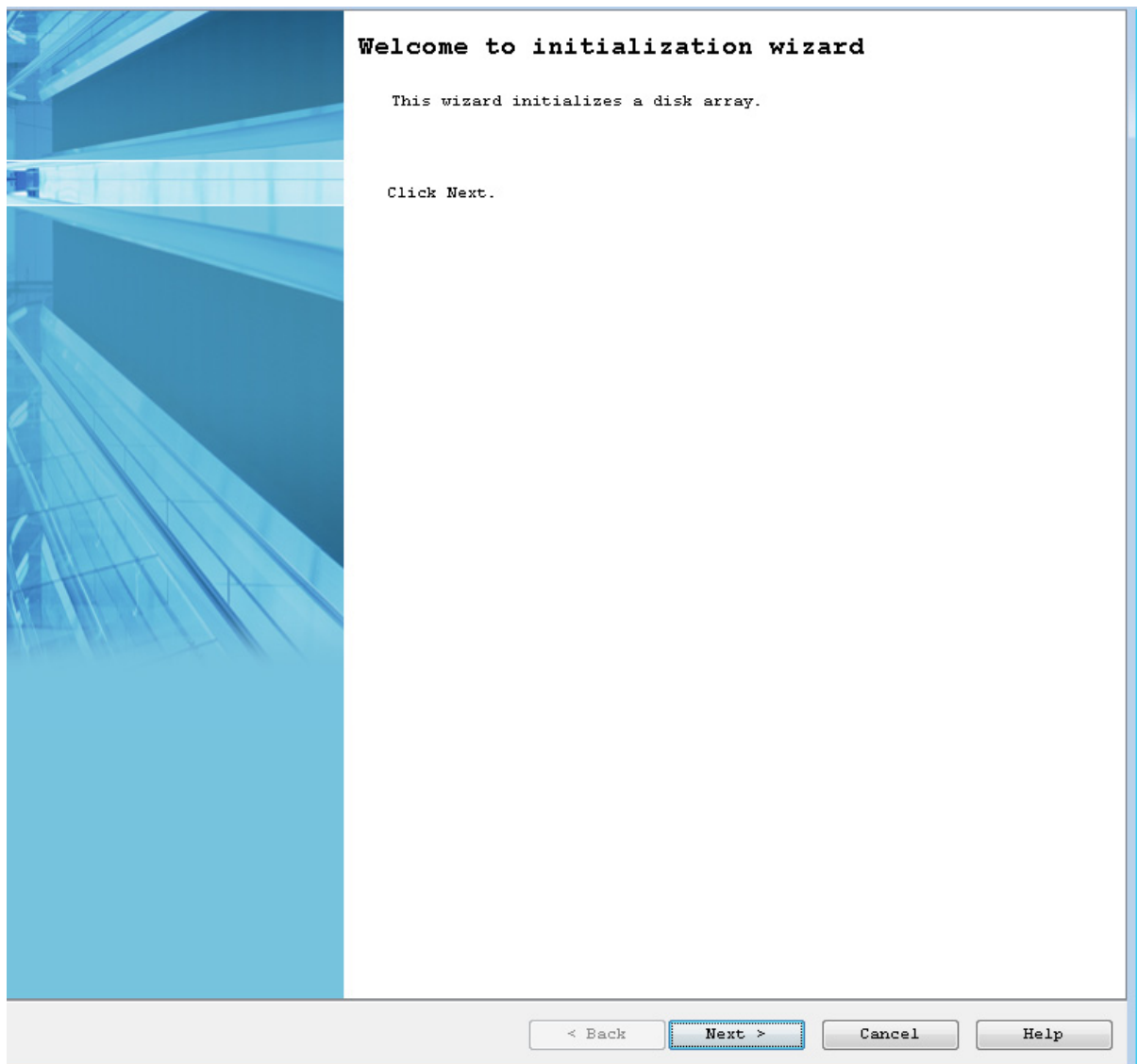


Figure 6-2: Welcome to Initialization Wizard

Click **Next**.

6.2.1.4 Set Disk Array Subsystem Name

You can change the disk array name.

Set Disk Array Subsystem Name > Set Time > Unlock License >
Host connection port parameters (iSCSI) > Set iSNS Server > Finish

Set Disk Array Subsystem Name.

Product ID : M100 Disk Array
Serial Number : 0000000991010010
Disk Array Subsystem Name : 0000000991010010
New Disk Array Subsystem Name :

< Back Next > Cancel Help

Figure 6-3: Set Disk Array Subsystem Name

Parameter	Description
Product ID	Displays the product ID of the disk array.
Serial Number	Displays the serial number of the disk array.

Parameter	Description
Disk Array Subsystem Name	Displays a name to identify the disk array subsystem.
New Disk Array Subsystem Name	By default, displays the current disk array subsystem name. To change this name, enter a new disk array subsystem name.

Perform the following steps to change a disk array name:

1. Enter a new name in the **New Disk Array Subsystem Name** box.
2. Confirm the name and click **Next**.

6.2.1.5 Set Time

Set Disk Array Subsystem Name > **Set Time** > Unlock License >
Host connection port parameters (iSCSI) > Set iSNS Server > Finish

State

Current time :
Apr 26, 2011 1:41:52 PM

NTP server :
Not synchronized

Select a time setting method.

Synchronize the time with the NTP server.
 Set the time manually.
 Don't set the time now.

Explanation

If you select "Set the time manually" while the time is synchronized with the NTP server, synchronization with the NTP server is cancelled.

< Back Next > Cancel Help

Figure 6-4: Set Time

Parameter	Description
State	Displays the date and time currently set for the disk array and the status of synchronization with the NTP server.
Synchronize the time with the NTP server.	Select this option to move on to the NTP setting page.

Parameter	Description
Set the time manually.	Select this option to move on to the manual time setting page.
Don't set the time now.	Select this option to move on to host port settings without setting time.

To configure a time using NTP, select **Synchronize the time with the NTP server** and click **Next**.



For the procedure when the **Set the time manually** option is selected, see *Storage Manager Configuration Setting Tool User's Manual (GUI) for the M Series*.

Set Time - NTP server

Configure the NTP settings.

Set Disk Array Subsystem Name > Set Time > Unlock License > Host connection port parameters (iSCSI) >
 Set iSNS Server > Finish

Set the IP addresses with the NTP server.

NTP server

IP version

IP address

NTP server

IP version

IP address

NTP server

IP version

IP address

Explanation

You can specify up to three NTP servers.

< Back Next > Cancel Help

Figure 6-5: Set Time - Setting NTP Server

Parameter	Description
IP Address	Specify the IP addresses of the NTP servers.

To set NTP server, enter the required information and click **Next**.

Parameter	Description
License key	Enter a license key and click Add to register the key with the License key list .
Add	Click this button to register the entered License key with the License key list .
Licence key list	Displays a list of entered license keys.
Delete	Click this button to delete license keys selected in the License key list .

To unlock the licenses, enter all the license keys to be unlocked and click **Next**.

6.2.1.7 Set host connection port parameters (iSCSI)

Set host connection ports for the disk array.

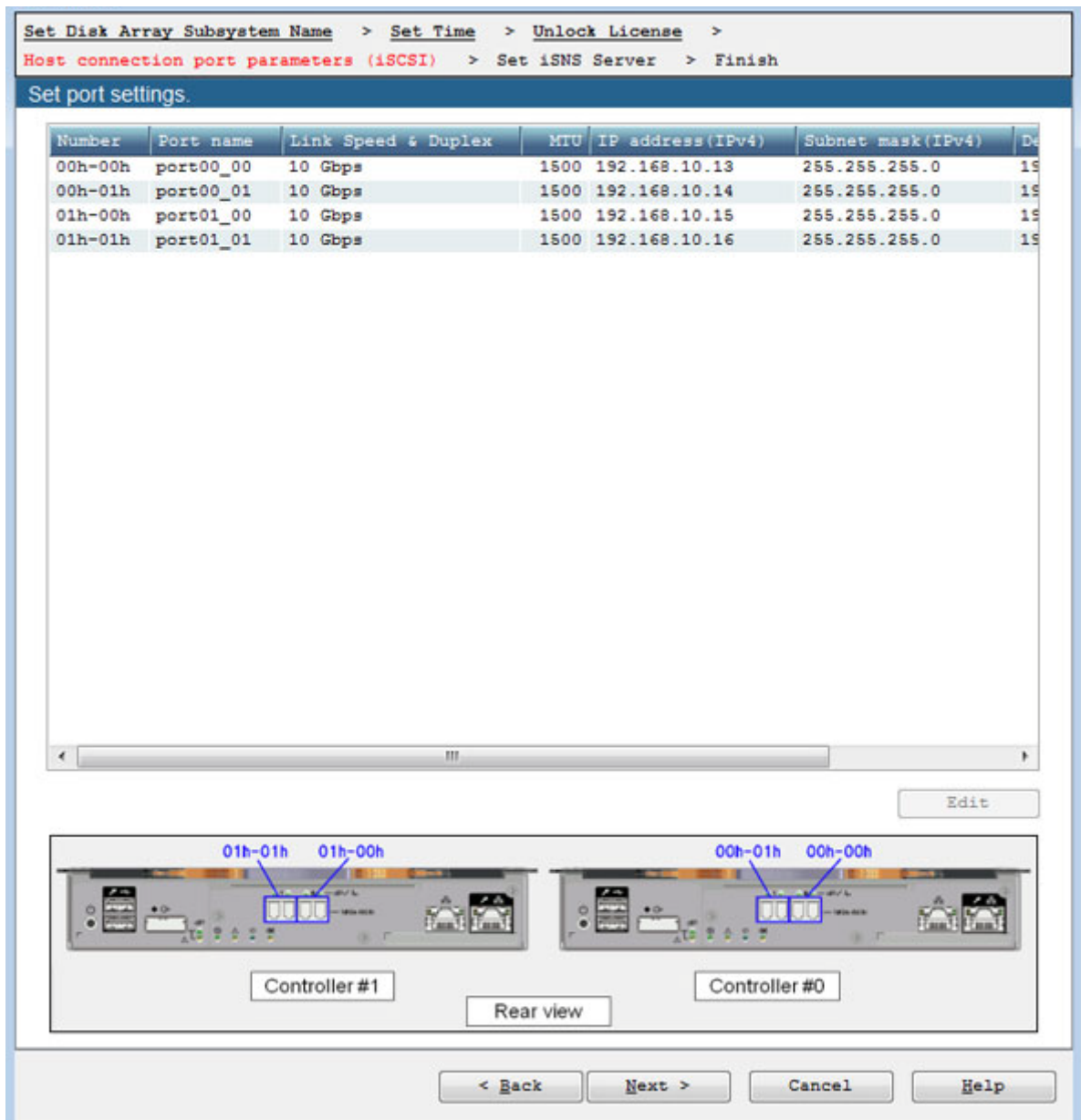


Figure 6-7: Host Connection Port Parameters (iSCSI)

Parameter	Description
Edit	Select a port from the host connection port list and click Edit . The dialog box for editing the settings of the selected port appears. To change the settings for another port, select the port to edit from the host connection port list and click Edit .

When editing the settings of host connection ports is completed, click **Next** on the Host connection port parameters (iSCSI) page.

The screenshot shows a 'Setting' dialog box with the following parameters:

- Port number : 01h-01h
- Port name : port01_01
- Link Speed & Duplex : 10 Gbps
- MTU : 1500
- IPv4
 - IP address : 192 . 168 . 10 . 16
 - Subnet mask : 255 . 255 . 255 . 0
 - Gateway address : 192 . 168 . 10 . 1

Buttons: OK, Cancel, Help

Figure 6-8: Host Connection Port Parameters (iSCSI) - Setting

Parameter	Description
Port number	Displays unique number for the port.
Port name	Specify a port name.
Link Speed & Duplex	Displays the value of the link speed duplex. These values cannot be changed.
MTU	Select a MTU (Maximum Transmission Unit) size from the drop-down list. Change the size according to the network environment in use. The default value is 1500.
IP address	Specify an IP address to be set for the port.
Subnet mask	Specify a subnet mask or subnet prefix to be set for the port.
Gateway address	Specify a gateway address to be set for the port.

Clicking **OK** applies the change of settings to the list.

When you click **Next** after changing the port settings as needed, the port settings are made.



Please perform another setup after waiting about 30 seconds after processing when a setup or change of an IP address is made. When MTU is changed, communication with other ports in addition to the iSCSI port may temporarily be interrupted.

6.2.1.8 Set iSNS Server

When any iSNS server is used, register the iSNS server information.

Set Disk Array Subsystem Name > Set Time > Unlock License >
Host connection port parameters (iSCSI) > **Set iSNS Server** > Finish

Configure the iSNS Server settings.

- iSNS server IP address and port number list -

iSNS Server Information	IP address 1	Port number 1	IP address 2	Port number 2
iSNS Server1	192.168.10.21	3205	192.168.10.22	3205
iSNS Server2	192.168.10.31	3025	192.168.10.32	3025
iSNS Server3	192.168.10.41	3025	192.168.10.42	3025
iSNS Server4	192.168.10.51	3025	192.168.10.52	3025

Buttons: Add, Edit, Delete

Explanation

The disk array tries connecting to all iSNS servers registered from all ports.
The target is registered only in iSNS that can be connected.

Buttons: < Back, Next >, Cancel, Help

Figure 6-9: Set iSNS Server

Parameter	Description
iSNS server IP address and port number list	Displays the IP address and port number of the iSNS server.
Add	Click this button to add iSNS server information. This information appears on the iSNS server IP address and port number list .
Edit	Select an iSNS server from iSNS server IP address and port number list and click Edit to modify the iSNS information.
Delete	Select an iSNS server from iSNS server IP address and port number list and click Delete to remove the iSNS server.

Perform any of the following steps:

- To set the iSNS servers to be monitored by the disk arrays supporting iSCSI, click **Add** to enter the necessary information. Then click **Next** to go on to **Finish initialization wizard** page.
- To not use the iSNS server, click **Next** to move on to license unlock procedure.

6.2.1.9 Finish Initialization Wizard

Confirm that the initialization is completed.

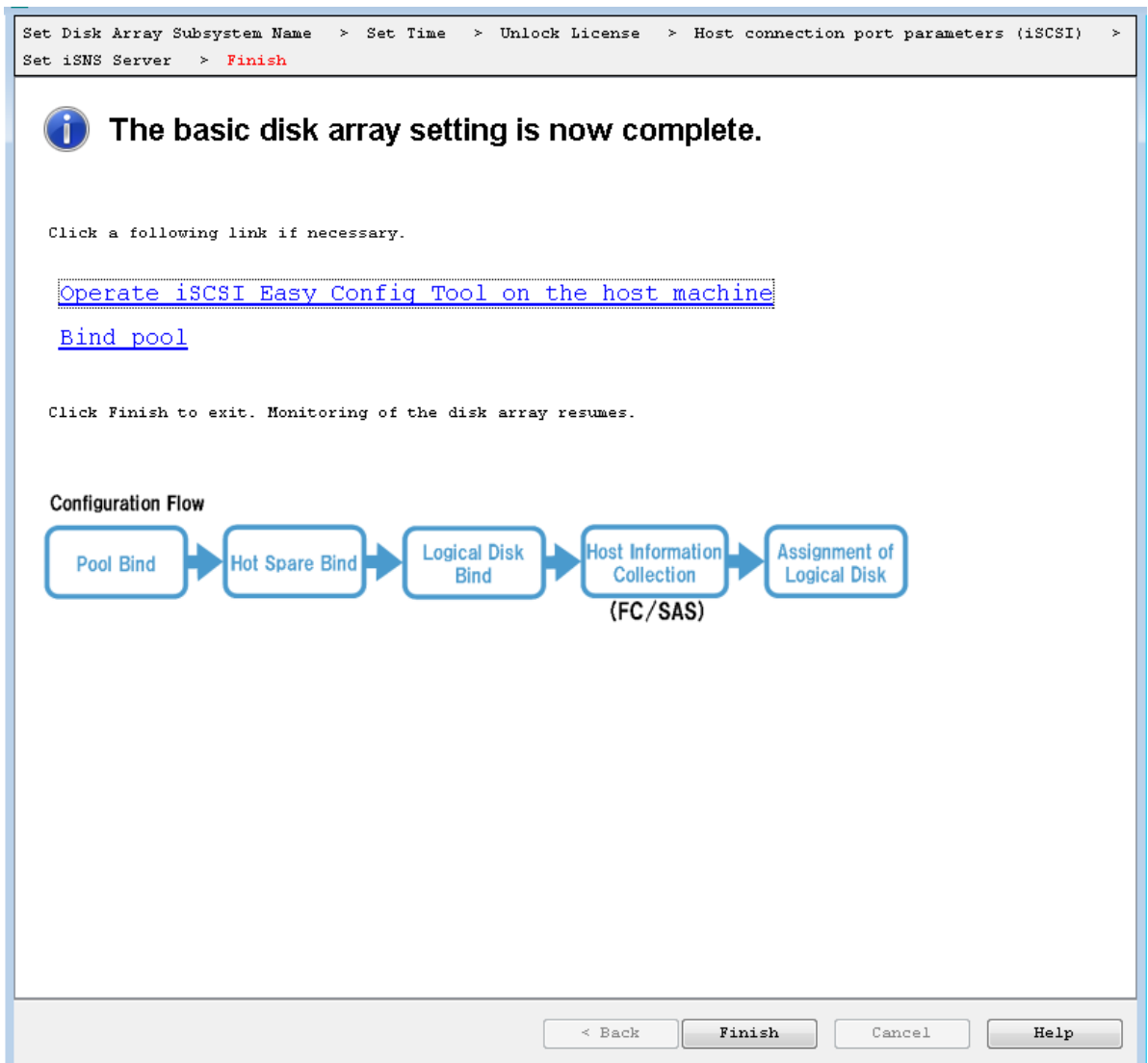


Figure 6-10: Finish Initialization Wizard

Parameter	Description
Operate iSCSI Easy Config Tool on the host machine	The initialization is suspended to perform initialization by using iSCSI Setup Tool.
Bind pool	When you click this hyperlink, the Pool Bind page appears to start pool binding.

Perform the following operations:

1. Click **Operate iSCSI Easy Config Tool on the host machine** to continue the initialization by using the iSCSI Setup Tool.
2. When the following window appears, see [Section 6.2.2: iSCSI Setup Tool](#) and perform initialization by using iSCSI Setup Tool. And then click **Bind pool** to bind pools.

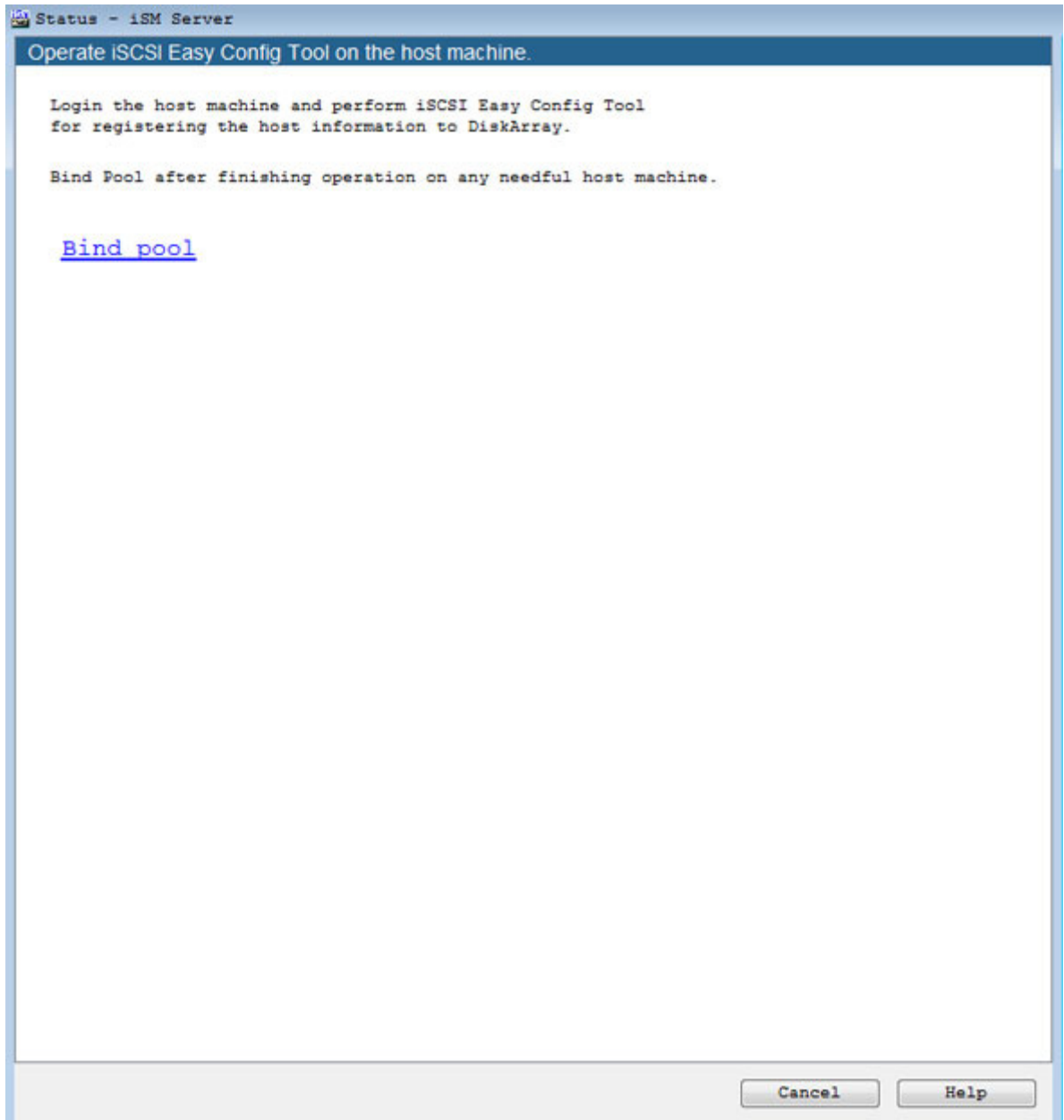


Figure 6-11: Status - Storage Manager Server

6.2.2 iSCSI Setup Tool

Use iSCSI Setup tool on application servers to configure the settings required on the application servers.

For details of the procedure, see either of the following sections according to the platform of the application servers.

- For Windows application servers, see [Section C.2: iSCSI Setup Tool](#).
- For Linux application servers, see [Section E.2: iSCSI Setup Tool](#).

6.2.3 Binding a Pool

Perform basic settings for binding a pool.

6.2.3.1 Pool Bind

The screenshot shows the 'Pool Bind' configuration window with the following steps and settings:

- Step 1:** Click Show pool list to see the pools that have been bound. A button labeled 'Show pool list' is present.
- Step 2:** Select the type of physical disks that configure a pool. The 'Physical disk type' dropdown is set to 'SAS'.
- Step 3:** Select RAID type. The 'RAID type' dropdown is set to 'RAID1/10'.
- Step 4:** Specify the number of physical disks that configure the pool and their capacity.
 - Auto disk selection: 'Number of physical disks (2-4)' is set to 2, and 'Physical disk capacity' is set to 914GB.
 - Manual disk selection: A button labeled 'Select physical disks' is present.

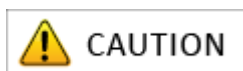
At the bottom, there is a 'Calculate pool capacity' button and a status line: 'Total capacity of the pool : 0 GB'. Navigation buttons at the bottom include '< Back', 'Next >', 'Cancel', and 'Help'.

Figure 6-12: Pool Bind

Parameter	Description
Show pool list	Click Show pool list to see the list of existing pools. Click Close pool list to hide the pool list.
Physical disk type	Select the type of physical disks to configure a pool.
RAID type	Select the RAID type of the pool.
Auto disk selection	Select the number of physical disks to be used from the Number of physical disks and the capacity per physical disk from Physical disk capacity . The selectable numbers of physical disks are: <ul style="list-style-type: none"> ■ RAID6(4+PQ): 6 disks or more ■ RAID6(8+PQ): 10 disks or more ■ RAID5(2+P): 3 disks or more ■ RAID5(4+P): 5 disks or more ■ RAID5(8+P): 9 disks or more ■ RAID-TM: 3 disks or more ■ RAID1: 2 disks or more
Manual disk selection	Select this option and click Select physical disks to manually select physical disks to be used for a pool.
Calculate pool capacity	Click this button to see the estimated capacity of the pool in Total capacity of the pool . When Physical disk type , RAID type , Number of physical disks , Physical disk capacity is changed, there is possibility that "calculating" is displayed temporarily under Total capacity of the pool .

Perform the following steps to bind a pool:

1. Select the type of physical disk from **Physical disk type**.
2. Select the type of RAID from the **RAID type** from the drop-down list menu.
3. Select the number of physical disk that configure the pool and their capacity using either **Auto disk selection** option or **Manual disk selection** option.



- When 61 or more physical disks configure a pool, pool expansion is automatically performed.
- The value for **Total capacity of the pool** displayed for a pool configuration with 61 or more physical disks is a rough estimate.

4. Click **Next** to move on to the page for confirming settings.

6.2.3.2 Pool Bind - Confirmation

The page for confirming the settings of pool binding appears. This screen lists the settings of the pool to be bound.

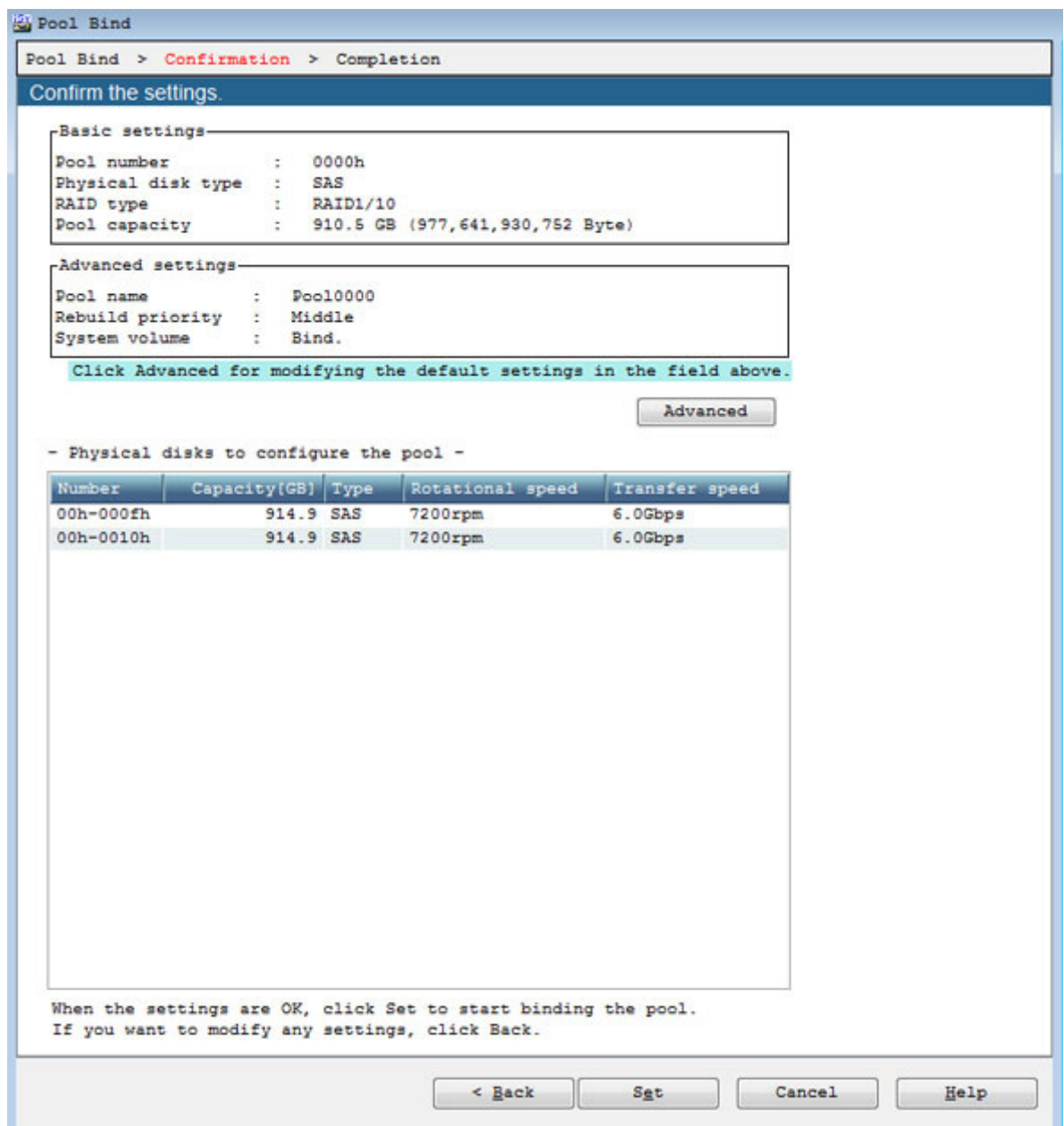
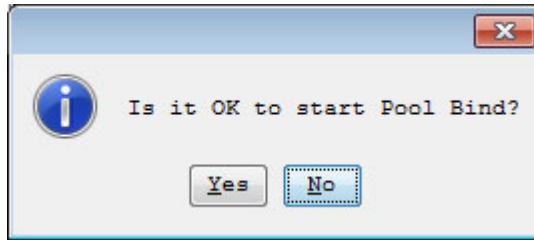


Figure 6-13: Pool Bind - Confirmation

Parameter	Description
Basic Settings	Displays basic settings to be used for binding a pool.
Advanced Settings	Displays default advanced settings to be used for binding a pool.
Advanced	Click Advanced to modify the default settings displayed under Advanced Settings .
Physical disks to configure the pool	Displays details of physical disks used to configure a pool.

Check if the list has any problems. If the list has no problems, click **Set** to display the confirmation dialog box.



Click **Yes** to perform pool binding. When the binding is completed, the completion page appears.



- When a physical disk to be used has stopped with the power saving function on, it takes time to bind the pool.
- When the first pool is bound, a system volume (8GB) is automatically created.

6.2.3.3 Pool Bind - Completion

When the pool binding is successfully completed, the result of pool binding appears.

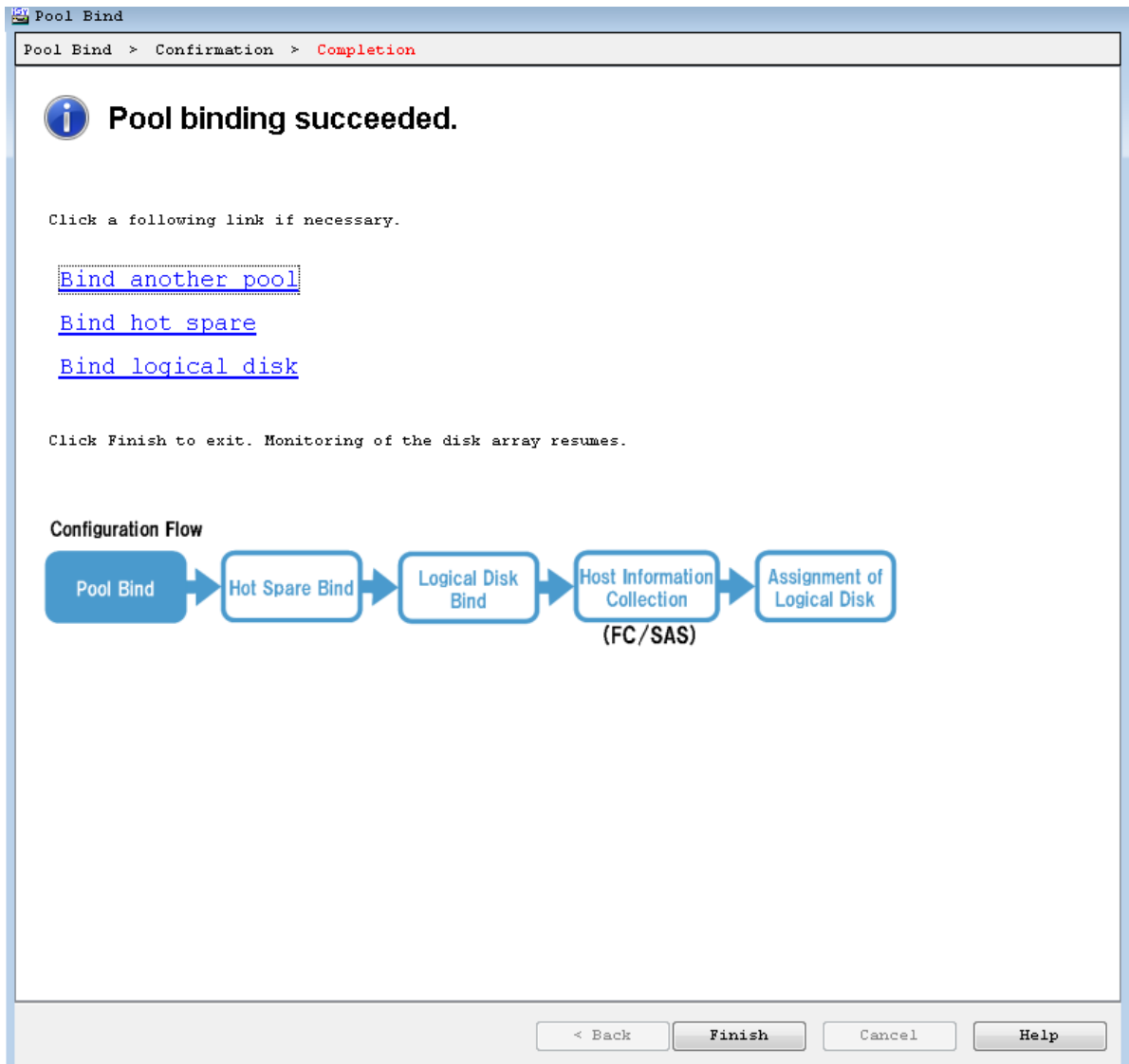


Figure 6-14: Pool Bind - Completion.

Parameter	Description
Bind another pool	Click this hyperlink to reopen the Pool Bind page to bind another pool.
Bind hot spare	Click this hyperlink to open the Hot Spare Bind page.
Bind logical disk	Click this hyperlink to open the Logical Disk Bind page.

Perform the following steps:

1. Click **Bind hot spare** to bind a hot spare.
2. If you do not want to bind a hot spare, click **Bind logical disk** to move on to logical disk binding.

6.2.4 Binding a Hot Spare

This section explains how to bind hot spare.

6.2.4.1 Hot Spare Bind

The **Hot Spare Bind** page has the view display and the list display. The displays can be switched by clicking the tabs.

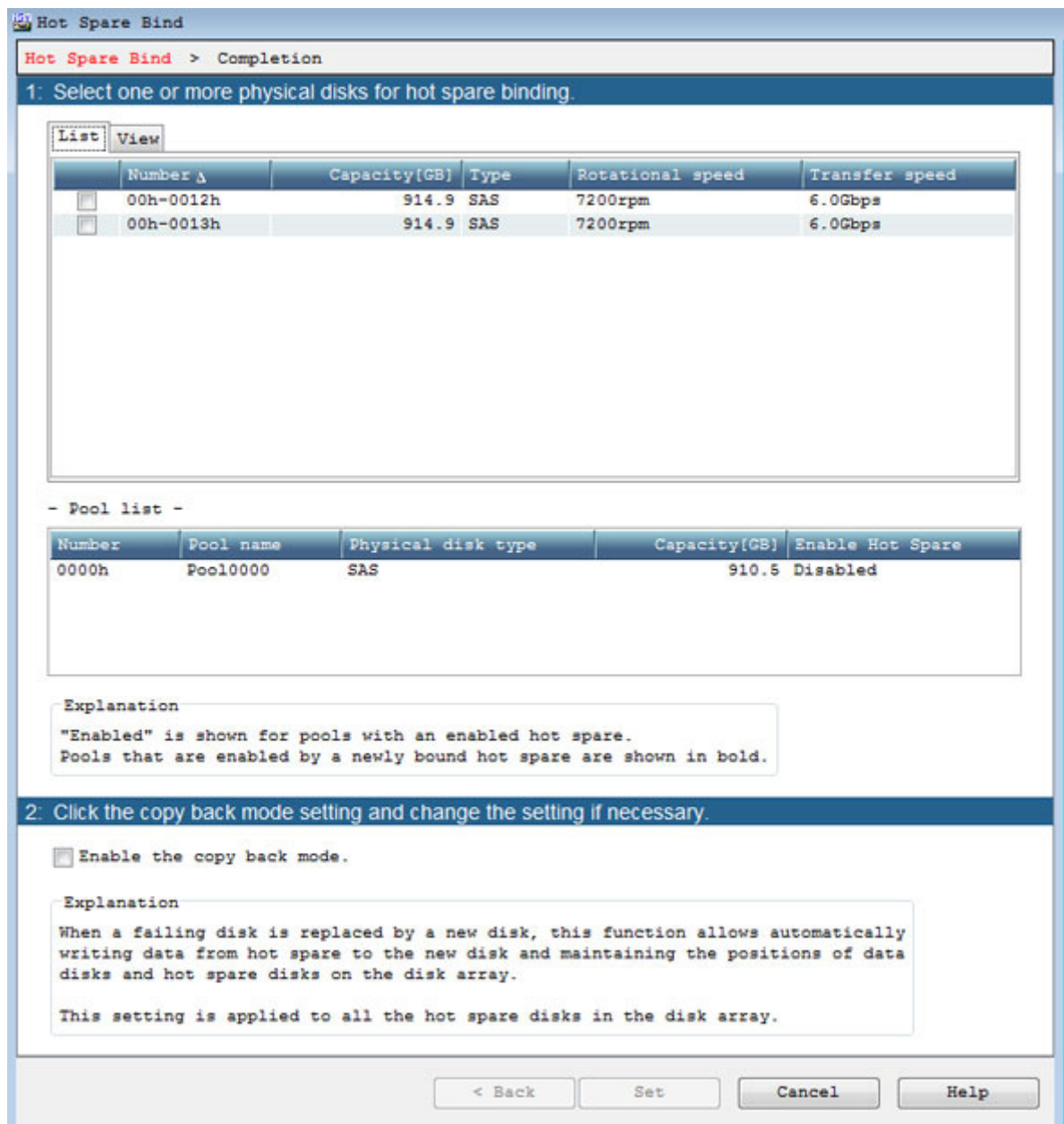


Figure 6-15: Hot Spare Bind - List Display

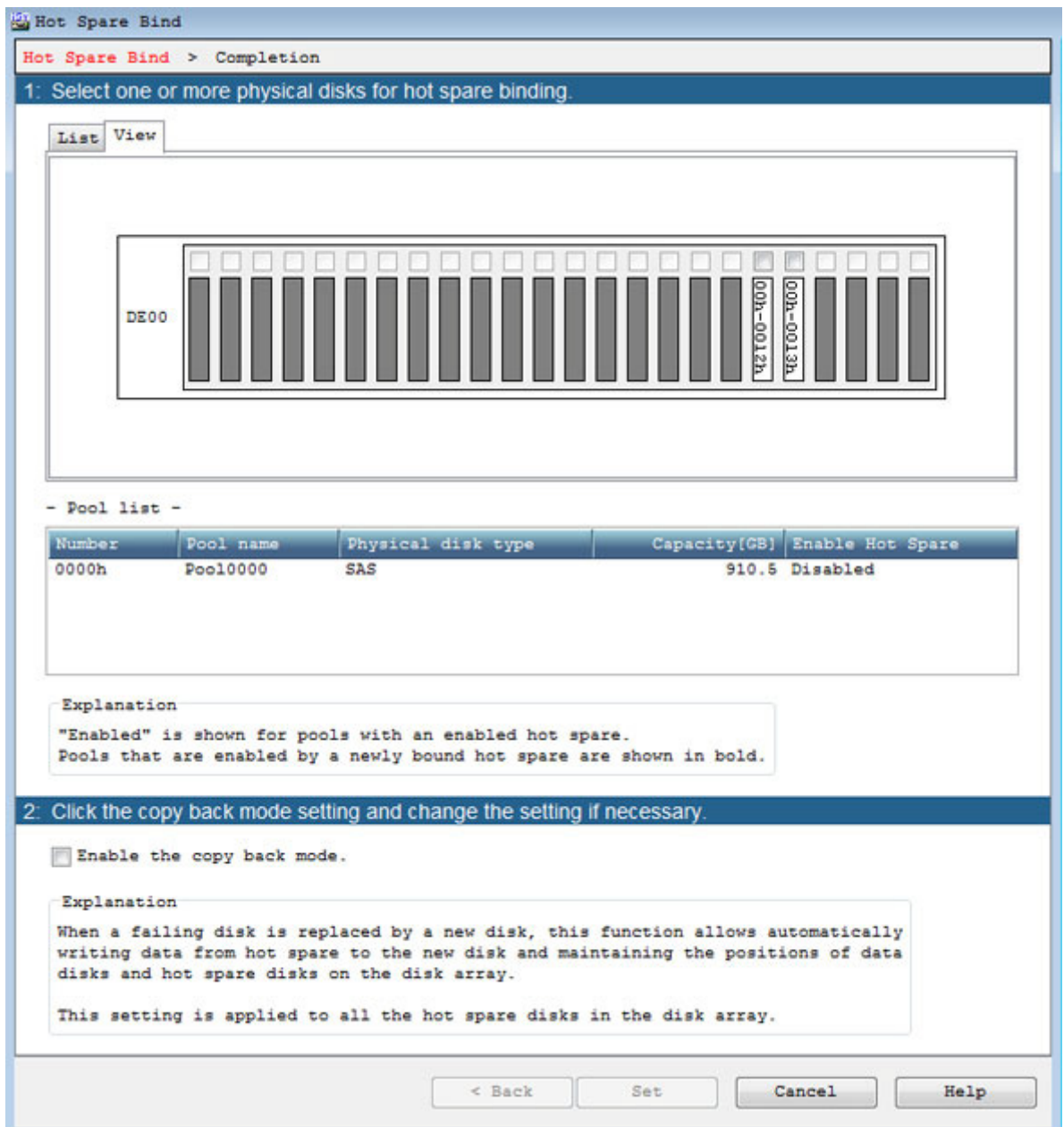


Figure 6-16: Hot Spare Bind - View Display

Parameter	Description
List	By default, the List view is displayed. The List view displays a list of physical disks available to bind a spare. Select the specified check box of the physical disk for which hot spare will be bound.
View	Click this tab for the visual display of physical disks available to bind a spare. Select the specified check box of the physical disk for which hot spare will be bound.
Pool list	Select a physical disk to create a hot spare. When you select the physical disk for hot spare binding, Enabled is displayed under the Enable Hot Spare field of the Pool list. Pools that are enabled by a newly bound hot spare are shown in bold letters.
Enable the copy back mode	Select this option to enable copy back mode. When a faulty disk is replaced by a new disk, copy back mode automatically copies back the data to the new disk.

Perform the following steps to bind a hot spare:

1. Select one or more physical disks for hot spare binding.



- For slots having no physical disks, the slot names and check boxes are grayed out in the visual display, and the slots are not listed in the list display.
- For physical disks for which a pool has been bound, the check boxes are grayed out in the visual display, and the disks are not listed in the list display.

2. Click **Set** to display the confirmation dialog box.



3. Click **Yes** to perform hot spare binding.

6.2.4.2 Hot Spare Bind - Completion

When the hot spare binding is completed, the result dialog box appears.

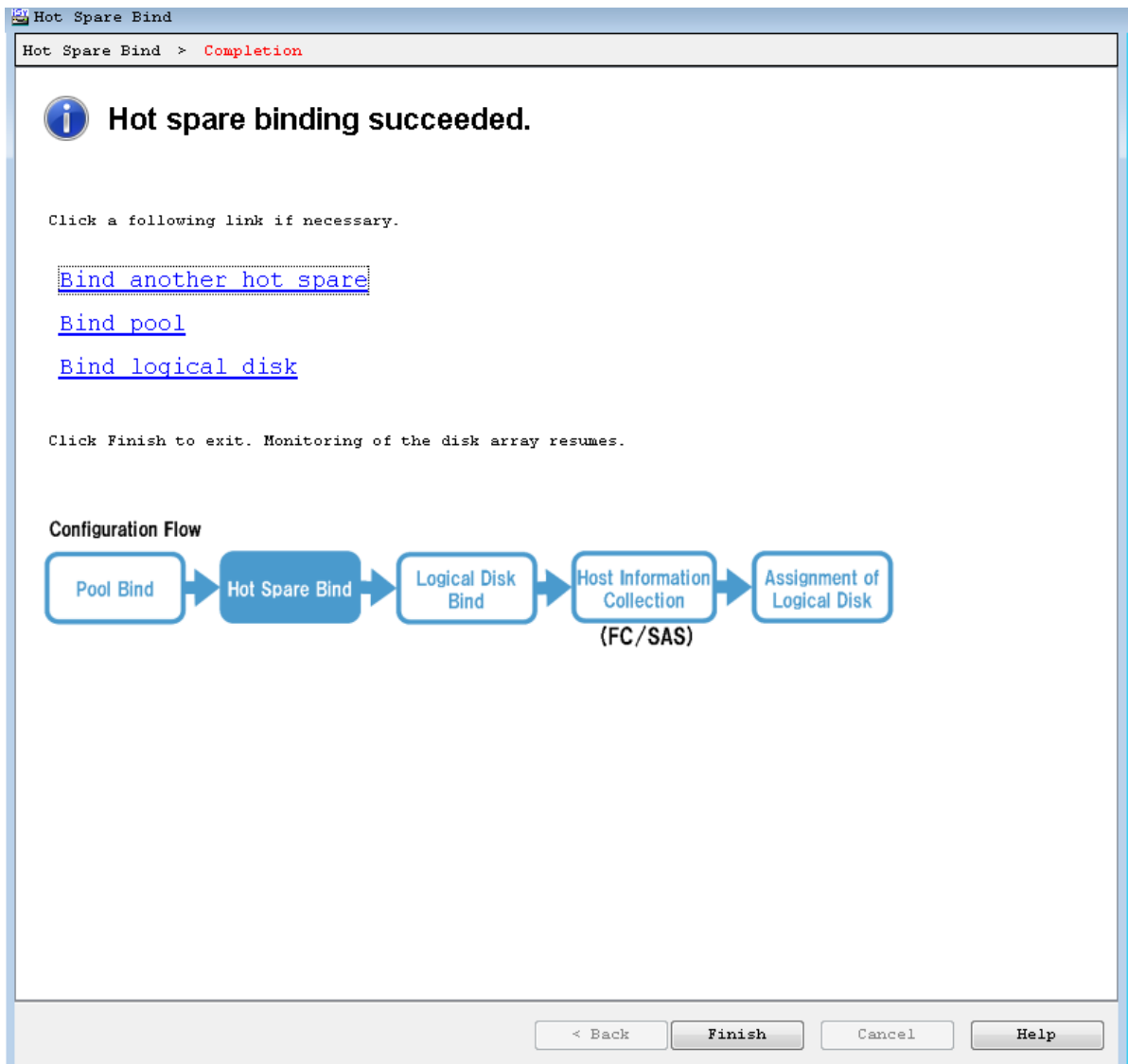


Figure 6-17: Hot Spare Bind - Completion

Parameter	Description
Bind another hot spare	Click this hyperlink to reopen the Hot Spare Bind page to bind another hot spare.
Bind pool	Click this hyperlink to open the Pool Bind page to bind another pool.
Bind logical disk	Click this hyperlink to open the Logical Disk Bind page.

To bind a logical disk, click **Bind logical disk**.

6.2.5 Binding Logical Disk

This section explains how to bind a logical disk.

6.2.5.1 Logical Disk Bind

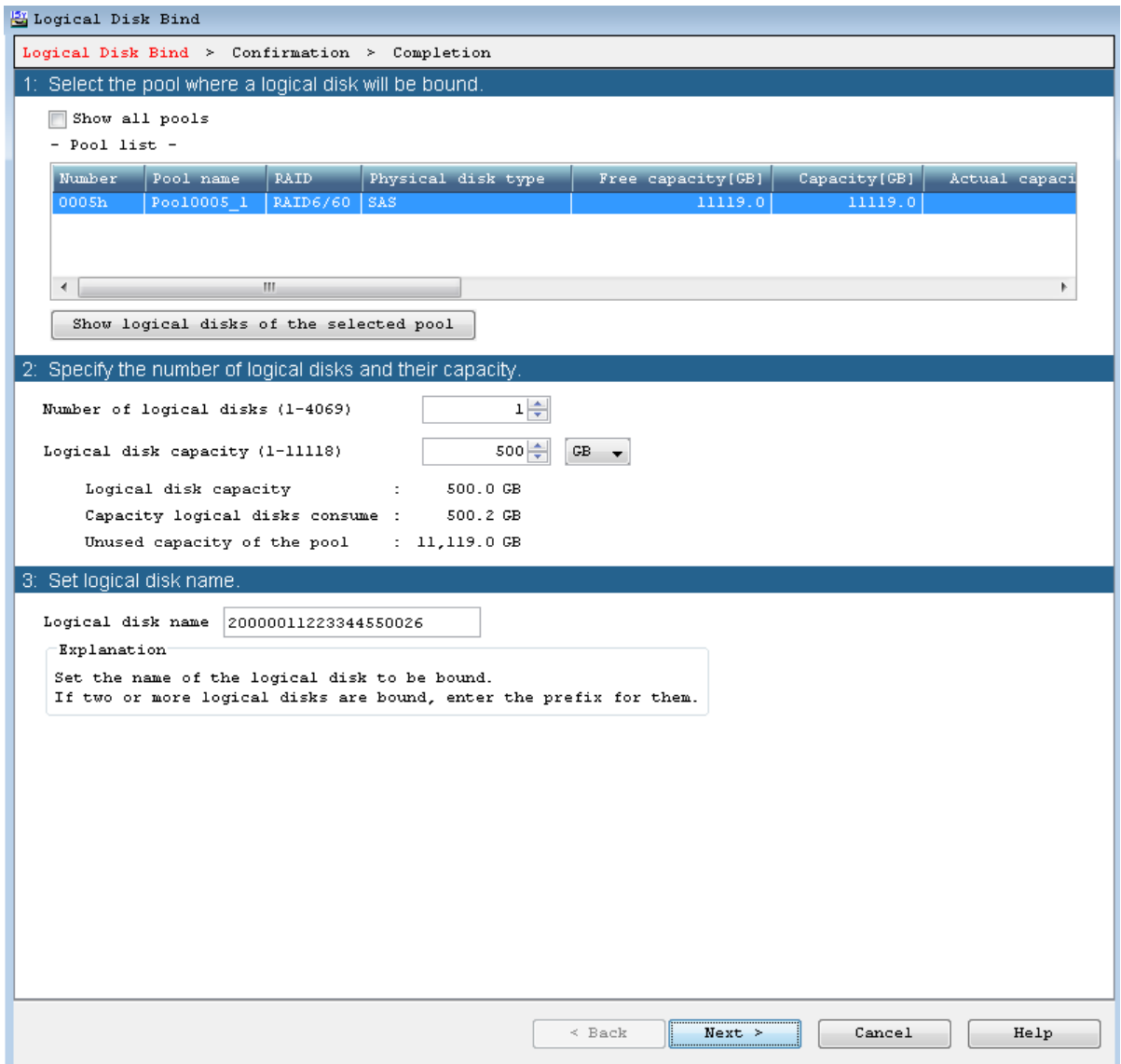


Figure 6-18: Logical Disk Bind

Parameter	Description
Pool list	Displays details of already bound pools. Select a pool in which logical disks will be bound.
Show all pools	By clearing this check box, you can view only the pool that is bound this time.

Parameter	Description
Show logical disks of the selected pool	Click this button to confirm a list of logical disks that are bound in the currently selected pool.
Number of logical disks	Specify the number of logical disks to be bound in the spinner.
Logical disk capacity	Specify the capacity of logical disks to be bound in the spinner.
Logical disk capacity	Indicates the capacity of a single logical disk.
Capacity logical disks consume	Indicates total size of the space occupied by logical disks.
Unused capacity of the pool	Indicates free space available in a pool.
Logical disk name	Enter a logical disk name. If two or more logical disks are bound, enter the prefix for them.

Select a pool in which logical disks will be bound, enter the number and capacity of logical disks, and click **Next**.

6.2.5.2 Logical Disk Bind - Confirmation

The settings of the logical disk to be bound are listed. Confirm the logical disk binding settings.

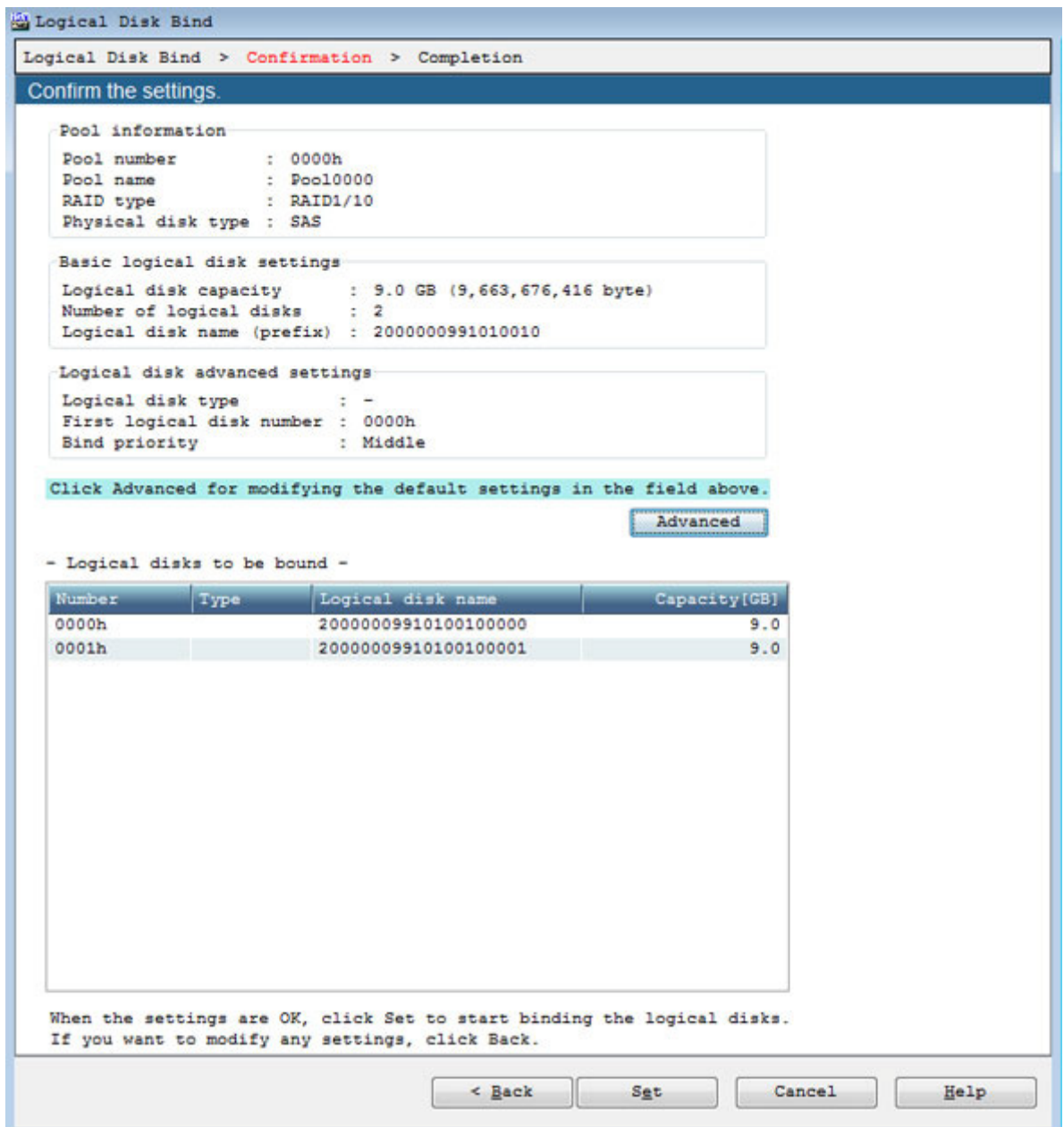


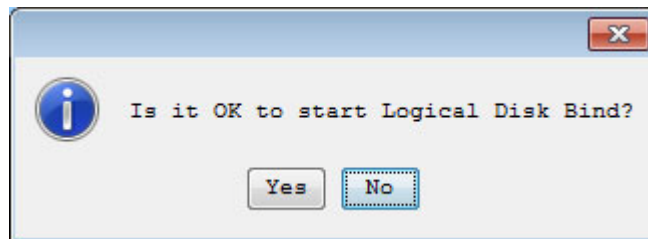
Figure 6-19: Logical Disk Bind - Confirmation

Parameter	Description
Basic logical disk settings	Displays the basic settings to be used for binding logical disks.
Pool information	Displays pool information.
Logical Disk Advanced Settings	Displays default advanced settings to be used for binding a logical disk.

Parameter	Description
Advanced	Click Advanced to modify the default settings displayed under Logical Disk Advanced Settings.
Logical disks to be bound	Displays the details of the logical disks to be bound.

Perform the following steps for binding a logical disk:

1. The settings of the logical disk to be bound are listed. Confirm the settings.
2. To perform advanced settings, click **Advanced**.
3. After confirming the settings, click **Set** to display the confirmation message.



4. Click **Yes** to perform the logical disk binding.

6.2.5.3 Logical Disk Bind - Completion

The result of the logical disk binding appears.

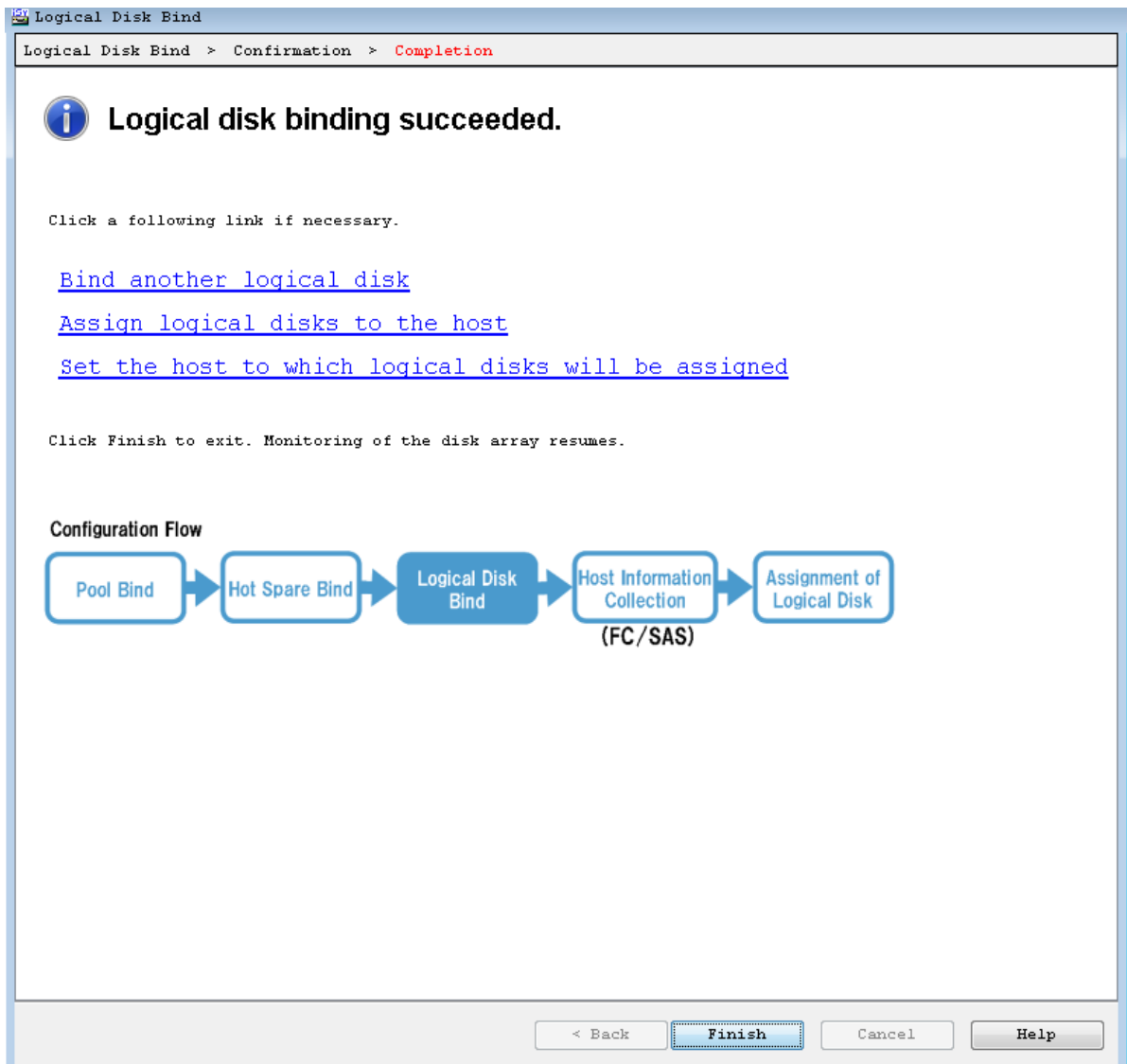


Figure 6-20: Logical Disk Bind - Completion

Parameter	Description
Bind another logical disk	Click this hyperlink to reopen the Logical Disk Bind page for another logical disk binding.
Assign logical disks to the host	Click this hyperlink to open the Assignment of Logical Disk page.

To assign the bound logical disk to a host, click **Assign logical disks to the host**.

6.2.6 Assigning Logical Disk

6.2.6.1 Assignment of Logical Disk

Assign logical disks to a host.

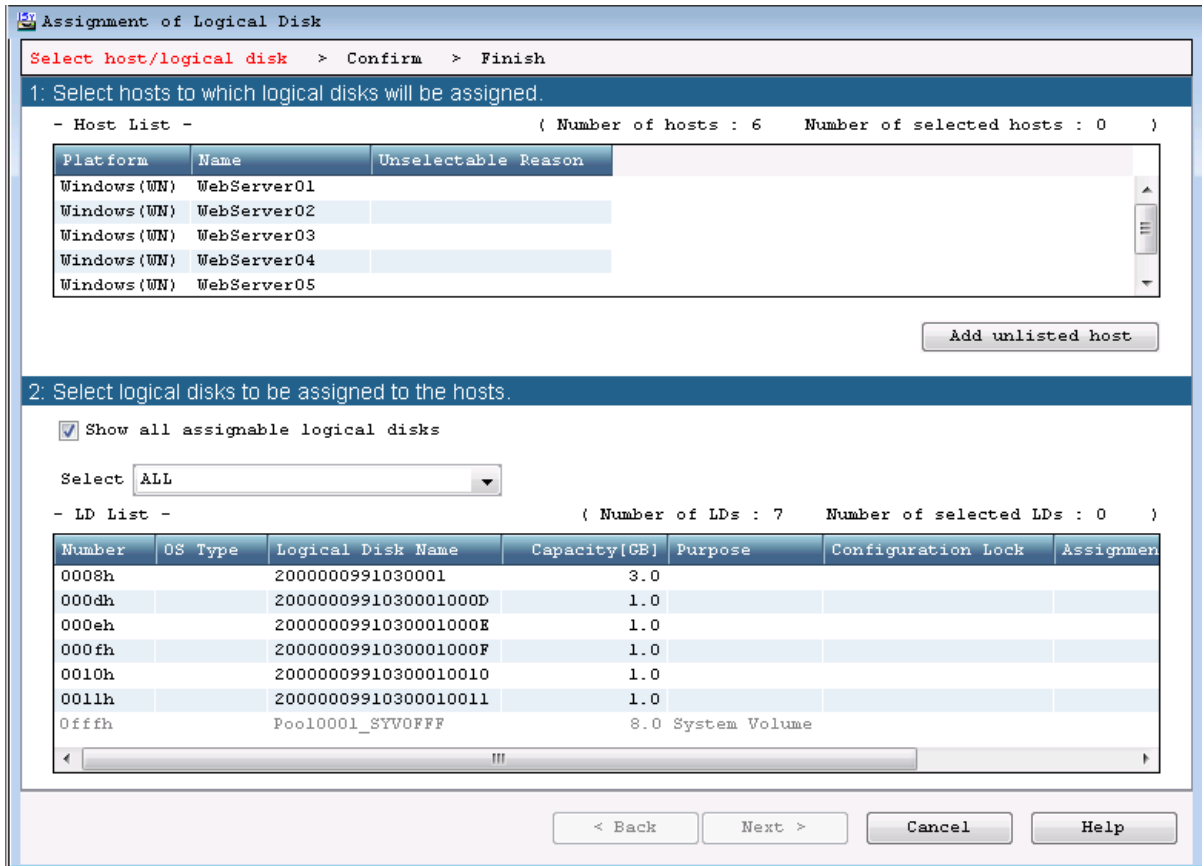
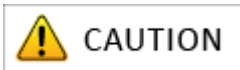


Figure 6-21: Assignment of Logical Disk

Parameter	Description
Host List	Displays hosts registered with the disk array. Click a host to which you want to assign logical disks.
Add unlisted host	Click this button to display a host addition page on which another host can be added.
Show all assignable logical disks	Select this check box to display all logical disks that can be assigned.
Select drop-down list	Select the logical disk list display type from the drop-down list.
LD List	Displays host information registered with the disk array. Click a logical disk you want to assign. Select logical disks to assign to host.



- The display items can be sorted, however, the order cannot be changed.
 - Multiple logical disks can be selected at a time.
-

Perform the following steps:

1. Select hosts from the **Host List** to which logical disks will be assigned.
2. Select logical disks from the **LD List** to which hosts will be assigned.
3. Click **Next**.

6.2.6.2 Assignment of Logical Disk - Confirm

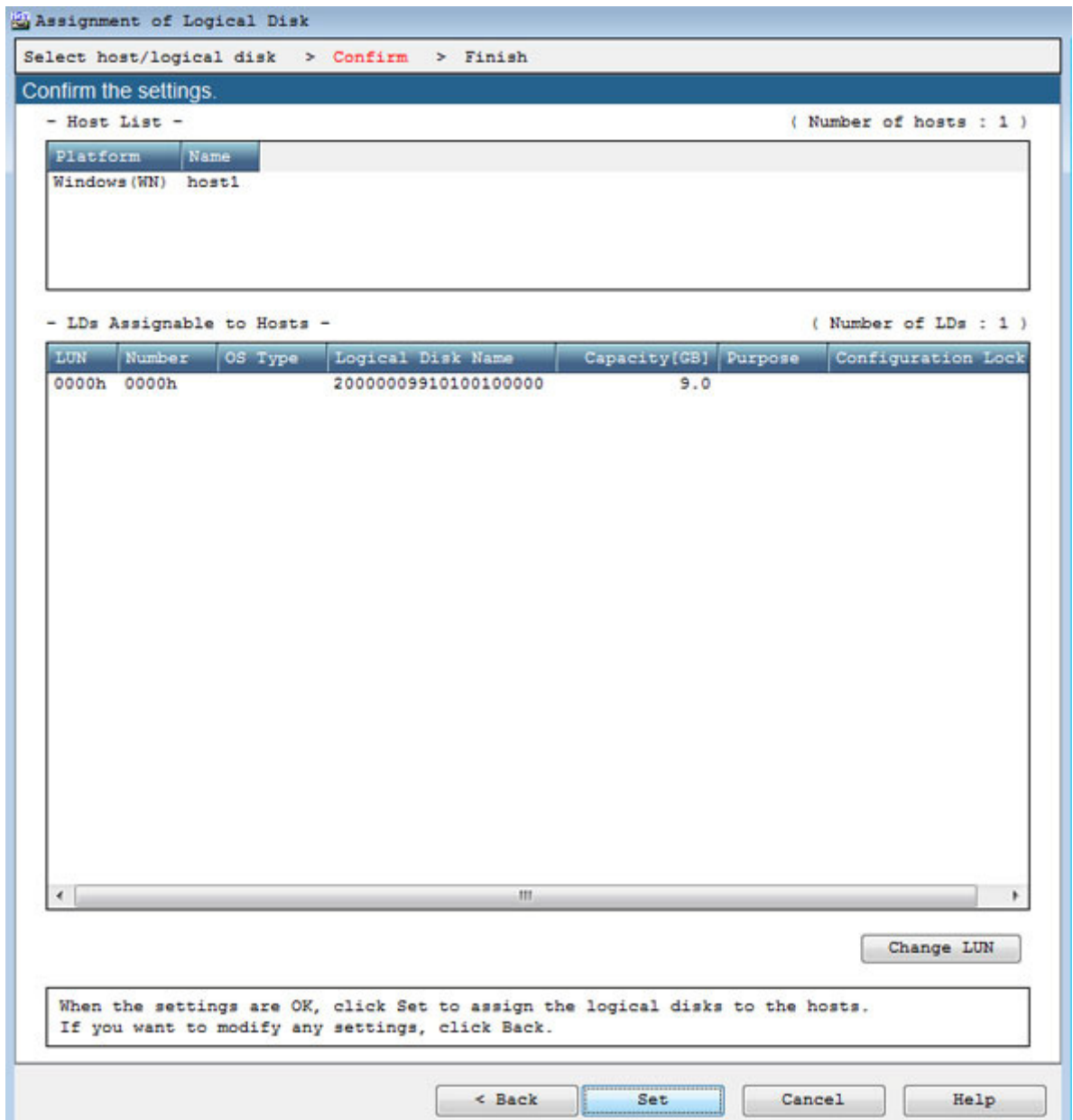


Figure 6-22: Assignment of Logical Disk - Confirm

Parameter	Description
Host List	Displays the host to which logical disks will be assigned.
LDs Assignable to Host	Displays logical disks to be assigned to the host.
Change LUN	Click this button to open the LUN Settings page, which allows configuring LUN (Logical Unit Number) settings.

Check the setting and click **Set** to perform the logical disk assignment. When the assignment is completed, the completion page appears.

6.2.6.3 Assignment of Logical Disk - Finish

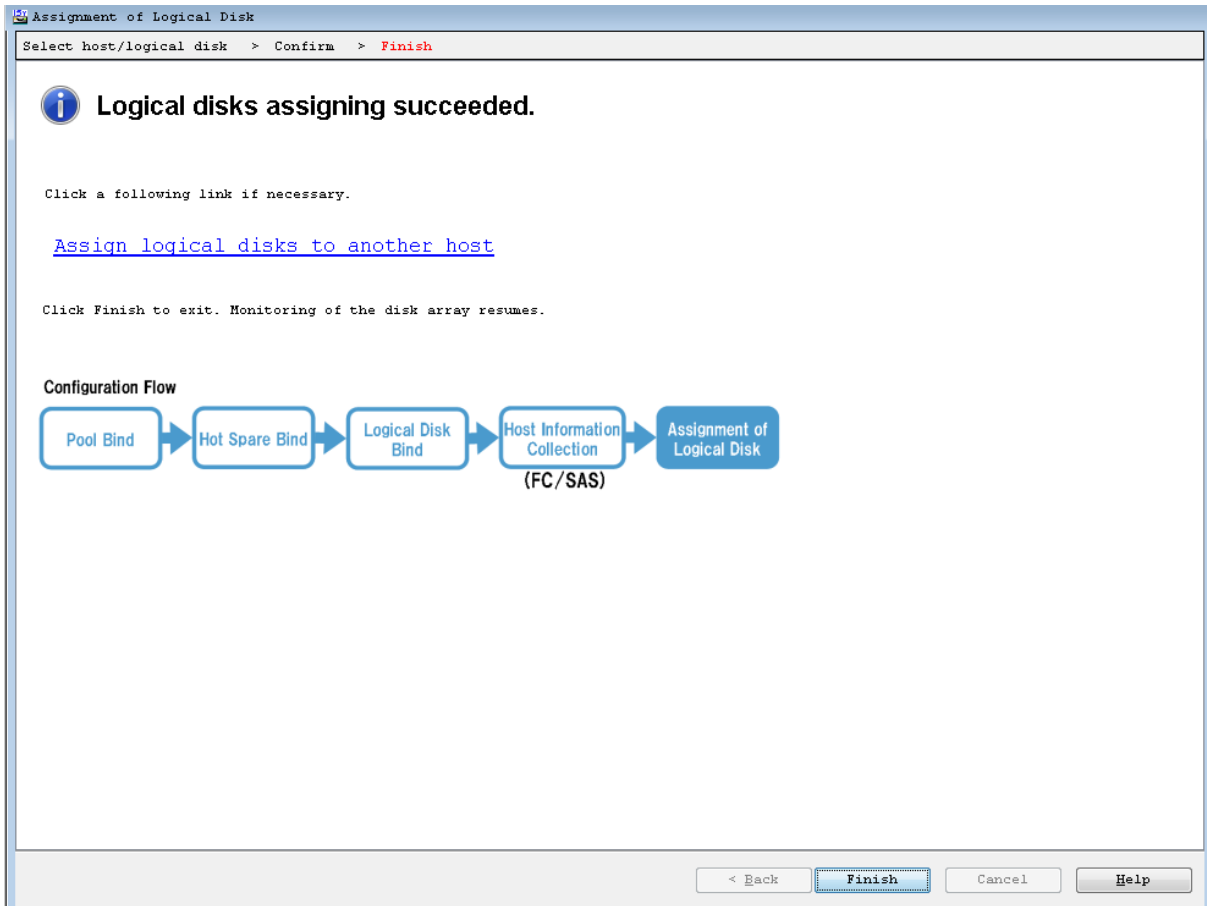


Figure 6-23: Assignment of Logical Disk - Finish

Parameter	Description
Assign other logical disks to the host	Click this hyperlink to assign another logical disk to the host.

The initialization is now complete. Click **Finish**.

Chapter 7 Installing Optional Parts

This chapter describes the preparation and installation of the optional parts of a disk array unit.

In this chapter

“Optional Parts” on page 186

“Preparation” on page 190

“Installation and Removal” on page 191

7.1 Optional Parts

Optional parts for disk array units are shown below.

Table 7-1: Optima3600 Optional Parts

Product Name	Qty.	Remark
DAC cabinet	1	Two AC power supplies installed
Host Port Extension (HPE) (8 Gbps, 4 ports, FC)	1	Double
Host Port Extension (HPE) (1 Gbps, 2 ports, iSCSI)	1	Double
Host Port Extension (HPE) (10 Gbps, 2 ports, iSCSI)	1	Double
Standard cache module (12 GB)	1	Two controllers
Standard cache module (24 GB)	1	Two controllers
Standard cache module (48 GB)	1	Two controllers
Additional cache module (12 GB -> 24 GB)	1	Two controllers
Additional cache module (12 GB -> 48 GB)	1	Two controllers
Additional cache module (24 GB -> 48 GB)	1	Two controllers
Disk Enclosure (DE) for 3.5-inch disk drives	1	Two AC power supplies installed Common to Optima1600/Optima2600 Series
Disk Enclosure (DE) for 2.5-inch disk drives	1	Two AC power supplies installed Common to Optima1600/Optima2600 Series
3.5-inch SAS disk drive	1	15Krpm/300GB SAS disk drive Common to Optima1600/Optima2600 Series
3.5-inch SAS disk drive	1	15Krpm/450GB SAS disk drive Common to Optima1600/Optima2600 Series
3.5-inch SAS disk drive	1	15Krpm/600GB (Standard) SAS disk drive Common to Optima1600/Optima2600 Series

Table 7-1: Optima3600 Optional Parts

Product Name	Qty.	Remark
3.5-inch SAS disk drive	1	15Krpm/600GB (Encryption) SAS disk drive Common to Optima1600/Optima2600 Series
3.5-inch NL-SAS disk drive	1	7.2Krpm/1TB NL-SAS disk drive Common to Optima1600/Optima2600 Series
3.5-inch NL-SAS disk drive	1	7.2Krpm/2TB NL-SAS disk drive Common to Optima1600/Optima2600 Series
3.5-inch SSD	1	6Grpm/400GB SSD Common to Optima1600/Optima2600 Series
2.5-inch SAS disk drive	1	10Krpm/300GB SAS disk drive Common to Optima1600/Optima2600 Series
2.5-inch SAS disk drive	1	10Krpm/450GB SAS disk drive Common to Optima1600/Optima2600 Series
2.5-inch SAS disk drive	1	10Krpm/600GB (Standard) SAS disk drive Common to Optima1600/Optima2600 Series
2.5-inch SAS disk drive	1	10Krpm/600GB (Encryption) SAS disk drive Common to Optima1600/Optima2600 Series
2.5-inch NL-SAS disk drive	1	7.2Krpm/1TB NL-SAS disk drive Common to Optima1600/Optima2600 Series
2.5-inch SSD	1	6Grpm/100GB SSD Common to Optima1600/Optima2600 Series
DAC cabinet	1	Two AC power supplies installed
Disk Enclosure (DE) for 3.5-inch disk drives	1	Two AC power supplies installed Common to Optima1600/Optima2600 Series
Disk Enclosure (DE) for 2.5-inch disk drives	1	Two AC power supplies installed Common to Optima1600/Optima2600 Series
DE Adapter Card	1	Double
DAC cabinet	1	Two AC power supplies installed

Table 7-1: Optima3600 Optional Parts

Product Name	Qty.	Remark
Disk Enclosure (DE) for 3.5-inch disk drives	1	Two AC power supplies installed Common to Optima1600/Optima2600 Series
Disk Enclosure (DE) for 2.5-inch disk drives	1	Two AC power supplies installed Common to Optima1600/Optima2600 Series

Table 7-2: Optional Parts For All Series

Product Name	Qty.	Remark
Front bezel	1	
HDD carrier for 3.5-inch disk drives	1	-
Dummy HDD carrier for 3.5-inch disk drives	1	-
HDD carrier for 2.5-inch disk drives	1	-
Dummy HDD carrier for 2.5-inch disk drives	1	-



The NL-SAS disk drive cannot be mixed in the same pool as the SAS disk drive. The operation will fail if they are mixed in the same pool. If the operation fails, a pool will be built that appears to have a capacity of 0, but this pool cannot be used and should be removed.

Confirm whether such a pool has been created before using the disk array unit.

Disk Drive Features

The disk drives that can be connected to the disk array unit are:

- SSD - Most superior in reliability and random access performance due to having no mechanical parts (motor, head, media), unlike HDD.
- SAS HDD - Superior in reliability and performance. Used in critical tasks requiring high performance/non-stop function.
- Nearline SAS HDD - High capacity disk that is suitable as a back up or archive disk. Can be used for regular, relatively low burden work (random access I/O) offered at a low price. Because it has both high capacity and low performance, failure recovery time is longer than that of SAS HDD.

In terms of reliability, RAID-60 and RAID-TM, which have duplicate redundancy, are recommended.

Table 7-3: Disk Drive Features

	SSD	15 Krpm SAS HDD	10 Krpm SAS HDD	7.2 Krpm Nearline SAS HDD
Reliability	Optimal	High	High	Low
Performance	Optimal	High	Average	Low Higher random access performance than SATA
Purpose	<ul style="list-style-type: none"> ■ High random access performance ■ High reliability ■ Low noise 	<ul style="list-style-type: none"> ■ Mission-critical ■ High transaction 	<ul style="list-style-type: none"> ■ Low power consumption 	<ul style="list-style-type: none"> ■ High capacity ■ Backup/archive ■ Regular, low-burden work (random access I/O)

7.2 Preparation

Review the following precautions and procedures when installing options to the disk array unit.

- Although users can install optional products themselves, Bull assumes no responsibility for damage to the disk array unit or components or for effects resulting from use if they do so. It is recommended that this work be performed by maintenance engineers of your maintenance service agent who have detailed expert knowledge about the disk array unit.
- Use optional parts and cables specified by Bull. There is a charge for repairs associated with malfunction, failure, or damage to the unit that occurs as a result of using parts other than those specified.

About electrostatic countermeasures

Be extremely careful of static electricity during installation as it could damage the parts.

- Wear a wrist strap (armband or antistatic gloves)
- Location
 - Install on a floor for which measures to prevent static electricity have been taken or on concrete.
 - If installing on a carpet or other location prone to static electricity, do the work after taking measures to prevent static electricity.
- Use of mat
 - Place the disk array unit on an antistatic mat and install the parts.
- Clothing
 - Do not install parts while wearing clothing made of wool or synthetic fibers.
 - Wear antistatic shoes while installing.
 - Prior to installation, remove items made of metal (for example: rings, bracelets, and watches).
- Handling the parts
 - Keep the parts to install in antistatic bags until inserting them in the disk array unit.
 - Hold each part by its edge and do not touch the pins or mounting parts.
 - When storing or transporting the parts, keep them in antistatic bags for protection.

7.3 Installation and Removal

Perform the following procedures to install or remove the concerned optional part of a disk array unit:

7.3.1 Front Bezel



The procedures described in this section is intended for the front bezel of DE. The front bezel of DAC can be inserted and removed following the same procedures.

Inserting a front bezel

The procedure for inserting a front bezel is as follows:

1. To install a front bezel, first unlock it by turning the key to the horizontal position.

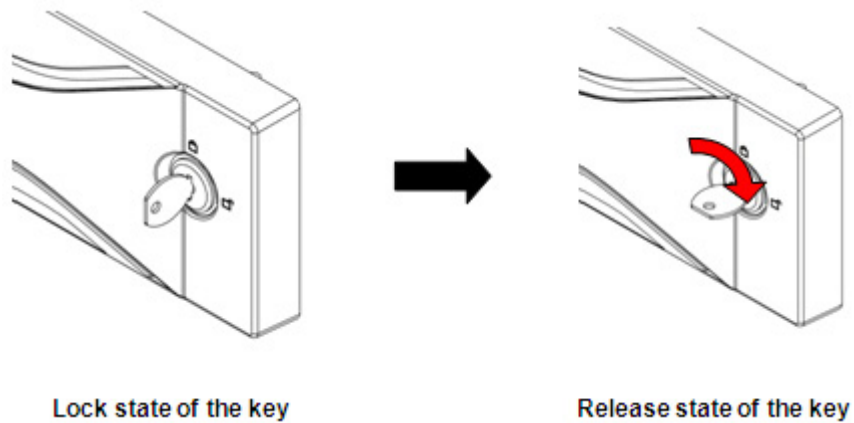


Figure 7-1: Key of the Front Bezel

2. Catch the left side of the front bezel on the hook of the unit.

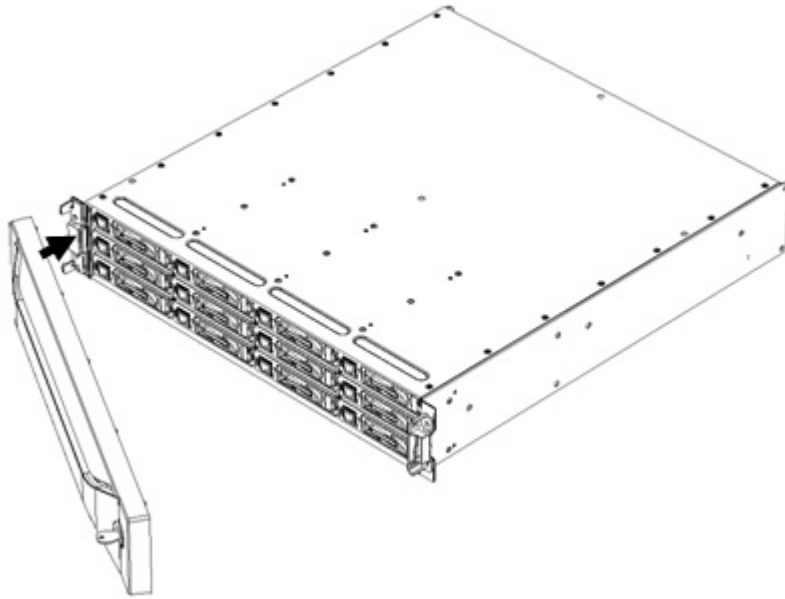


Figure 7-2: Inserting the Front Bezel (1)

3. Catch the right side of the front bezel, too. Then lock it by turning the key counterclockwise. Installation of the front bezel is now complete.

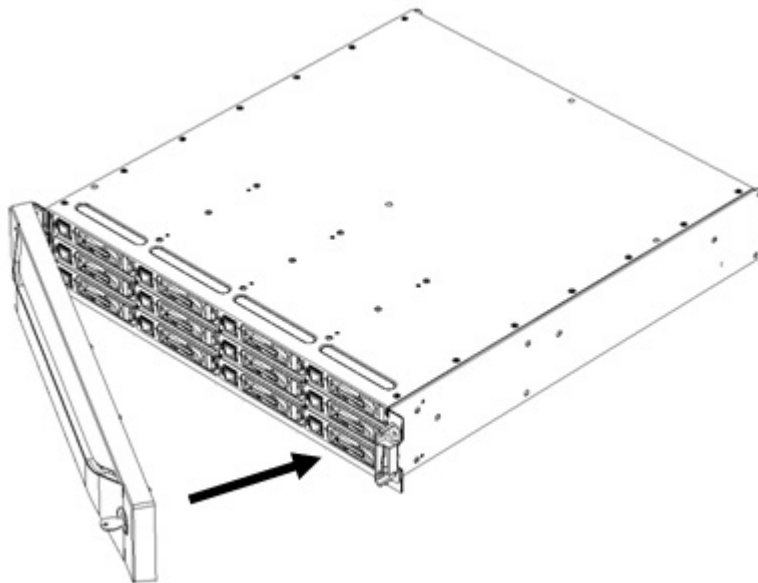


Figure 7-3: Inserting the Front Bezel (2)

Removing a front bezel

The procedure for removing a front bezel is as follows:

1. Release the lock by turning the key clockwise.

2. Pull the right side towards you by pivoting the left end, detach the left side, and pull the entire bezel towards you.

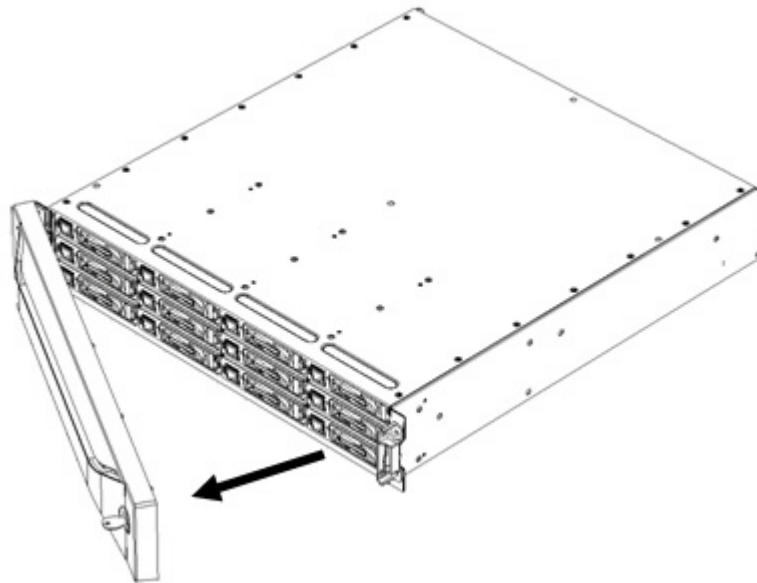


Figure 7-4: Removing the Front Bezel

7.3.2 Host Port Extension (HPE)

Removing a Host Port Extension

The procedure for removing a host port extension from its cabinet is as follows:

1. Confirm that the power is turned off.
2. Confirm that the cable of the host port extension is not connected.
3. Pull out the host port extension by pushing its handle downward.

Installing a Host Port Extension

The procedure for installing a host port extension in the cabinet is as follows.

1. Confirm that the power is turned off.
2. Remove dummy canister if it is installed in a host port extension slot of the cabinet.
3. Insert the host port extension, press until it is fully inserted, and then make sure it is locked.



If the host port extension is not fully inserted, it could lead to malfunction.

7.3.3 Disk Drives

For details about how to install disk drives, see [Section 3.2.3: "Installing Disk Drives"](#).

Removing a Disk Drive

The procedure for removing the disk drive is as follows:

1. Release the lock on the ejector of the disk drive, and pull the drive forward at an angle of about 40°.



Before pulling the ejector forward, wait about 30 seconds for the disk drive to fully stop (HDD only).

2. Hold the target disk drive firmly while slowly pulling it from its slot.

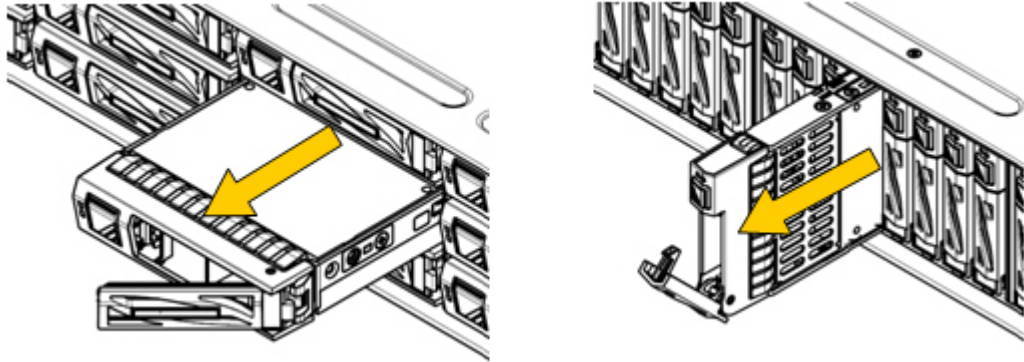


Figure 7-5: Removing the Disk Drive

3. Close the ejector of the disk drive.

7.3.4 Disk Enclosures

For installing and removing disk enclosures, see the sections below.

7.3.4.1 Mounting Disk Enclosures on Rack

See [Section 3.2.2: "Mounting a Disk Enclosure on a Rack"](#).

7.3.4.2 Connecting Disk Enclosures

When connecting a disk enclosure, use a SAS cable to connect DPx on the disk array unit with the DP0-IN on the disk enclosure. If connecting multiple disk enclosures, use a SAS cable to connect DP0-OUT on a disk enclosure with DP0-IN on the next disk enclosure.

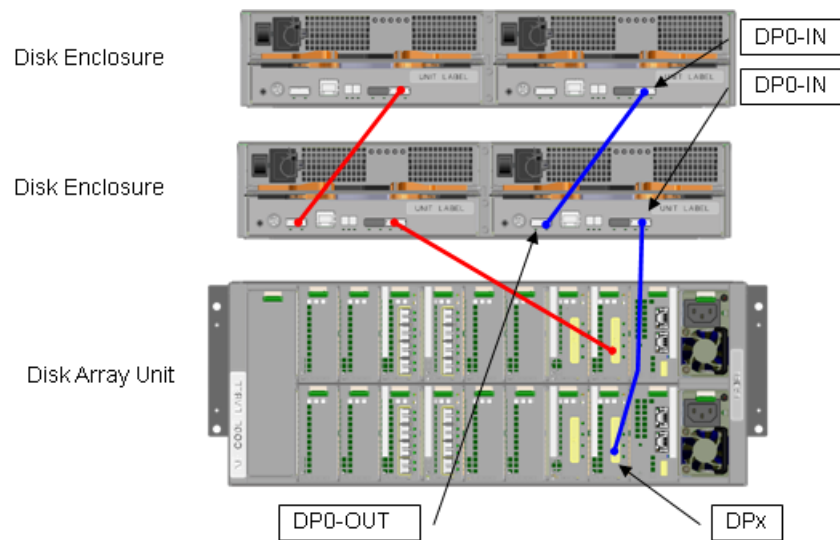


Figure 7-6: SAS Cable Connection



Do not connect to the DP1-IN (on the left of DP0-IN).

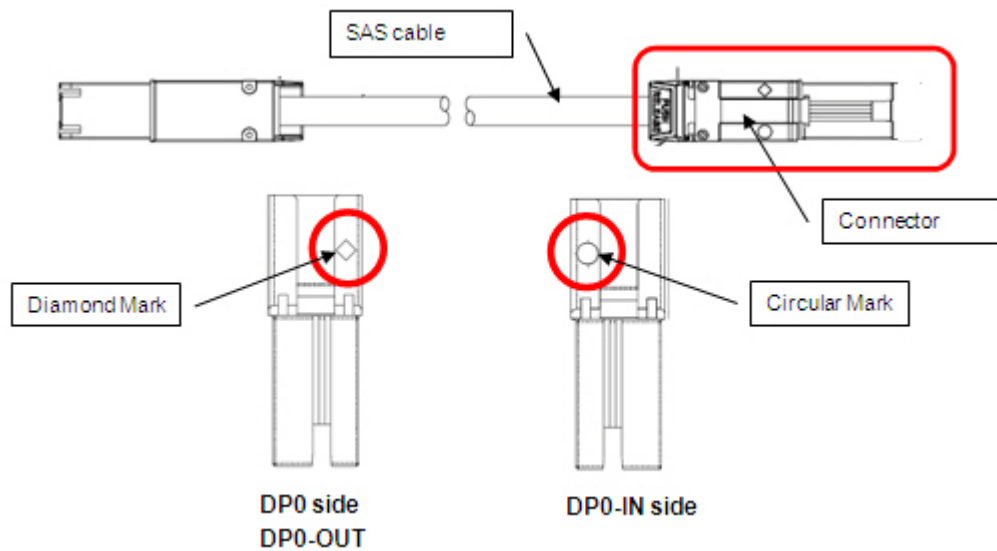


Figure 7-7: Cables and Connectors



CAUTION

- Push the SAS cable into each connector securely until you hear a click.
- SAS cables can also be used to control the disk enclosure's power supply.
- The disk enclosure will not power on unless the 2 SAS cables are connected.



- SAS cables have grooves in the connecting portion that protect against incorrect insertion.
- Select a connector appropriate to the port to which it will be connected and connect the cable.

7.3.4.3 SAS Cable Connections and DE and PD Numbers

The number of disk enclosures show below can be connected to this disk array unit.

Figure 7-8: SAS Cable Connections and DE/PD Numbers shows how to connect disk enclosures. The DE and PD numbers are described following the figure.

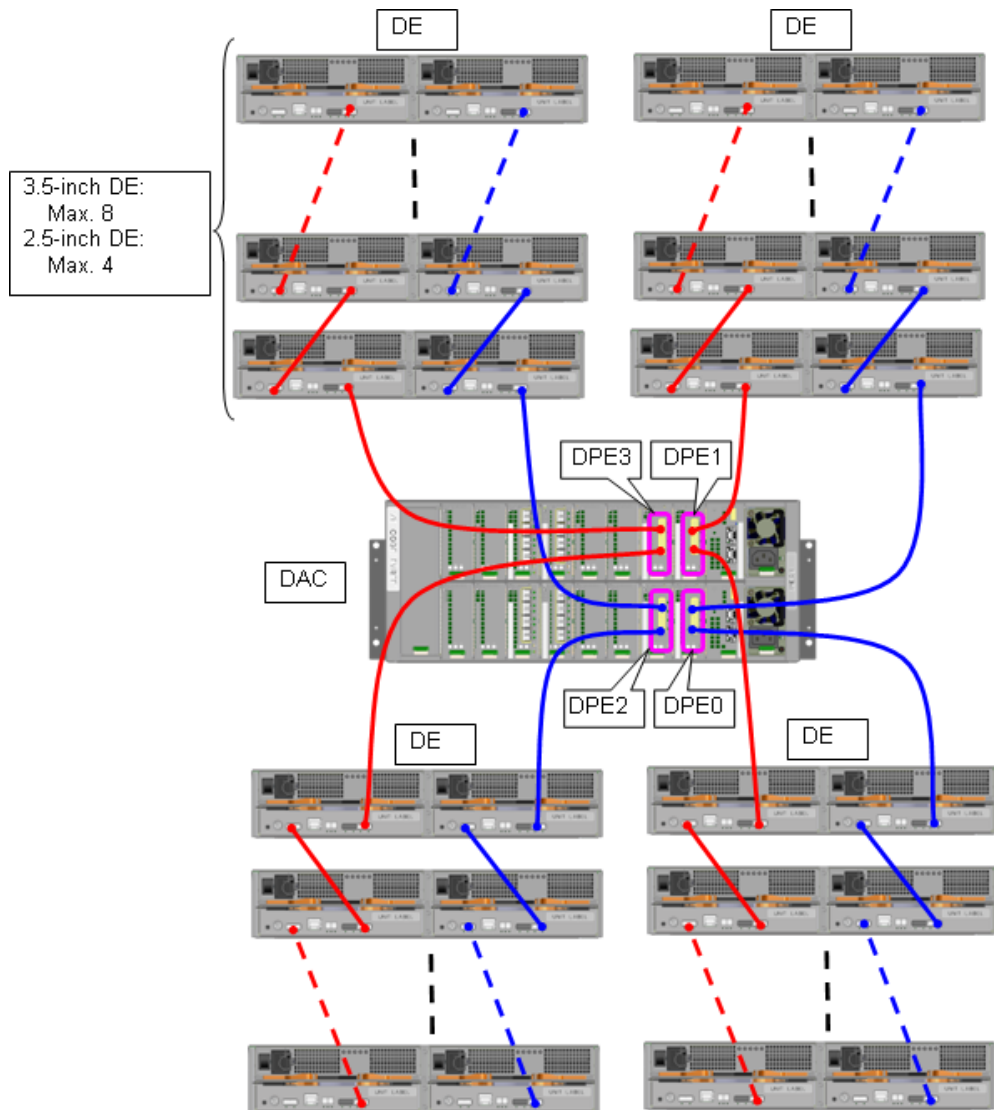
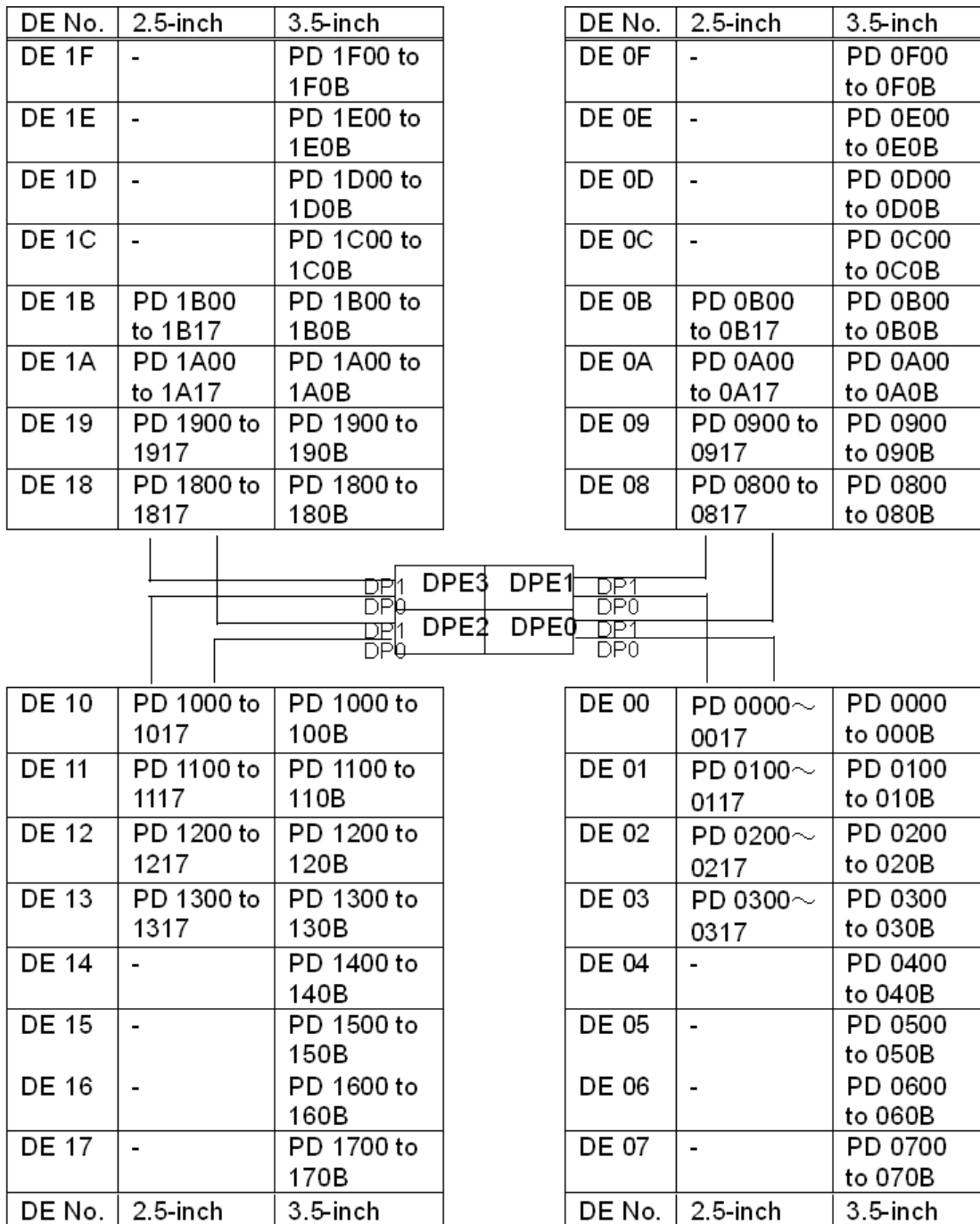


Figure 7-8: SAS Cable Connections and DE/PD Numbers

The number of DEs that can be connected to a disk port (DP) of DPE differs depending on the type of DE to be connected.

- Total number of disk drives supported by the disk array: 384
- Number of disk drives that can be connected to a DP: 96
 - When connecting only 3.5-inch DEs, up to eight DEs can be connected.
 - When connecting only 2.5-inch DEs, up to four DEs can be connected.

For the Optima3600 Series, connection of the basic DE (DE 00 in the figure below) is required.



7.3.5 Batteries (BBU)

For installing and removing the battery (BBU), follow the procedure given below:

1. Confirm that the disk array has been powered off.
2. Remove the BBU.
Remove the screws on the front of the BBU, and pull it.
3. Insert a new BBU.
Straight and fully insert the target BBU. Then, anchor it by tightening the screws on the front of the BBU.

7.3.6 Cache Modules

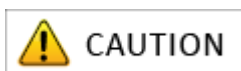
For installing and removing the cache modules, follow the procedure given below:



CAUTION

- DIMMs and Flash Memory ASSYs composing the cache module are precision machines. Protect them from any shock or vibration.
- Cache modules are electrical parts. When handling them, take an anti-static measure such as using a wrist strap.

1. Confirm that the disk array has been powered off.
2. Remove the controller (CONT) from its cabinet.
 - (1) Loosen the screws on the both ejectors on the controller (CONT).
 - (2) Pull and open the ejectors. Then the controller (CONT) comes out.
 - (3) Remove the controller by holding it with both hands.
3. Remove three DIMMs.
Push the levers on both sides of the DIMM sockets outward, and then remove the DIMMs from each socket by pulling them upward.
4. Insert new DIMMs.
Open the levers of the DIMM sockets, and then insert three new DIMMs into the sockets straight. Fit the notch of the DIMM terminal to the wrong insertion prevention part of the socket. Push the inserted DIMM all the way in, lock the DIMM and socket by putting the levers inside.
5. Remove the Flash Memory ASSYs.
 - (1) Unlock the Flash Memory ASSY fixture.
 - (2) Among four Flash Memory ASSYs, Remove three Flash Memory ASSYs; PDOM1, PDOM2, and PDOM3, from the socket by pulling it upward.



CAUTION

Do not remove Flash Memory ASSY "PDOMS". Doing so might cause the disk array to not reboot.

6. Installing new Flash Memory ASSYs.
 - (1) Insert new Flash Memory ASSYs to the sockets.
 - (2) Lock the fixture.
7. Install the controller (CONT) to its cabinet.
 - (1) Hold the both ejector on the controller (CONT), and then unlock and pull the ejectors open.
 - (2) Fully insert the controller (CONT) to its cabinet.
 - (3) Close the ejectors. If the controller (CONT) is out of its cabinet, insert it again because it was not correctly inserted. After confirming that the controller (CONT) is correctly inserted, tighten the screws of the ejectors.

Chapter 8 Changes to the Configuration

This chapter describes how to change the settings of a disk array unit after use of the disk array unit is started.

In this chapter

[“Modifying the Settings by Using DIP Switches” on page 202](#)

[“Modifying the Configuration by Storage Manager \(FC\)” on page 203](#)

[“Modifying the Configuration by Storage Manager \(iSCSI\)” on page 206](#)

8.1 Modifying the Settings by Using DIP Switches

The OptimaX600 series does not require modification of the settings by using DIP switches. Do not change the configuration of the DIP switches located on the surface of the controller.

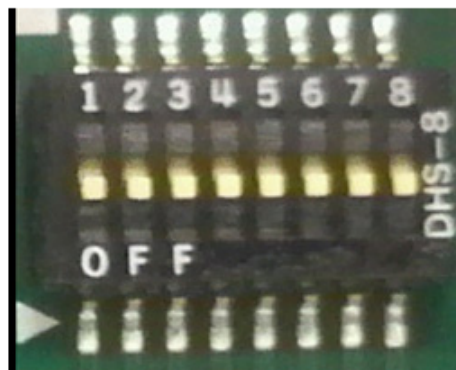
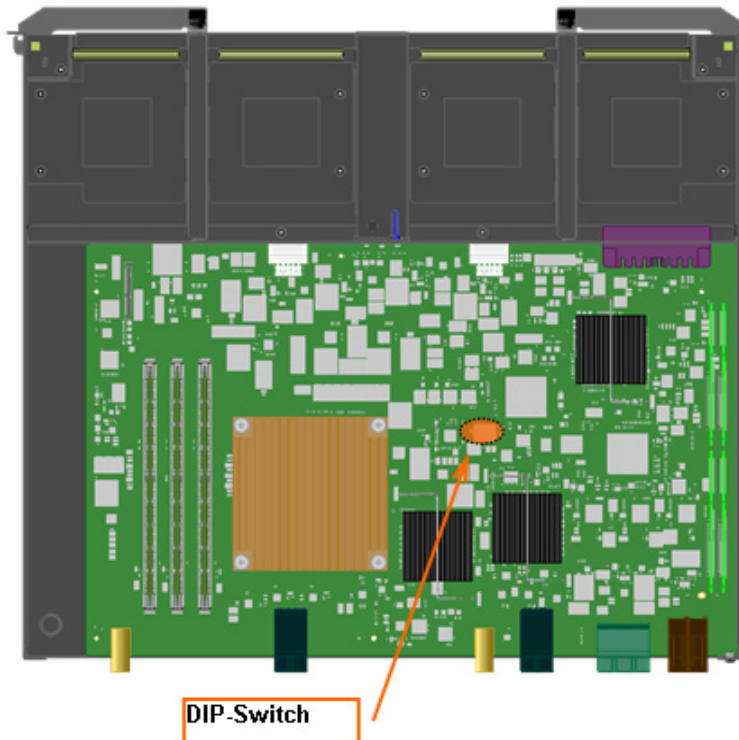


Figure 8-1: DIP Switch

8.2 Modifying the Configuration by Storage Manager (FC)

This section provides information on modifying the configuration of an FC connected disk array by Storage Manager.

8.2.1 Binding Additional Logical Disks (FC)

This section describes how to bind additional logical disks on an FC connected disk array.

To bind additional logical disks on an FC connected disk array, click **Configuration**, **Logical Disk** and **Logical Disk Bind** on the left pane of the window.

See [Section 8.2.2: “Adding Application Servers”](#) to bind additional logical disks when an application server is added.

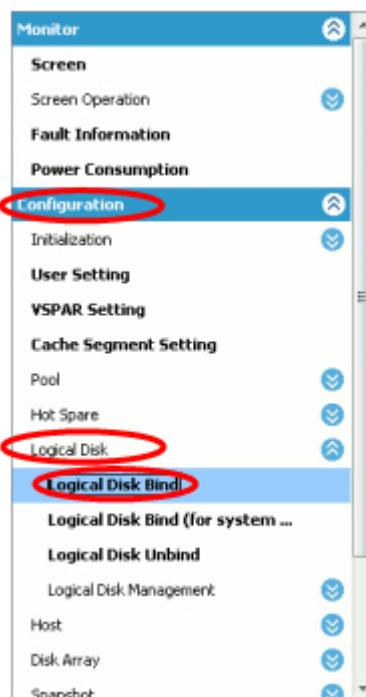


Figure 8-2: Binding a Logical Disk (FC)

For the details of the procedure after the startup, see [Section 5.3.4: “Binding Logical Disks”](#).

8.2.2 Adding Application Servers

This section describes how to add logical disks and an application server to an initialized disk array.

1. Collect the host information on the application server

First of all, collect the host information on the application server to be newly added.

For details about collecting the host information of application servers, see [Section 5.2: “Collecting Host Information From Application Servers”](#).

2. Retrieve the host information

Retrieve the host information of the application server.

Click **Host > Host Operation > Host information collection** on the menu located on the left of the window to open the window for retrieving the host information.

3. Bind a pool

Bind a pool if logical disks should be bound not on an existing pool but on a pool that is newly bound.

4. Bind logical disks

Bind logical disks to be assigned to the new application server.

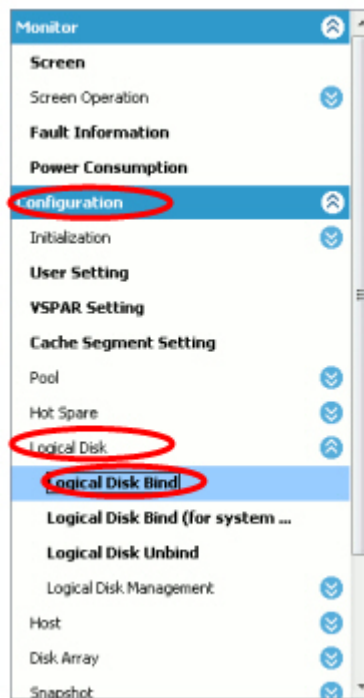


Figure 8-3: Logical Disk Bind (FC)

Click **Configuration**, **Logical Disk** and **Logical Disk Bind** on the left pane of the window to start binding the logical disks.

The rest of the procedure is the same as the procedure in [Section 5.3.4: “Binding Logical Disks”](#).

5. Assign the logical disks to the host

Lastly, assign the logical disks you have created to the application server.

On the **Logical Disk Binding Completion** window, click **Assign logical disk to the host** to start assigning the logical disks.

The rest of the procedure is the same as the procedure in [Section 5.3.5: "Collecting Host Information"](#).

8.2.3 Using the Initialization Wizard to Modify the Configuration

The configuration can be modified by re-running the initialization wizard.

The procedure is the same as the procedure for the first settings. For details of the procedure see [Section 5.3.1: "Initialization Wizard"](#).

When you re-run the initialization wizard, Storage Manager issues a message asking whether to stop monitoring of the target disk array by Storage Manager and to proceed with the initialization. Click **Yes** and stop monitoring of the disk array to modify the configuration.



Figure 8-4: Message Asking Whether to Stop Monitoring

8.2.4 Modifying the Disk Array Configuration

Each setting configured by the initialization wizard can be modified individually.

See [Table 8-1: Relation between the initialization wizard and configuration settings](#) to find how the settings configured in the initialization wizard and configuration settings are related.

Table 8-1: Relation between the initialization wizard and configuration settings

Setting in the initialization wizard	How to modify the setting
Set Disk Array Subsystem Name	Select Disk Array > Disk Array Management > Change of Settings .
Time Settings	Select Disk Array > Time Settings .
License Unlock	Select Disk Array > License Unlock .
Host Connection Port Parameters (FC)	Select Disk Array > Host Connection Port > Host Connection Port Setting (FC) .
Port Mode Switching	Select Disk Array > Host Connection Port > Port Mode Switching .

8.3 Modifying the Configuration by Storage Manager (iSCSI)

This section provides information on modifying the configuration of an iSCSI connected disk array by Storage Manager.

8.3.1 Binding Additional Logical Disks (iSCSI)

This section describes how to bind additional logical disks on an iSCSI connected disk array.

To bind additional logical disks on an iSCSI connected disk array, click **Configuration** and **Logical Disk**, and **Logical Disk Bind** on the left pane of the window.

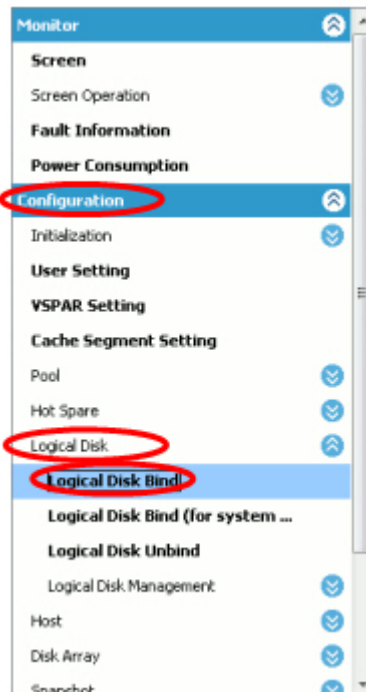


Figure 8-5: Binding a Logical Disk (iSCSI)

For the details of the procedure after the startup, see [Section 6.2.5: "Binding Logical Disk"](#).

8.3.2 Using the Initialization Wizard to Modify the Configuration

The configuration can be modified by re-running the initialization wizard.

The procedure is the same as the procedure for the first settings. For details of the procedure see, [Section 6.2.1: "Initialization Wizard"](#).

When you re-run the initialization wizard, Storage Manager issues a message asking whether to stop monitoring of the target disk array by Storage Manager and to proceed with the initialization. Click **Yes** and stop monitoring of the disk array to modify the configuration.



Figure 8-6: Message Asking Whether to Stop Monitoring

8.3.3 Modifying the Disk Array Configuration

Each setting configured by the initialization wizard can be modified individually.

See [Table 8-2: Relation between the initialization wizard and configuration settings](#) to find how the settings configured in the initialization wizard and configuration settings are related.

Table 8-2: Relation between the initialization wizard and configuration settings

Setting in the initialization wizard	How to modify the setting
Set Disk Array Subsystem Name	Select Disk Array > Disk Array Management > Change of Settings .
Time Settings	Select Disk Array > Time Settings .
Setting host connection port parameters (iSCSI)	Select Disk Array > Host Connection Port > Host Connection Port Settings (iSCSI) .
Setting iSNS server	Select Disk Array > iSNS Server Settings .
License Unlock	Select Disk Array > License Unlock .

Chapter 9 Troubleshooting

This chapter provides information on troubles and what should be done for troubles.

In this chapter

[“Troubleshooting According to Device Conditions” on page 210](#)

[“Network Setting Tool Errors” on page 217](#)

[“Storage Manager Errors” on page 218](#)

[“iSCSI Setup Tool Errors” on page 226](#)

[“StoreWay Multipath \(Windows\) Errors” on page 232](#)

[“StoreWay Multipath \(Linux\) Errors” on page 234](#)

[“Changing Network Settings for Monitoring Disk Arrays from Storage Manager” on page 236](#)

[“Troubleshooting at Installation” on page 237](#)

[“User Support” on page 241](#)

9.1 Troubleshooting According to Device Conditions

In this section, troubles are classified as follows, according to the location where the trouble occurs.

1. Trouble in disk array unit (front panel LED status): See [Table 9-1: Trouble in Disk Array Unit \(Front Panel LED Status\)](#)
2. Trouble in disk array unit (rear panel LED status): See [Table 9-2: Trouble in Disk Array Unit \(Rear Panel LED Status\)](#)
3. Trouble in disk enclosure (rear panel power LED status): See [Table 9-3: Trouble in Disk Enclosure \(Rear Panel Power LED Status\)](#)
4. Trouble in disk enclosure: See [Table 9-4: Trouble in Disk Enclosure](#)
5. Wrong SAS cable connection: See [Table 9-5: Wrong SAS Cable Connection](#)
6. Trouble in linkup of host port: See [Table 9-6: Trouble in Linkup of Host Port](#)

Table 9-1: Trouble in Disk Array Unit (Front Panel LED Status)

Condition	Cause and Action
POWER LED (green) is on, and SERVICE LED (amber) is off	This is not a fault. This indicates that the disk array unit is in normal operation after turning on.
POWER LED (green) and SERVICE LED (amber) are off	This indicates the disk array unit power-on sequence has not been completed. It takes several minutes for the POWER LED to turn on after turning on the unit. If LEDs do not turn on within 10 minutes, check the following: <ul style="list-style-type: none"> ■ Confirm that power is being supplied to the unit. ■ Confirm that PS Status LED on the back of the unit is on in green. Otherwise, check the cable connection and power source.
POWER LED (green) and SERVICE LED (amber) are on	This indicates that the disk array unit or connected disk enclosure requires maintenance. Since there are two or more maintenance requests at the same time, check all of the following: <ul style="list-style-type: none"> ■ Confirm that power is being supplied to both PS0 and PS1 in the disk array unit or connected disk enclosure. To ensure that power is being supplied, confirm that POWER LEDs of the disk array unit and disk enclosure are on. ■ When SERVICE LED of the connected disk enclosure is on, refer to the description of "SERVICE LED is on". ■ When the last operation is maintenance, processing such as disk recovery may take time. Ask the maintenance personnel for the estimated time of completion. If the disk is not recovered beyond the estimated time, ask the maintenance personnel to investigate.

Table 9-1: Trouble in Disk Array Unit (Front Panel LED Status) (Contd.)



Condition	Cause and Action
POWER LED (green) is on and SERVICE LED (amber) blinks at intervals (on for 1 second and off for 1 second)	<p>This indicates that the power-on sequence or download sequence of the disk array unit is in progress.</p> <p>The sequence will take several minutes to complete.</p> <p>If SERVICE LED continues to blink for over 10 minutes, there may be a failure.</p> <hr/> <div style="display: flex; align-items: center;">  <div style="border: 1px solid black; padding: 2px 5px;">WARNING</div> <div style="margin-left: 20px;">Do not turn off the power or AC power while SERVICE LED is blinking.</div> </div> <hr/>
POWER LED (green) is on and SERVICE LED (amber) blinks at intervals (on for 4 seconds and off for 8 seconds)	<p>This indicates that battery backup failed in the last power-off state. Files may be corrupted. Restore those files using backup files.</p> <p>This may occur because of the following causes. Address the appropriate cause to remove the problem.</p> <ol style="list-style-type: none"> 1. A backup device such as a flash memory was destroyed. Replace the controller. 2. Battery backup was performed past the battery life span. 3. The disk array unit was continuously used or has been used at a temperature higher than the predetermined temperature. <hr/> <div style="display: flex; align-items: center;">  <div style="border: 1px solid black; padding: 2px 5px;">CAUTION</div> <div style="margin-left: 20px;"> <p>In the cases other than 1, the battery backup retention time of the battery cannot be guaranteed. It is necessary to replace the battery due to its life span. Contact your sales or maintenance service agent. (There is a charge for battery exchange due to life span.)</p> <p>For the procedure to recover from this condition, refer to Section 1.3.1.3: "Notes on Powering On the Disk Array System".</p> </div> </div> <hr/>
POWER LED (green) blinks at intervals (on for 0.2 seconds and off for 0.2 seconds), and SERVICE LED (amber) is off	<p>This is not a fault.</p> <p>This indicates that the disk array unit can be turned off by performing automatic flash because the host port is disconnecting for 5 minutes. When the host port recovers, the unit returns to a normal state.</p>

Table 9-2: Trouble in Disk Array Unit (Rear Panel LED Status)

Condition	Cause and Action
CONT READY LED (green) is on, and CONT FAULT LED (amber) is off	This indicates that the power-on sequence or rebooting is in progress. The sequence will take several minutes to complete. If this condition continues for over 10 minutes, there may be a failure.
CONT READY LED (green) blinks (on for 1 second and off for 1 second), and CONT FAULT LED (amber) is off	This is not a fault. This indicates that the controller is in normal operation.
CONT READY LED (green) blinks rapidly, and CONT FAULT LED (amber) is off	This indicates that power has been disrupted, or automatic shutdown or memory backup is being performed. The sequence will take several minutes to complete. If this condition continues for over 10 minutes, there may be a failure.
CONT READY LED (green) is on, and CONT FAULT LED (amber) blinks (on for 1 second and off for 1 second)	This indicates that subsequent disk enclosures are not turned on. Turn on the disk enclosures.
CONT READY LED (green) and CONT FAULT LED (amber) are on	This indicates that there is a maintenance request because a failure was detected. Analyze the error and then remove the cause.
CONT READY LED (green) blinks (on for 1 second and off for 1 second), and CONT FAULT LED (amber) is on	The subsequent disk enclosures cannot be found, or the disk ports are disconnected. Check whether the cables are correctly connected to the disk ports.
CONT READY LED (green) blinks (on for 1 second and off for 1 second), and CONT FAULT LED (amber) rapidly blinks	This is not a fault. This indicates that device firmware is being updated. When updating is complete, the device returns to a normal state.
BBU FAULT LED (amber) is on	This is not a fault. The battery is being recharged.

Table 9-2: Trouble in Disk Array Unit (Rear Panel LED Status) (Contd.)

Condition	Cause and Action
LNK LED (green) of the management port is out, or blinks	<p>When connecting a cable to the management port, LNK LED (green) may not turn on because of the following causes.</p> <ul style="list-style-type: none"> ■ The power of the HUB, switch, or server to connect to has not been turned on. ■ The power supply of the HUB, switch, or server to connect to is at fault. ■ The cable type is wrong. A cross cable and straight cable are not recognized automatically. Use a cable following the predetermined connection method. ■ The Speed and Duplex settings do not match. Auto Detect is set as default. Since connecting to a device in Full Duplex mode could cause abnormal operation, set Auto Detect or Half Duplex to the device to connect. (To set Full Duplex, ask your sales or maintenance service agent.) ■ Depending on the type of hub, it may remain off or it may blink.
ACTIVE LED (Green/Amber) of the management port is on or blinks	<p>This is not a fault.</p> <p>ACTIVE LED (Green/Amber) is on when connection is established through the disk array unit monitoring protocol with a cable connected to the management port. If the cable is removed from the unit, ACTIVE LED briefly remains on.</p>

Table 9-3: Trouble in Disk Enclosure (Rear Panel Power LED Status)


Condition	Cause and Action
INPUT GOOD LED (green) is on, FAULT LED (amber) is off, and DC GOOD LED (green) is on	<p>This is not a fault.</p> <p>This indicates that AC input is being supplied to the unit and DC output is in normal operation.</p>
INPUT GOOD LED (green) is off.	<p>AC input is not being supplied.</p> <p>Check whether the power supply cable is correctly connected. If the cable is correctly connected, replace the power supply.</p>
INPUT GOOD LED (green), FAULT LED (amber), and DC GOOD LED (green) are on	<p>This indicates that the power fan error was detected or the temperature within the power supply reached the warning value. Replace the power supply.</p> <hr/> <div style="display: flex; align-items: center;">  <div style="margin-left: 5px;">CAUTION</div> </div> <p>The unit has dual power supply configuration. Therefore, SERVICE LED turns on when FAULT LEDs of both PS0 and PS1 are on.</p> <hr/>

Table 9-3: Trouble in Disk Enclosure (Rear Panel Power LED Status) (Contd.)


Condition	Cause and Action
INPUT GOOD LED (green) is on, FAULT LED (amber) is on, and DC GOOD LED (green) is off	<p>This is not a fault.</p> <p>This indicates that DC output error or temperature error within the power supply was detected.</p> <hr/> <div style="display: flex; align-items: center;">  <div style="margin-left: 5px;">CAUTION</div> </div> <p>The unit has a dual power supply configuration. Therefore, SERVICE LED turns on when FAULT LEDs of both PS0 and PS1 are on.</p>
STANDBY GOOD LED (green) is on	<p>This is not a fault.</p> <p>The disk array unit is in standby state.</p>

Table 9-4: Trouble in Disk Enclosure

Condition	Cause and Action
POWER LED (green) is on, and SERVICE LED (amber) is off	<p>This is not a fault.</p> <p>This indicates that the disk enclosure is in normal operation after turning on.</p>
POWER LED (green) is off	<p>This indicates that starting the disk enclosure has not been completed.</p> <p>The power of the disk enclosure is turned on in conjunction with the power of the connected disk enclosure or disk array unit.</p> <p>It takes several minutes until POWER LED of the disk enclosure turns on after turning on the unit power.</p> <p>If POWER LED does not turn on within 10 minutes, check the following.</p> <ul style="list-style-type: none"> ■ Check whether INPUT GOOD LED of the disk enclosure power supply is on, indicating that the power is supplied to the disk enclosure. ■ Check cable connection status to confirm whether this disk enclosure is normally connected to other disk enclosures or the disk array unit. ■ Check POWER LED of the disk array unit to confirm whether the power of the disk array unit was turned on. If this LED is out, check whether the power source is functioning normally.
SERVICE LED (amber) is on	<p>This indicates that the disk enclosure is out of order or maintenance has not been completed.</p> <ul style="list-style-type: none"> ■ When the last operation is maintenance, processing such as disk recovery may take time. Ask the maintenance personnel for the estimated time of completion. If the disk is not recovered beyond the estimated time, ask the maintenance personnel to investigate.

Table 9-5: Wrong SAS Cable Connection

Condition	Cause and Action
It is necessary to change the disk enclosure connection	If a pool, logical disk or spare has been built, it is necessary to release it before changing the connection. Turn off the disk array unit, and then change the SAS cable connection. Next, turn on the unit, and then wait until the unit is ready. Changing the SAS cable connection is then complete.

Table 9-6: Trouble in Linkup of Host Port

Condition	Cause and Action
Logical disk in disk array is not visible from application server (host).	There is possibility that "Data Rate" / "Server Connection Type" settings are inconsistent between disk array unit and device to be connected (host HBA / switch). Please confirm below. For details, refer to <i>Configuration Setting Tool User's Manual (GUI) for the Optima X600 series</i> .
Connection between the disk array and destination (host/switch/RD port) does not linkup.	<p>1. Confirm Server Connection Type between application server (host)</p> <p>This disk array unit can use auto configuration by setting "Server Connection Type" to Auto Negotiate. But depending on settings of switch and host HBA to be connected, there are cases that connection does not linkup or takes time. In such cases, reconfigure "Server Connection Type" appropriate to switch and host HBA to be connected.</p> <ul style="list-style-type: none"> ■ Direct Connection/FC-AL Select this option when you directly connect host connection port and application server (host) with FC cable or when you use Loop topology FC switch. ■ FC Switch Connection (Fabric) Select this option when you connect to FC switch other than Loop topology FC switch.
Connection between the disk array and destination (host/switch/RD port) takes time to linkup.	<p>2. Confirm Data Rate</p> <p>This disk array unit can use auto configuration by setting "Data Rate" of host port to Auto Negotiate. But depending on settings of switch and host HBA to be connected, there are cases that connection does not linkup or takes time. In such cases, reconfigure "Data Rate" appropriate to switch and host HBA to be connected. For details of confirming and setting data rate of host HBA / FC switch, refer to manual of FC switch.</p>
Connection between the disk array and destination (host/switch/RD port) does not linkup at the maximum data rate.	For the Optima1600 Series disk array units, the default data rate of the host port is Auto Negotiate. Therefore, automatic detection is performed. When connection between the disk array unit and the destination switch or host HBA cannot linkup at the maximum data rate by the disk array unit, use the maximum data rate supported by the switch or host HBA.

9.2 Network Setting Tool Errors

Problem	Cause and Solution
The target disk array is not displayed	The network between the Network Setting Tool and the disk array may not be configured correctly. User Datagram Protocol (UDP) and the port number "2370" are used to find disk arrays. Check the network settings including the firewall settings, configure the settings to allow packets to travel through the network, and then try finding the disk array again.

9.3 Storage Manager Errors

9.3.1 Errors Experienced Throughout Storage Manager Usage

Problem	Cause and Solution
You cannot connect to the target disk array when Storage Manager client is started.	The IP addresses of the disk array specified may not be correct. Use the Network Setting Tool to confirm if the specified IP addresses of the disk array are correct. If these IP addresses are not correct, set the IP addresses again.
The window you have been working on is not visible.	The following factor is conceivable. Remove the factor and try your operation again. <ul style="list-style-type: none"> ■ The window you have been working on may be hiding behind another window. Switch window by pressing ALT+TAB.
When access to the disk array is attempted from Storage Manager Client (Web GUI), nothing is shown on the Web browser and the status bar, located at the bottom of the window, shows done.	The following causes are conceivable. <ul style="list-style-type: none"> ■ JRE is not installed. Check JRE has been installed on the machine where Storage Manager Client runs. If not, install JRE according to the procedure described in . ■ The security settings of the Web browser are not configured. Configure the Web browser settings by setting the URL of the connecting destination as trusted sites. Also configure the security level of trusted sites by selecting Enable under Run ActiveX controls and plug-ins of ActiveX controls and plug-ins. For details of the settings, Section 4.5: "Starting Storage Manager Client". ■ The network is congested. When Storage Manager Client (Web GUI) is started, it downloads files required for its operation from the disk array. Depending on the network traffic, it may take time. Wait for a few minutes for the download to complete.
When access to the disk array is attempted from Storage Manager Client (Web GUI), the message "Warning - Security" is shown.	This message indicates the digital signature of Storage Manager Client has been successfully verified. Check the name is "StorageManager" and the publisher is "Bull SAS", and then click Run . If you select the Always trust content from this publisher check box and then click Run , the message will not be shown the next time you start Storage Manager Client.
When access to the disk array is attempted from Storage Manager Client (Web GUI), the Windows Security Alert dialog box tells a Web browser function is blocked	The function is blocked by a firewall. Click Unblock on the dialog box or configure the firewall settings in advance so that your Web browser is not blocked.

Problem	Cause and Solution
<p>When access to the disk array is attempted from Storage Manager Client (Web GUI), the Java icon continues to be shown on the Web browser window and the login window does not appear.</p>	<p>The connection may fail when your Web browser is configured to go through a proxy server. In this case, configure the proxy exception of the Web browser so that disk array is connected without going through a proxy server. Follow the steps below.</p> <p>Perform Step 1 through 3 only when Internet Explorer is used.</p> <ol style="list-style-type: none">1. Click Control Panel, and Internet Options. On the Connections tab click LAN Settings to open the LAN Settings dialog box.2. If the Use a proxy server check box is not selected, the following procedure is not necessary. If this check box is selected, click Advanced to open the Proxy Settings dialog box.3. Add both the host name and the IP address to the Do not use proxy server for addresses beginning with box. Steps from 4 should be performed if your browser is Internet Explorer or Firefox.4. Follow the steps below to check the JRE proxy settings Select Control Panel, Java and Network Setting to see whether the User browser settings check box has been selected. If not, click Advanced to add both the host name and the IP address of the connecting destination to the Exceptions box.5. Exit and restart Web browsers.

Problem	Cause and Solution
<p>When startup of Storage Manager Client (Web GUI) is attempted, it does not start and the message [00008-04] is shown.</p>	<p>The following causes are conceivable. Check the machine experiencing the problem.</p> <p>Protected mode is enabled.</p> <p>If Internet Explorer 7 or later is used as a Web browser and the protected mode is enabled, starting Storage Manager Client fails. Follow the steps below to disable the protected mode.</p> <ol style="list-style-type: none"> 1. Select Control Panel and Internet Options. Click the Security tab. 2. Click to clear Enabled Protected Mode check box of the zone where the URL of the connecting destination (trusted site) is set. 3. Exit and restart the Web browsers you are using, and then try starting Storage Manager Client (Web GUI) again. <p>JRE security policy has been modified.</p> <p>Installing another product may change the JRE security policy and affect startup of Storage Manager Client (Web GUI).</p> <p>The JRE security policy is defined by the following file.</p> <pre><JRE installation folder>\lib\security\java.security</pre> <p>If this is the cause of the problem, follow the steps below to change the security policy.</p> <p>Note that the change does not affect any behavior of products other than Storage Manager Client (Web GUI).</p> <ol style="list-style-type: none"> 1. Copy the iSMClient.policy file in the CD-ROM shipped with the product to the following folder. <pre><JRE installation folder>\ lib\security\bull</pre> <p>You must create the <code>bull</code> folder because it does not exist by default.</p> <p>The iSMClient.policy file is located in the following folder of the CD-ROM.</p> <pre>\Storage_Manager_Software_For_Windows\ Client\WINDOWS\iSMClient.policy</pre> <ol style="list-style-type: none"> 2. Rewrite the first line in the "iSMClient.policy" file that has been copied by the IP address (host name) and the port number of the connecting destination. 3. Add the following line indicated by the * mark to the java.security file located in the following folder.

Problem	Cause and Solution
	<pre> <JRE installation folder>\lib\security\java.security ----- policy.url.1=file... policy.url.2=file... policy.url.<no>=file:\${java.home}/lib/ security/bull/ismClient.policy * ----- Specify the next number of described policy.url in where <no> is. </pre>
<p>While a controller failure occurs, it takes time from 20 minutes to 30 minutes to process the configuration of the disk array from Storage Manager Client.</p>	<p>A controller failure may cause the delay of processes. Configure the disk array after restoration of the controller. If you have to configure the disk array while a controller failure occurs, take the following measure:</p> <p>When Storage Manager Express is being used Configure the disk array by using CLI (Command Line Interface). For details of CLI, see <i>Storage Manager Command Reference</i>.</p> <p>When Storage Manager is being used Remove once the IP address of the faulty controller from a monitoring target of Storage Manager, and restart the server. Add the IP address again after restoration of the controller, and restart Storage Manager Server.</p>

9.3.2 Errors in Initialization

Problem	Cause and Solution
Configuring any the following failed. <ul style="list-style-type: none"> ■ Setting disk array subsystem name. ■ Setting the time (synchronization with the NTP server) ■ Setting the time (manually) ■ Unlocking a license ■ Setting host connection port (iSCSI) ■ Setting iSNS server ■ Setting host connection port (FC) ■ Port mode switching 	It is conceivable that a disk array problem or communication error between the disk array and a client has occurred. Check if the disk array or the client has a problem. Fix the problem and then perform initialization again.
An error occurred in the completion page of the initialization.	This problem may occur when the next generation Java plug-in is not disabled. See Section 4.5.1: "Before Starting Storage Manager Client" to disable the next generation Java plug-in, and then perform the initialization again.
Whenever Storage Manager is started, the dialog prompting to start initialization is displayed.	This problem occurs when initialization is not completed successfully. Start the initialization wizard and complete it successfully.

9.3.3 Errors in Pool Binding

Problem	Cause and Solution
Pool binding failed.	<p>It is conceivable that a disk array problem or communication error between the disk array and the client has occurred.</p> <p>Check if the disk array or the client has a problem.</p> <p>Fix the problem and then select Pool on the tree of the main screen to check the list of pools.</p> <ol style="list-style-type: none"> 1. If there is no newly bound pool, try pool bind again. 2. If there is any newly bound pool, right-click the pool to check its properties. <ol style="list-style-type: none"> a. If the status of the pool is normal and physical disks are displayed on the list of physical disks without any problem, the pool has been bound successfully. You do not need to bind the pool again. b. If the status of the pool is not normal or physical disks are not displayed on the list of physical disks, the pool is bound abnormally. Use the configuration menu to unbind the pool and then bind the pool again.
Creating a system volume failed.	<p>It is conceivable that a disk array problem or communication error between the disk array and the client has occurred.</p> <p>Check if the disk array or any client has a problem.</p> <p>Fix the problem and then click Monitor and Fault Information on the main screen to see the Fault Information window.</p> <ol style="list-style-type: none"> 1. When a message "System area (Logical disk number) has become fault." is displayed, delete the system volume by selecting Logical Disk and Logical Disk Unbind. Create a system volume by selecting Logical Disk and Logical Disk Bind (for system...). 2. When a message "Storage System Volume (System Volume) is not built." is displayed, create a system volume by selecting Logical Disk and Logical Disk Bind (for system...). <p>If neither of the messages (a) and (b) is reported, the system volume is successfully created. You do not need to re-create it.</p>

9.3.4 Errors in Hot Spare Binding

Problem	Cause and Solution
Hot spare binding failed.	<p>It is conceivable that a disk array problem or communication error between the disk array and the client has occurred.</p> <p>Check if the disk array or any client has a problem.</p> <p>Fix the problem and then click physical disk on the main screen to see the list of physical disks.</p> <p>If the physical disk on which hot spare binding has been performed is categorized as "not set", try hot spare binding again. If the physical disk on which hot spare binding has been performed is categorized as Hot Spare, binding hot spare is successfully completed. You do not need to perform hot spare binding again.</p>

9.3.5 Errors in Logical Disk Binding

Problem	Cause and Solution
Logical disk binding failed.	<p>It is conceivable that a disk array problem or communication error between the disk array and the client has occurred.</p> <p>Check if the disk array or the client has a problem.</p> <p>Fix the problem and then select Logical Disk on the tree of the main screen to check the list of logical disks. If all the logical disks specified in logical disk binding are bound, the logical disk binding has been completed successfully. You do not need to perform the logical disk binding again. If any logical disk specified in the logical disk binding is not bound, perform the logical disk binding again.</p>

9.3.6 Errors in Retrieving Host Information

Problem	Cause and Solution
Automatic collection of host information was performed but no host is shown.	<p>The following causes are conceivable.</p> <ol style="list-style-type: none"> 1. FC cables between the disk array and hosts are not connected correctly. 2. Storage Manager Agent Utility is not installed on the hosts or the hosts are not running. 3. The command has not been executed on Linux hosts. <p>Check the following, fix the problem, and then try collecting the host information again.</p> <ol style="list-style-type: none"> 1. Check the disk array and hosts are connected correctly with direct connection or via FC switches. Check the host ports connectivity and accessibility. 2. Install Storage Manager Agent Utility on the hosts, start running the hosts and try collecting the host information again. 3. For the Linux hosts, you need to open the window to register the host information and run the <code>iSMcc_hostinfo -store</code> command on the hosts. After running the command, click Show collected information.

9.3.7 Assigning Logical Disk Errors

Problem	Cause and Solution
Assigning logical disks failed.	It is conceivable that a disk array unit problem or communication error between the disk array and the client has occurred. Check if the disk array unit or the client has a problem. Fix the problem and then perform assigning logical disks again.

9.4 iSCSI Setup Tool Errors

9.4.1 iSCSI Setup Tool (Windows) Errors

Problem	Cause and Solution
The message, "The tool has already been started." is displayed and the iSCSI Setup Tool cannot be started.	The iSCSI Setup Tool is already up and running. Click OK to close the error message and terminate the running iSCSI Setup Tool. Then, start the iSCSI Setup Tool again.
The message, "The host name should be up to 15 characters in length. A host name can include alphanumeric characters and hyphens(-)." is displayed and the iSCSI Setup Tool cannot be started.	Change the host name using only alphanumeric characters or hyphen (-) based on the restrictions of creating a target. Click OK to close the error message. After changing the host name, restart the iSCSI Setup Tool.
The message, "Failed to collect the serial number. (Error code:xxxx)" is displayed and the iSCSI Setup Tool cannot be started.	An error occurred in retrieving the serial number. Click OK to close the error message. For details, see Section 9.4.3: "iSCSI Setup Tool Error Codes" .
The message, "The tool is not set correctly." is displayed and the iSCSI Setup Tool cannot be started.	The iSCSI Setup Tool is not installed correctly. Click OK to close the error message. Re-install the iSCSI Setup Tool and start it again.
The message, "No management port of the disk array is set." is displayed and the iSCSI Setup Tool cannot be started.	The management port settings of the disk array are not configured. Click OK to close the error message. Set the management port and start the iSCSI Setup Tool again.
The message, "An error occurred while reporting a log file. (Error code:xxxx)" is displayed.	An error occurred during output of the log file. Click OK to terminate the iSCSI Setup Tool. For details, see Section 9.4.3: "iSCSI Setup Tool Error Codes" .
The message, "Unexpected error occurred." is displayed.	An unexpected error occurred. Click OK to terminate the iSCSI Setup Tool. Do not close the error message, generate the user dump, the event log and the log file, and contact your maintenance service provider.
When a serial number is entered, the message, "No management port of the disk array is set." is displayed.	The host post connection settings are not configured. See Section 6.2.1: "Initialization Wizard" to perform the initialization to configure the host connection port settings. Then, run the iSCSI Setup Tool again.

Problem	Cause and Solution
When a serial number is entered, the message, "The target has already been assigned to the initiator. Serial number =" is displayed.	The target with the initiator already exists. To register the initiator again, delete the LD set to which the initiator was added by using the LD Set management of the iSM client, and then run the iSCSI Setup Tool again.
When a serial number is entered, the message, "Failed to collect the disk array information. (Error code:xxxx)" is displayed.	An error occurred in retrieving the disk array information. For details, see Section 9.4.3: "iSCSI Setup Tool Error Codes" .
When you click Logon, the message, "Please enter a target secret." is displayed.	The CHAP authentication check box is selected but information for Target secret and Target secret again is not entered. Enter information in the Target secret and the Target secret again boxes.
When you click Logon, the message, "Target secret unmatched. Please enter the target secret again." is displayed.	The information entered in the Target secret does not match with that of the Target secret again. Re-enter information in the Target secret and the Target secret again boxes.
When you click Logon, the message, "Please enter a CHAP secret." is displayed.	The Mutual CHAP authentication check box is selected but information for the CHAP secret and CHAP secret again is not entered. Enter information in the CHAP secret and the CHAP secret again boxes.
When you click Logon, the message, "CHAP secret unmatched. Please enter the CHAP secret again." is displayed.	The information entered in the CHAP secret does not match with that of the CHAP secret again. Re-enter information in the CHAP secret and the CHAP secret again boxes.
When you click Logon, the message, "Logon Failed.(Error code." is displayed.	An error occurred in logging on to the target. For details, see Section 9.4.3: "iSCSI Setup Tool Error Codes" .

9.4.2 iSCSI Setup Tool (Linux) Errors

Problem	Cause and Solution
The message, "File not found." is displayed.	A file that is specified as a parameter file does not exist. Specify the file name correctly.
The message, "iSCSI Initiator is not installed." is displayed.	iSCSI Initiator is not installed. Install iSCSI Initiator, start the service, and then re-start iSCSI Setup Tool.
The message, "The parameter is invalid." is displayed.	The format of IP addresses of host connection ports specified in the parameter file is invalid. Modify the parameter file and re-start the iSCSI Setup Tool.

Problem	Cause and Solution
The message, "No parameter is set." is displayed.	Valid parameters are not entered in the parameter file. Modify the parameter file and re-start iSCSI Setup Tool.
The message, "Please enter serial number." is displayed.	A serial number is not entered in the parameter file. Modify the parameter file and re-start iSCSI Setup Tool.
The message, "Please enter target IP address." is displayed.	The IP addresses of host connection ports are not specified in the parameter file. Modify the parameter file and re-start iSCSI Setup Tool.
The message, "Please enter the target CHAP secret." is displayed.	The target CHAP secret is specified but no CHAP initiator secret is specified in the parameter file. Modify the parameter file and re-start iSCSI Setup Tool.
The message, "The tool has already been started." is displayed.	The iSCSI Setup Tool is already is up and running. Terminate the running iSCSI Setup Tool, and then restart it.
The message, "Invalid host name." is displayed.	A character other than alphanumeric characters or hyphen (-) is used for a server host name. Change the host name using only alphanumeric characters or hyphen (-) based on the restrictions of creating target. After changing the host name, restart the iSCSI Setup Tool.
The message, "Failed to collect the serial numbers. Error code:xxxx" is displayed.	An error occurred in retrieving the serial number. For details, see Section 9.4.3: "iSCSI Setup Tool Error Codes" .
The message, "No management port of the disk array is not set." is displayed.	The management port settings are not configured to the disk array. Set the management port and start the iSCSI Setup Tool again.
The message, "Host connection ports of the disk array are not set." is displayed.	The host post connection settings are not configured. See Section 6.2.1: "Initialization Wizard" to perform the initialization to configure the host connection port settings. Then, run the iSCSI Setup Tool again.
The message, "The target has already been assigned to the initiator." is displayed.	The target which is assigned to initiators already exists. To register the initiator again, delete the LD Set to which the initiator was added by using the LD Set management of the iSM client, and then run the iSCSI Setup Tool again.
The message, "Failed to collect the host port information. Error code:xxxx" is displayed.	An error occurs in a process of retrieving the disk array information. For details, see Section 9.4.3: "iSCSI Setup Tool Error Codes" .
The message, "Failed to log on to the target. Error code:xxxx" is displayed.	An error occurred in logging on to the target. For details, see Section 9.4.3: "iSCSI Setup Tool Error Codes" .

9.4.3 iSCSI Setup Tool Error Codes

iSCSI Setup Tool reports how commands have run and error messages to the following log file.

Windows

%iSMvol%\etc\trace\iSMiSCSISetup.log

Linux

/opt/iSMvol/etc/trace/iSMiSCSISetup.log

1. Error in log file output

[Format]

The error occurred when the log file was output.(Error code:xxxx)

The error is reported by retrieving the error code at the time of executing Windows API function through the GetLastError function.

2. Errors in collecting the serial number.

[Formats]

Windows

Failed to collect the serial number.(Error code:xxxx)

Linux

Failed to collect the serial numbers. Error code:xxxx

Error Codes	Cause
108	The IP address you have specified is used by another network equipment.
109	Target resource does not exist.
110	The disk array you have specified is being used by another tool.
111	There are multiple disk arrays with the same serial number.
112	Disk array could not be found.
201	System call failed.
202	Configuring IP address failed.
203	An internal error occurred.

3. Errors in collecting disk array information and logon.

[Formats]

Windows

Failed to collect the disk array information.(Error code:xxxx)

Logon Failed.(Error code:xxxx)

Linux

Failed to collect the host port information. Error code:xxxx

Failed to log on to the target. Error code:xxxx

a. Errors in accessing the disk array

Error Codes	Cause
iSM31001	A command is running.
iSM31002	An unknown error occurred.
iSM31003	Invalid option value.
iSM31004	System call failed.
iSM31005	Connection to Storage Manager failed.
iSM31006	Connection to disk array failed.
iSM31007	Invalid host is specified.
iSM31008	Starting configuration settings failed.
iSM31009	The maximum number of connection.
iSM31010	Storage Manager server version does not match.
iSM31011	File open error.
iSM31012	File load error.
iSM31013	File write error.
iSM31014	File close error.
iSM31015	The disk array is being configured for settings.
iSM31016	Invalid file format.
iSM31017	Invalid command name.
iSM31018	Invalid sub-command name.
iSM31019	Invalid character sting is specified.
iSM31020	Finishing settings of configuration failed.
iSM31021	Closing the socket failed.
iSM31022	The specified OS is not supported.
iSM31023	Shortage of required options.
iSM31024	Restriction on the logical disk number (LDN) specified in the system area.
iSM31025	The maximum number of options have been exceeded.
iSM31026	Duplicated option.
iSM31027	An invalid related option has been specified.
iSM31028	Invalid option name.
iSM31029	Configuration settings are not started.
iSM31031	Unlocking licenses are not done.
iSM31044	The disk array does not support creation of LD set.
iSM31056	Upper limit of LD set creation.
iSM31057	The specified LD set name is invalid.
iSM31058	The specified LD set is not found.

Error Codes	Cause
iSM31059	The specified LD set exists.
iSM31060	The specified platform is not supported.
iSM31061	Operation on invalid partition.
iSM31098	Partition status has been updated.
iSM31108	The specified LD set is locked.
iSM31147	The specified platform is not supported.
iSM31150	The specified initiator set is set to another LD set.
iSM31151	The specified LD set is being used.
iSM31152	Upper limit of initiator addition.
iSM31174	Exception occurred during transmission.
iSM31175	Timeout occurred with connection to Storage Manager.
iSM31208	Specified LD set is designated for FC.
iSM31212	The platform of LD set does not match that of initiator.

b. Other errors

Error Codes	Cause
-	An error occurred in lscscli or iscsiadm command. (Refer to the log file for the detail on the error.)
Time Out	Timeout occurred while running a command.
Service Error	An error occurred during service startup. (Refer to the log file for the detail on the error.)
SSH Error	Error occurred during the process of SSH. (Refer to the log file for the detail on the error.)

9.5 StoreWay Multipath (Windows) Errors

Problem	Cause and Solution
<p>The SPS command <code>/lun, -getlun</code> failed.</p>	<p>When no paths are recognized by SPS, the following error may occur when the SPS command is executed.</p> <pre>> spsadmin /lun "Operation failed."</pre> <p>When this error occurs, check:</p> <ul style="list-style-type: none"> ■ Whether the installed HBA driver is appropriate and it is installed correctly. Refer to the installation manual of the HBA driver, and reinstall a HBA driver supported by the OS and the servers it will be installed. ■ Whether settings of the disk array unit, including the access control and the cross call, and the FC switch settings are configured correctly. <p>If the problem persists even after checking and performing above mentioned, please contact the Support Service.</p>
<p>Only one path is detected after the SPS command <code>/lun, -getlun</code> is run.</p> <p>The number of devices shown under the disk drive of the device manager is smaller than expected.</p>	<p>Check the following:</p> <ul style="list-style-type: none"> ■ Whether the FC cables are connected correctly. Connect the FC cables again. <p>When this error occurs, check:</p> <ul style="list-style-type: none"> ■ Whether the installed HBA driver is appropriate and it is installed correctly. Refer to the installation manual of the HBA driver, and reinstall a HBA driver supported by the OS and the servers it will be installed. ■ Whether settings of the disk array unit, including the access control and the cross call, and the FC switch settings are configured correctly. <p>If the problem persists even after checking and performing above mentioned, please contact the Support Service.</p>

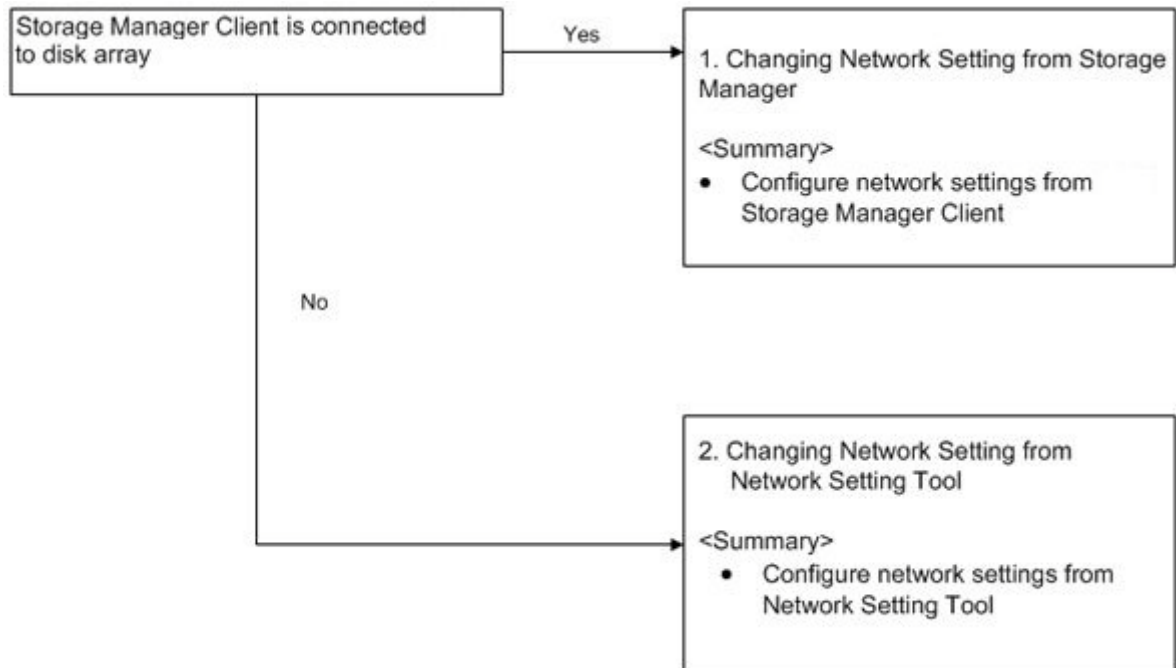
Problem	Cause and Solution
Event ID280 (spsdsm) is generated in the system event log.	Check if the configuration of connections between the servers and the disk array unit has been changed due to an event such as replacement of an HBA or reconnection of an FC cable. Delete the old configuration information by running <code>spsadmin/deletemissing</code> .
Event ID10 (WinMgmt/WMI) is generated in the application event log.	<p>This event is generated due to the specification of the SPS, and is not indication of abnormality. This does not affect the operation of the system.</p> <p>Source: WinMgmt (Case of Windows Server 2003) WMI (Case of Windows Server 2008)</p> <p>EventID: 10 Type: Error Description: Event filter with query "select * from SPN_EVENTENTRY" could not be (re)activated in namespace "//./root/WMI" because of error 0x80041010. Events may not be delivered through this filter until the problem is corrected.</p> <p>Or, Event filter with query "select * from NEC_MAM_EVENTENTRY" could not be (re)activated in namespace "//./root/WMI" because of error 0x80041010. Events may not be delivered through this filter until the problem is corrected.</p>

9.6 Changing Network Settings for Monitoring Disk Arrays from Storage Manager

If a disk array cannot be monitored correctly from Storage Manager due to faults occurring in performing initialization or erroneous settings, network settings must be changed.

Change disk array network settings using any of the following two procedures.

Whether the disk array or management server must be changed is noted in the summary of each setting. Make changes after taking into account their effect on business.



1. Changing Network Setting from Storage Manager

If the disk array is monitored from Storage Manager, the disk array unit network settings can be changed from Storage Manager.

Make changes using [Configuration] - [Disk Array] - [Management Port Settings] from the menu. For details, refer to the *Storage Manager Configuration Setting Tool User's Manual (GUI) for the Optima X600 Series*.

2. Changing Network Setting from Network Setting Tool

The disk array unit network settings can be changed from Network Setting Tool. For details, see [Section 4.3.2: "Configuring IP Addresses by Using Network Setting Tool"](#).

9.7 Troubleshooting at Installation

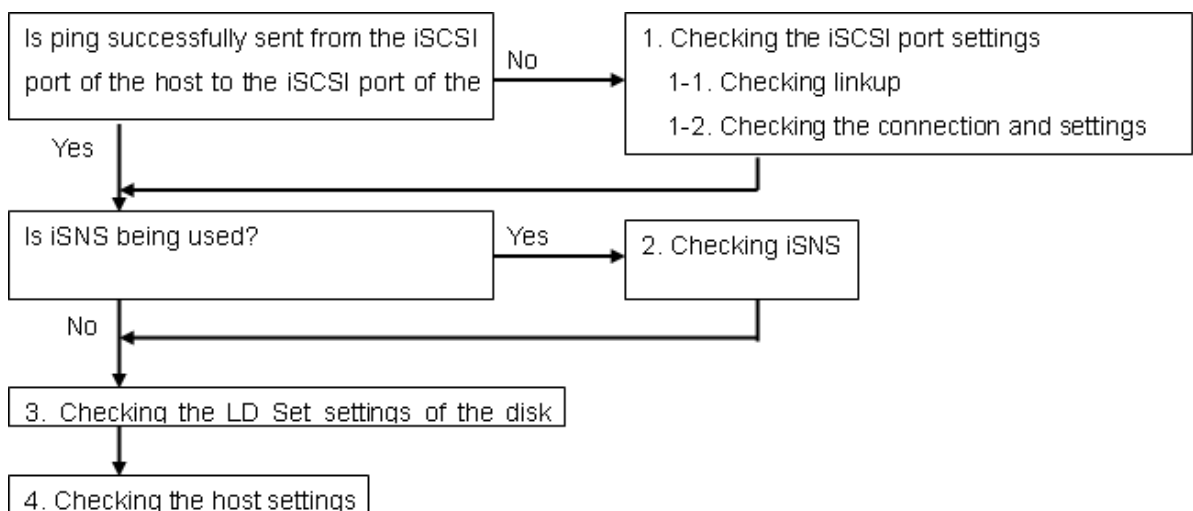
If the iSCSI port of the disk array cannot be set or the disk cannot be recognized by the host when installing the disk array, check the disk array settings following the procedure described below.

9.7.1 The IP Address of the iSCSI Port cannot be set on the Storage Manager Initialization Wizard.

The same IP address cannot be set to multiple iSCSI ports in a disk array. If an IP address conflict occurred when setting an IP address, specify a unique IP address to each iSCSI port.

9.7.2 The logical disks of the disk array cannot be recognized by the host, or an error message is displayed

The following figure shows the confirmation procedure. First, execute ping to the iSCSI port of the disk array from the iSCSI port of the host (the appropriate NIC of software initiator), and check whether ping is successfully sent. For details about how to send ping, refer to the PING communication method of each OS.



1. Checking the iSCSI port settings

If the disk array did not correspond to ping, check (1)-1 and (1)-2. After checking them, go to the steps described below:

- When using iSNS: (2) Checking iSNS
- When not using iSNS: (3) Checking the LD Set settings of the disk array

1-1. Checking linkup

Check the port to which the disk array and connected devices such as a host and switch are connected is correctly linkup.

Check method

The Link LED of the iSCSI port of the disk array is lit, the port is linkup. If the port is not linkup, check which of the following (a to c) is the LED status of the port.



When the Ready LED of the controller is not blinking, the disk array is not online. Check the following when the disk array is online.

-
- a. The Link LED and Active LED blink twice every two seconds
The iSCSI settings such as an IP address and subnet mask of the port have not been set, or they are invalid. Specify the iSCSI settings again by using the Storage Manager initialization wizard. It is thought that Node Name (WWnn) of the disk array has not been set. If the LEDs are still blinking, after the iSCSI settings of the port have been correctly specified, check the Node Name of the disk array is correctly set.
 - b. The Link LED and Active LED blink once every two seconds
The port is offline. Check whether the disk array is being shut down.
 - c. The Link LED and Active LED are not lit
In the case of 10Gbps iSCSI, check whether the connected devices such as a host and switches support 10Gbps, or whether they are normally running.
In the case of 1Gbps iSCSI, the LEDs are not linkup when the link speed is not 1Gbps. Check whether the transfer rate of the connected devices such as a host and switches is 1Gbps, or whether they are normally running.
If the connected devices are normally running, check the cable connection.

1-2. Checking the connection and settings

- a. Checking the cable connection
Check whether the cable connection between the host and disk array, including switches is correct.
 - b. Checking the IP address and other settings of the connected devices
Check the IP address and subnet mask settings of the connected devices including the host. For the checking method, refer to the manual of the host.
 - c. Checking the connection devices such as switches
When the host and disk array are connected via a switch, check the switch settings. For the checking method, refer to the manual of the switch.
2. Checking iSNS
- When iSNS is used and the disk array and host information cannot be applied to the iSNS server, check the following. When iSNS is not used, or the problem has been corrected, go to 3. "Checking the LD Set settings of the disk array".

Check items

- Check whether the iSNS server-related connection between the host and disk array is correct.
- Check whether the iSNS server-related IP addresses of the host and disk array are correct, and whether the TCP port number is correct.

For how to change the iSNS settings of the disk array, refer to the manual of Storage Manager.



Be sure to specify the number of the following registered ports for the port number.

- iSCSI port: 3260 (The iSCSI port number of the Optima3600 series disk array is defined to this number.)
- iSNS port: 3205 (Specify the iSNS port number from Storage Manager.)

3. Checking the LD Set settings of the disk array

Check the Access Control and CHAP authentication settings of the disk array. After checking and changing the settings, go to 4. "Checking the host settings".

LD Set log collection method

After collecting the LD Set information by using Storage Manager, check the settings below. For how to collect the LD Set information, refer to the manual of Storage Manager.

(3)-1 Checking the settings related to Access Control

- a. Check that the initiator name set to the LD Set is the same as that of the host.
- b. Check that the IP address of the iSCSI port of the disk array, which has been set to the LD Set, is correct.
- c. Check that the logical disks assigned to the host as an LD Set is correct.

(3)-2 Checking the CHAP authentication settings

Check whether CHAP is enabled or disabled by referring to the CHAP authentication / bidirectional CHAP authentication settings of the initiator (host) and Storage Manager.

For how to change the settings of Storage Manager, refer to the manual of Storage Manager.

4. Checking the host settings

Check the following iSCSI settings of the host.

(4)-1 Checking the iSCSI parameter settings of the host

Check that the iSCSI settings of the host, including the initiator name, CHAP, and target portal, are correct.



If the port number can be selected for the target specification settings of iSCSI initiator, including an IP address and subnet mask, use the default port number (3260).

(4)-2 Checking the multi-session settings of the host

Check that the login setting of the host is not set to multi-session. For how to check the login setting, refer to the manual of the host (software initiator).

Multi-session

If logging in to the same IP address (iSCSI port) of the disk array twice from the hosts with the same name, the first login connection is disconnected.

Example: In the case of iSCSI Initiator on Windows Server 2003, if the same target is specified to Persistent Targets twice or more

If the Automatically restore this connection when the system boots check box is selected at login, the target is registered to the Persistent Targets tab of the Microsoft iSCSI Initiator dialog box.

If the same target logs in to the disk array twice or more by specifying the same IP address, the duplicated list is set to Persistent Targets, and the system enters a multi-session. If a duplicated Target-IPaddress pair exists in Persistent Targets, delete the duplicated pair.

For details, refer to the manual of Microsoft iSCSI Initiator.

(4)-3 Checking whether the host logged in target on the disk array

Check whether the host is logging in the target on the disk array. For how to check, refer to the manual of the host (software initiator). If the host is not logging in the target, check whether the host is set to log in the target on the disk array.

For iSCSI Initiator software, it is possible to specify whether to automatically reconnect to the host after rebooting the host. If the logical disk cannot be recognized after rebooting the host, check whether the automatic recognition settings are appropriate.

5. When the error cause cannot be identified

Prepare the items described in [Section 9.9.2: "Before You Call"](#), and then contact Bull SAS sales, the sales agent from whom you purchased the disk array unit, or your maintenance service agent.

9.8 User Support

9.8.1 Unit Life Span and Maintenance Period

The unit life span and maintenance periods after production ends for the disk array unit are as follows.

Parts used in the disk array unit include parts that must be replaced due to their life spans (such as cooling fans, batteries, and disk drives).

Since life spans may be shorter than five years depending on the environment in which the disk array unit is used, it is recommended that parts be replaced regularly. Contact your maintenance service agent regarding replacements and life spans.

- Unit life span: 5 years
- Maintenance period: 5 years after production ends

Note that repair may not be possible in the cases below. Moreover, a fee may be charged even if within the warranty period.

- Stained goods, dropped goods, goods damaged by mishandling
- Goods damaged by mishandling in storage or shipping
- Items altered by the user
- Items whose life spans are over
- Goods damaged by earthquake, lightning, fire, or other natural disaster, and goods damaged due to an accident or other external cause

Life Spans of Parts

- Fan (power supply): 50,000 hours
- Disk drive: 5 years

Consumables

- Battery



The battery life span becomes shorter when it is used in high temperatures environments.

The life span is about 5 years when used under an ambient temperature of 25 degree celsius(77°F), but will be reduced to approximately half (about 2.5 years) at an ambient temperature of 35 degree celsius(95°F). In addition, as backup frequency increases, the battery life span becomes shorter. The life span above is calculated considering accidental power disconnection such as power outage.

9.8.2 Before You Call

Before you call to clarify your queries or consult on a failure or abnormality of a disk array unit, the following items should be available.

- The warranty and this user guide.
- Conditions of the fault or abnormality, notes on content of questions.
- Notes on the unit configuration and software used on it.

(Use the troubleshooting information sheet on the following page and the checksheet found in [Appendix I: "LED Inspection Checksheet"](#))

- Notes on the configuration of the connection of the host unit to the disk array unit and the configuration of peripheral equipment connected to the host unit.
- Manuals for the host unit and peripheral equipment connected to the host unit and manuals of software used.

<u>Troubleshooting Information Sheet</u>	
1. Write down the model and serial number of the disk array unit. You can find them on the nameplate.	
MODEL:	_____
SER.NO:	_____
2. Confirm the following.	
Number of installed drive enclosures:	_____
Number of installed disks:	_____
3. Do you use UPS? What model?	_____
4. Do you use a power coupling unit or PMAN? What model?	_____
5. Are the following LEDs of the controller enclosure on? Yes/No/Blinking	
6. Are the following LEDs of the drive enclosure on? Yes/No/Blinking	

9.8.3 Contacts for questions and consultation

For questions and consultation about the disk array unit, contact Bull sales, the sales agent from whom you purchased it, or your maintenance service agent.

Appendix A Specifications

The specifications of the disk array are shown below.

Table A-1: Specifications - Disk Array

	StoreWay Optima3600
Host interface	(A) Fibre channel (FC-AL / Fabric) ■ Maximum transfer rate: 8 Gbps
	(B) iSCSI interface ■ Maximum transfer rate: 1 Gbps ■ Maximum transfer rate: 10 Gbps (Fibre)
	(C) SAS interface ■ Maximum transfer rate: 6 Gbps
HPEs per unit	2 (initial) 4 (when HPE added)
Number of host ports per CONT	(A) 4
	(B) 2
	(C) 2
Cache memory capacity per unit	12 GB, 24 GB, or 48 GB
Backup time for cache memory	Unlimited
DEs per unit	3.5-inch DE: Max. 32 (max. 8 per port) 2.5-inch DE: Max. 16 (max. 4 per port)
Number of disk drives	3 to 384 (max. 96 per port)
Disk drive	3.5-inch SAS (15Krpm): 300 GB, 450 GB, 600 GB (standard), 600 GB (encryption) 3.5-inch NL-SAS (7.2Krpm): 1 TB, 2 TB 3.5-inch SSD: 400 GB 2.5-inch SAS (10Krpm): 300 GB, 450 GB, 600 GB (standard), 600 GB (encryption) 2.5-inch NL-SAS (7.2Krpm): 1 TB 2.5-inch SSD: 10 0GBβ
Disk interface	SAS: Maximum transfer rate: 6 Gbps
RAID type	RAID-10, 50, 60, TM

Specifications of the RAID configurations are shown below.

Table A-2: Specifications - RAID Configurations

RAID type	RAID components	Number of disk drives	Storage efficiency
RAID-10	$(1D+1D) \times n$	2 or more	50%
RAID-50	$(2D+P) \times n$	3 or more	66%
	$(4D+P) \times n$	5 or more	80%
	$(8D+P) \times n$	9 or more	88%
RAID-60	$(4D+PQ) \times n$	6 or more	66%
	$(8D+PQ) \times n$	10 or more	80%
RAID-TM	1D+1D+1D	3	33%



- It is recommended that you use disk drives of the same capacity and rotational frequency for RAID systems.
 - D refers to data disk; P and Q refer to parity disks.
 - n is an integer greater than 1.
-

Appendix B How to Set/Check Application Server (Windows) (FC)

This appendix provides the steps you should follow while setting or checking application server in the Windows environment, when the disk array is configured for the FC connection.

B.1 Installing Storage Manager Agent Utility

This section describes how to install Storage Manager Agent Utility.

B.1.1 Before Installation

Note the followings before installing the Storage Manager Agent Utility. The following functions become available by installing the Storage Manager Agent Utility.

- iSM volume list command.
- Host agent (Host information collection command and host agent service) (*1)
- iSCSI Setup Tool (*2)
- Storage Manager Host Register Agent (*3)
 - *1 Available in Windows Server 2003 SP 1 or later environments.
 - *2 Available in Windows Server 2008 or later environments.
 - *3 Available in Windows Server 2003 or later environments.

Table B-1 shows the supported operating environment

Table B-1: Operating Environment (Windows)

Operating systems	<p>Microsoft Windows Server 2003, Standard Edition (SP0 to SP2) (*1) Microsoft Windows Server 2003 R2, Standard Edition (SP0, SP2) Microsoft Windows Server 2003, Standard x64 Edition (SP0, SP2) Microsoft Windows Server 2003 R2, Standard x64 Edition (SP0, SP2) Microsoft Windows Server 2003, Enterprise Edition (SP0 to SP2) (*1) Microsoft Windows Server 2003 R2, Enterprise Edition (SP0, SP2) Microsoft Windows Server 2003, Enterprise x64 Edition (SP0, SP2) Microsoft Windows Server 2003 R2, Enterprise x64 Edition (SP0, SP2) Microsoft Windows Server 2003, Enterprise Edition for Itanium-based Systems (SP0 to SP2) (*1) (*5) Microsoft Windows Server 2008 Standard (SP0, SP2) (*2) (*3) (*4) Microsoft Windows Server 2008 R2 Standard (SP0, SP1) (*2) (*4) Microsoft Windows Server 2008 Enterprise (SP0, SP2) (*2) (*3) (*4) Microsoft Windows Server 2008 R2 Standard (SP0, SP1) (*2) (*4) Microsoft Windows Server 2008 for Itanium-based Systems (SP0, SP2) (*5)</p> <p>(*1) To use the host information collection function included in Storage Manager Agent Utility, SP1 or SP2 must be applied on this OS. (*2) The product without Hyper-V function is also supported. (*3) The Server Core install option is not supported. (*4) The iSCSI Setup Tool (sharing function) can be used on the Optima X600 series disk arrays. This tool supports Windows Server 2008 or later. The 32-bit version of Java Runtime Environment (JRE) must be installed to use this function. (*5) The Optima X600 series does not support Microsoft Windows Server 2003, Enterprise Edition for Itanium-based Systems, and Microsoft Windows Server 2008 for Itanium-based Systems.</p>
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Table B-1: Operating Environment (Windows)

Memory	Microsoft Windows Server 2003, Standard Edition OS required memory + 10 MB or more Microsoft Windows Server 2003 R2, Standard Edition OS required memory + 10 MB or more Microsoft Windows Server 2003, Standard x64 Edition OS required memory + 12 MB or more Microsoft Windows Server 2003 R2, Standard x64 Edition OS required memory + 12 MB or more Microsoft Windows Server 2003, Enterprise Edition OS required memory + 10 MB or more Microsoft Windows Server 2003 R2, Enterprise Edition OS required memory + 10 MB or more Microsoft Windows Server 2003, Enterprise x64 Edition OS required memory + 12 MB or more Microsoft Windows Server 2003 R2, Enterprise x64 Edition OS required memory + 12 MB or more Microsoft Windows Server 2003, Enterprise Edition for Itanium-based Systems OS required memory + 37 MB or more Microsoft Windows Server 2008 Standard OS required memory + 10 MB or more Microsoft Windows Server 2008 Enterprise OS required memory + 10 MB or more Microsoft Windows Server 2008 for Itanium-based Systems OS required memory + 37 MB or more
Disk capacity	20 MB or more

* Above are the supported environments for this version at the point of the initial shipment of this product.

B.1.2 Installation

Use Storage Manager Setup to install the Storage Manager Agent Utility.

Storage Manager Setup starts automatically when the Storage Manager Express Setup and Utility CD-ROM is set and then you can perform installation as prompted.

The procedure for starting the Storage Manager Setup is:

1. Logon as administrator.
2. Set the CD-ROM of Storage Manager in an application server.
3. The Storage Manager Setup starts automatically. Perform the installation as prompted.

The Storage Manager Setup may not start automatically depending on your system configuration, in which case, start the following program contained in the CD-ROM:

```
\INSTALL\WINDOWS\ISMSETUP.EXE
```

**CAUTION**

After the Storage Manager Agent Utility is installed, the system needs to be restarted to start the Storage Manager host agent service.

B.2 Collecting/Registering Host Information on Application Server

B.2.1 Collecting Host Information by Using File Output

To collect host information by using file output, follow the procedure below.

1. Run host information collection command (iSMcc_hostinfo)

Run the host information collection command (iSMcc_hostinfo) from the command prompt. For the `-export` option, specify a file (host information file) to which host information will be reported.

Run the host information collection command (iSMcc_hostinfo) as a user privileged as Administrator.

```
D:\> iSMcc_hostinfo -export \ServerName
iSMcc_hostinfo: Info:      iSM11700: Please wait a minute.
iSMcc_hostinfo: Info:      iSM11770: Host Information was exported
successfully. (code=
aaaa-bbbb-bbbb-bbbb)
iSMcc_hostinfo: Info:      iSM11100: Command has completed
successfully.
```

2. Confirm the result of running the command

After running the host information collection command (iSMcc_hostinfo), confirm that the message No. iSM11770 is reported and the host information is successfully collected. "aaaa" in the message example above is replaced with a process number and "bbbb" with an internal code for maintenance in the actual message.

3. Transferring the host information file

Transfer the host information file reported by using the host information collection command (iSMcc_hostinfo) to a client by using file transfer, USB memory, or other methods.

To register host information files transferred to clients, see [Section B.2.2: "Registering Host Information by Using File Output"](#).

B.2.2 Registering Host Information by Using File Output

To register host information by using file output, follow the procedure below.

1. Report a host information file.

See [Section B.2.1: “Collecting Host Information by Using File Output”](#) to report a host information file.

2. Transfer the host information file to a client.

Use file transfer, USB memory or other methods to transfer the host information file to a client.

3. Register the host information by using Storage Manager.

On the left pane on the Storage Manager window, click **Configuration**, **Host** and **Host Information Collection** to open the Host Information Registration window.



Figure B-1: Getting Started - Host Information Collection

4. Select host information setting method.

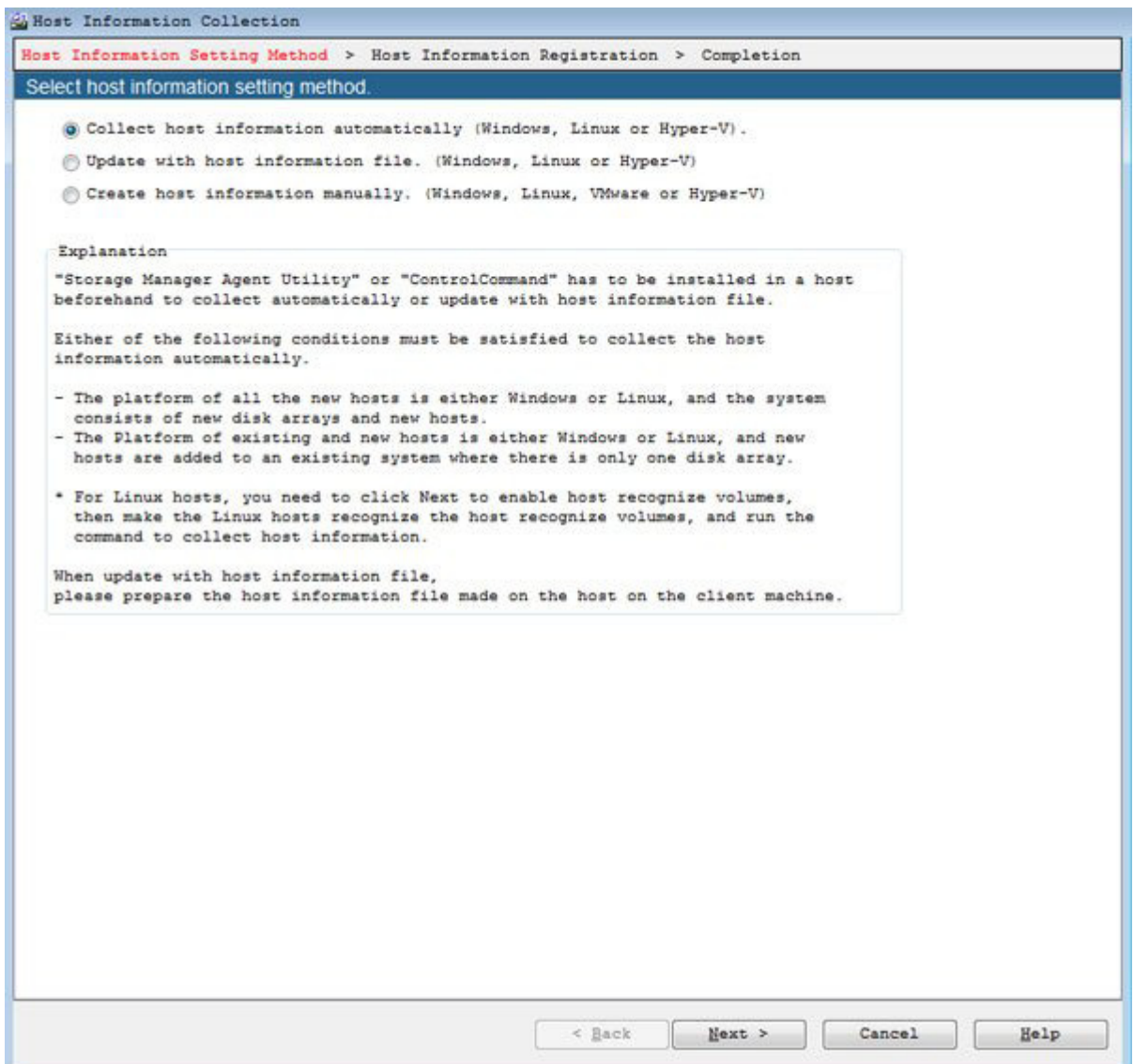


Figure B-2: Host Information Collection - Setting Method

Select the **Update with host information file. (Windows, Linux or Hyper-V)** option and click **Next**.

5. Specify the host information file.

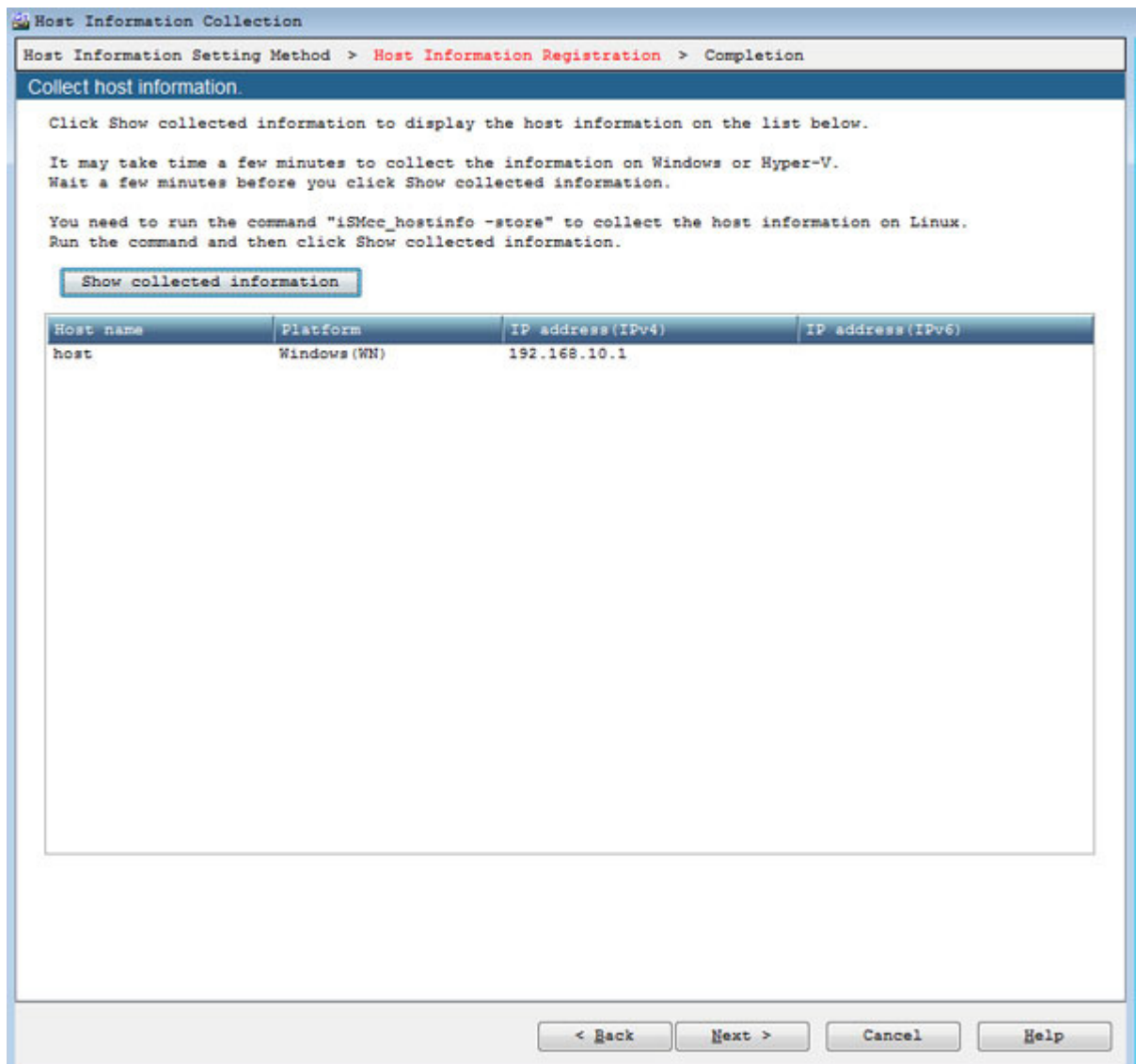


Figure B-3: Host Information Collection - Registration

- a. Click **Show collected information** to specify the file in which host information is recorded and click **Add**.
- b. Confirm that all the host information is retrieved and click **Next**.
This displays the Host information collection completion window.

6. Host information setting completion window

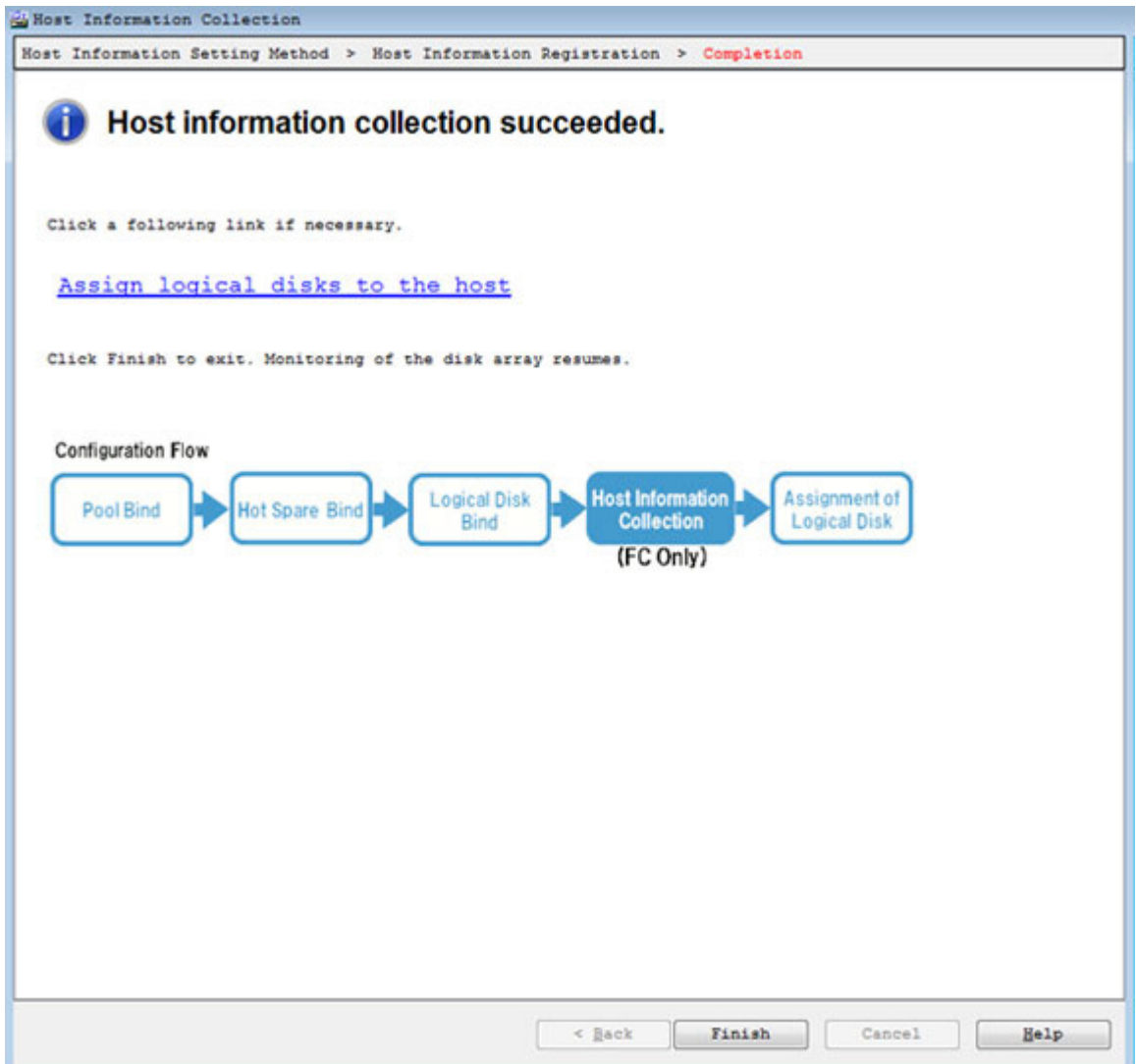


Figure B-4: Host Information Collection - Completion

The result of setting host information is displayed. Click **Finish** to close the page.

B.3 Checking Connection from Application Server

This section describes how to check connection under a Windows environment and check the Multipath settings and status.

B.3.1 Check connection under a Windows environment

After confirming that the application server and disk array unit are connected through an FC cable, restart the server and perform the following checks.

- a. To start, select **Administrative Tools > Computer Management > Device Manager**.
- b. Click **Disk drives** and check the number of logical disks.



If nothing is displayed, the OS was unable to recognize logical disks in the disk array assigned to a server. Check the connection between the server and disk array unit, the Access Control settings, host bus adapter driver settings, etc.

Display example: When four logical disks are assigned to a server.

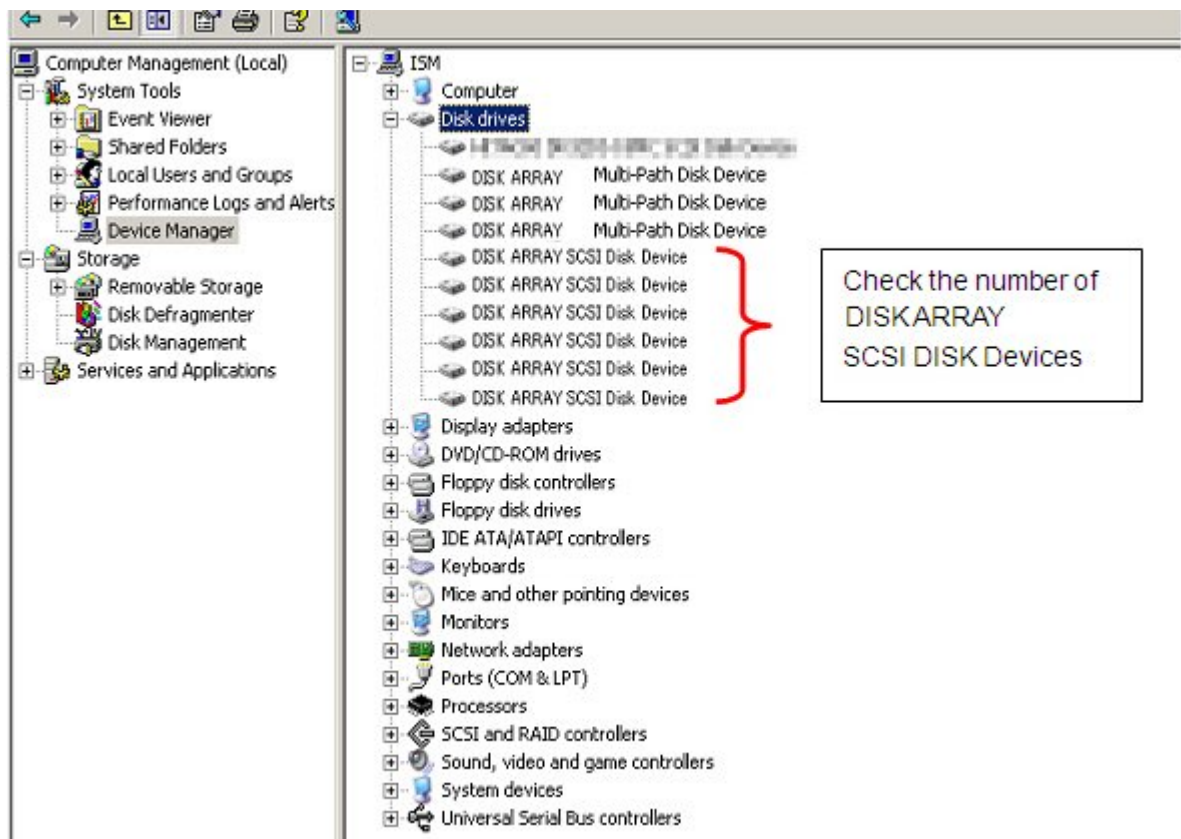


Figure B-5: Computer Management - Device Manager

- c. Open **Disk Management** and check the number of logical disks assigned to a server.

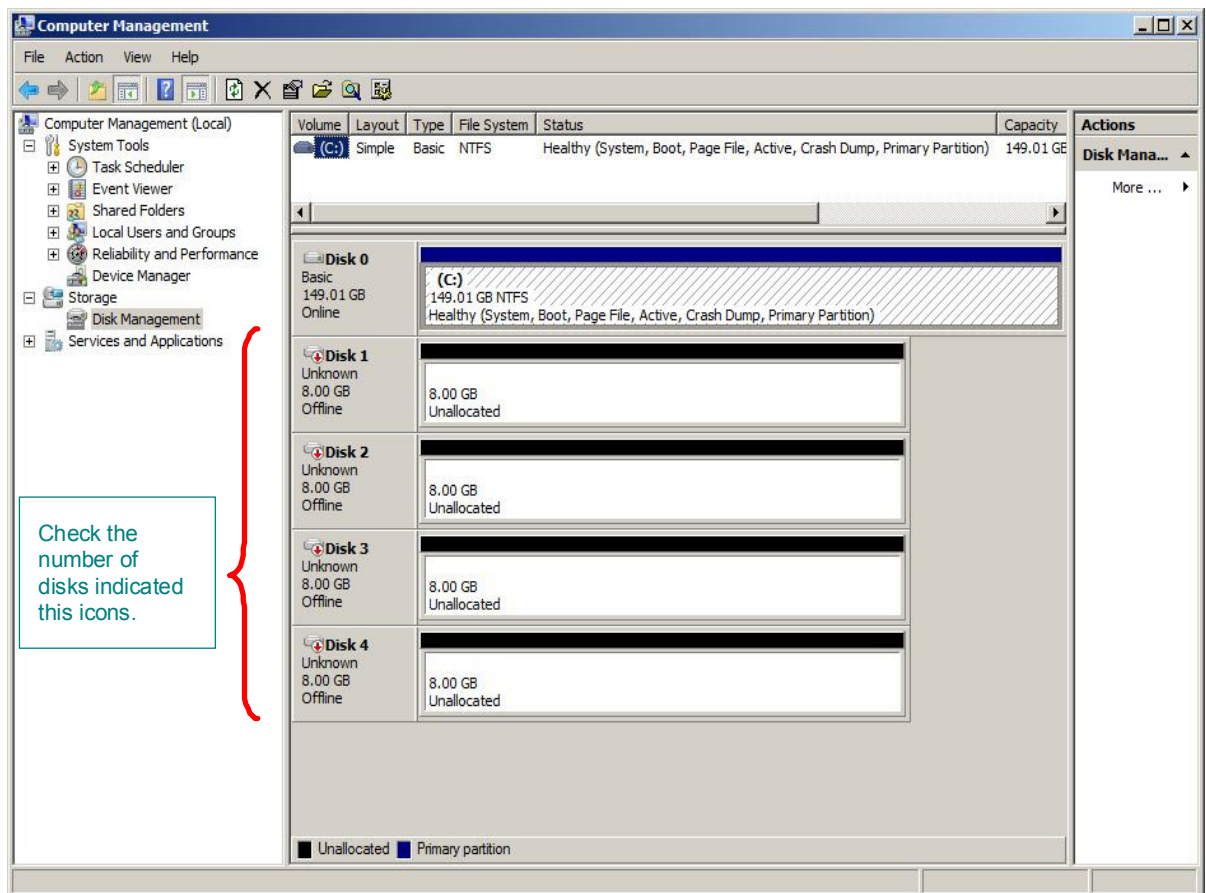


Figure B-6: Computer Management - Disk Management

B.3.2 Check the Multipath Settings and Status

When Multipath is not used, it is not necessary to perform this step.

After checking the FC cable connection between the application server and disk array unit, restart the server and run the following command from the command prompt.



For details, refer to the *StoreWay Multipath User's Guide (Windows Version)*.

Check Multipath status

Run the following command from the command prompt.

```
spsadmin /lun
```

Check the message shown after the command is executed, and then check the number of logical disks assigned to the server, the number of access paths per logical disk, and each path status.

Display example: When two logical disks are assigned to a server, with two access paths per logical disk.

```
C:\>spsadmin /lun

+++ LogicalUnit #0 +++
  SerialNumber="0000000995000001", LDNumber=0x00000
  LoadBalance=Least Size
  0: ScsiAddress=2:0:0:0, Priority=1, Status=Active
  1: ScsiAddress=3:0:0:0, Priority=2, Status=Standby

+++ LogicalUnit #1 +++
  SerialNumber="0000000995000001", LDNumber=0x00001
  LoadBalance=Least Size
  0: ScsiAddress=2:0:0:1, Priority=1, Status=Active
  1: ScsiAddress=3:0:0:1, Priority=2, Status=Standby
```

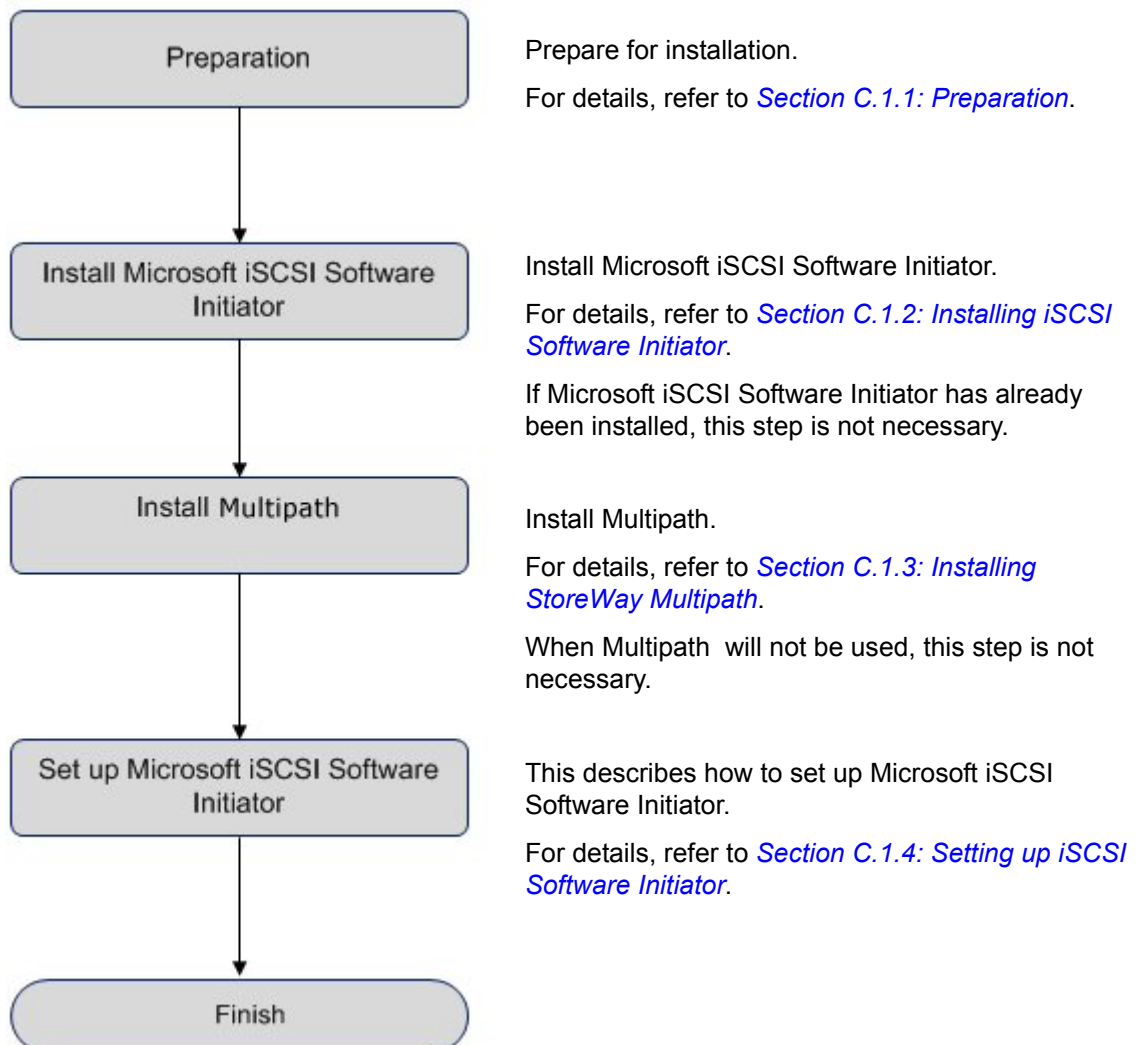


If nothing is displayed, none of the access paths recognized the logical disks of the disk array unit assigned to the application server. Check the connection between the application server and the disk array unit, the Access Control settings, host bus adapter driver settings, and other settings.

Appendix C How to Set/Check Application Server (Windows) (iSCSI)

C.1 Initializing Application Server

Perform the following steps to initialize the application server in Windows environments.



C.1.1 Preparation

Perform the following steps to prepare for installation of application server in Windows environment:

1. Provide IP addresses for an application server

Prepare IP addresses to be assigned to the application server as many as the NIC (1000BASE-T or 10GBASE-SR) ports. In addition, prepare the subnet mask and gateway addresses by asking the network administrator.



If two or more IP addresses are used by Multipath, the same network segment cannot be specified. Prepare IP addresses of other segments.

Example 1: Connectable configuration

HP0:192.168.0.10

HP1:192.168.1.10

Example 2: Unconnectable configuration

HP0:192.168.0.10

HP1:192.168.0.11

2. Attach NIC (1000BASE-T or 10GBASE-SR)

Attach the NIC to the application server as described in the manuals provided with the NIC and application server.



If the NIC has already been attached to the application server, this step is not necessary.

3. Install the NIC (1000BASE-T or 10GBASE-SR) driver

Install and set up the driver according to the setup procedure in the manual provided with the NIC equipped in the server, or by referencing information provided on the Web, etc.



If the driver has already been installed and set up for the NIC equipped in the application server, this step is not necessary.

4. Specify the network settings

Select **Start > Control Panel > Network Connection**, and then open **Local Area Connection Properties** to specify the IP address, subnet mask, and default gateway.

5. Connect to the disk array unit

Use a 10-Gbps or 1-Gbps cable to connect the application server to the host port (HP connector) of the disk array unit.

- Unit equipped with NF53x1-xF21xx (unit with 10Gbps iSCSI 2port controllers)
10-Gbps cable
Connector shape: LC connector



NF9320-SJxx (FC cable) can be used.

- Unit equipped with NF53x1-xF11xx (unit with 1Gbps iSCSI 2port controllers)
1-Gbps cable
Connector shape: RJ-45 connector



- CAT6 LAN cable is recommended.
- Either straight cable or crossover cable can be used.

For a sample connection configuration, see [Appendix K: "iSCSI Connection Configuration-Examples"](#).

The following shows the positions of the host ports.

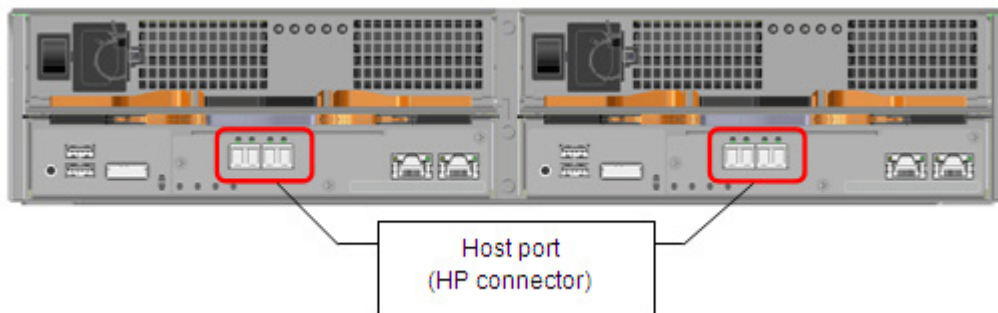


Figure C-1: Unit with NF53x1-xFxx (10Gbps iSCSI 2port Controllers)

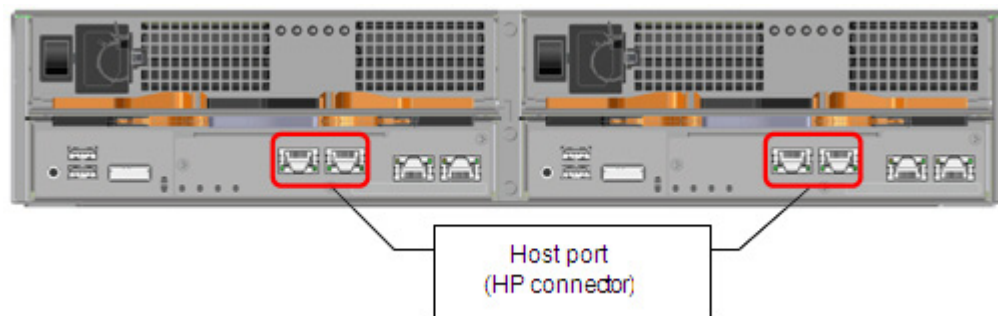


Figure C-2: Unit with NF53x1-xFxx (1Gbps iSCSI 2port Controllers)

The following shows an example of a 10-Gbps iSCSI connection (redundant path configuration in combination with Multipath).

To implement the following recommended example, two NICs must be installed in the application server and two 10-Gbps cables are needed to connect the disk array unit and NICs.

Use a 10-Gbps cable to connect the NIC to the host port (HP connector) of the disk array unit. (The 10-Gbps cable has the same connector shape on both ends.)

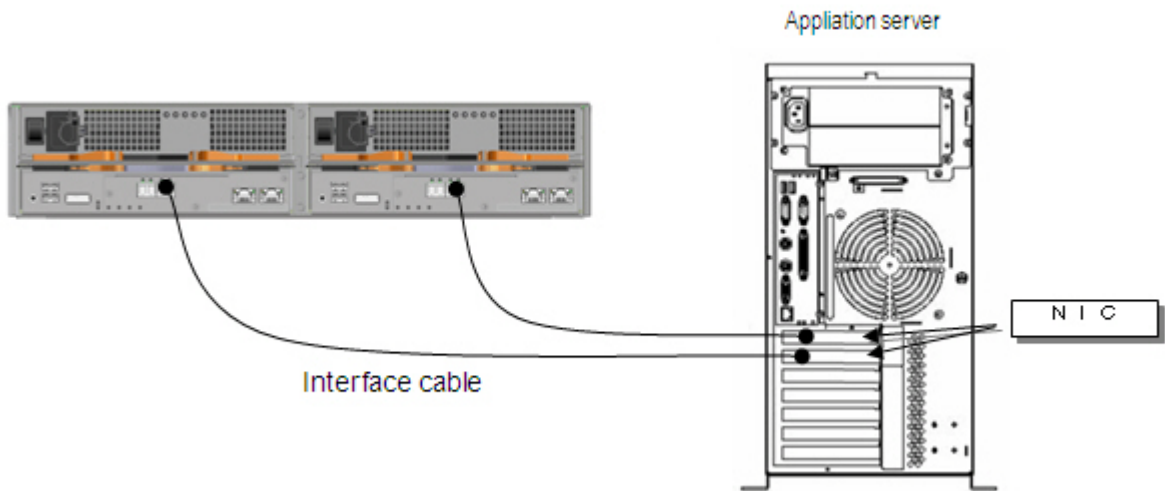


Figure C-3: Configuration Example

C.1.2 Installing iSCSI Software Initiator

Perform the following steps to install iSCSI Software Initiator in Windows Server 2008 or Windows Server 2003 environments:

Windows Server 2008

Windows Server 2008 have the iSCSI Software Initiator already installed, so there are no installation steps. Select **Start > Administrative Tools**, and then start iSCSI Initiator.

The following dialog boxes are displayed only during initial startup. After the service is started, if there are no problems with the firewall settings, click the **Yes** button in each screen.

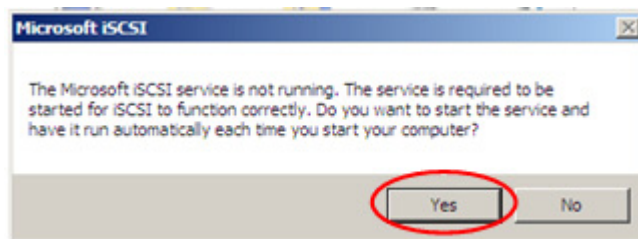


Figure C-4: Microsoft iSCSI (1) Dialog Box

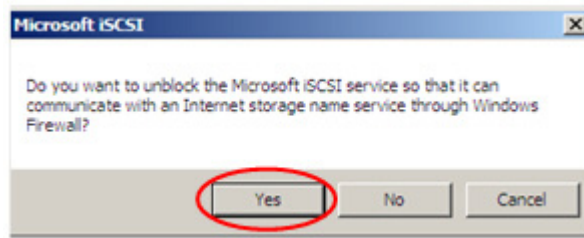


Figure C-5: Microsoft iSCSI (2) Screen

Windows Server 2003/Windows Server 2003 R2

Perform the following steps to install the initiator in Windows Server 2003 or Windows Server 2003 R2 environment:

1. Download the Microsoft iSCSI Software Initiator from the Microsoft website (<http://www.microsoft.com/downloads/>).
2. The following screen is displayed when installation of the Microsoft iSCSI Software Initiator begins. Click the **Next** button.



Figure C-6: Software Update Installation Wizard Screen (1)

3. After changing the settings as follows, click the **Next** button.
 - Select the **Initiator Service** option.
 - Select the **Software Initiator** option.

- Deselect the **Microsoft MPIO Multipathing Support for iSCSI** option.



When Multipath is being used, the MPIO function cannot be used.

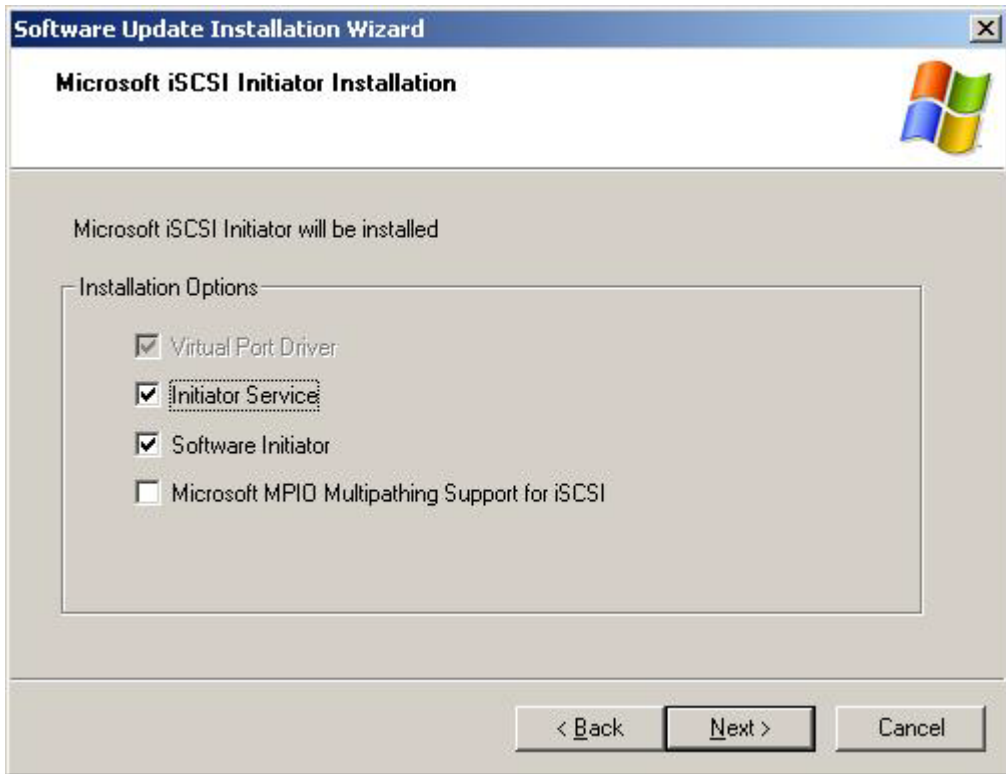


Figure C-7: Software Update Installation Wizard Screen (2)

4. If you agree to the terms of the license agreement, select **I Agree**, and then click the **Next** button.

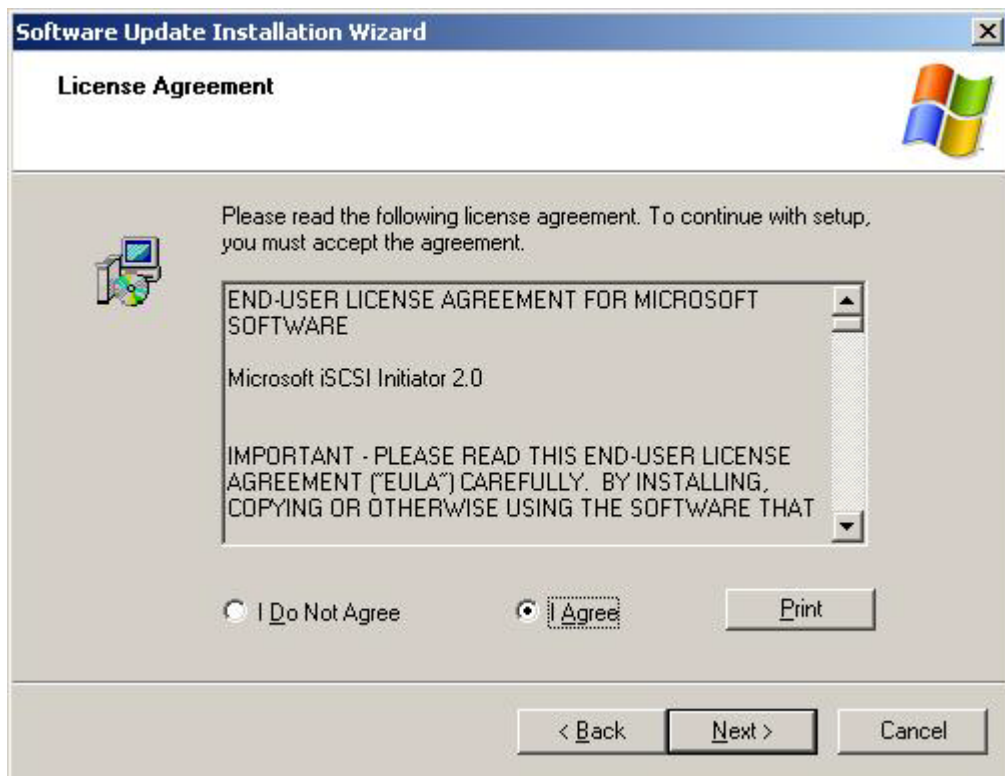


Figure C-8: Software Update Installation Wizard Screen (3)

5. The following dialog box appears next. No more user input is needed until installation is completed.

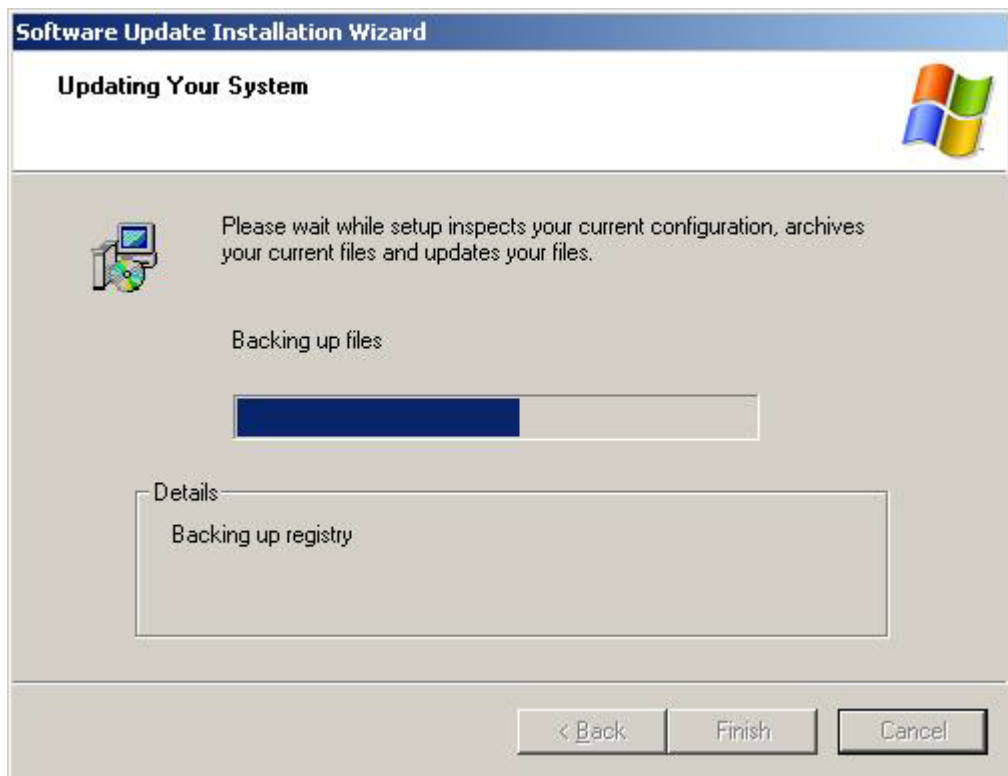


Figure C-9: Software Update Installation Wizard Screen (4)

6. Click the **Finish** button to restart the server.

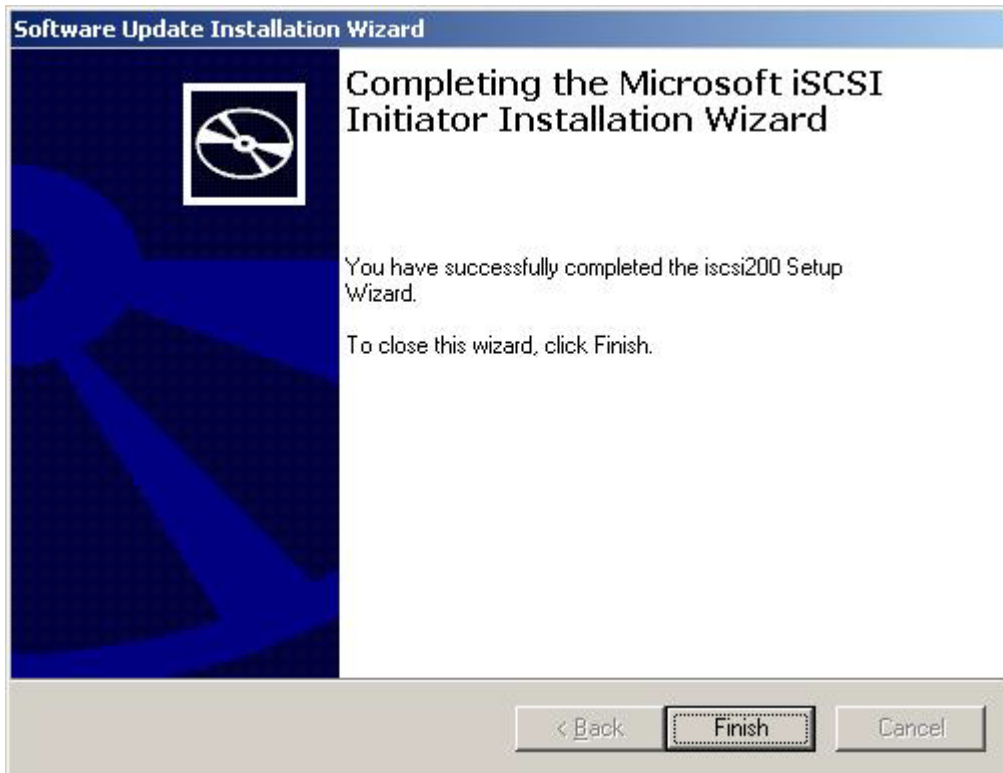


Figure C-10: Software Update Installation Wizard Screen (5)

7. After the server is restarted, the Microsoft iSCSI Initiator icon appears on the desktop.



Figure C-11: Application Server Desktop Screen

C.1.3 Installing StoreWay Multipath

See [Section G.1: For Windows Application Server](#) for installation procedure.

This operation is not necessary if you do not install StoreWay Multipath.



When using Multipath MPIO function of the iSCSI Software Initiator cannot be used. If the iSCSI Software Initiator has already been installed and MPIO function is set to enabled, you must uninstall the iSCSI Software Initiator. Then reinstall the iSCSI Software Initiator with the setting not using MPIO function.

C.1.4 Setting up iSCSI Software Initiator

Settings for the Windows Server 2008 environment are described below.

1. Select the **General** tab in the iSCSI Initiator Properties screen to check the iqn (iSCSI Qualified Name) shown as the Initiator name.

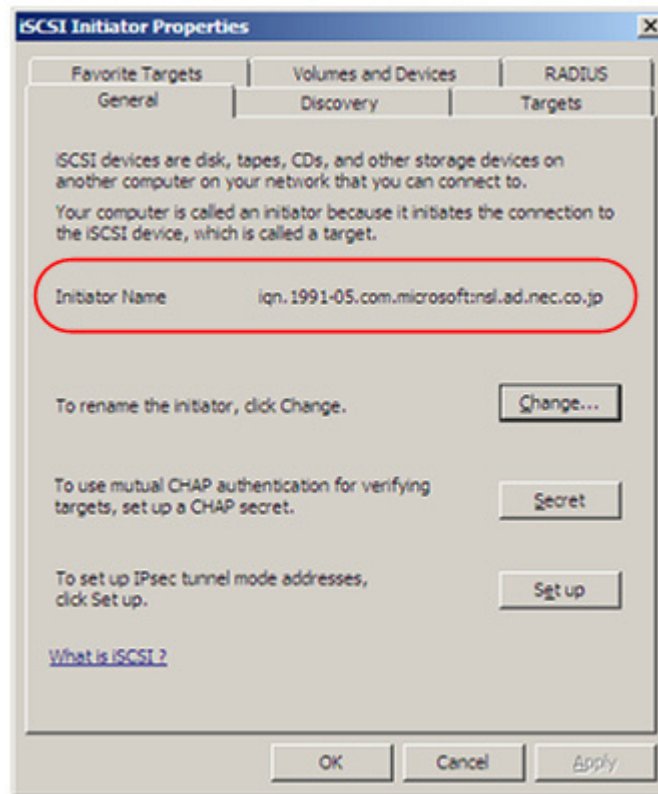


Figure C-12: iSCSI Initiator Properties (General Tab) Screen

- Click the **Change** button to change the iqn.
- Click the **Secret** button when using the mutual CHAP authentication.
- Click the **Setup** button when using the IPsec tunnel mode function. This is not supported.



CAUTION

- The **Secret** setting for mutual CHAP authentication must also be set for the disk array unit. The setting method is described in *Section 13.2.21: iSMcfgsetldsetchap of Storage Manager Command Reference*.
- Mutual CHAP authentication is also described in *Storage Manager Command Reference* as **Bidirectional CHAP authentication**.



CHAP authentication is also described in [Appendix N: "CHAP Authentication"](#).

2. If mutual CHAP authentication will be used, click the **Secret** button. If mutual CHAP authentication will not be used, skip step (3) and move to step (4) below.

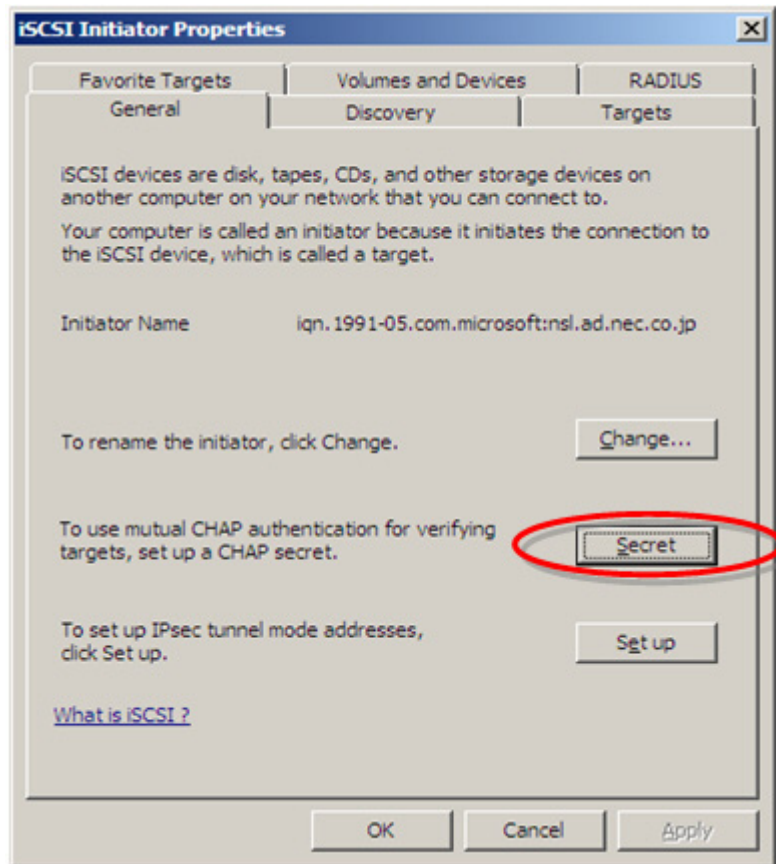


Figure C-13: iSCSI Initiator Properties (General Tab) Screen

3. Under **CHAP Secret**, enter the password assigned to Initiator for use in mutual CHAP authentication, and then click the **OK** button.

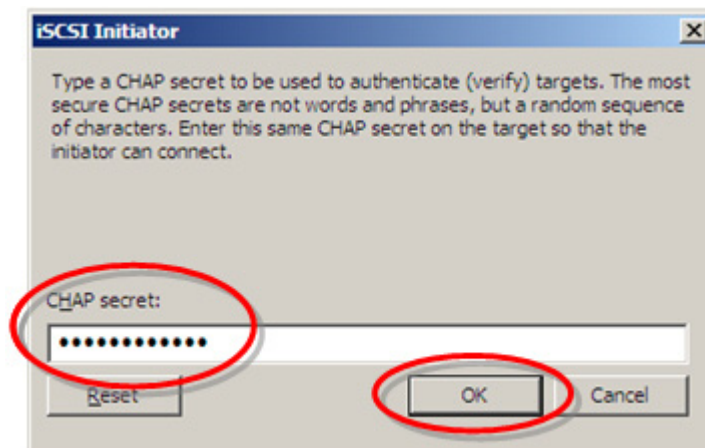
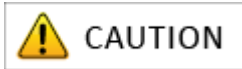


Figure C-14: CHAP Secret Input Window



- The CHAP Secret can be specified as any string of 12 to 16 alphanumeric characters as well as !#\$%&'*+~/=?{|}_.-. Letters are case-sensitive. For security, password text strings are indicated as ● or other symbols.
 - Mutual CHAP authentication is also described in *Storage Manager Command Reference* as **Bidirectional CHAP authentication**.
 - The CHAP Secret that is set here is a password that a target uses to authenticate the Initiator. This password is also required for settings on the disk array side (see *Section: 13.2.21 iSMcfg setldsetchap in the Storage Manager Command Reference*), so be sure to write it down so it is not forgotten.
-
4. Perform the iSCSI Initiator Properties Discovery tab settings using any of the following options:
- Settings when not using iSNS (Internet Storage Name Service) server
 - Settings when using the iSNS (Internet Storage Name Service) server

Settings when not using iSNS (Internet Storage Name Service) server

Perform the following settings:

- a. Under the **Discovery** tab in **iSCSI Initiator Properties**, click the **Add Portal** button under **Target Portal**.

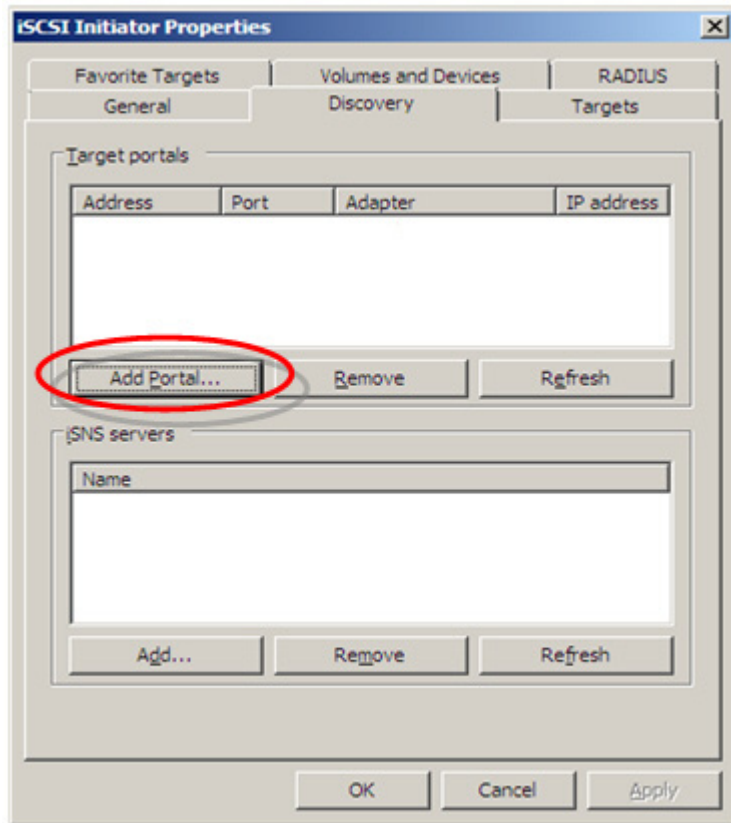


Figure C-15: iSCSI Initiator Properties (Discovery Tab) Screen

- b. Enter the IP address of the disk array host port (iSCSI port) under **IP address or DNS name**. Make sure the entry is correct, and then click the **OK** button.

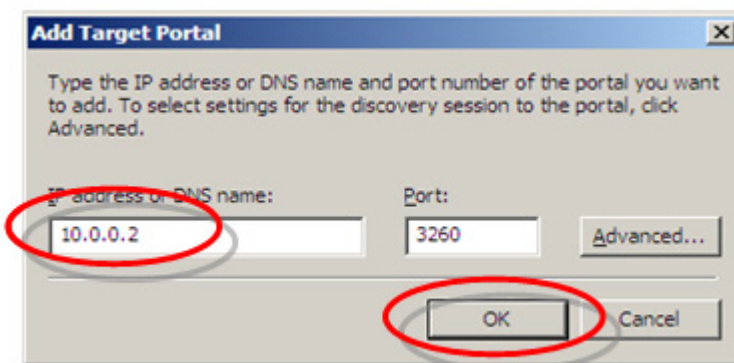


Figure C-16: Add Target Portal Screen



Do not change the Port setting "3260".

- c. The following pop-up window may appear, but it does not affect operations. Click the **OK** button.

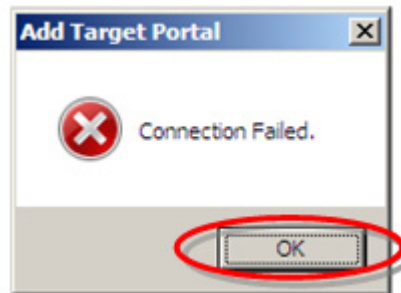


Figure C-17: Authentication Error Screen

- d. To make the host port (iSCSI port) on the disk array of a redundant configuration, perform steps (a) to (c) above for each additional host port. When settings are completed, a screen such as the following is displayed. Click the **OK** button.
Example: When two Target Portal IP addresses have been registered.

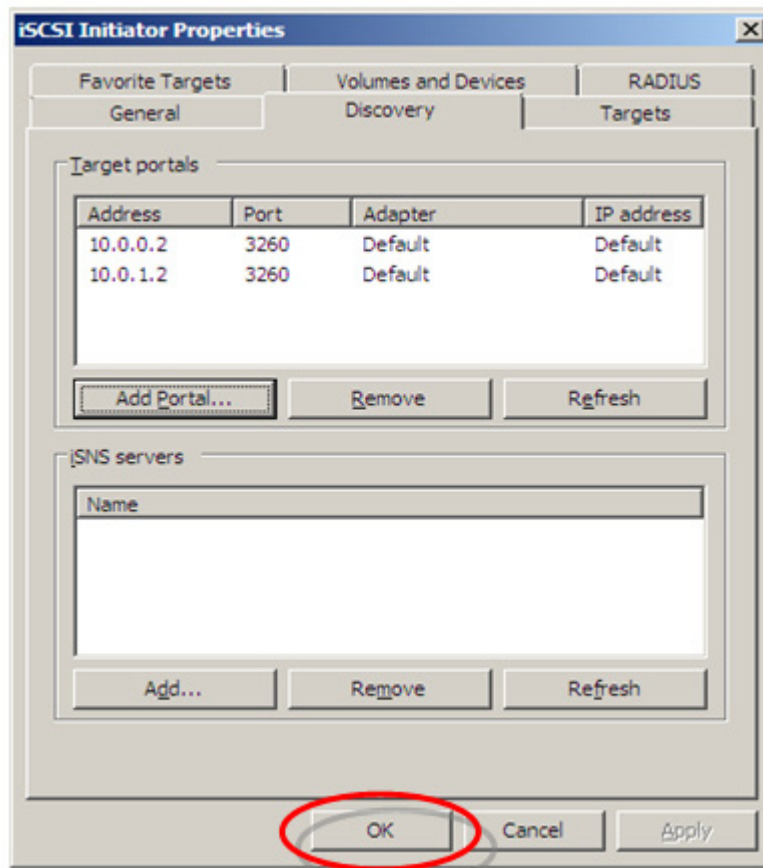


Figure C-18: iSCSI Initiator Properties (Discovery Tab) Screen

Settings when using iSNS (Internet Storage Name Service) server



- Microsoft iSNS Server must be installed in a Windows server on the same network as the application server.
- For detailed description of iSNS server, refer to manuals and other documents provided separately from Microsoft Corporation.

Perform the following settings:

- a. Under the Discovery tab in **iSCSI Initiator Properties**, click the **Add** button.

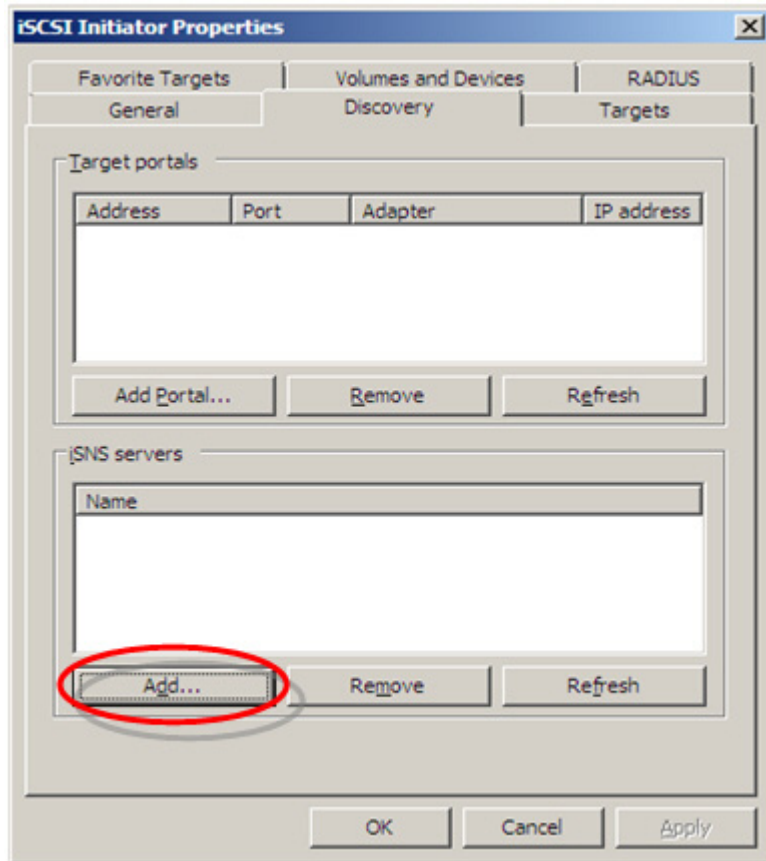


Figure C-19: iSCSI Initiator Properties (Discovery Tab) Screen

- b. Enter the IP address of the iSNS server under **IP address or DNS name of server**. Make sure the entry is correct, and then click the **OK** button.

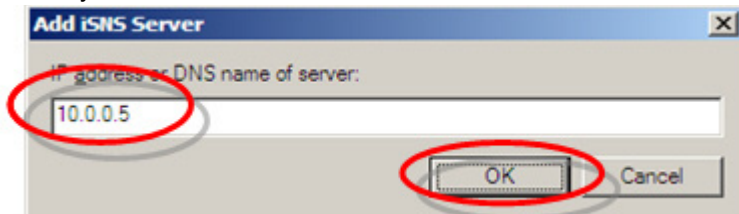


Figure C-20: iSNS Server Add Screen

- c. Repeat steps (a) and (b) above for each iSNS server IP address to be registered. When settings are completed, a screen such as the following is displayed. Click the **OK** button.

Example: When two iSNS server IP addresses are registered.

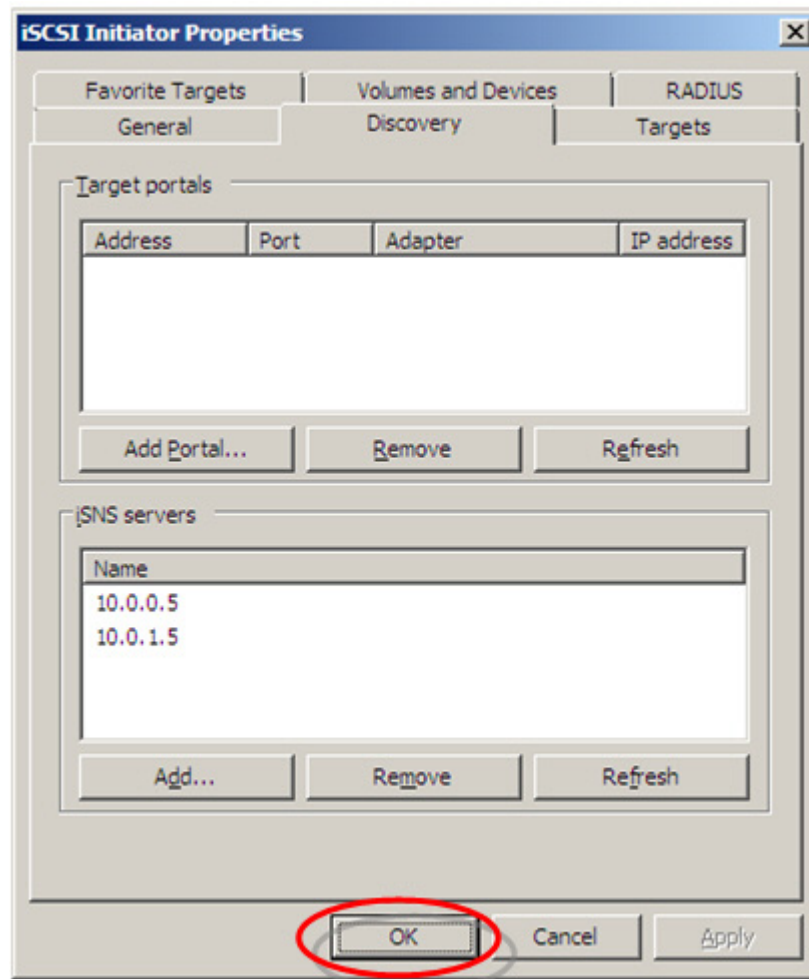


Figure C-21: iSCSI Initiator Properties (Discovery Tab) Screen

- d. This gets Initiator information from the application server registered to the iSNS server. Refer to [Appendix M: "Retrieve Initiator Information on Application Servers Registered with iSNS Server"](#).



When using the iSNS server, the Initiator name of the application server must be directly entered under the Initiator settings in the iSCSI Setup Tool.

- e. Click the **OK** button.

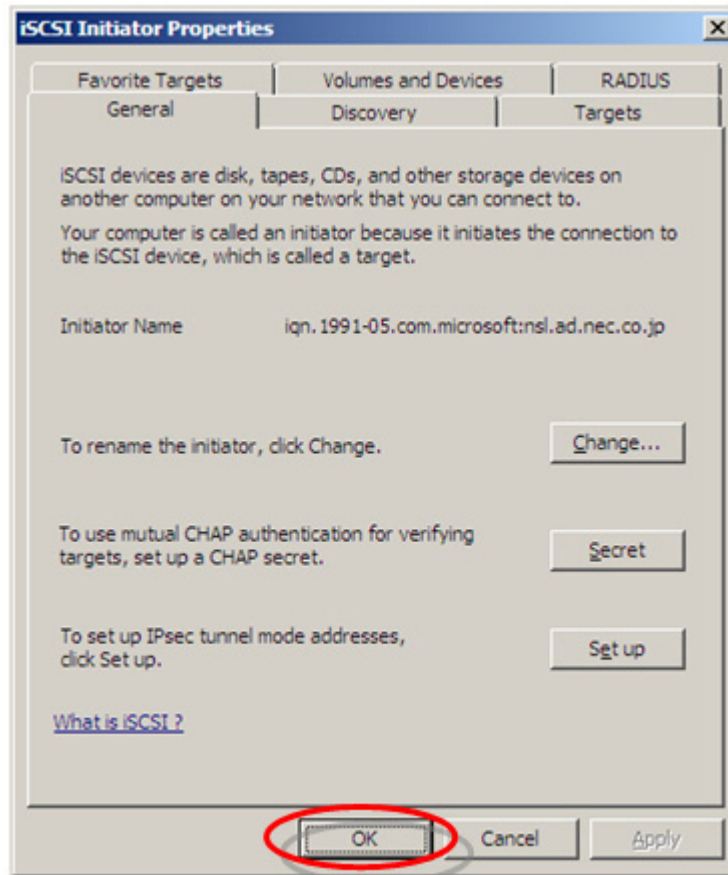


Figure C-22: iSCSI Initiator Properties (General Tab) Screen

C.2 iSCSI Setup Tool

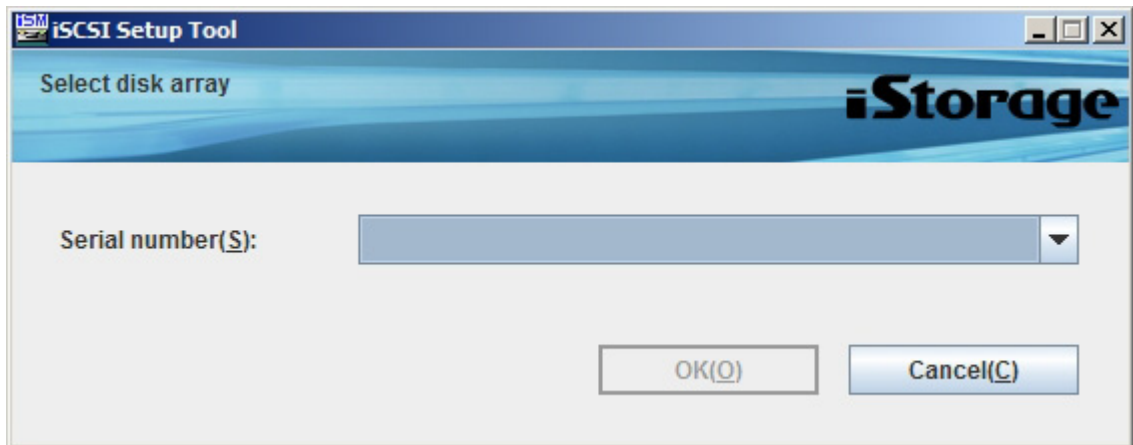
Run the iSCSI Setup Tool on application servers to configure the iSCSI settings required for the application server. Before starting this section, you need to install Storage Manager Agent Utility. For details on how to install, see [Section B.1: Installing Storage Manager Agent Utility](#).

1. Starting iSCSI Setup Tool

Click **Start > Storage Manager Agent Utility > iSCSI Setup Tool** to start iSCSI Setup Tool.

2. Selecting the target disk array unit

Select the serial number of the target disk array unit from the **Serial number(S)** box.



After selecting or entering the serial number, click **OK**.

3. When collecting the disk array unit information is successfully completed, the serial number, controllers, IP addresses of the disk array unit and their connection statuses are displayed.

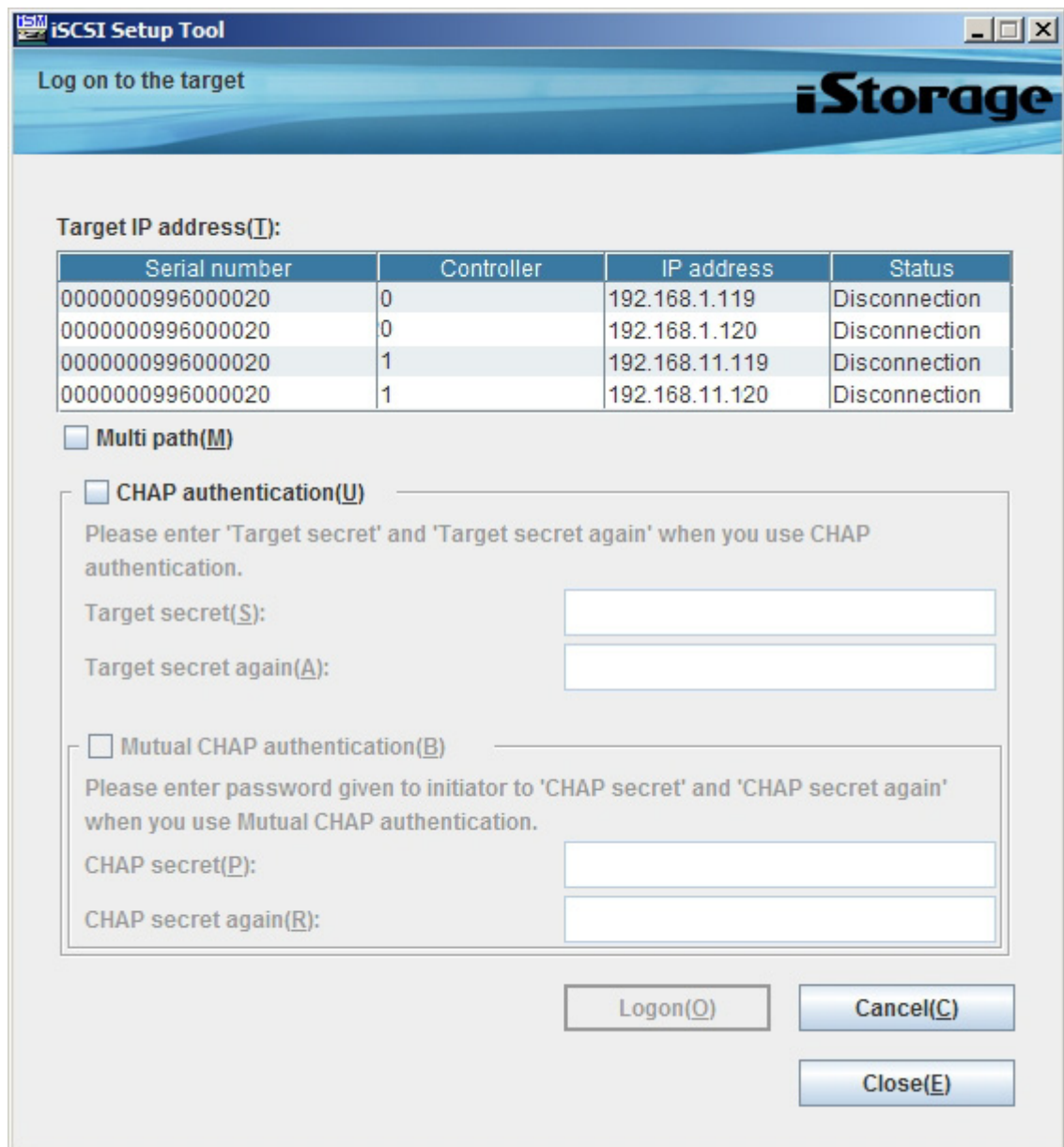
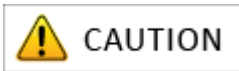


Figure C-23: iSCSI Setup Tool - Log on to the Target

Select a target IP addresses from the list and configure required settings. You can select multiple target IP addresses. When you want to select multiple target IP addresses, select the **Multi Path** check box.

After the required information is entered, click **Logon**.

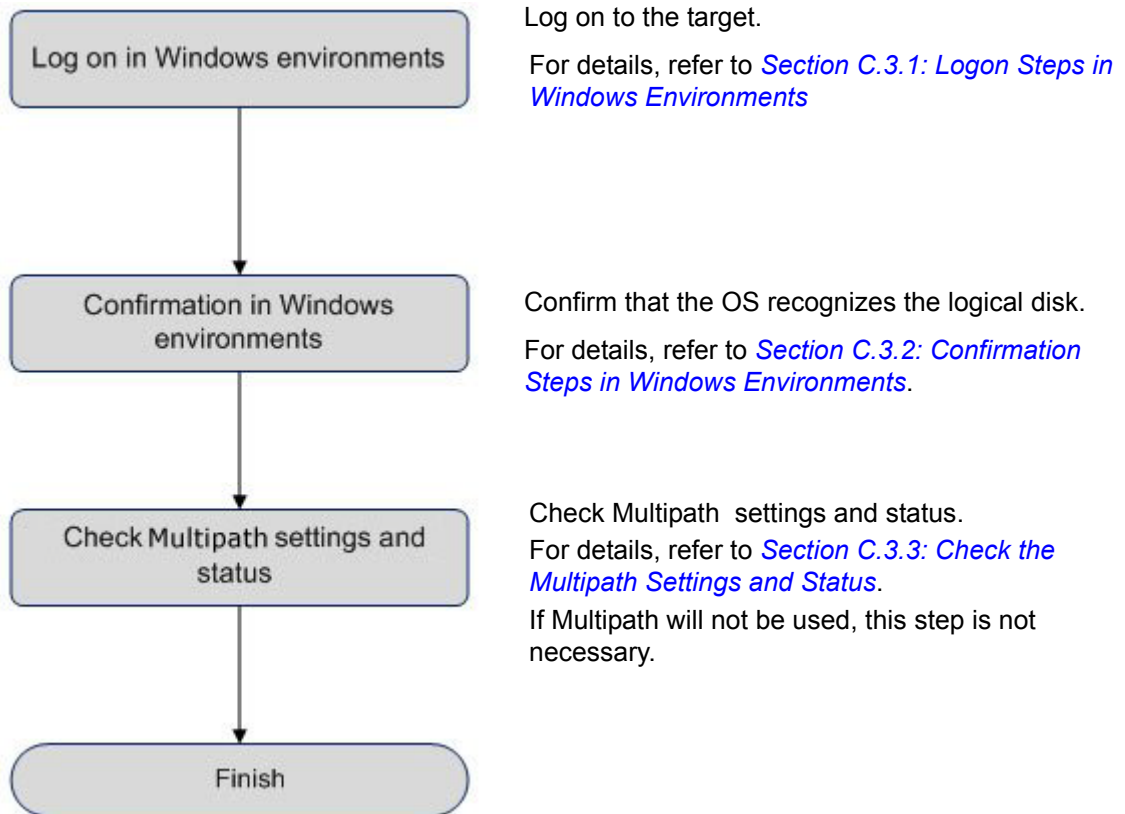
4. When logging on to the target disk array is successfully complete, the message "Logon Succeeded." appears. Clicking **OK** brings you back to the logon page of the target, so click **Close** to end iSCSI Setup Tool.



- iSCSI Setup Tool uses Java. It is necessary to install Java Runtime Environment (32-bit version) to the operation server.
 - The host name should be 15 bytes or less.
 - An error may occur and an invalid LD set may be recorded when you complete logon and retry to logon to a disk array system with the same serial number. In this case, delete the invalid LD set using Storage Manager.
 - An application server has to be connected to both of the network connected with a management port of a target disk array and the network connected with a host connection port.
 - When using Storage Manager (Storage Manager Express/Storage Manager Suite), please use the iSCSI Setup Tool in the state which doesn't hold a configuration setting screen of Storage Manager.
 - Please use the iSCSI Setup Tool in the state in which a LD set with the iqn of the same application server does not exist in the target disk array.
 - After setting an IP address in a host connection port or changing it, the iSCSI Setup Tool will be sometimes an error. Please re-execute the iSCSI Setting Tool in that case.
-

C.3 Checking Connection from Application Server

Perform the following steps to connect the application server and disk array in Windows environments.



C.3.1 Logon Steps in Windows Environments

Perform the following steps to logon to the target in the windows environment:

1. Click the **Refresh** under the **Targets** tab in **iSCSI Initiator Properties**. Then, the Initiator name (iqn) of the disk array unit will be shown under **Targets**. Select an iqn and click the **Log on** button.

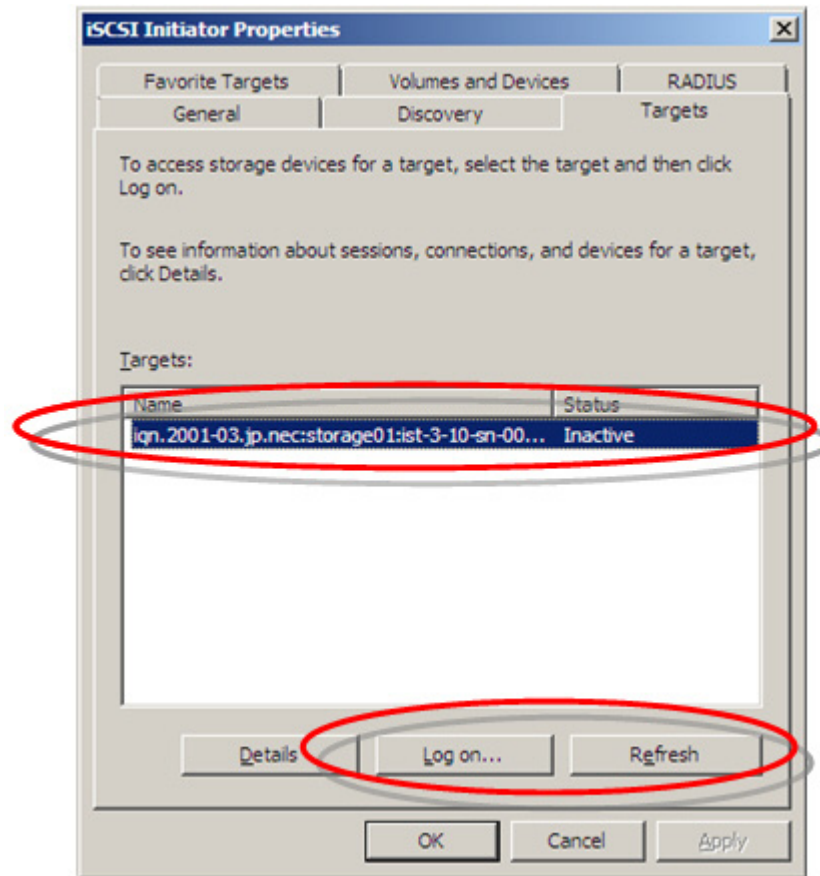


Figure C-24: iSCSI Initiator Properties (Targets Tab) Screen

2. Change the following settings. When finished, click the **Advanced** button.
 - Select the **Automatically restore this connection when the system boots** option.
 - Do not select the **Enable multi-path** option.

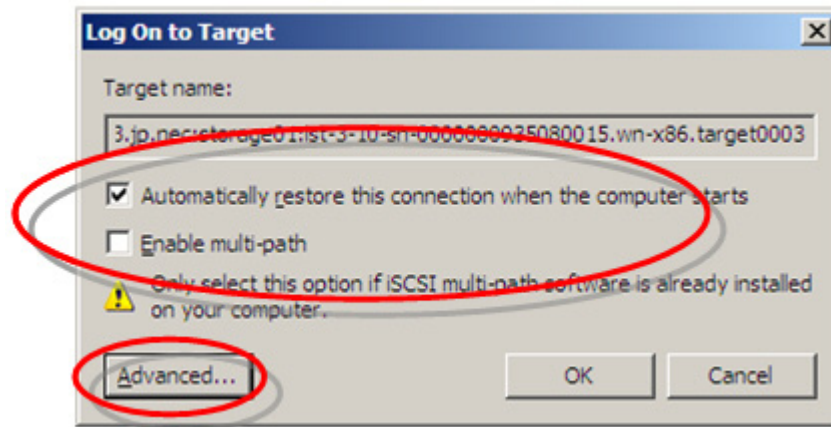


Figure C-25: Log On to Target Screen

3. Change the following settings. When finished, click the **OK** button.

Connection settings

- Select the **Microsoft iSCSI Initiator** option from the **Local Adapter** drop-down menu.
- Select the IP address of the local server from the **Source IP** drop-down menu.
- Select the IP address of the disk array host port (iSCSI port) from the **Target Portal** drop-down menu.

CHAP Authentication Settings

- Select the **CHAP logon information** option.
- Enter password to be assigned to target in the **Target Secret** box.
- Select **Execute mutual CHAP** option when using mutual CHAP authentication.

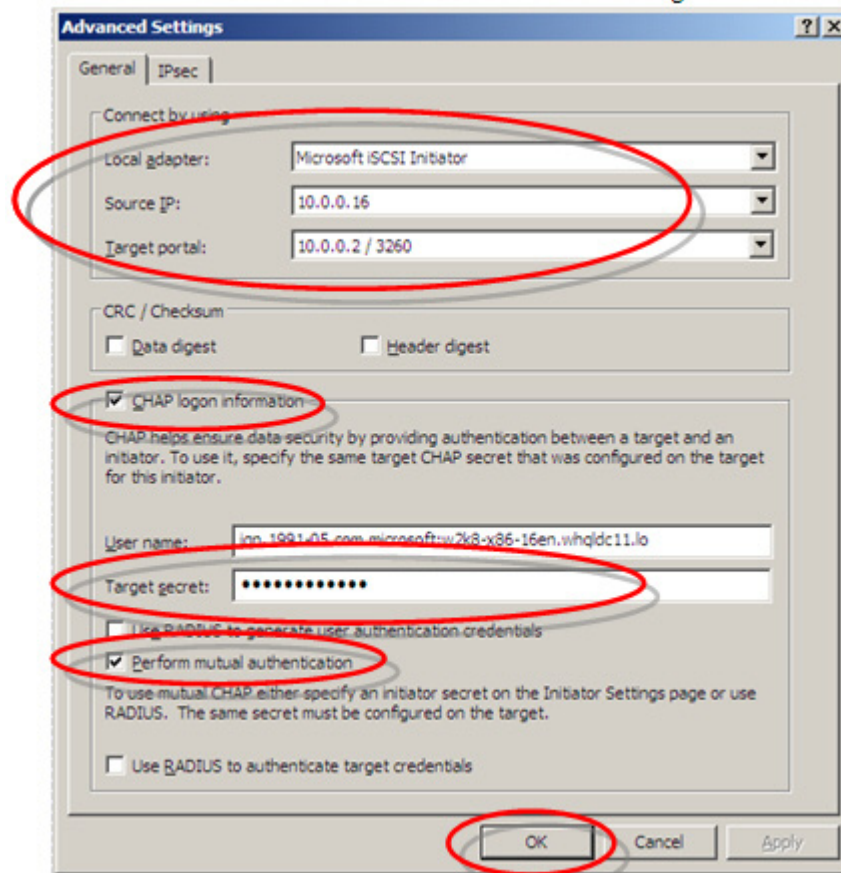


Figure C-26: Advanced Setting (General Tab) Screen



CAUTION

- The CHAP Secret can be specified as any string of 12 to 16 alphanumeric characters as well as !#\$%&*'~/=?{|}_-. Letters are case-sensitive. For security, password text strings are indicated as dots or other symbols.
- Mutual CHAP authentication is also described in *Storage Manager Command Reference* as **Bidirectional CHAP authentication**.



For description of CHAP authentication, refer to [Appendix N: "CHAP Authentication"](#).



The Target Secret that is set here is a password that a target uses to authenticate an Initiator. This password is also required for settings on the disk array side (see *Section: 13.2.21 iSMcfg setldsetchap in the Storage Manager Command Reference*), so be sure to write it down so it is not forgotten.

4. Click the **OK** button.

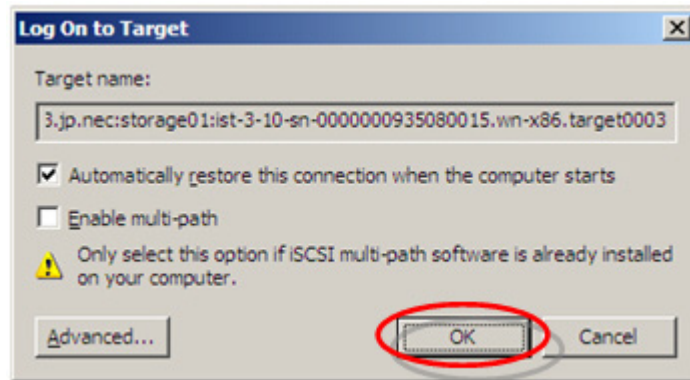
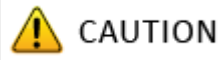
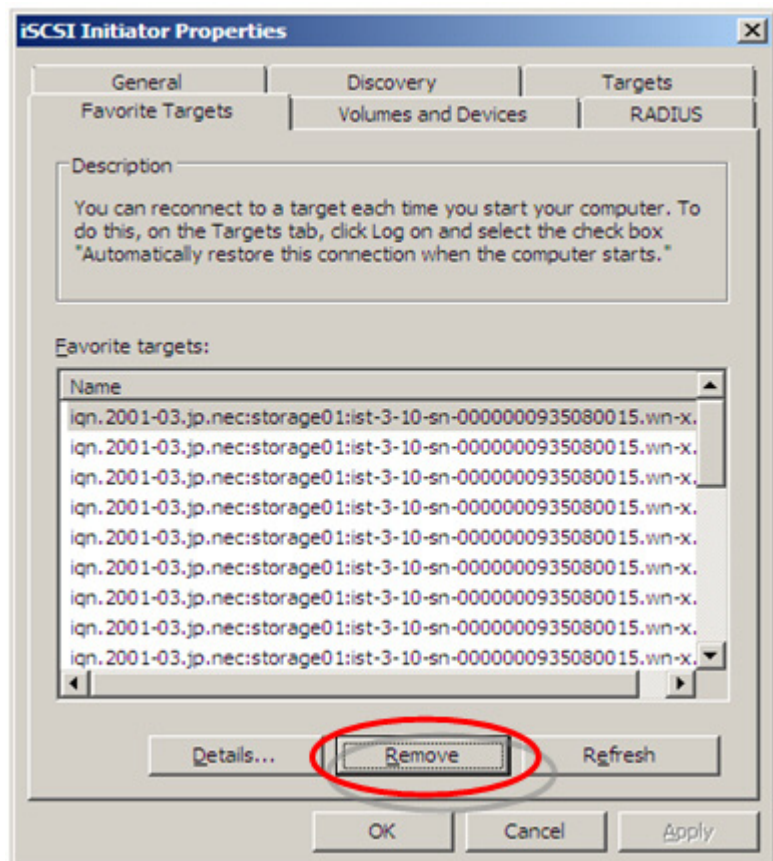


Figure C-27: Log On to Target Screen



In the Log On to Target screen, the target for which **Automatically restore connection when computer boots** has been specified is registered as a **Persistent Target** in **iSCSI Initiator Properties**.

To change or delete the logon setting for this target, select the iqn of the target to be deleted as a **Persistent Target**, and after it is deleted go to the **Targets** tab under **iSCSI Initiator Properties** to set or change the logon settings for that target.



Perform the following steps:

1. Select iqn of target.
 2. Delete the selected iqn.
-
3. Check that the iqn status of the target disk array unit is shown as **Connected** (transition from inactive).
 - When adding registration of host port (iSCSI port) for the disk array (redundant configuration). Click the **Log On** button.
 - When not adding registration of host port (iSCSI port) for the disk array (non-redundant configuration) Click the **OK** button. This completes the operations.

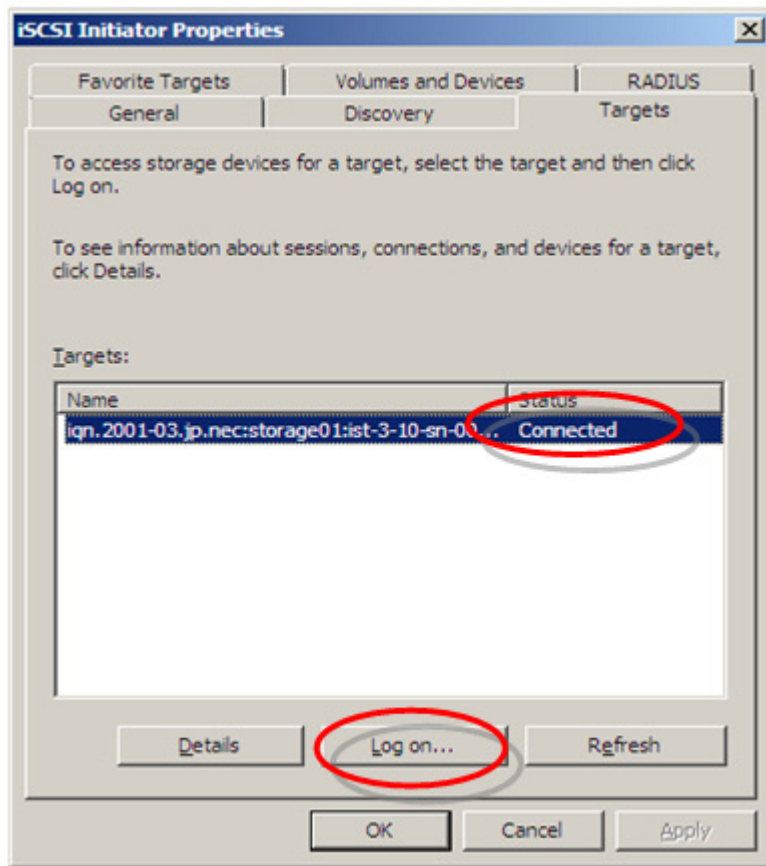


Figure C-28: iSCSI Initiator Properties (Targets Tab) Screen

When adding host port registration

4. Change the following setting. When finished, click the **Advanced** button.
 - Select the **Automatically restore this connection when the system boots** option.
 - Select the **Enable multi-path** option.



Under the settings for the newly registered disk array host port, select the **Enable multi-path** option.

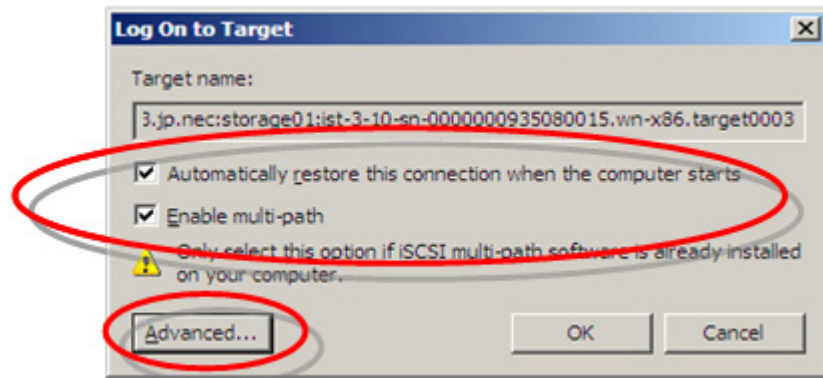


Figure C-29: Log On to Target Screen

When registering additional host port

5. Change the following settings. When finished, click the **OK** button.

Connection settings

- Select the **Microsoft iSCSI Initiator** option from the **Local Adapter** drop-down menu.
- Select the IP address of the local server from the **Source IP** drop-down menu.
- Select the IP address of the disk array host port (iSCSI port) from the **Target Portal** drop-down menu.

CHAP authentication settings

- Select the **CHAP logon information** option.
- Enter password to be assigned to target in the **Target Secret** box.
- Select **Execute mutual CHAP** option when using mutual CHAP authentication.

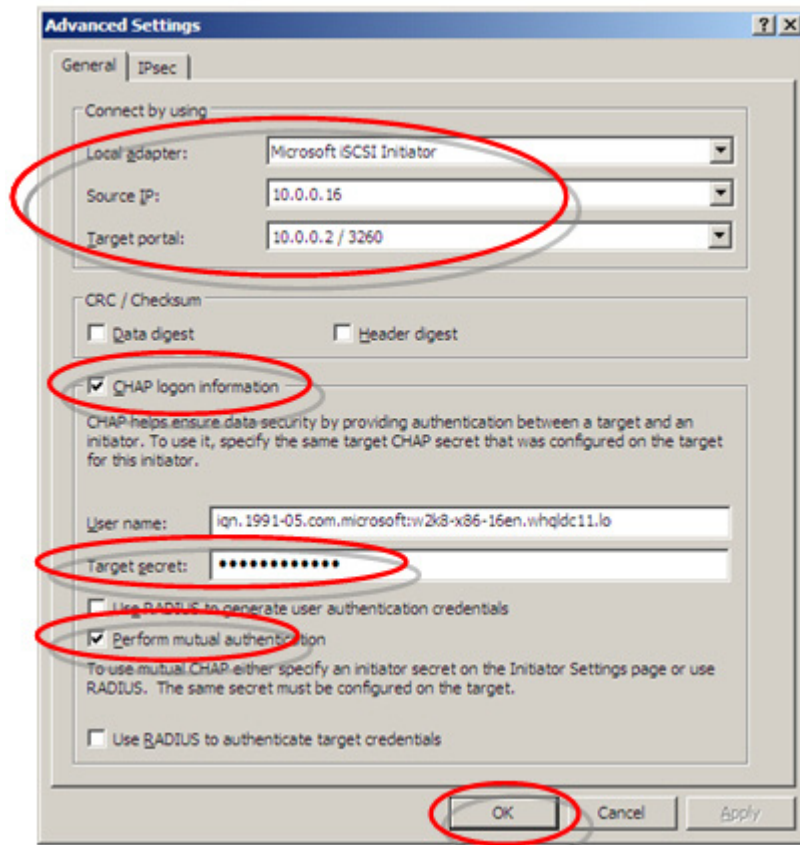


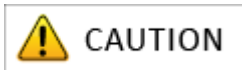
Figure C-30: Advanced Setting (General Tab) Screen



- The CHAP Secret can be specified as any string of 12 to 16 alphanumeric characters as well as !#\$%&'*+~/=?{ }_-. Letters are case-sensitive. For security, password text strings are indicated as dots or other symbols.
- Mutual CHAP authentication is also described in Storage Manager Express as **Bidirectional CHAP authentication**.



For description of CHAP authentication, refer to [Appendix N: "CHAP Authentication"](#).



The Target Secret that is set here is a password that a target uses to authenticate an Initiator. This password is also required for settings on the disk array side (see *Section: 13.2.21 iSMcfg setldsetchap in the Storage Manager Command Reference*), so be sure to write it down so it is not forgotten.

Additional host port registration

6. Click the **OK** button.

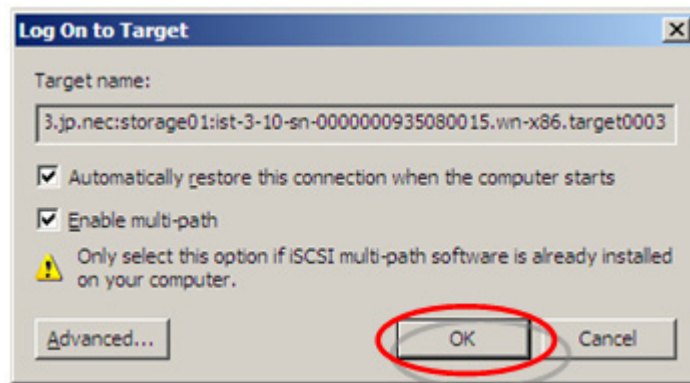


Figure C-31: Log On to Target Screen

7. To register additional disk array host ports, click the **Log On** button, and then perform steps (6) to (8) for each port to be registered.

After the host port settings have been registered, click the **OK** button.

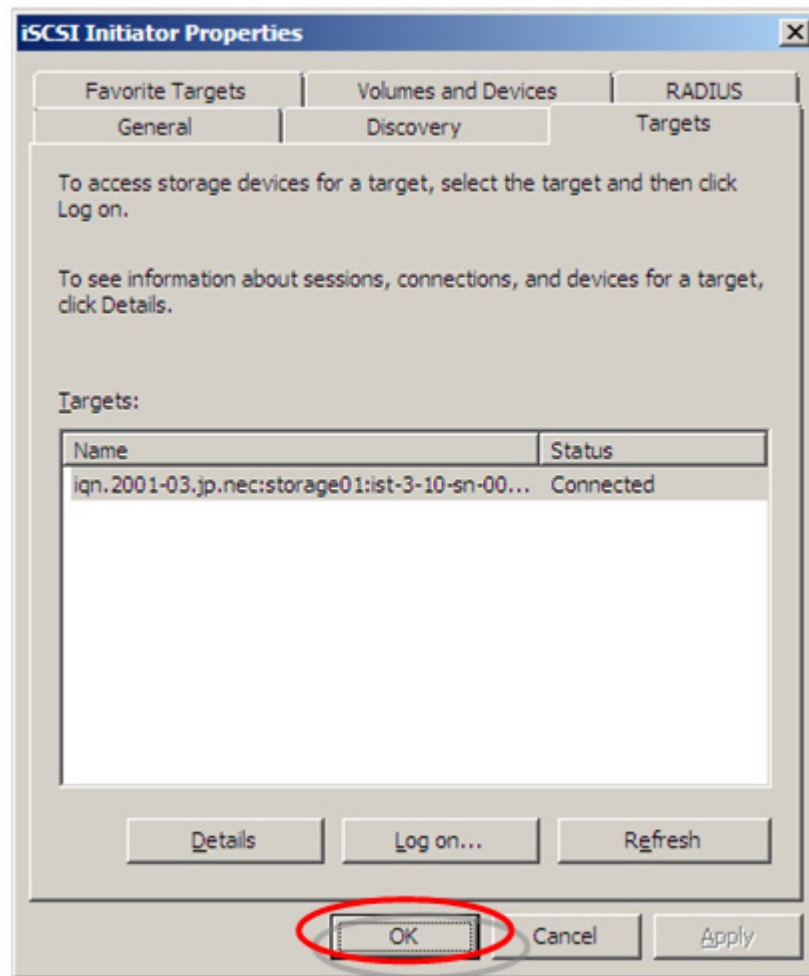


Figure C-32: iSCSI Initiator Properties (Target Tab) Screen

C.3.2 Confirmation Steps in Windows Environments

Perform the following step to confirm that the OS recognizes logical disk in the Windows environment:

1. Select **Administrative Tools > Computer Management > Disk Manager** to start.
2. Click **Disk drives** and check the number of logical disks.



If nothing is shown, the OS was unable to recognize logical disks in the disk array assigned to a server. Check the connection between the server and disk array unit, the Access Control settings, NIC driver settings, etc.

Display example: When four logical disks are assigned to a server.

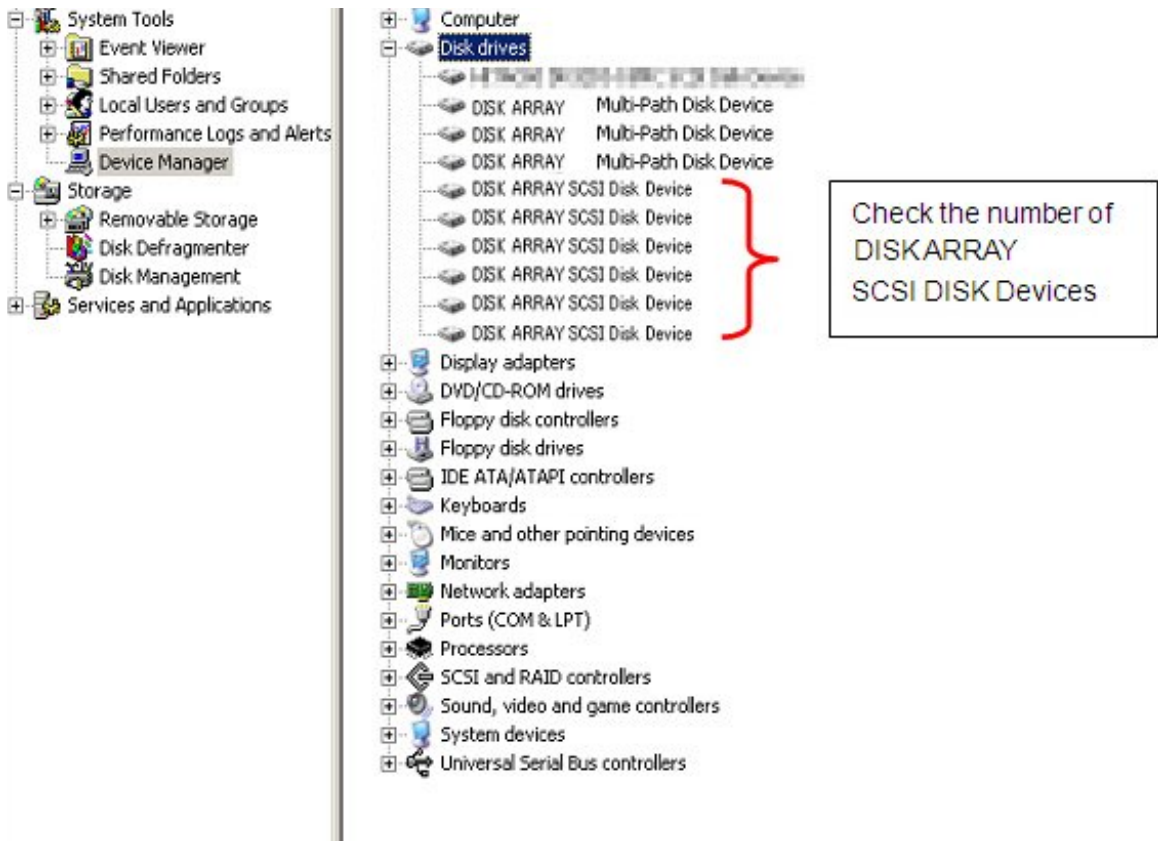


Figure C-33: Device Manager

3. Open **Disk Management** and check the number of logical disks (number of logical disks assigned to a server).

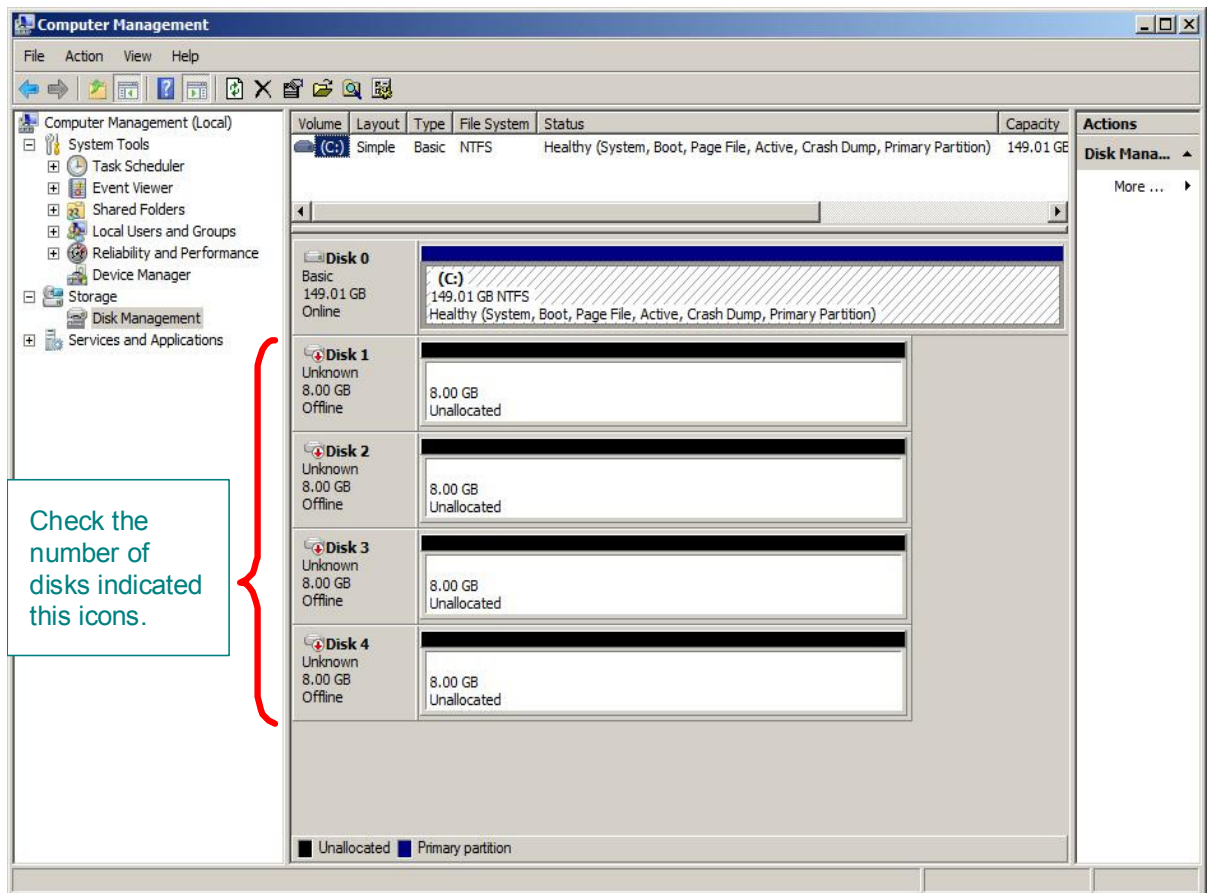


Figure C-34: Disk Management

C.3.3 Check the Multipath Settings and Status

When Multipath will not be used, this step is not necessary.

After checking the HOST cable connection between the application server and disk array unit, restart the server and run the following command from the command prompt.

For details, refer to the *Multipath User's Guide (Windows Version)*.

To check Multipath status, run the following command from the command prompt:

```
spsadmin /lun
```

Check the message shown after the command is executed then check the number of logical disks assigned to the server, the number of access paths per logical disk, and each path status.

Display example: When two logical disks are assigned to a server, with two access paths per logical disk

Following is an example of `spsadmin/lun` output:

```
C:\>spsadmin /lun

+++ LogicalUnit #0 +++
SerialNumber="0000000995000001", LDNumber=0x00000
LoadBalance=Least Size
0: ScsiAddress=2:0:0:0, Priority=1, Status=Active
1: ScsiAddress=3:0:0:0, Priority=2, Status=Standby

+++ LogicalUnit #1 +++
SerialNumber="0000000995000001", LDNumber=0x00001
LoadBalance=Least Size
0: ScsiAddress=2:0:0:1, Priority=1, Status=Active
1: ScsiAddress=3:0:0:1, Priority=2, Status=Standby
```



If nothing is displayed, none of the access paths recognized the logical disks of the disk array unit assigned to the application server. Check the connection between the application server and the disk array unit, the Access Control settings, NIC driver settings, etc.

Appendix D How to Set/Check Application Server (Linux) (FC)

This appendix provides the steps you should follow while setting or checking application server in the Linux environment, when the disk array is configured for the FC connection.

D.1 Installing Storage Manager Agent Utility

This section describes how to install the Storage Manager Agent Utility.

D.1.1 Before Installation

Note the followings before installing the Storage Manager Agent Utility. The following functions become available by installing the Storage Manager Agent Utility.

- iSM volume list command
- Host agent (Host agent service)
- iSCSI Setup Tool
- Storage Manager Host Register Agent

[Table D-1](#) shows the supported operating environment.

Table D-1: Operating Environment (Linux)

Operating systems	Red Hat Enterprise Linux Version 5 (*1) Red Hat Enterprise Linux 5.5 to 5.7 (IA32/EM64T) Red Hat Enterprise Linux 5.5 to 5.7 Advanced Platform (IA32/EM64T) Red Hat Enterprise Linux Version 6 Red Hat Enterprise Linux 6.1 (IA32/EM64T) SUSE Linux Enterprise Server10 SUSE Linux Enterprise 10 SP3 (IA32/EM64T) (*2) (*1) The iSCSI Setup Tool (sharing function) supports Red Hat Enterprise Linux 5.5 (IA32, EM64T). (*2) Only for disk arrays connected via FC
Memory	OS required memory + 5 MB or more (IA32 server and EM64T server)
Disk capacity	12 MB or more

* Above are the supported environments for this version at the point of the initial shipment of this product.

D.1.2 Installation

Install the Storage Manager Agent Utility by following the procedure below:

1. Log in as a root user.
2. Check that none of the following software has been installed:
 - iSMrpl (ReplicationControl)
 - iSMrpd (ReplicationControl/DisasterRecovery)
 - iSMsc (SnapControl)
 - iSMvol (iSM volume list command)
 - iSMagent (Storage Manager Agent Utility)

Run the following commands and check the results:

```
rpm -q iSMrpl
rpm -q iSMrpd
rpm -q iSMsc
rpm -q iSMvol
rpm -q iSMagent
```

If any of them has been installed, uninstall all of them.

3. Set the CD-ROM in the application server.



On the server where CD-ROMs are not available, transfer the file of iSMvol.rpm from other server to install it.

4. Mount the CD-ROM by performing one of the following:
 - Create a mount directory (Example: /cdrom)
 - Use the mount command for mounting.

```
mount -r /dev/cdrom /cdrom
```
5. Use the rpm command to start installation.

```
rpm -ivh /cdrom/VOLLIST/LINUX/iSMVOL/iSMvol.rpm
```
6. The installation is complete when the following message is shown:

```
Installation completed.
```

7. Unmount the CD-ROM. Use the umount command for unmounting.

```
umount /cdrom
```


D.2 Collecting/Registering Host Information on Application Server

D.2.1 Collecting Host Information by Using File Output

To collect host information by using file output, follow the procedure below.

1. Run host information collection command (iSMcc_hostinfo)

Run the host information collection command (iSMcc_hostinfo) from the command line. For the `-export` option, specify a file (host information file) to which host information will be reported.

Run the host information collection command (iSMcc_hostinfo) as a root user.

```
# iSMcc_hostinfo -export /tmp/ServerName
iSMcc_hostinfo: Info:      iSM11700: Please wait a minute.
iSMcc_hostinfo: Info:      iSM11770: Host Information was exported
successfully. code=
aaaa-bbbb-bbbb-bbbb)
iSMcc_hostinfo: Info:      iSM11100: Command has completed
successfully.
```

2. Confirm the result of running the command

After running the host information collection command (iSMcc_hostinfo), confirm that the message No. iSM11770 is reported and the host information is successfully collected. `aaaa` in the message example above is replaced with a process number and `bbbb` with an internal code for maintenance in the actual message.

3. Transfer the host information file

Transfer the host information file reported by using the host information collection command (iSMcc_hostinfo) to a client by using file transfer, USB memory and other methods.

To register host information files transferred to clients, see [Section D.2.2: "Registering Host Information by Using File Output"](#).

D.2.2 Registering Host Information by Using File Output

To register host information by using file output, follow the procedure below.

1. Report a host information file.

See [Section D.2.1: “Collecting Host Information by Using File Output”](#) to report a host information file.

2. Transfer the host information file.

Use file transfer, USB memory or other methods to transfer the host information file to a client.

3. Register the host information by using Storage Manager.

On the left pane on the Storage Manager window, click **Configuration**> **Host** > **Host Information Collection** to open the host information registration window.

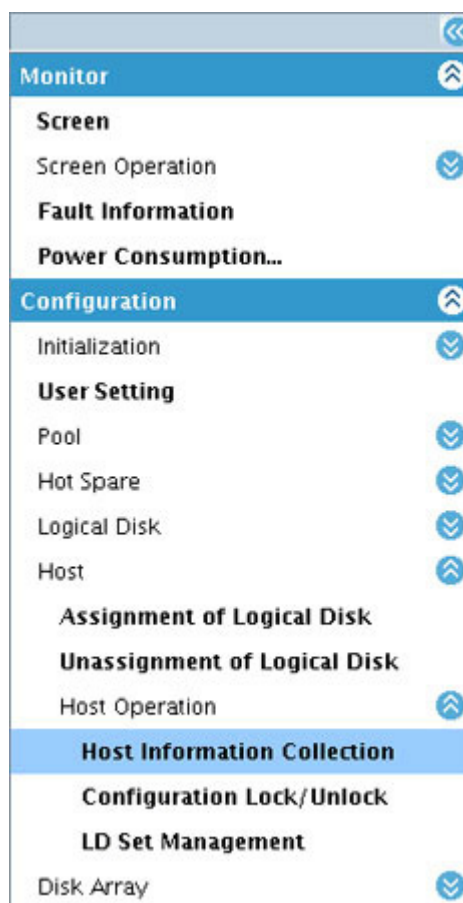


Figure D-1: Getting Started - Host Information

4. Select host information setting method.

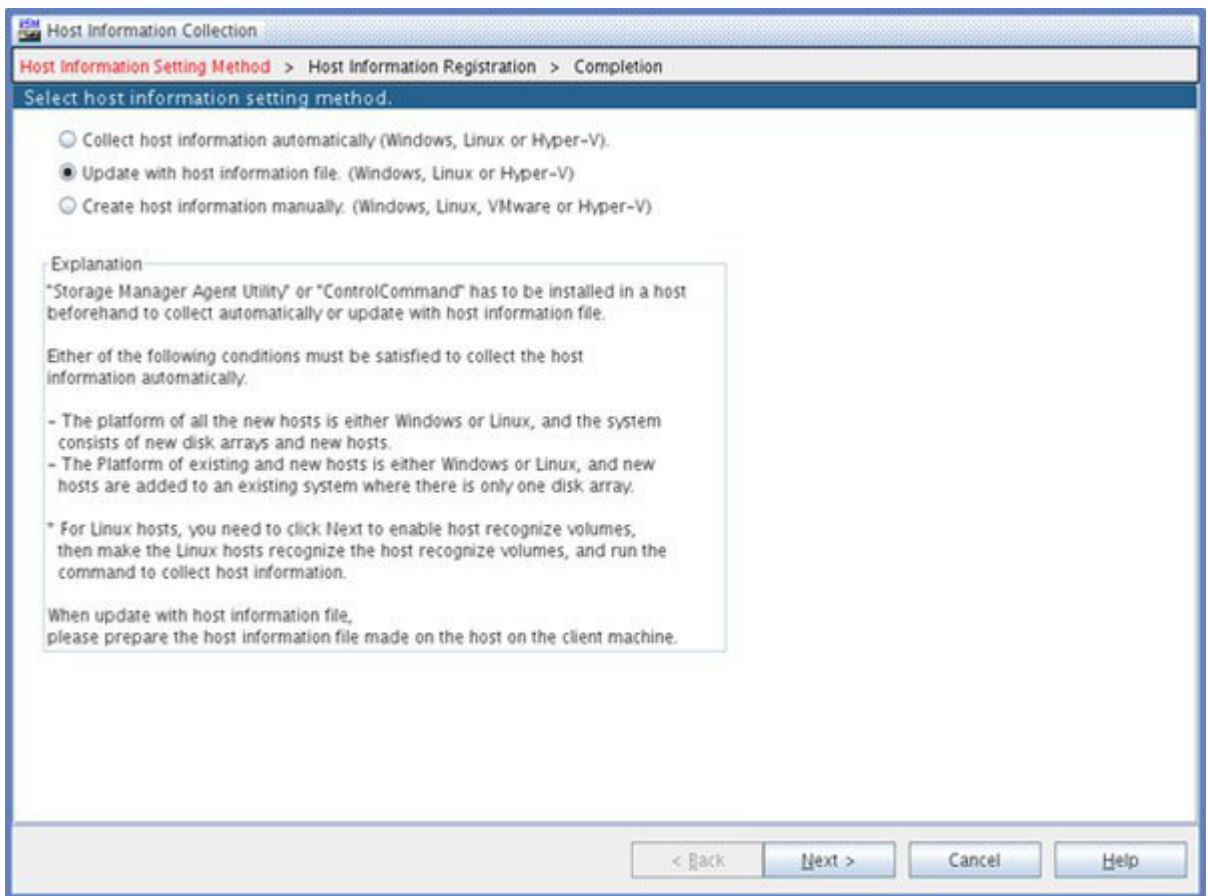


Figure D-2: Set Host Information - Select How to Set

Select the **Update with host information file** and click **Next**.

5. Specify the host information file.

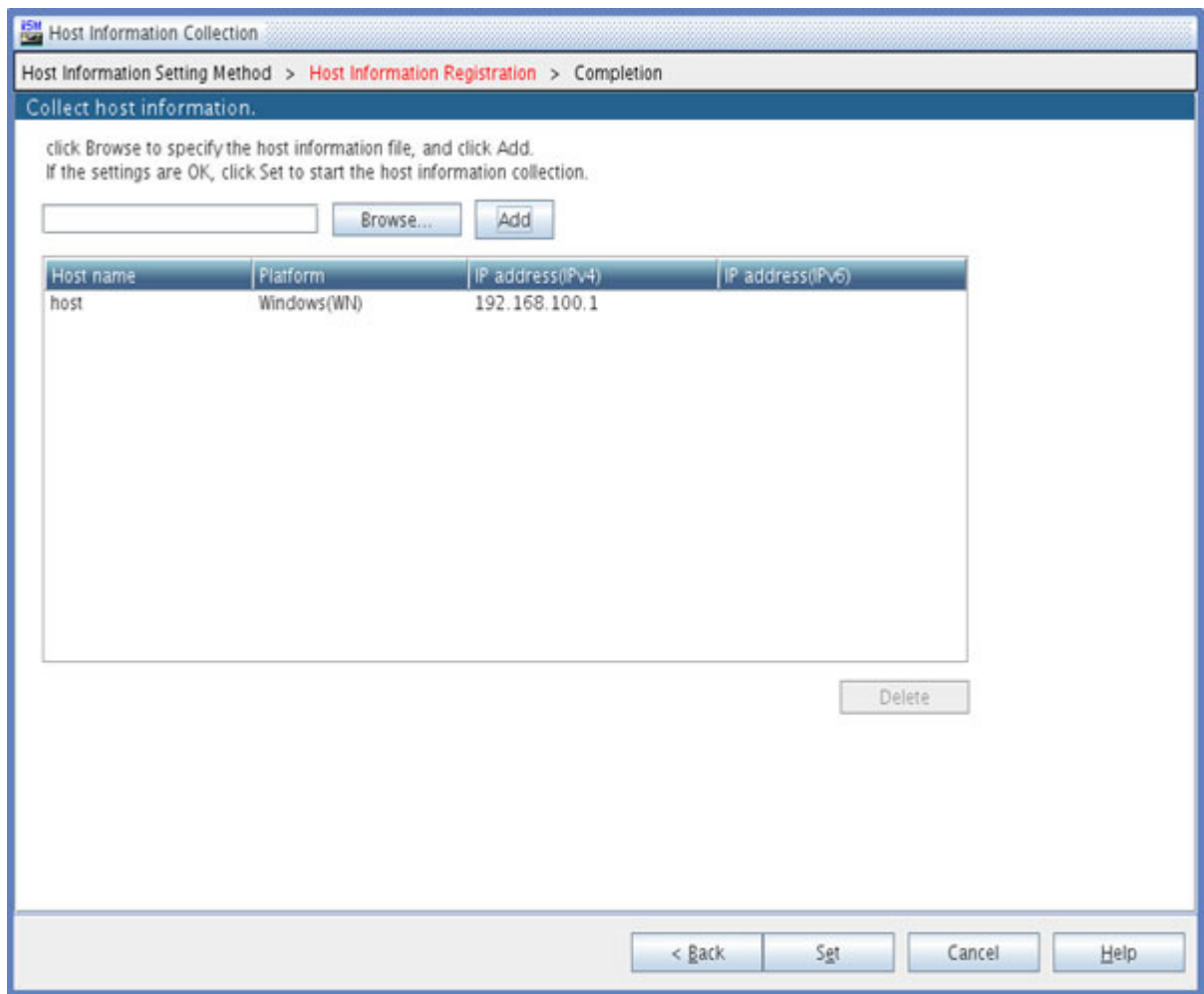


Figure D-3: Set Host Information - Specifying Host Information File

- a. Click **Browse** to specify a file in which host information is recorded and click **Add**.
 - b. Confirm that all the host information is retrieved and click **Next**.
This displays the Host information setting completion page.
6. Check the **Host information Collection Completion** page.

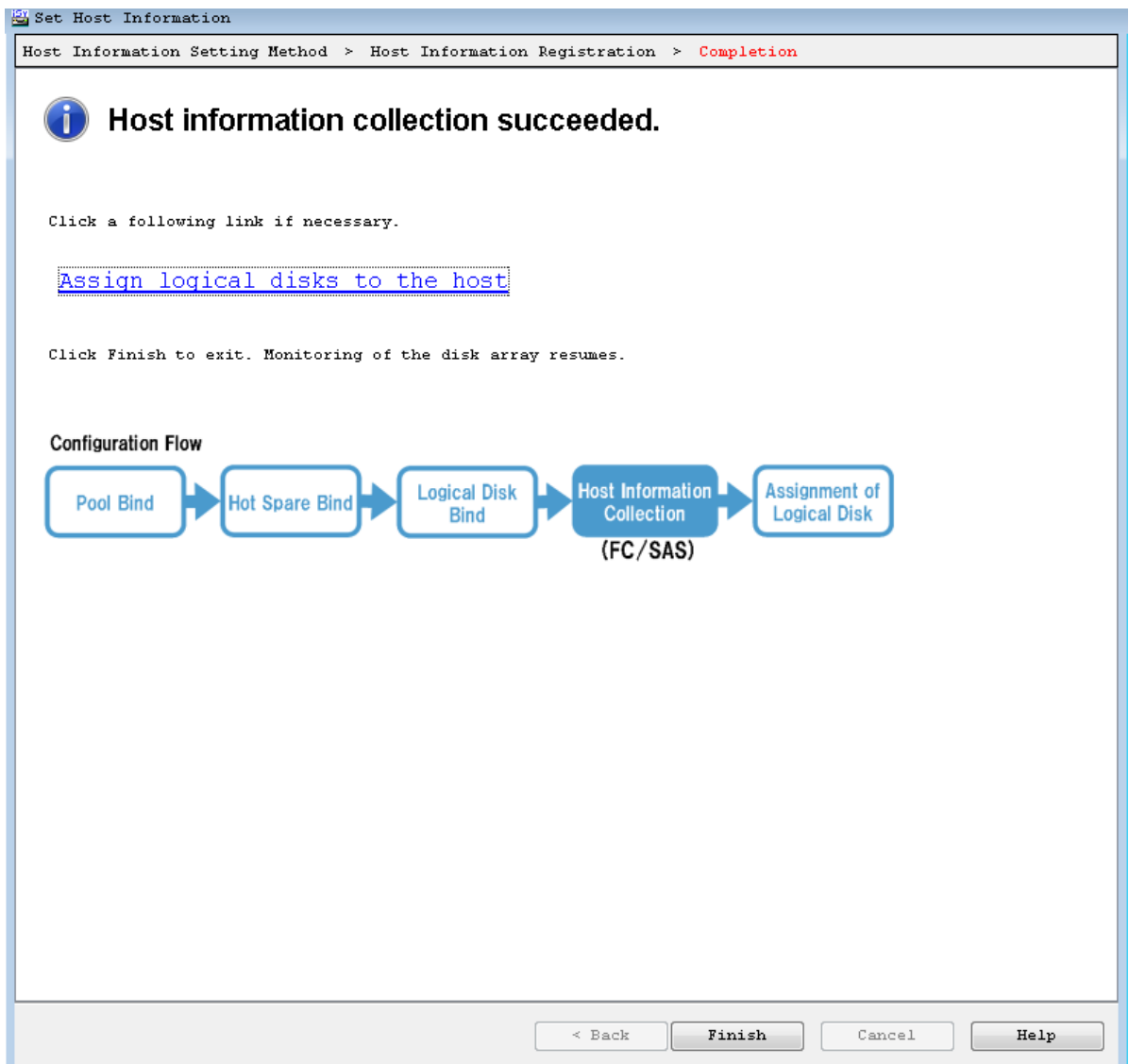


Figure D-4: Host Information Collection - Completion

The result of setting host information is displayed. Click **Finish** to close the page.

D.3 Checking Connection from Application Server

This section describes how to check connection in Linux environment and check the Multipath settings and status.

D.3.1 Confirmation Steps in Linux environment

After checking the FC cable connection between the application server and disk array unit, restart the application server and run the following command to check the number of logical disks ("No. of logical disks assigned to application server" × "No. of access paths from application server to individual logical disks") and the respective vendor and model names (Bull SAS, DISK ARRAY).



If nothing is shown, the OS was unable to recognize logical disks in the disk array assigned to an application server. Check the connection between the server and disk array unit, the Access Control host bus adapter driver settings, etc.

Display example: When two logical disks are assigned to a server, with two access paths per logical disk.

```
# cat /proc/scsi/scsi
Attached devices:
Host: scsi1 Channel: 00 Id: 00 Lun: 00
Vendor: xxxxxxxx Model: xxxxxxxx Rev: xxxxx
Type: Direct-Access ANSI SCSI revision: 03
Host: scsi1 Channel: 00 Id: 00 Lun: 00
Vendor: xxxxxxxx Model: xxxxxxxx Rev: xxxxx
Type: Processor ANSI SCSI revision: 02
Host: scsi2 Channel: 00 Id: 00 Lun: 00
Vendor: Bull SAS Model: DISK ARRAY Rev: xxxxx
Type: Direct-Access ANSI SCSI revision: 04
Host: scsi2 Channel: 00 Id: 00 Lun: 01
Vendor: Bull SAS Model: DISK ARRAY Rev: xxxxx
Type: Direct-Access ANSI SCSI revision: 04
Host: scsi3 Channel: 00 Id: 00 Lun: 00
Vendor: Bull SAS Model: DISK ARRAY Rev: xxxxx
Type: Direct-Access ANSI SCSI revision: 04
Host: scsi3 Channel: 00 Id: 00 Lun: 01
Vendor: Bull SAS Model: DISK ARRAY Rev: xxxxx
Type: Direct-Access ANSI SCSI revision: 04
Host: scsi4 Channel: 00 Id: 00 Lun: 00
Vendor: Bull SAS Model: DISK ARRAY Rev: xxxxx
Type: Direct-Access ANSI SCSI revision: 04
Host: scsi4 Channel: 00 Id: 00 Lun: 01
Vendor: Bull SAS Model: DISK ARRAY Rev: xxxxx
Type: Direct-Access ANSI SCSI revision: 04
```

Hostbus adapter#1

Hostbus adapter#2

Check the number of these lines.

*



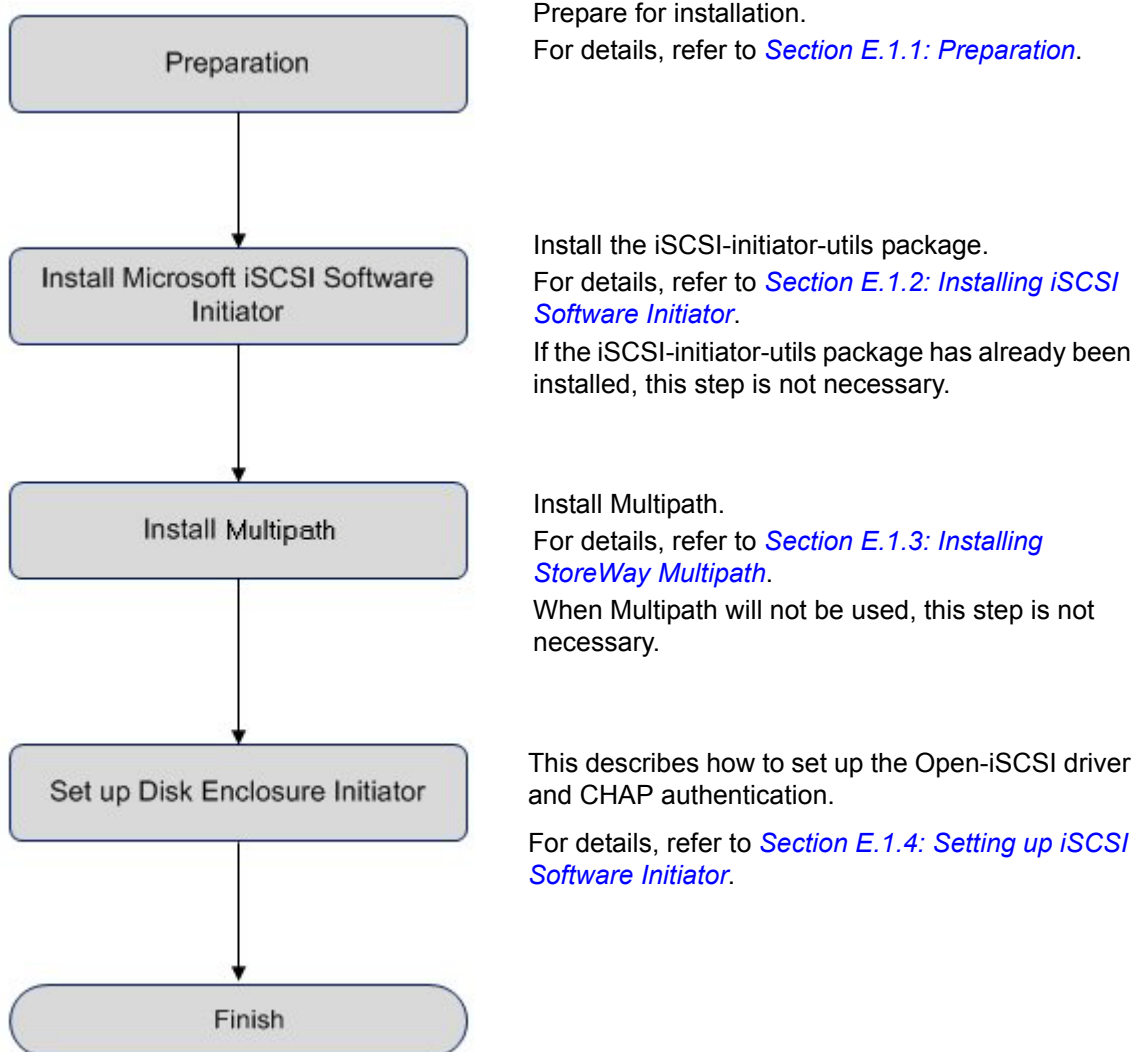
In the environment where Multipath is installed, in some cases, depending on the Linux kernel version, the logical disks that can be controlled by Multipath are displayed after the logical disks recognized by the OS via the host bus adapter (comprised in the above example of host bus adapter #1 and host bus adapter #2).

Appendix E How to Set/Check Application Server (Linux) (iSCSI)

This appendix provides the steps you should follow while setting or checking an application server in the Linux environment, when the disk array is configured for the iSCSI connection.

E.1 Initializing Application Server

Perform the following steps to initialize the application server in Linux environment.



E.1.1 Preparation

Perform the following steps to prepare for installation of application server in the Linux environment:

1. Provide IP addresses for an application server

Prepare IP addresses to be assigned to the application server as many as the NIC (1000BASE-T or 10GBASE-SR) ports. In addition, prepare the subnet mask and gateway addresses by asking the network administrator.



If two or more IP addresses are used by Multipath, the same network segment cannot be specified. Prepare IP addresses of other segments.

Example 1: Connectable configuration

iHP0:192.168.0.10

iHP1:192.168.1.10

Example 2: Unconnectable configuration

iHP0:192.168.0.10

iHP1:192.168.0.11

2. Install NIC (1000BASE-T or 10GBASE-SR)

Install the NIC to the application server as described in the manuals provided with the NIC and application server.



If the NIC has already been installed to the application server, this step is not necessary.

3. Install the NIC (1000BASE-T or 10GBASE-SR) driver

Install and set up the driver according to the setup procedure in the manual provided with the NIC installed in the server, or by referencing information provided on the Web, etc.



If the driver has already been installed and set up for the NIC installed in the application server, this step is not necessary.

4. Specify the network settings

Select **Start > Control Panel > Network Connection**, and then open **Local Area Connection Properties** to specify the IP address, subnet mask, and default gateway.

5. Connect to the disk array unit

Use a 10-Gbps or 1-Gbps cable to connect the application server to the host port (HP connector) of the disk array unit.

- Unit equipped with NF53x1-xF21xx (unit with 10Gbps iSCSI 2port controllers)
10-Gbps cable
Connector shape: LC connector



NF9320-SJxx (FC cable) can be used.

- Unit equipped with NF53x1-xF11xx (unit with 1Gbps iSCSI 2port controllers)
1-Gbps cable
Connector shape: RJ-45 connector



- CAT6 LAN cable is recommended.
- Either straight cable or crossover cable can be used.

For a sample connection configuration, see [Appendix K: "iSCSI Connection Configuration-Examples"](#).

The following shows the positions of the host ports.

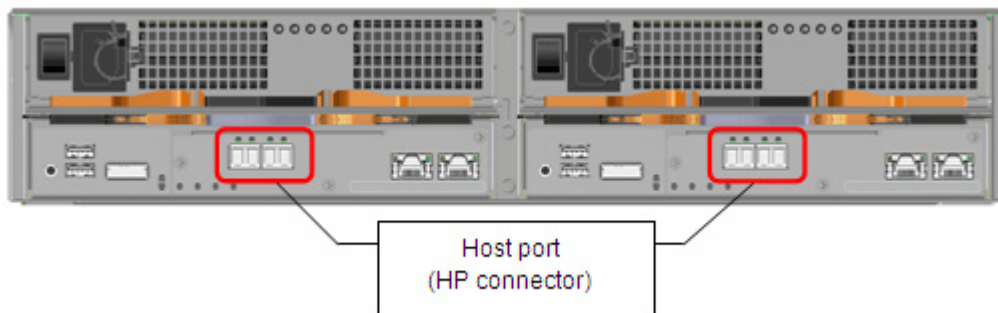


Figure E-1: Unit with NF53x1-xF21xx (10Gbps iSCSI 2port Controllers)

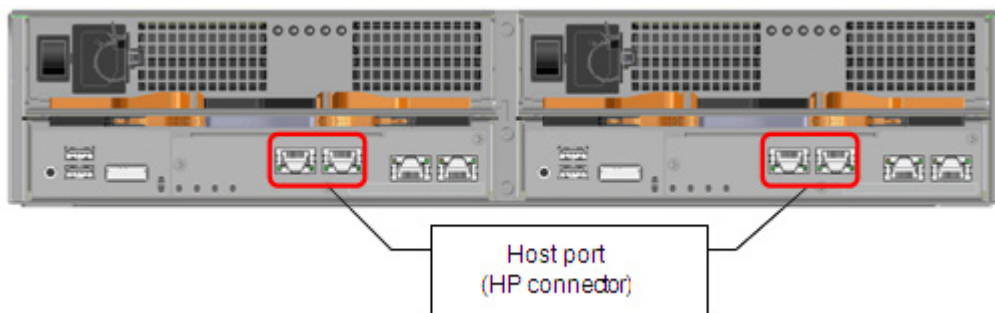


Figure E-2: Unit with NF53x1-xF11xx (1Gbps iSCSI 2port Controllers)

The following shows an example of a 10-Gbps iSCSI connection (redundant path configuration in combination with Multipath).

To implement the following recommended example, two NICs must be installed in the application server and two 10-Gbps cables are needed to connect the disk array unit and NICs.

Use a 10-Gbps cable to connect the NIC to the host port (HP connector) of the disk array unit. (The 10-Gbps cable has the same connector shape on both ends.)

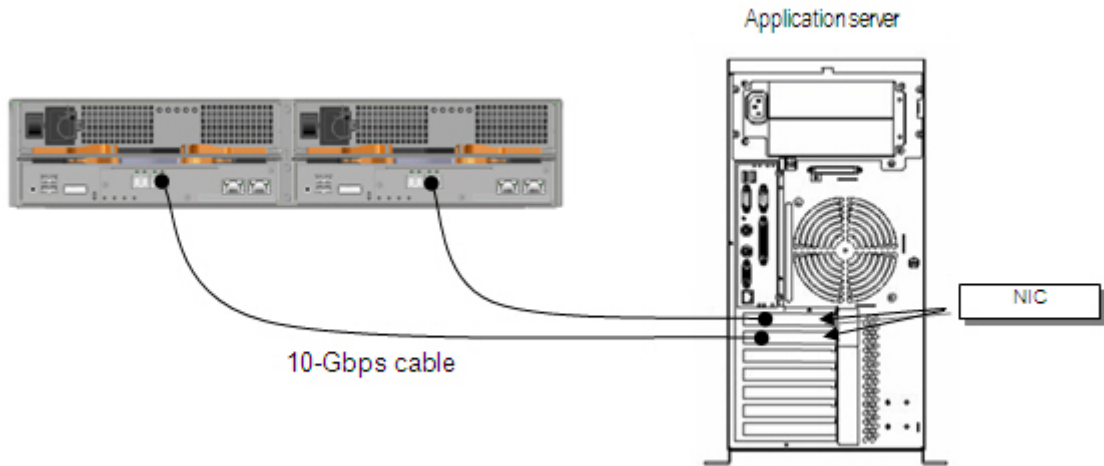


Figure E-3: Configuration Example

E.1.2 Installing iSCSI Software Initiator

Installation of `iscsi-initiator-utils` package is necessary.

Install the package by following the procedures on the manual of the operating system or the information provided on the website.



- This procedure is unnecessary if the installation of `iscsi-initiator-utils` package is already finished.
- `Open-iscsi` is installed as standard DBM database. Discovery (`discovery.db`) and Node (`node.d`) tables are included. The iSCSI database files are stored in `/etc/iscsi/`.

Install `iscsi-initiator-utils` package.

```
# yum install iscsi-initiator-utils
```

E.1.3 Installing StoreWay Multipath

See [Section G.2: For Linux Application Server](#) for installation procedure.

This operation is not necessary if you do not install StoreWay Multipath.

E.1.4 Setting up iSCSI Software Initiator

Perform the following steps to install iSCSI Software Initiator in the Linux environment:

Set up Open-iSCSI Driver

1. Run the following command from the console to stop the iSCSI service.

```
# service iscsid stop
```



If the iSCSI service has already been stopped, this step is not necessary.

2. Use `vi` or another editor to open the `/etc/iscsi/iscsid.conf` file on the server.
3. After changing the settings in the variables shown in [Table E-1: Open-iSCSI Driver Settings](#) to the following values, save and close the file.

```
node.startup = Automatic
node.session.timeo.replacement_timeout = 30
```

Table E-1: Open-iSCSI Driver Settings

Variable name	Default value	Set value	Remarks
node.startup	No	Automatic	Automatically log on after the server reboots
node.session.timeo.replacement_timeout	120	30	Shorten the failover time when using Multipath

4. Run the following command from the console to start the iSCSI service.

```
# service iscsi start
```

5. Run the following command from the console to confirm that the iSCSI service is operating.

```
# /etc/init.d/iscsi status
```

Set up CHAP Authentication

If CHAP authentication will not be used, this step is not necessary.



For description of CHAP authentication, refer to [Appendix N: "CHAP Authentication"](#).

- Setup method when using **CHAP authentication of Initiator**.

1. Use `vi` or another editor to open the `/etc/iscsi/iscsid.conf` file on the server.
2. After editing the file as shown below, save and close the file.

```
node.session.auth.authmethod = CHAP
node.session.auth.username = <iqn (username) of server>
node.session.auth.password = <password of CHAP Initiator>
```

(Example)

```
node.session.auth.authmethod = CHAP
node.session.auth.username = iqn.1991-05.com.microsoft.exp120rj
node.session.auth.password = jR021_0085ssexpxE
```

3. Restart the iSCSI service

```
# /etc/init.d/iscsi stop
# /etc/init.d/iscsi start
```



CAUTION

The CHAP Initiator password that is set here is a password that a target uses to authenticate the Initiator. This password is also required for settings on the disk array side (see *Section: 13.2.21 iSMcfg setldsetchap in the Storage Manager Command Reference*), so be sure to write it down so it is not forgotten.

■ Setup method when using **bidirectional CHAP authentication**.

1. Use `vi` or another editor to open the `/etc/iscsi/iscsid.conf` file on the server.
2. Edit the file as shown below, then save and close the file.

```
node.session.auth.authmethod = CHAP
node.session.auth.username = <iqn (username) of server>
node.session.auth.password = <password of CHAP Initiator>
node.session.auth.username_in= <iqn (username) of disk array>
node.session.auth.password_in = < password of CHAP target>
```

(Example)

```
node.session.auth.authmethod = CHAP
node.session.auth.username = iqn.1991-05.com.microsoft.exp120rj
node.session.auth.password = jR021_0085ssexpxE
node.session.auth.username_in =
iqn.2001-03.jp.nec:storage01:ist-m000-sn-
0000000938209213.wn-0.target0000 -p 192.168.10.64:3260
node.session.auth.password_in = i3DegarotsiCEN
```


3. Restart the iSCSI service.

```
# /etc/init.d/iscsi stop
# /etc/init.d/iscsi start
```



CAUTION

The CHAP Initiator password that is set here is a password that a target uses to authenticate the Initiator. This password is also required for settings on the disk array side (see *Section: 13.2.21 iSMcfg setldsetchap in the Storage Manager Command Reference*), so be sure to write it down so it is not forgotten.

Execute Discovery

■ Method when not using iSNS (Internet Storage Name Service) server

Use the `iscsiadm` command to search for the target.

```
# iscsiadm -m discovery -t sendtargets -p <IP address of disk array>
(Example)# iscsiadm -m discovery -t sendtargets -p 192.168.1.1:3260
```

■ Method when using iSNS server

1. Use `vi` or another editor to open the `/etc/iscsi/iscsid.conf` file on the server.
2. Set the IP address and port number of the corresponding iSNS server.
3. Restart iSCSI service.

```
# /etc/init.d/iscsi stop
# /etc/init.d/iscsi start
```

4. Get Initiator information from an application server registered to iSNS server.

See [Appendix M: "Retrieve Initiator Information on Application Servers Registered with iSNS Server"](#).



When using iSNS server, the Initiator name of the application server must be directly entered under the Initiator settings in the iSCSI Setup Tool.

E.2 iSCSI Setup Tool

Run the iSCSI Setup Tool on an application server to configure the iSCSI settings required for the application server. Before starting the following section, you need to install the Storage Manager Agent Utility. See [Section D.1: Installing Storage Manager Agent Utility](#) for details on how to install the Storage Manager Agent Utility.

1. Run the following script on the application server.

```
# iSMiSCSISetup.sh
```

2. When a list of serial numbers is shown as follows, enter a list number corresponding to the serial number of the disk array unit you want to configure.

```
1) 0000000991000001
2) 0000000991000002
3) 0000000991000003
4) 0000000991000004
Please select serial number.
```

3. The following message appears to confirm whether to use CHAP authentication. Enter `y` to use the CHAP authentication. Enter `n` to skip the CHAP authentication.

```
To use CHAP authentication, please enter 'y'. [y/n]
```

4. When `n` is entered to skip the CHAP authentication, proceed to step (9). When `y` is entered to use the CHAP authentication, the following message appears. Enter the password of the CHAP initiator.

```
Please enter the target CHAP secret.
```

5. To confirm, enter the password of the CHAP initiator again.

```
Please enter password again.
```

6. This is to confirm whether to use mutual CHAP authentication. Enter `y` to use the mutual CHAP authentication. Enter `n` to skip the mutual CHAP authentication.

```
To use mutual CHAP authentication, please enter 'y'. [y/n]
```

7. Proceed to step (9) when `n` is entered to skip the CHAP authentication. If `y` is entered to use the mutual CHAP authentication, the following message appears. Enter the password of the CHAP target.

```
Please enter the initiator secret.
```

8. To confirm, enter the password of the CHAP target again.

```
Please enter password again.
```

9. The IP addresses of the disk array are listed as follows. Enter a list number corresponding to the IP addresses of the disk array. iSCSI Setup Tool runs a ping command using the IP addresses that are set in the host connection port parameters. It does not show failed results and delete the failed ones from the search result of the target.

```
1) Serial number=0000000991000004, Controller=0, IP
address=172.168.1.101
2) Serial number=0000000991000004, Controller=0, IP
address=172.168.1.102
3) Serial number=0000000991000004, Controller=1, IP
address=172.168.2.101
4) Serial number=0000000991000004, Controller=1, IP
address=172.168.2.102
Please select target IP address.
```

10. After the following message appears to confirm whether to create an LD set, enter `y` to proceed.

```
To create LD set, please enter 'y'. [y/n]
```

11. When the process is successfully complete, a list of the IP addresses appears as follows:

```
Succeed to log on to the target.
Serial number=XXXXXXXXXXXXXXXXXX, Controller=X, IP
address=XXX.XXX.X.XXX
```

The above is an example. You will actually see the serial number, controller number and IP address of the target. You can specify a parameter file as shown below.

```
# iSMiSCSISetup.sh [-f <parameter name> [-n]]
```

- When you specify `-f <parameter name>`, a parameter is loaded from the file specified.
- When you specify `-n`, a dry run is performed to check for any parameter error, and does not process

The details of the parameter file are described as follows.

Details

```
-m <Serial number>
-I <Password of CHAP initiator>
-t <Password of CHAP target>
-p <IP address of host connection port>
```

Descriptions

- In case CHAP authentication is not used, you do not need to supply a password of the CHAP initiator and a password of the CHAP target. When you use CHAP authentication, use the initiator name for the user name of CHAP initiator.
- In case mutual CHAP authentication is not used, you do not need to supply a password of CHAP target. When you use mutual CHAP authentication, use the target name for the user name of CHAP target.
- Lines, where any other letters than ones mentioned above is specified followed by a hyphen (-), are ignored and the operation continues.

For example: When CHAP authentication is not used.

```
-m 0000000991000004
-p 172.168.1.101
```

For example: When Mutual CHAP authentication is used.

```
-m 0000000991000004
-i jR0210085sserpxE
-t i3DegrarotsiCEN
-p 172.168.1.101
```



It is necessary to configure a public key with Storage Manager for SSH connection.

How to register

1. When you run the following command, it prompts for your parameter entry. Do not enter anything but press the **Enter** key.

```
ssh-keygen -t rsa
```

2. After you run the following command, it prompts for a user name and password entries. Enter sysadmin for the user name and the password of the sysadmin user.

```
ftp <IP addresses of management ports for Storage Manager>
```

3. After you subsequently run the following commands, run the quit command to end the FTP.

```
cd .ssh
get authorized_keys
```

4. Run the following command.

```
cat ../ssh/id_rsa.pub >> authorized_keys
```

5. When you run the following command, it prompts for a user name and password entries. Enter sysadminj for the user name and the password of the sysadmin user.

```
ftp < IP addresses of management ports for Storage Manager>>
```

**CAUTION**

6. After you subsequently run the following commands, run the quit command to end the FTP.

```
cd .sshput authorized_keys
```

7. Run the following command.

```
ssh sysadmin@< IP addresses of management ports for  
Storage Manager>>
```

8. When the following message appears, enter *yes*.

```
Are you sure you want to continue connecting (yes/no)?
```

9. Check it does not prompt for a password entry, and then run the exit command to end SSH.

- Because the port number 2730 is used, you need to set the exception for the firewall.

- iSCSI Initiator needs to be installed and the service must be started in advance.

If you use the CHAP authentication with two or more disk arrays, please follow the procedures shown as below.

Procedures

1. Configure the iSCSI setting using iSCSI Setup Tool.
2. Execute the following command in the order as below. (If there are two or more IP addresses succeeded to log on, execute the `iscsiadm` command repeatedly to each IP address.)

```
service iscsi stop  
iscsiadm -m node -o delete -p <target IP addresss  
succeeded to log on in step 1.>  
service iscsi start
```

3. Select the IP address of another disk array by iSCSI Setup Tool, and configure the iSCSI setting.
4. Execute the following command. (If there are two ore more IP addresses succeeded to log on, use the first IP address specified in step 2.)

```
iscsiadm -m discovery -t sendtargets -p <target IP  
addresss succeeded to log on in step 1.>
```

5. Execute the following commands.

```
iscsiadm -m node --targetname <target name specified  
in step /1/> -p <target IP addresss succeeded to log  
on in step /1/> --op update -n  
node.session.auth.authmethod -v CHAP  
iscsiadm -m node --targetname <target name specified  
in step /1/> -p <target IP addresss succeeded to log  
on in step /1/> --op update -n  
node.session.auth.username -v <initiator name>  
iscsiadm -m node --targetname <target name specified  
in step /1/> -p <target IP addresss succeeded to log  
on in step /1/> --op update -n  
node.session.auth.password -v <CHAP password for the  
initiator>
```



6. If you use mutual CHAP authentication, execute the following commands.

```
iscsiadm -m node --targetname <target name specified  
in step 1.> -p <target IP address succeeded to log on  
in step 1.> --op update -n  
node.session.auth.username_in -v <target name  
specified in step 1.>  
iscsiadm -m node --targetname <target name specified  
in step 1.> -p <target IP address succeeded to log on  
in step 1.> --op update -n  
node.session.auth.password_in -v <CHAP password for  
the target>
```

7. Execute the following command.

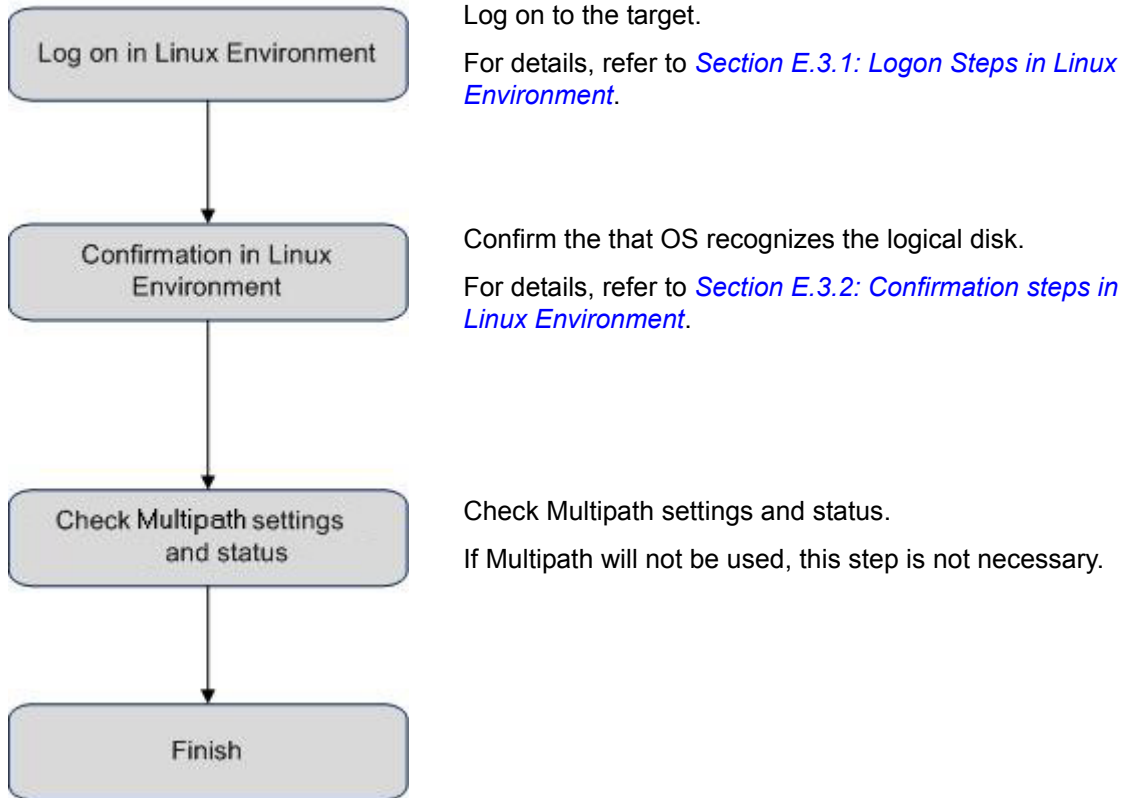
(If there are two or more IP addresses succeeded to log on, repeat the steps 5-7)

```
iscsiadm -m node --targetname <target name specified  
in step 1.> -p <target IP address succeeded to log on  
in the step 1.> -l
```

* If you use three or more disk arrays, repeat the procedures in steps 1-2 repeatedly, and then perform the procedure in step 3 for the last disk array unit. And then perform the procedure the steps 4–7 repeatedly for each disk arrays you have done the procedures in step 1-2.)

E.3 Checking Connection from Application Server

Perform the following steps to connect the application server and disk array in Linux environment.



E.3.1 Logon Steps in Linux Environment

1. Search for target.

```
# iscsiadm -m discovery -t sendtargets -p <IP address of disk array>
(Example)# iscsiadm -m discovery -t sendtargets -p 192.168.10.64:3260
```

2. Log on to target.

```
# iscsiadm -m node -T <iqn of disk array> -p <IP address of disk
array> -l
(Example)# iscsiadm -m node -T
iqn.2001-03.jp.nec:storage01:ist-m000-sn0000000938209213.
wn-0.target0000 -p 192.168.10.64:3260 -l
```


E.3.2 Confirmation steps in Linux Environment

Run the following command to check the number of logical disks (No. of logical disks assigned to application server × No. of access paths from application server to individual logical disks) and the respective vendor and model names (Bull SAS, DISK ARRAY).

```
# cat /proc/scsi/scsi
```



If nothing is shown, none of the access paths recognized the logical disks of the disk array unit assigned to the application server. Check the connection between the application server and the disk array unit, the Access Control settings, NIC driver settings and so on.

Display example: When two logical disks are assigned to a server, with two access paths per logical disk.

```
# cat /proc/scsi/scsi
Attached devices:
Host: scsi1 Channel: 00 Id: 00 Lun: 00
Vendor: xxxxxxxx Model: xxxxxxxx Rev: xxxx
Type: Direct-Access ANSI SCSI revision: 03
Host: scsi1 Channel: 00 Id: 00 Lun: 00
Vendor: xxxxxxxx Model: xxxxxxxx Rev: xxxx
Type: Processor ANSI SCSI revision: 02
Host: scsi2 Channel: 00 Id: 00 Lun: 00
Vendor: Bull SAS Model: DISK ARRAY Rev: xxxx
Type: Direct-Access ANSI SCSI revision: 04
Host: scsi2 Channel: 00 Id: 00 Lun: 01
Vendor: Bull SAS Model: DISK ARRAY Rev: xxxx
Type: Direct-Access ANSI SCSI revision: 04
Host: scsi3 Channel: 00 Id: 00 Lun: 00
Vendor: Bull SAS Model: DISK ARRAY Rev: xxxx
Type: Direct-Access ANSI SCSI revision: 04
Host: scsi3 Channel: 00 Id: 00 Lun: 01
Vendor: Bull SAS Model: DISK ARRAY Rev: xxxx
Type: Direct-Access ANSI SCSI revision: 04
Host: scsi4 Channel: 00 Id: 00 Lun: 00
Vendor: Bull SAS Model: DISK ARRAY Rev: xxxx
Type: Direct-Access ANSI SCSI revision: 04
Host: scsi4 Channel: 00 Id: 00 Lun: 01
Vendor: Bull SAS Model: DISK ARRAY Rev: xxxx
Type: Direct-Access ANSI SCSI revision: 04
```

Diagram annotations: A bracket on the left groups the scsi2 and scsi3 entries under 'NIC#1' and 'NIC#2'. A red bracket on the right groups the scsi2, scsi3, and scsi4 entries with a box containing the text 'Check the number of these lines.' A dashed bracket on the right groups the scsi4 entries with an asterisk '*'. The asterisk is positioned to the right of the scsi4 entries.

* In the environment where Multipath is installed, in some cases, depending on the Linux kernel version, the logical disks that can be controlled by Multipath are displayed after the logical disks recognized by the OS via the NIC (comprised in the above example of NIC#1 and NIC#2).

Appendix F How to Set/Check Application Server (VMware) (iSCSI)

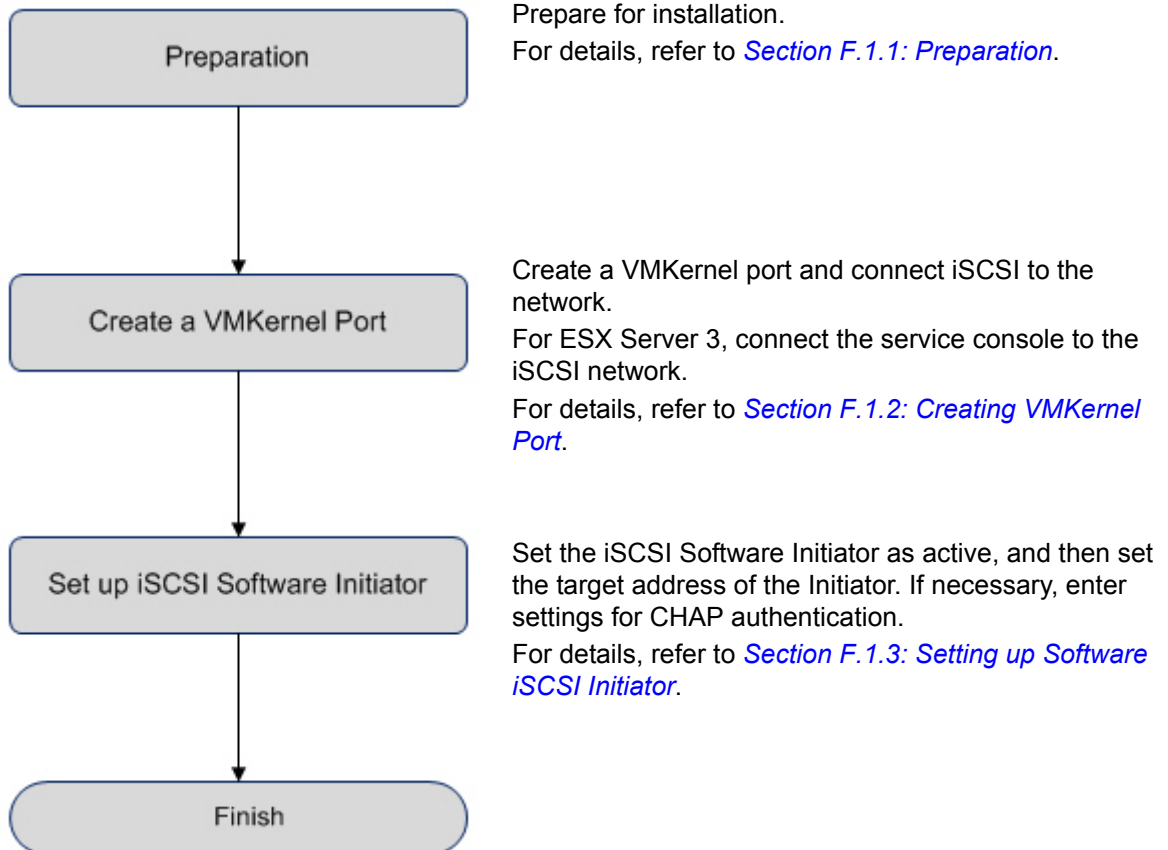
This appendix provides the steps you should follow while setting or checking an application server in the VMware environment, when the disk array is configured for the iSCSI connection.

F.1 Initializing Application Server

Perform the following steps to initialize the application server in the VMware environment.



The following describes the steps for using software iSCSI Initiator in the ESX Server environment.



F.1.1 Preparation

Perform the following steps to prepare for installation of application server in the VMware environment:

1. Provide IP addresses for an application server

Prepare IP addresses to be assigned to the application server as per the no. of NIC (1000BASE-T or 10GBASE-SR) ports. In addition, prepare the subnet mask and gateway addresses by asking the network administrator.



If two or more IP addresses are used by Multipath, the same network segment cannot be specified. Prepare IP addresses of other segments.

Example 1: Connectable configuration

HP0:192.168.0.10

HP1:192.168.1.10

Example 2: Unconnectable configuration

HP0:192.168.0.10

HP1:192.168.0.11

2. Install NIC (1000BASE-T or 10GBASE-SR)

Install the NIC to the application server as described in the manuals provided with the NIC and application server.



If the NIC has already been installed to the application server, this step is not necessary.

3. Install the NIC (1000BASE-T or 10GBASE-SR) driver

Install and set up the driver according to the setup procedure in the manual provided with the NIC installed in the server, or by referencing information provided on the Web and so on.



If the driver has already been installed and set up for the NIC installed in the application server, this step is not necessary.

4. Specify the network settings

Select **Start > Control Panel > Network Connection**, and then open **Local Area Connection Properties** to specify the IP address, subnet mask, and default gateway.

5. Connect to the disk array unit

Use a 10-Gbps or 1-Gbps cable to connect the application server to the host port (HP connector) of the disk array unit.

- Unit equipped with NF53x1-xF21xx (unit with 10Gbps iSCSI 2port controllers)
10-Gbps cable
Connector shape: LC connector



NF9320-SJxx (FC cable) can be used.

- Unit equipped with NF53x1-xF11xx (unit with 1Gbps iSCSI 2port controllers)
1-Gbps cable
Connector shape: RJ-45 connector



- CAT6 LAN cable is recommended.
- Either straight cable or crossover cable can be used.

For a sample connection configuration, see [Appendix K: "iSCSI Connection Configuration-Examples"](#).

The following shows the positions of the host ports.

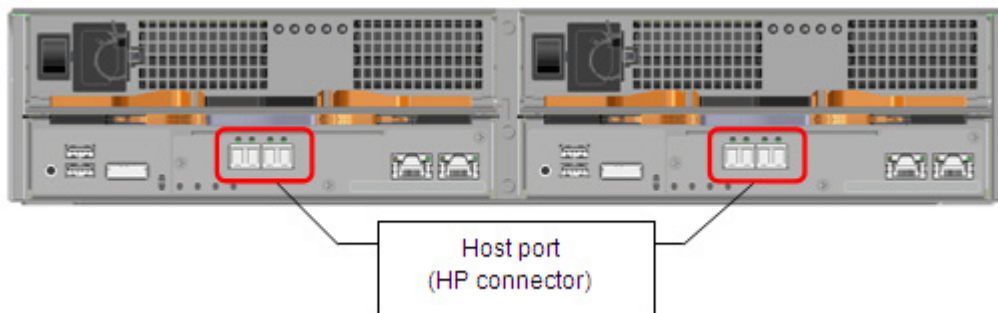


Figure F-1: Unit with NF53x1-xF21xx (10Gbps iSCSI 2port Controllers)

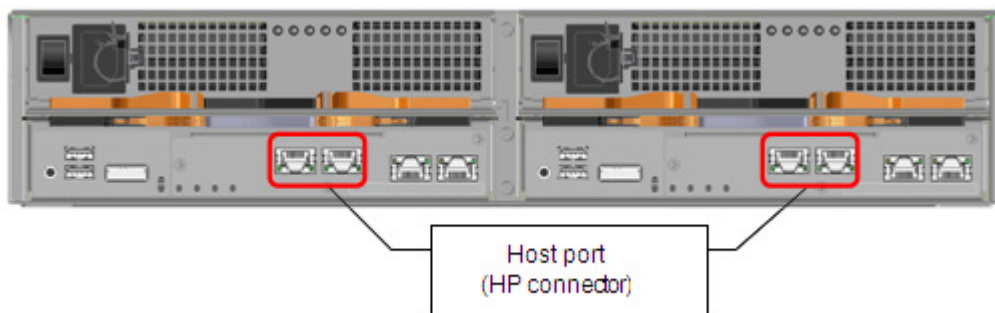


Figure F-2: Unit with NF53x1-xF11xx (1Gbps iSCSI 2port Controllers)

The following shows an example of a 10-Gbps iSCSI connection (redundant path configuration in combination with Multipath).

To implement the following recommended example, two NICs must be installed in the application server and two 10-Gbps cables are needed to connect the disk array unit and NICs.

Use a 10-Gbps cable to connect the NIC to the host port (HP connector) of the disk array unit. (The 10-Gbps cable has the same connector shape on both ends.)

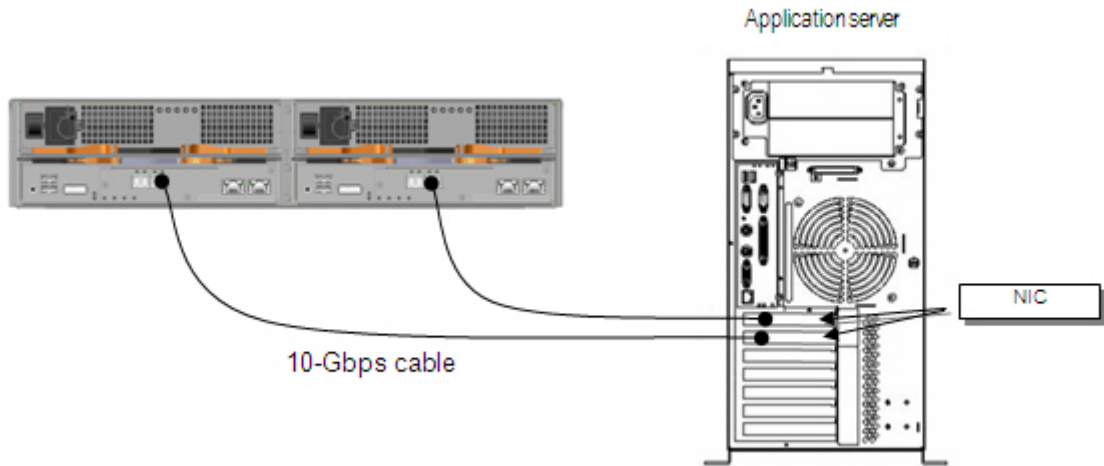


Figure F-3: Configuration Example

6. For the basic requirements when using iSCSI storage for ESX Server systems other than the above, refer to the OS Manual or to information provided on the Web and so on.

7. Prepare VMware Infrastructure Client (VI Client) operating environment

VI Client is a key component that generates, manages, and supervises virtual machines, virtual machine resources, and virtual machine hosts. VI Client must be installed on a Windows machine that supports network connection of ESX Server or VirtualCenter server environment.

F.1.2 Creating VMKernel Port

The following operations must be performed before configuring iSCSI storage.

- Create a VMKernel port for iSCSI Software Initiator.
- Connect the service console to an iSCSI network (only when with ESX Server 3).

Create a VMKernel port for iSCSI Software Initiator

1. Log in to VI Client.

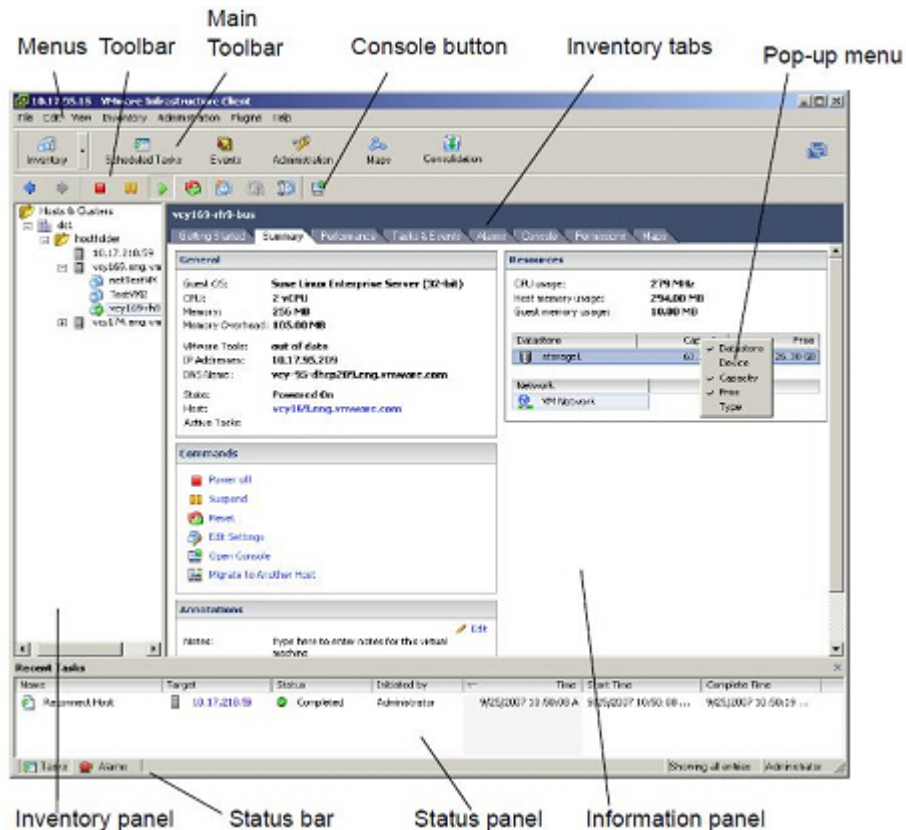


Figure F-4: VMware Infrastructure Client Layout Screen

2. After selecting a server from the Inventory panel, click the **Network** button for the configuration. This opens the Hardware Configuration page.
3. Click **Add network**.
4. Select **VMKernel** in the **Connection Type** screen of the Add Network Wizard, and then click the **Next** button.



With ESX Server 3i, the **Service Console** option is not shown in the wizard screen.

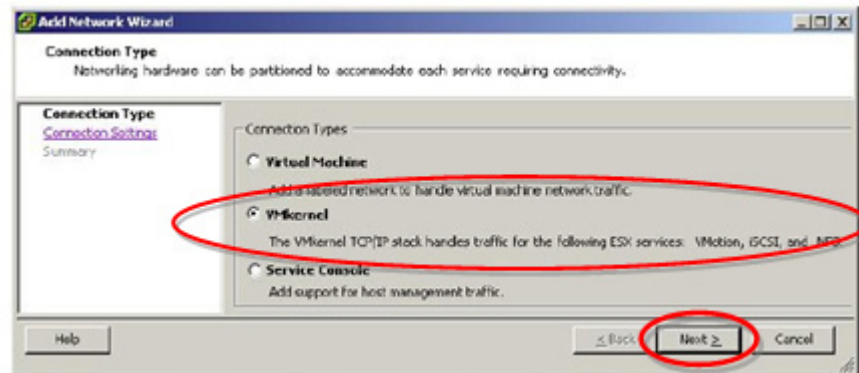


Figure F-5: Add Network Wizard Screen (1)

5. In the **VMkernel – Network Access** screen of the Add Network Wizard, select the vSwitch to be used or select **Create Virtual Switch**. Next, select the check box for the network type used by vSwitch, and then click the **Next** button.

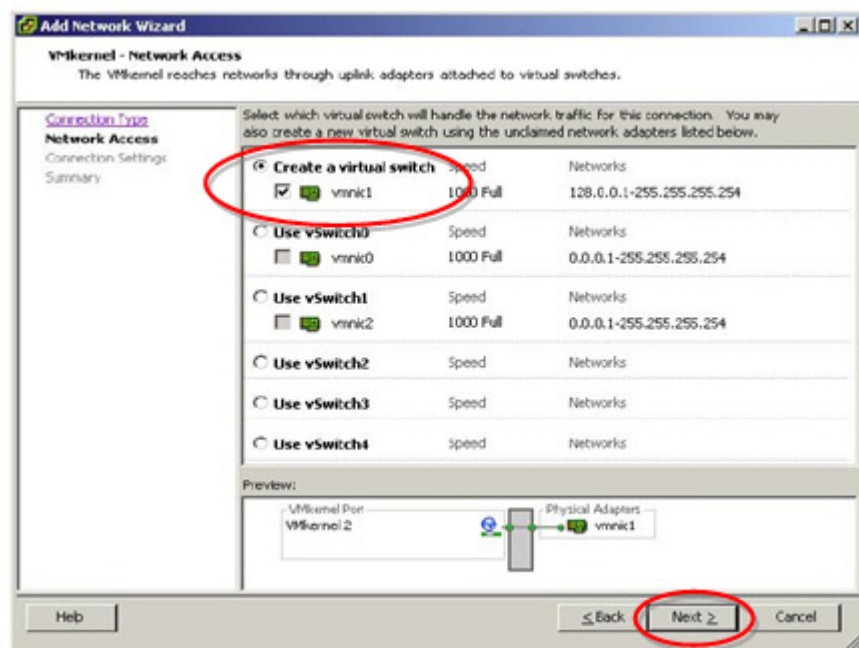


Figure F-6: Add Network Wizard Screen (2)

6. Under Port Group Properties in the **VMkernel: connection setup** screen of the Add Network Wizard, select or type a network label and VLAN ID. For the IP setting, enter the IP address and subnet mask. After completing the settings, click the **Next** button.
 - **Network Label:** This name identifies the port group being created. When using this name to configure a VMkernel service such as Vmotion or IP storage, this label specifies the virtual adapter to connect to the port group.
 - **VLAN ID:** This identifies the VLAN used for the port group's network traffic. A VLAN ID is not required. Check with the network administrator to determine whether or not this must be set.

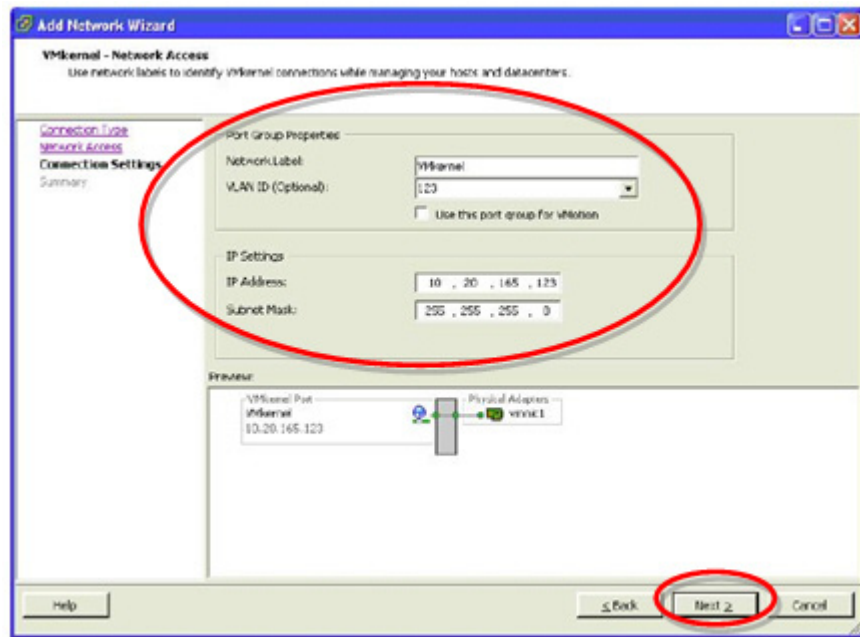


Figure F-7: Add Network Wizard Screen (3)

7. A warning alarm is output if a default gateway has not been set. Click the **Yes** button.



A gateway setting is required when connecting to a machine that is not set for the same IP subnet as the service console (ESX Server 3 only) or VMkernel.

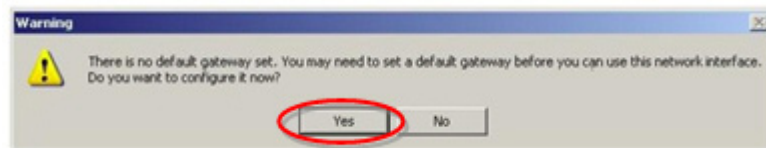


Figure F-8: Warning Screen

8. Set the IP address of each gateway corresponding to the "routing" service consoles and VMkernel in the **DNS and Routing Configuration** screen. After completing the settings, click the **OK** button.

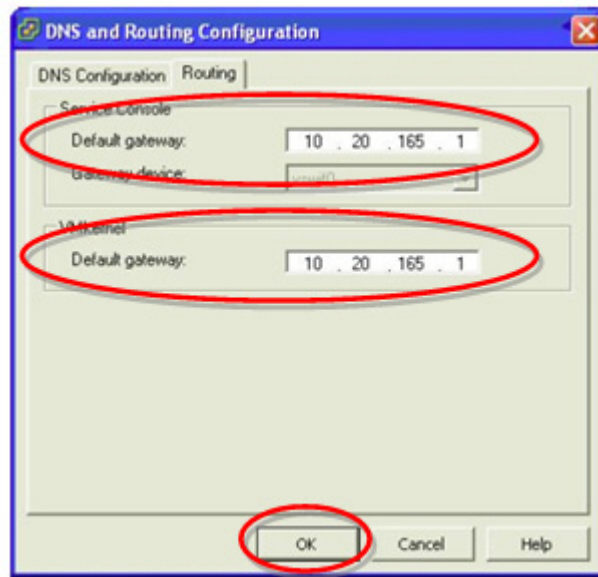


Figure F-9: DNS and Routing Configuration Screen

9. Click the **OK** button. Check the content of the **Settings Completed** screen. If there are no problems, click the **Finish** button.

Connect the service console to an iSCSI network (only when with ESX Server 3)

After creating a VMKernel port for iSCSI Software Initiator, connect a service console with the same vSwitch as for the target VMKernel port.



This operation is not required when using ESX Server 3i.

1. After logging in to the VI Client, select a server from the Inventory panel. This opens the Hardware Configuration Page for this server.
2. Click the **Network** button for the configuration.
3. On the right side of the screen, click the **Properties** button for the vSwitch associated with the created VMKernel port.
4. Click the **Add** button for the port.
5. After selecting **Service console** in the **Connection Type** screen of the Add Network Wizard, click the **Next** button.

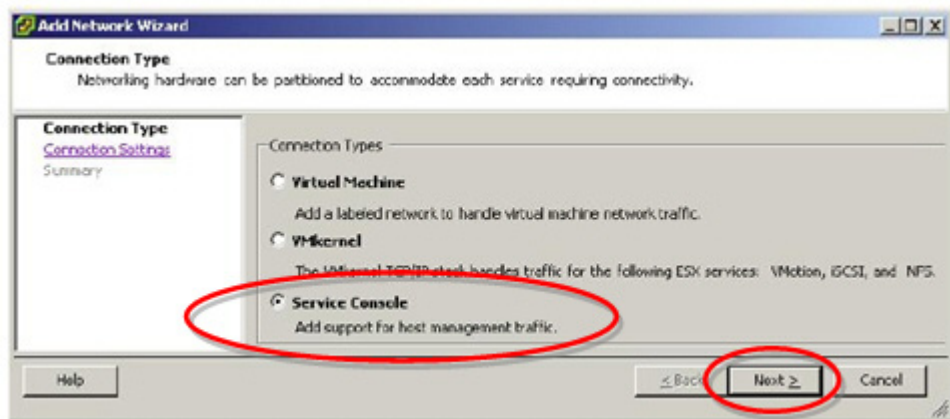


Figure F-10: Add Network Wizard Screen (4)

6. On the **Service Console: Connection Settings** screen of the Add Network Wizard, enter a Network label to identify the port group that was created under **Port Group Properties**. Select either **Automatically retrieve IP settings** or **Use the following IP setting**. If you selected **Use the following IP setting**, enter the IP address and subnet mask, then click the **Edit** button.

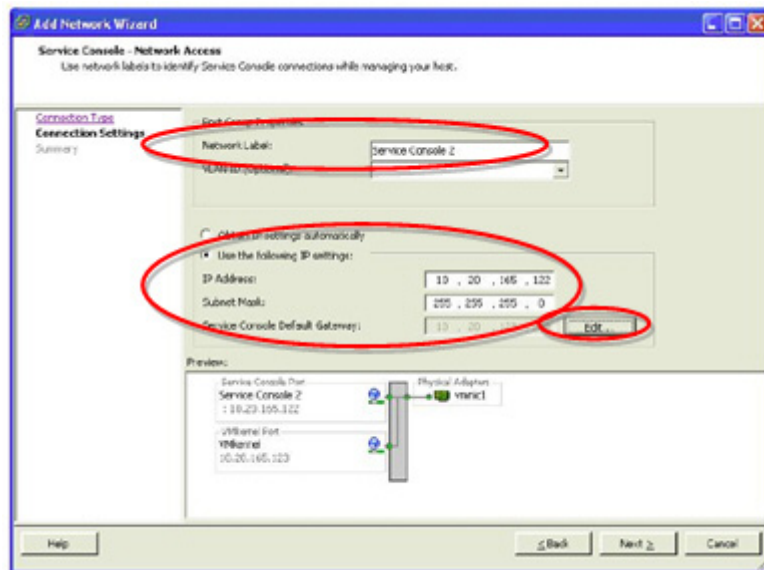


Figure F-11: Add Network Wizard Screen (5)

7. Enter the IP address of the default gateway for service control. When settings are completed, click the **Next** button.
8. In the **Settings Completed** screen of the Add Network Wizard, use the Preview function to check that vSwitch has been correctly configured, and then click the **Finish** button.

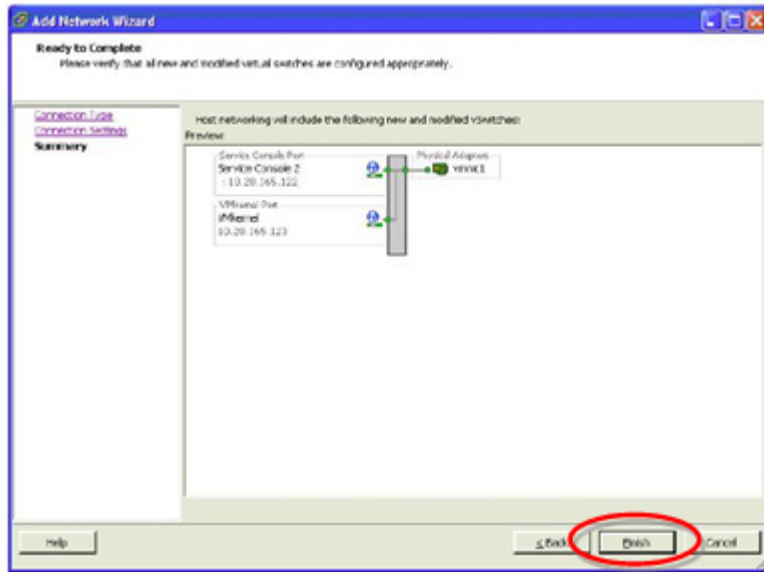


Figure F-12: Add Network Wizard Screen (6)

F.1.3 Setting up Software iSCSI Initiator

To configure Software iSCSI Initiator, activate Initiator and then set the target address for Initiator. This section describes the parameter settings related to CHAP authentication.

Activate Software iSCSI Initiator

Activate software iSCSI Initiator, so that ESX Server can be used.

1. After logging in to VI Client, select a server from the Inventory panel.
2. Click the **Storage Adapter** button under the hardware to be configured. (A list of available storage adapters is displayed.)
3. After selecting an available software Initiator from the iSCSI software adapter, click **Properties**.

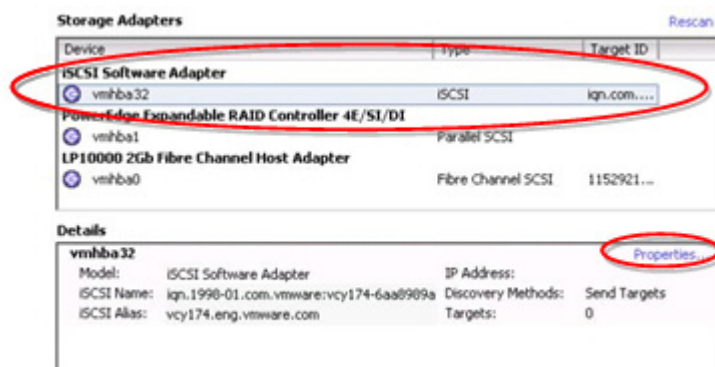


Figure F-13: Hardware Configuration Page Screen

4. Click the **Configure** button under the **General** tab in the iSCSI Initiator Properties screen.

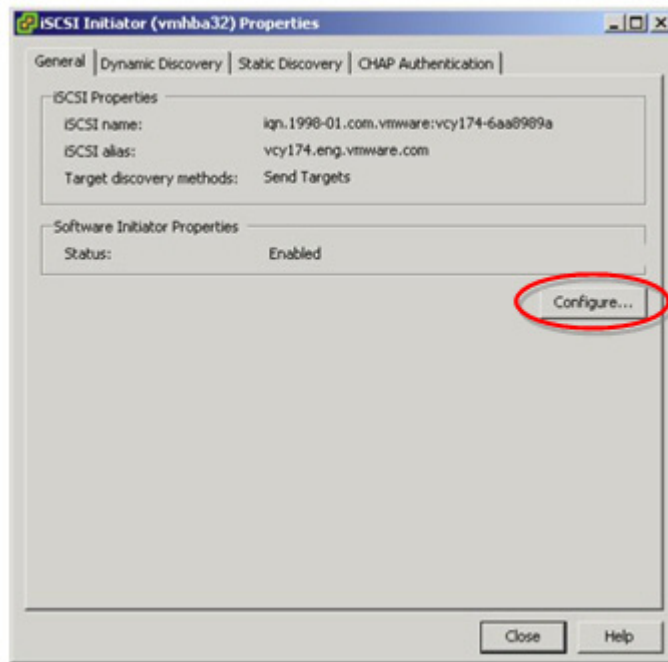


Figure F-14: General Tab in iSCSI Initiator Properties Screen

5. Select the **Enabled** check box under **Status** in the General Properties screen. After completing the settings, click the **OK** button.

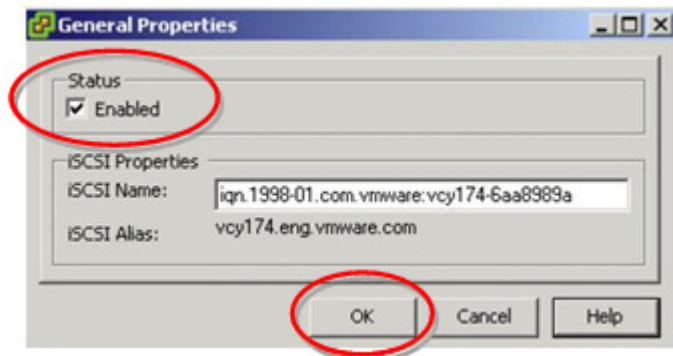


Figure F-15: General Properties Screen

Set up detection address

Set the target detection address so that the software Initiator is able to designate access-enabled storage resources on the network.

1. Click the **Add** button under the **Dynamic Discovery** tab in the **iSCSI Initiator Properties** screen.

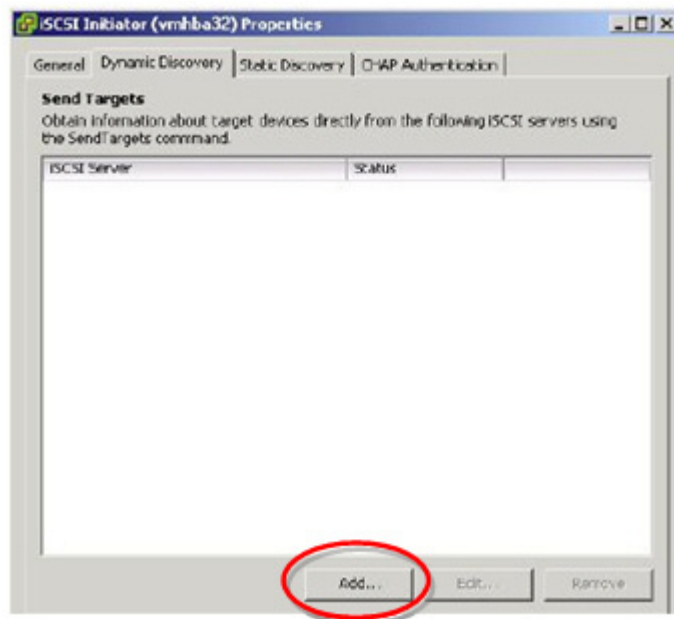


Figure F-16: Dynamic Discovery Tab in iSCSI Initiator Properties Screen

2. Enter the IP address of the server to be used as the target sending iSCSI server. After completing the settings, click the **OK** button.

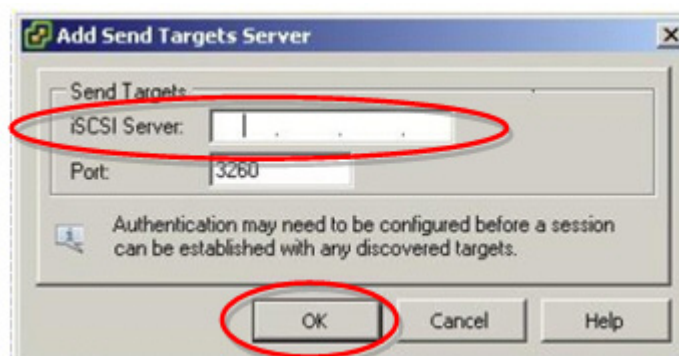


Figure F-17: Add Target Sending Server Screen

CHAP Parameter Settings

If CHAP authentication will not be used, this step is not necessary.



For description of CHAP authentication, refer to [Appendix N: "CHAP Authentication"](#).

1. Click the **CHAP Authentication** tab in the **iSCSI Initiator Properties** screen.

- The default CHAP parameters are shown under the **CHAP Authentication** tab.
- To change these CHAP parameters, click the **Configure** button.

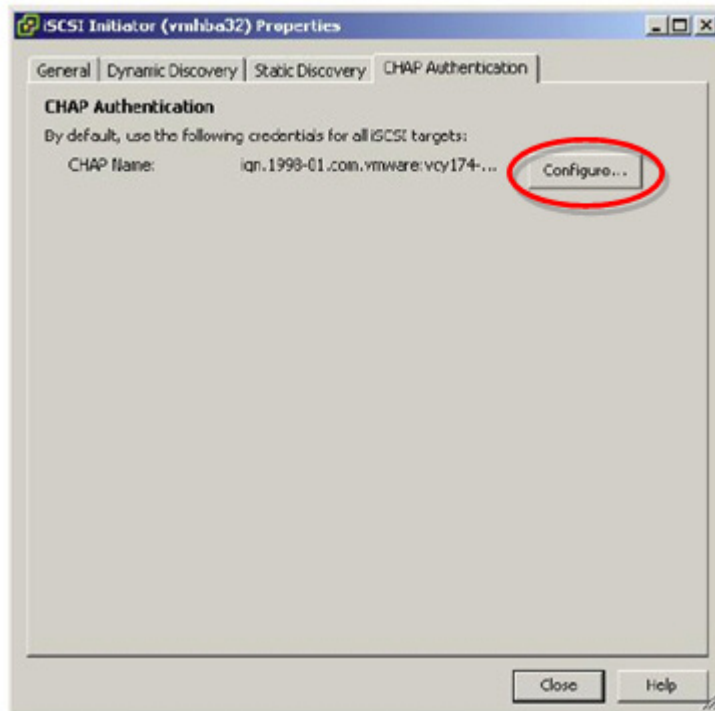


Figure F-18: CHAP Authentication Tab in iSCSI Initiator Properties Screen

2. Click the **CHAP Authentication** tab in the **iSCSI Initiator Properties** screen and change the following settings. After completing the settings, click the **OK** button.

Certificate

- Select the **Use the following CHAP credentials** option to activate CHAP authentication function.
- Select the **Use Initiator Name** option to use the Initiator name as the CHAP name. Enter any CHAP name to be used instead.
- Enter the CHAP Secret in the **CHAP Secret** box.
- Select **Disable CHAP authentication** to disable the CHAP authentication function.

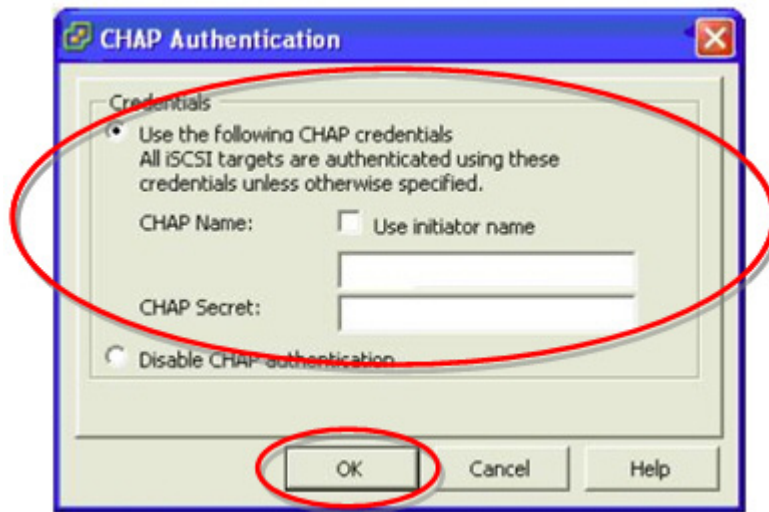
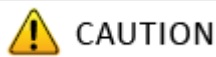
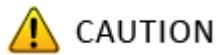


Figure F-19: CHAP Authentication Screen



CAUTION

For sessions after CHAP setup, the CHAP Secret is used to authenticate the Initiator. This has no effect on any session that has already been established. When CHAP has been disabled, the current session continues until a restart or a forced log-out of the disk array unit is executed. After a restart or a forced log-out of the disk array unit, it is no longer possible to connect to any disk array that requires CHAP authentication.

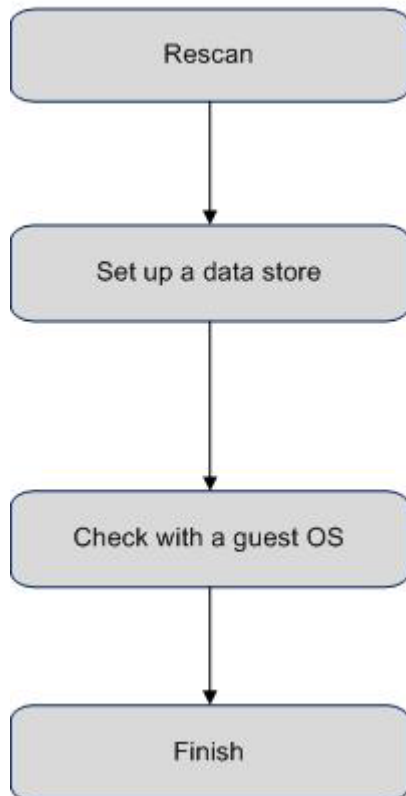


CAUTION

The CHAP Secret that is set here is a password that a target uses to authenticate the Initiator. This password is also required for settings on the disk array side (see *Section: 13.2.21 iSMcfg setldsetchap in the Storage Manager Command Reference*), so be sure to write it down so it is not forgotten.

F.2 Checking Connection from Application Server

Perform the following steps to connect the application server and disk array unit in a VMware environment.



After executing a rescan, make sure that a list of available adapters is shown by the software iSCSI Initiator used to access software- activated iSCSI storage disk array units.

For details, refer to [Section F.2.1: Executing Rescan](#).

Set up a data store for the software-activated iSCSI storage device.

For details, refer to [Section F.2.2: Setting up a Data Store](#).

Make sure that the logical disks are recognized by the Guest OS.

For details, refer to [Section F.2.3: Confirmation Using Guest OS](#).

F.2.1 Executing Rescan

Perform the following steps:

1. Use VI Client to select a server, then select **Storage Adapter** as the configuration hardware setting.
2. Click **Rescan** under **Storage Adapter**.



Select an available software Initiator from displayed list of available iSCSI software adapters. This brings up a display of Initiator details such as the model name, IP address, iSCSI name, detection method, iSCSI alias, and various detected targets.

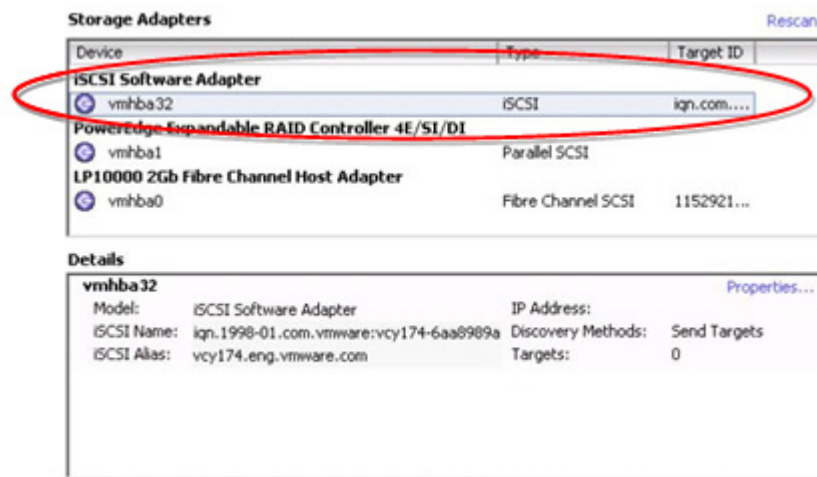


Figure F-20: Hardware Configuration Screen (1)

3. Click **Properties** in **Details**.

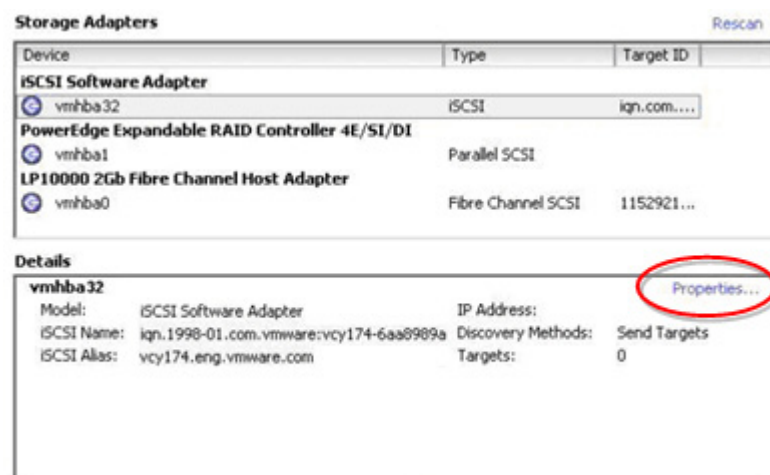


Figure F-21: Hardware Configuration Screen (2)

4. Properties that can be added are shown under the **General** tab of the **iSCSI Initiator Properties** screen.



The software Initiator configuration and default properties can be changed.

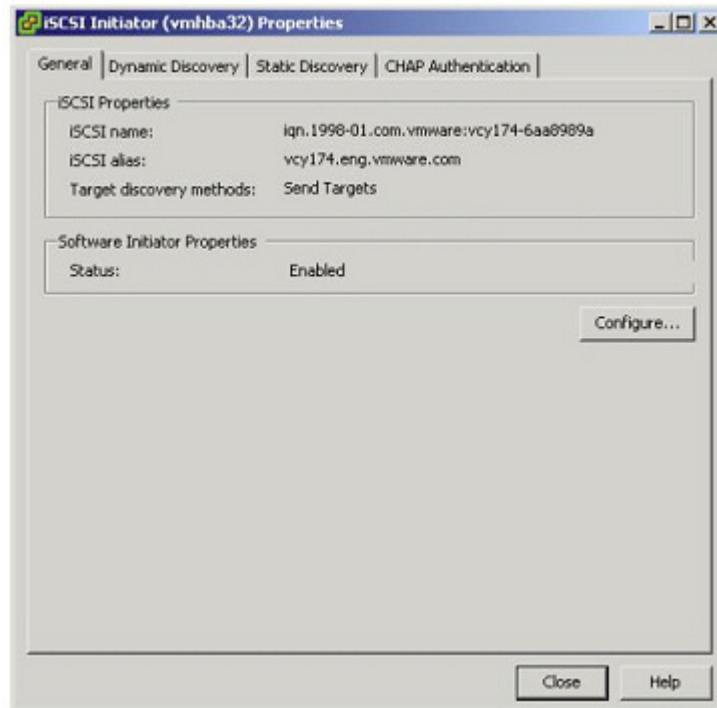


Figure F-22: General Tab in iSCSI Initiator Properties Screen

F.2.2 Setting up a Data Store

Create a data store for a software-activated iSCSI storage device. After creating it, execute a rescan. Disk/LUN from the ESX Server system can be used.

1. Use the VI Client to select a server, and then select **Hardware > Storage** under **Configuration**.
2. Click **Add storage**.
3. Select **Disk/LUN**, and then click the **Next** button.

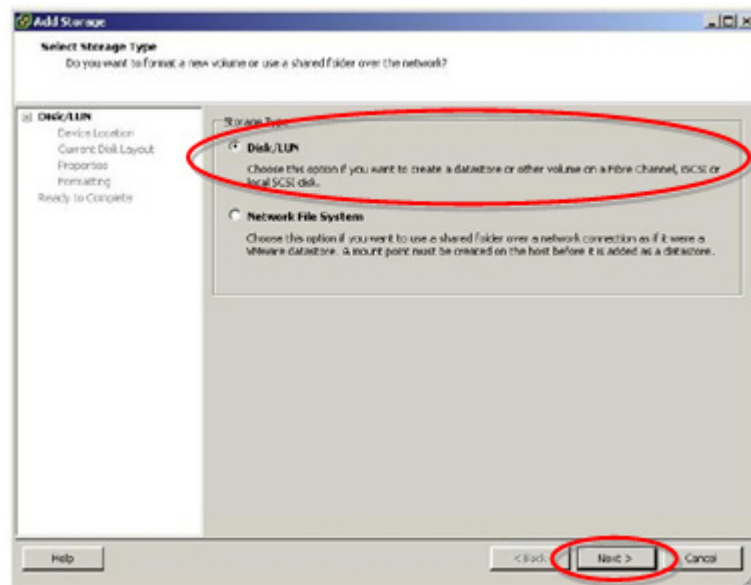


Figure F-23: Add Storage Wizard Screen (1)

4. Select the iSCSI device to be used for the data store, and then click the **Next** button.

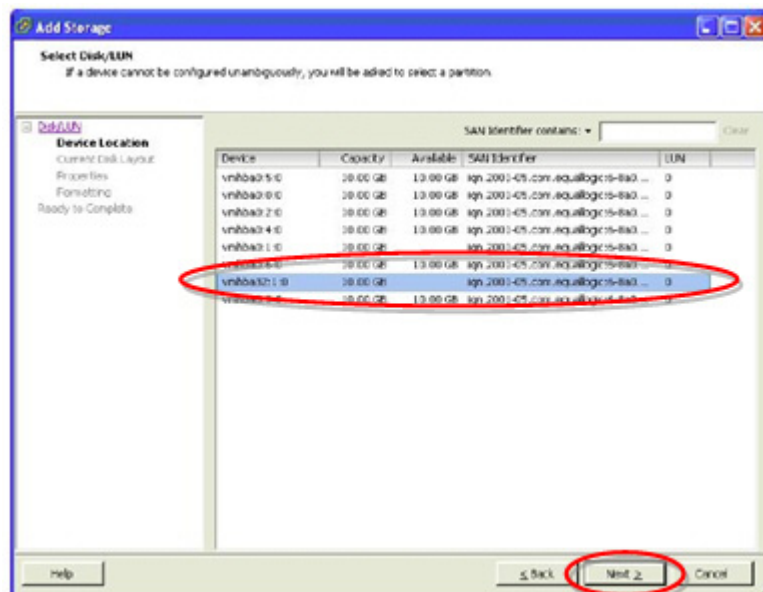


Figure F-24: Add Storage Wizard Screen (2)

5. **Current disk layout** is displayed. Check the current disk array layout. If there are no problems with the settings, click the **Next** button.

- The Disk/LUN Properties are now shown. Enter the data store name.
After completing the settings, click the **Next** button.



The data store name is shown in the VI Client. The label must be unique within the current instance of the virtual Infrastructure.

- Adjust the file system values and area to be used for data store. The default settings is to set the storage device for all empty areas. After completing the settings, click **Next**.

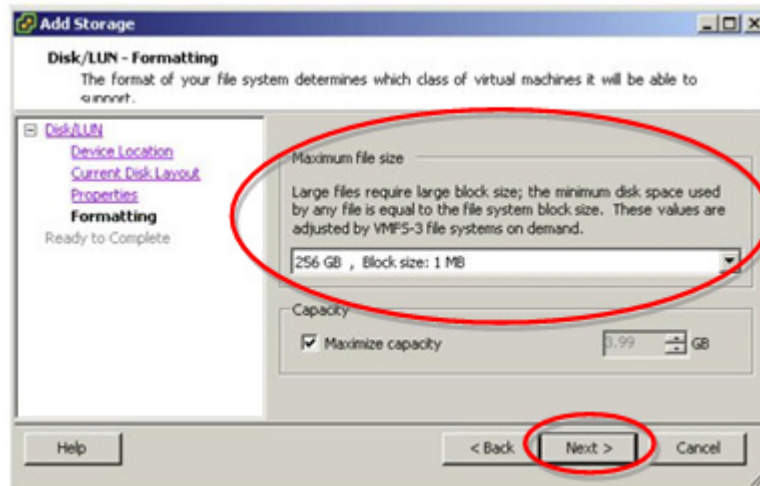


Figure F-25: Add Storage Wizard Screen (3)

- When the **Completed Settings** screen appears, check the data store configuration. If there are no problems with the settings, click the **Finish** button.



Until now, a data store has been created in an iSCSI storage device that can be accessed by Software Initiator.

- Click the **Change** button.

F.2.3 Confirmation Using Guest OS

Perform the following steps to confirm that the logical disks are recognized by the guest operating system:

Confirmation in Windows Environment

1. Select **Administrative Tools > Computer Management > Disk Manager** to start.
2. Click **Disk drives** and check the number of logical disks (No. of logical disks assigned to server × No. of access paths from server to individual logical disks) and the respective disk drive names (Bull DISK ARRAY SCSI Disk Device).



If nothing is shown, check the software iSCSI Initiator settings for the ESX Server environment, the server-Storage connections, NIC driver settings and so on.

3. Open **Disk Management** and check the number of logical disks (number of logical disks assigned to server).

Confirmation in Linux Environment

Run the following command to check the number of logical disks (No. of logical disks assigned to application server × No. of access paths from application server to individual logical disks) and the respective vendor and model names (Bull, DISK ARRAY).

```
# cat /proc/scsi/scsi
```



If nothing is shown, check the software iSCSI Initiator settings for the ESX Server environment, the server-Storage connections, NIC driver settings and so on.

Appendix G Installing StoreWay Multipath

This appendix provides the steps you should follow while installing the StoreWay Multipath (hereinafter referred to as Multipath) in a Windows or Linux application server.

G.1 For Windows Application Server

Use the setup CD-ROM and follow the steps below to install Multipath in a Windows application server:

1. Turn off the power supply of the server first and then disconnect all connections between the server and the disk array unit. When SAN boot is enabled, the server should be connected to the disk array unit via a single connection.
2. Power on the server and log in as a user having administrative authority (built-in-administrator for Windows Server 2008) for the server where Multipath will be installed. Insert the setup CD-ROM of Multipath in the CD/DVD drive of the server.
3. When the message shown below or a similar message appears, click **Yes**. If no message is shown, run "iSpmStarter.exe" located in the root directory of the setup CD-ROM of Multipath.

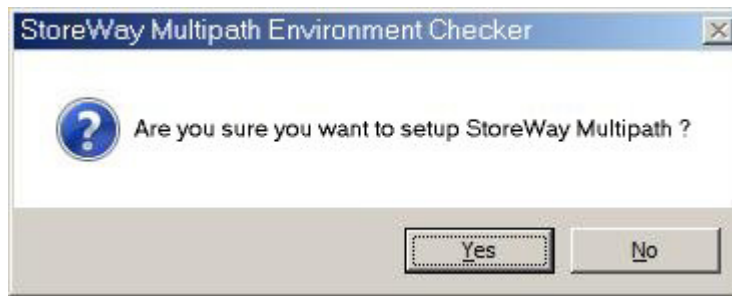


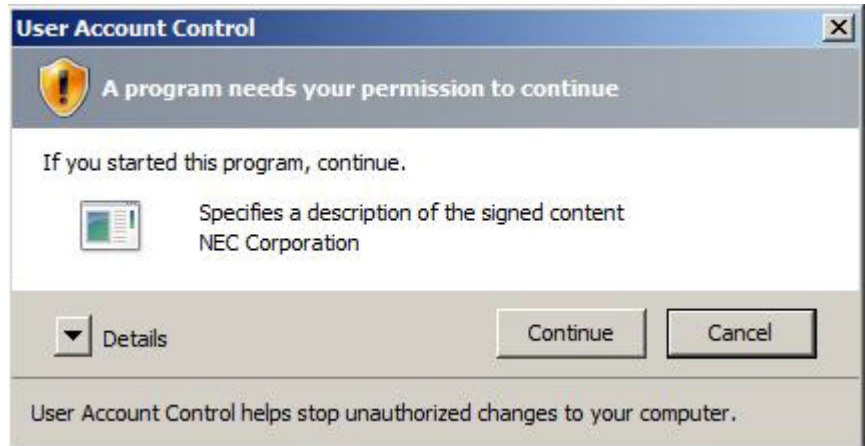
Figure G-1: Storage Multipath Environment Checker



"iSpmStarter.exe" must be run when Multipath is installed in a server core environment where no messages are shown. Before running "iSpmStarter.exe", make sure that the current directory is the root directory of the CD/DVD drive in which the CD-ROM is inserted.



The following message may appear when the installation is performed by any user other than OS-built-in-administrator. When you see this message, click **Continue**.



4. The setup program for Multipath starts. Depending on the server status, either of the following two message is shown:
 - If you are installing Multipath on the server for the first time, the **Welcome to the InstallShield Wizard for Storage Multipath** page is shown. Click **Next** to proceed to step (5).

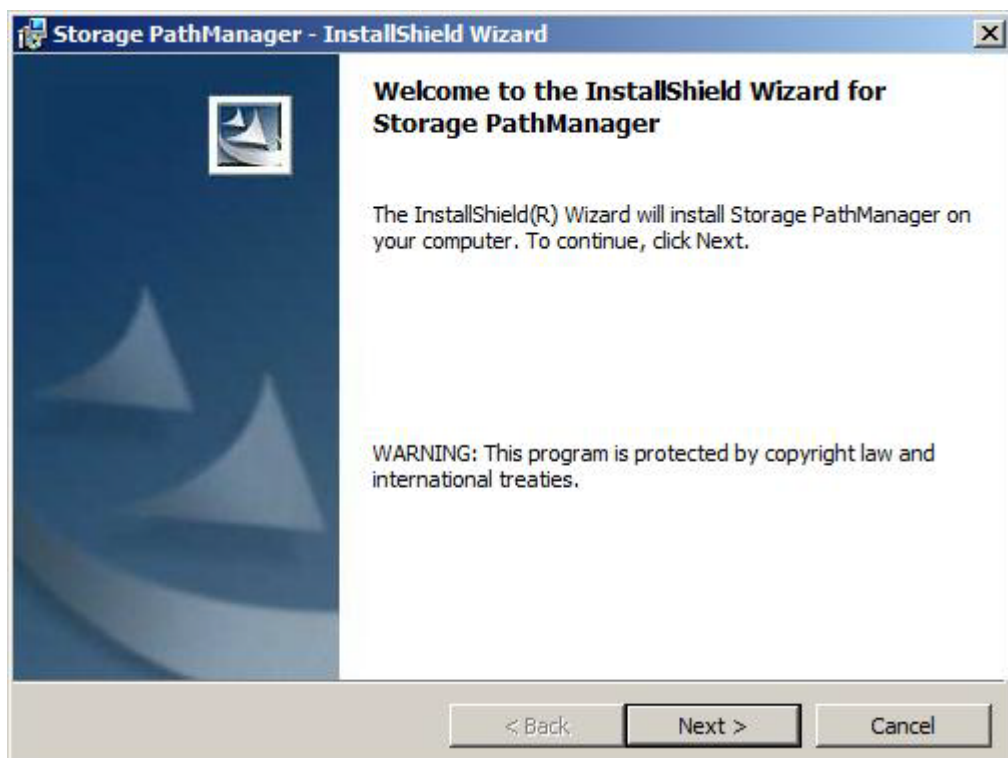


Figure G-2: Storage Multipath InstallShield Wizard - Welcome Page 1

- If the same version of Multipath has already been installed, the maintenance page is shown. Click **Cancel** to finish the installation.

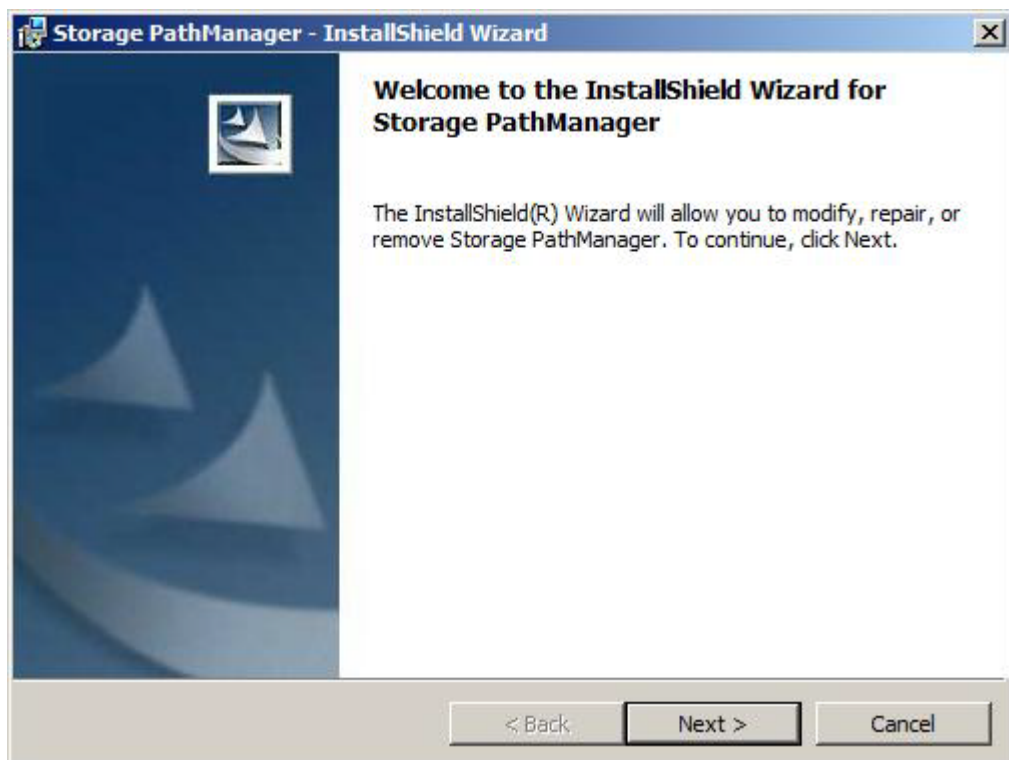


Figure G-3: Storage Multipath InstallShield Wizard - Welcome Page 2

5. When the **Ready to Install the Program** page is shown, click **Install** to start the installation.

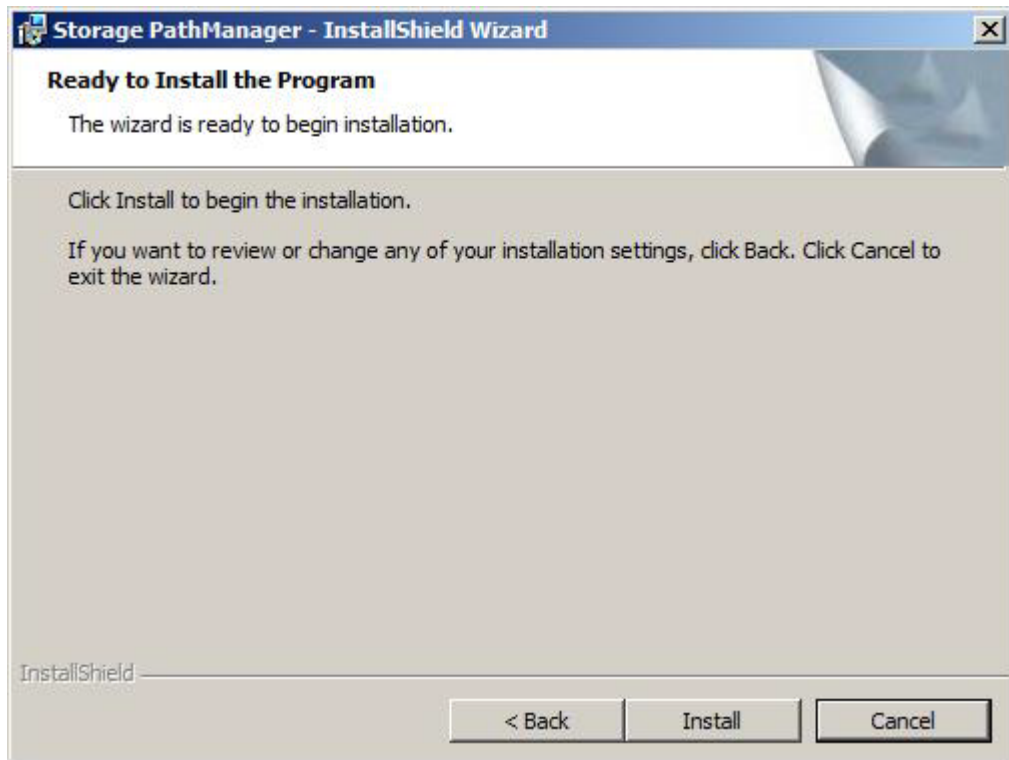


Figure G-4: Storage Multipath InstallShield Wizard - Ready to Install the Program

6. When the **InstallShield Wizard Completed** page is shown, click **Finish**.

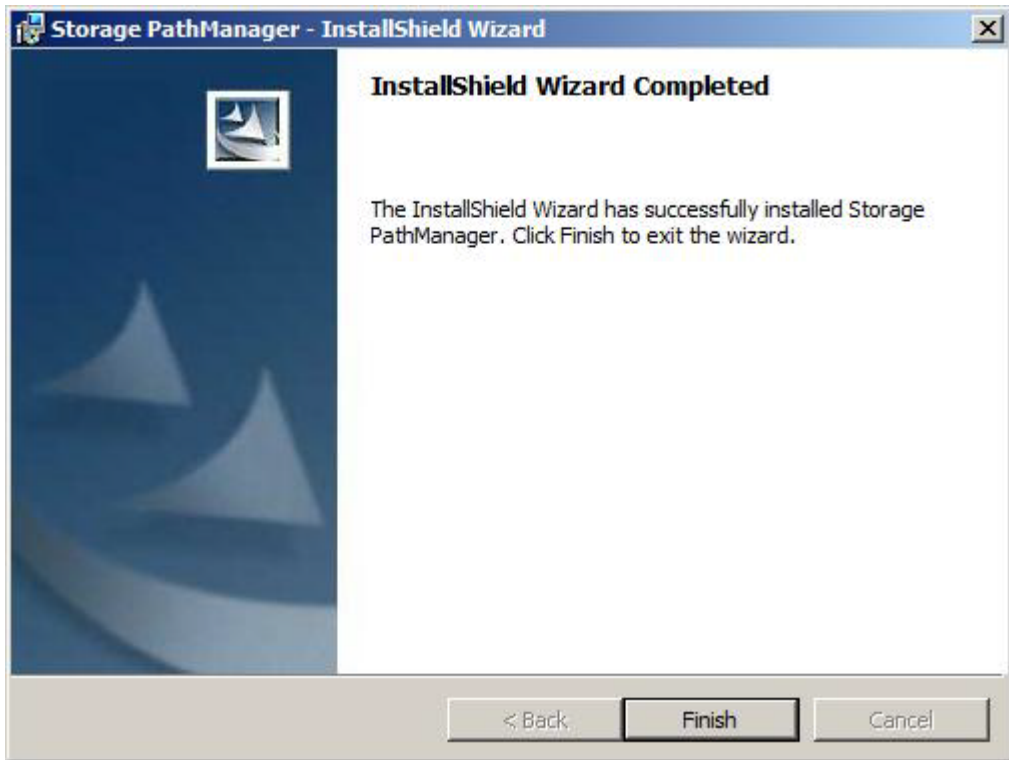


Figure G-5: Storage Multipath InstallShield Wizard - Completed

7. When the following message asking for restart is shown, click **Yes** to restart the server.

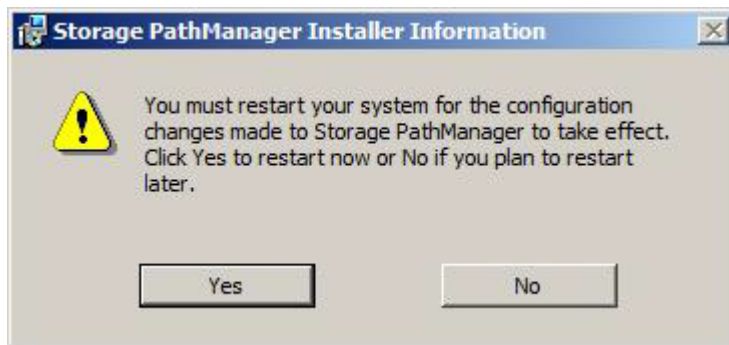


Figure G-6: Storage Multipath Installer Information

8. When the server is restarted, connect the target disk array unit to the server. Multipath automatically recognizes target disk array unit and paths allowing you to start operation.
The installation of Multipath is now complete.
e.

Appendix H Notes-Using Microsoft Cluster Service in Windows Server 2003 Environment

When you are using Microsoft Cluster Service (MSCS) in the Windows Server 2003 environment, the value set to each server by the MSCS specifications must match the disk array Target ID and LUN (number) values recognized by each server. Cluster setup does not work when different values are set.

For details, refer to the following URL:

[KB331801] Cluster setup may not work when you add nodes.

<http://support.microsoft.com/kb/331801>

H.1 Target ID

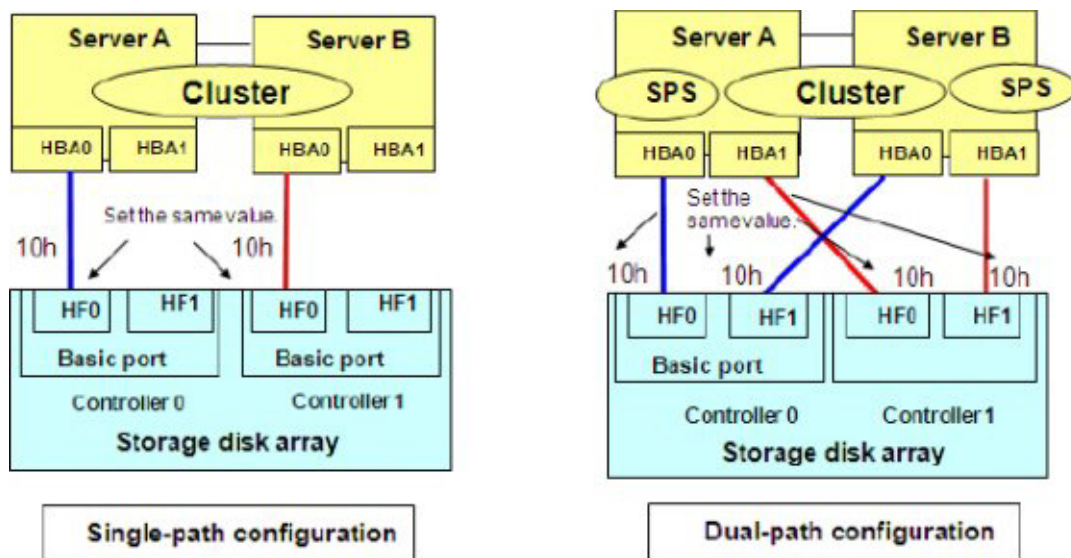
The following describes a connection method related to setup of matching values as the Target IDs of disk array unit controllers recognized by the server.

- When directly connecting server (HBA) and disk array unit

Set matching values to the Loop Switch ID of the disk array unit controller.

The Switch ID that is set becomes the Target ID recognized by the server.

Similarly, when there are multiple connection paths between servers and disk array units, set the same values to the Loop Switch IDs of all controller ports to be connected.



SPS: Multipath

Figure H-1: Direct Connection

- When connecting to FC switches, such as N8190-119 in Loop Topology
Set identical Loop Switch ID values to controllers of the same disk array unit.
The Switch ID that was set becomes the Target ID recognized by the server.
When multiple disk array units are connected to FC switches, different Loop Switch ID values must be set to each disk array unit. Normal operation will not occur if matching values are set.



Because FC switches in a Loop Topology require different Loop Switch IDs within FC switches, a configuration cannot be built using just one FC switch.

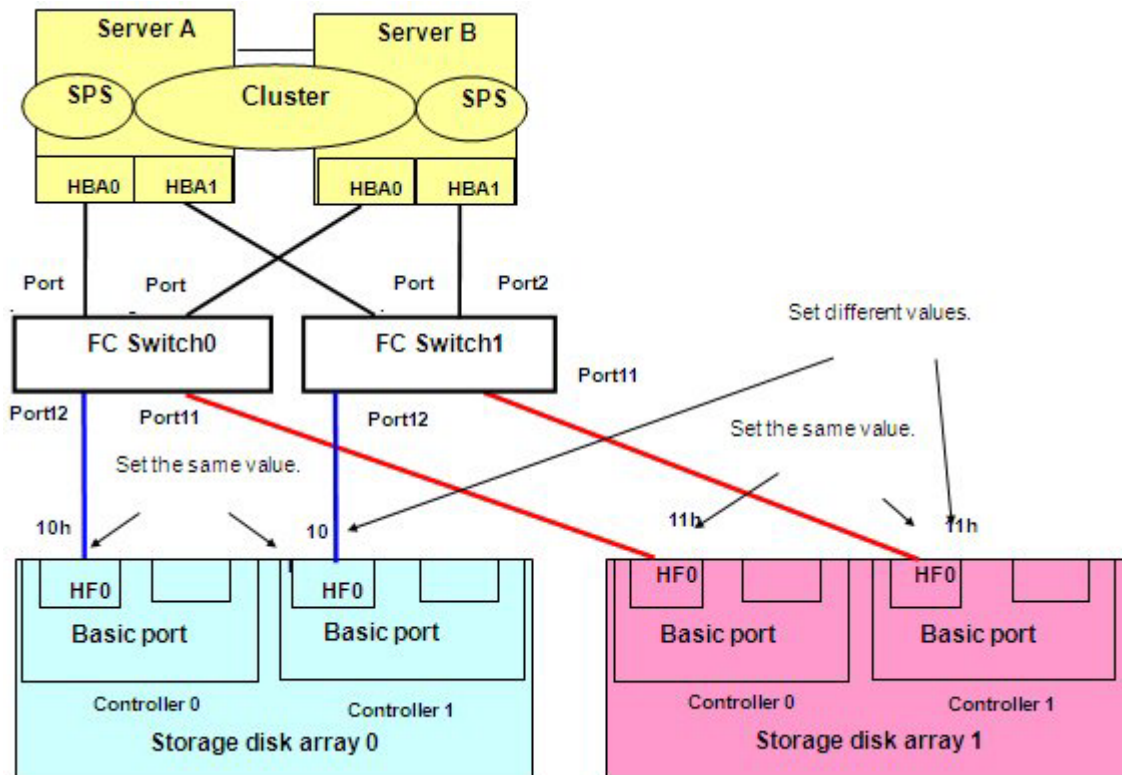


Figure H-2: Connecting to Loop Topology FC Switch

- When connecting to a Fabric Switch, such as NF9340-xSxx, N8406-040/042
As shown in the figure below, for each Fabric Switch or each Zoning group, connections from servers and disk array units must be linked to the same port number on each switch.
Target IDs starting from 0 are assigned to targets that are recognized by the server starting from the lowest N_Port ID value (lowest port number of switch).

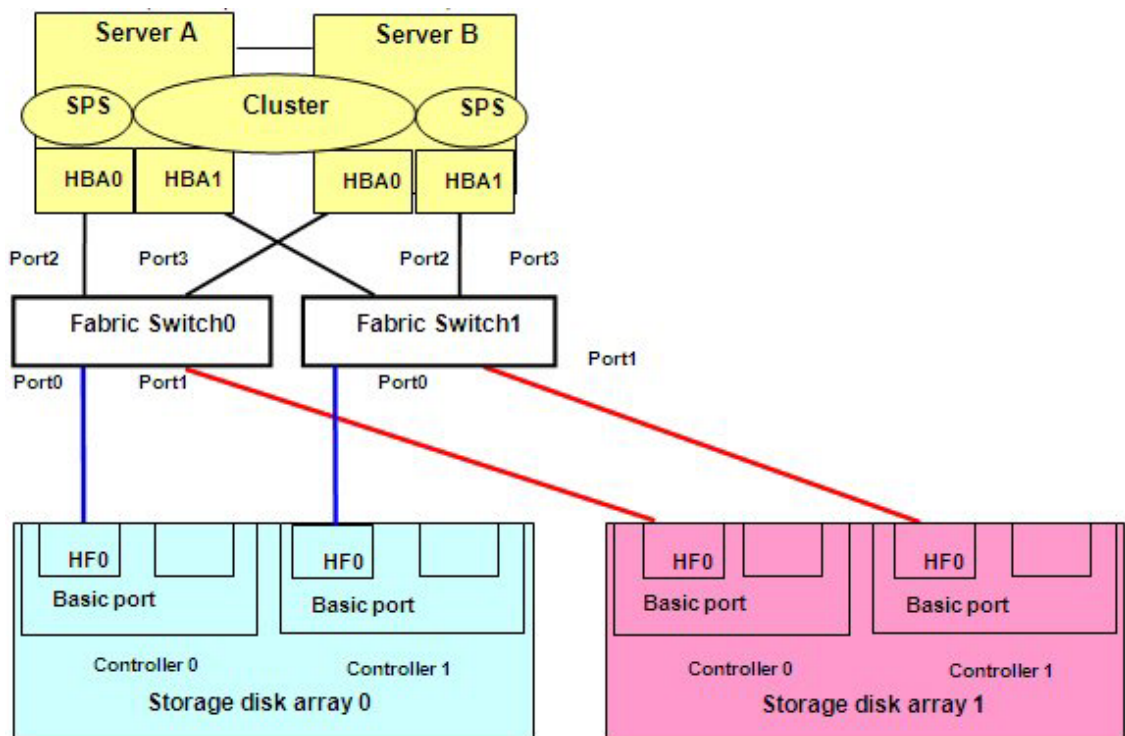


Figure H-3: Connecting to Fabric Switch

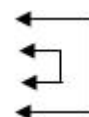
Table H-1: Connection of Switch

Switch No. Port No.	Connected Device	Switch ID	Target ID	
Switch0 - Port0	iStorage0- Cont0	10h	0	Recognizes targets connected to fabric switch in detected order and assigns Target ID from lower switch port number. Target ID for the first detected target will be 0. Secondly, detected target will have "Target ID = 1 and so on.
Switch0 - Port1	iStorage1- Cont0	12h	1	
Switch0 - Port2	server A- HBA0	-	-	
Switch0 - Port3	server B- HBA0	-	-	
Switch1 - Port0	iStorage0- Cont1	11h	0	
Switch1 - Port1	iStorage1- Cont1	13h	1	
Switch1 - Port2	server A- HBA1	-	-	
Switch1 - Port3	server B- HBA1	-	-	



If you connect wrong disk arrays to Ports of Switch0 and Switch1, you cannot perform cluster setup since Target IDs differ between controller 0 and controller 1.

- Switch0 - Port0 : disk array 0 - Cont0 Target ID 0
- Switch0 - Port1 : disk array 1 - Cont0 Target ID 1
- Switch1 - Port0 : disk array 1 - Cont1 Target ID 0
- Switch1 - Port1 : disk array 0 - Cont1 Target ID 1



Target IDs at CONT0 and CONT1 differ.

H.2 Logical Unit Number

This section describes a method for setting matching values as the Logical Unit Number (LUN) of disk array units recognized from the server.

Each disk array unit includes an access control function that masks logical disks and maps LDNs starting from LUN0. If this access control is not being used, the logical disk number (LDN) of a logical disk configured in a disk array unit becomes the Logical Unit Number (LUN) that can be accessed from the server.

When access control is used, it becomes possible to change LUN (number) that can be accessed from the server.

For example, when LDN00 to 03 are in a disk array unit, access control can set LDN00 = LUN00, LDN01 = LUN01, LDN02 = LUN02 as recognized from Server A and LDN00 = LUN01, LDN01 = LUN02, LDN03 = LUN00 as recognized from Server B. In this case, there are different LDNs for the LUN that is recognized from Server A and the LDN that is recognized from Server B.

- When access control is not used

No settings are necessary.

- When access control is used

When you are setting access control, LDNs within a disk array unit must be set so that the same LUN (number) is recognized from each server.

Appendix I LED Inspection Checklist

If you cannot monitor status using Storage Manager, the LEDs in the unit can be used to check on LED status. If errors are detected, report the status indicated with an underline and the differing LED status to expedite the identification of the abnormality source and the arrangements for its repair. For more details, see [Section 1.2.3: "LED Display"](#).

- When the LEDs blinks, write down the cycle or pattern (for example, lit 4 seconds and not lit 8 seconds) in parenthesis.
- When the LEDs, such as PS Status LED, are on in two colors, write down the colors in parenthesis.

I.1 Disk Array Controller

Table I-1: Disk Array Controller - Front

	(1) UID LED (Blue)	On· Off · Blinking ()
	(2) SERVICE LED (Amber)	On· Off · Blinking ()
	(3) POWER LED (Green)	On· Off · Blinking ()
	(4) STANDBY LED (White)	On· Off · Blinking ()
	(5) CONT UID LED (Blue)	On· Off · Blinking ()
CONT0	(6) CONT FAULT LED (Amber)	On· Off · Blinking ()
	(7) CONT READY LED (Green)	On· Off · Blinking ()
	(8-1) FAN0 FAULT LED (Amber)	On· Off · Blinking ()
	(8-2) FAN1 FAULT LED (Amber)	On· Off · Blinking ()
	(9) BBU FAULT LED (Amber)	On· Off · Blinking ()
CONT1	(6) CONT FAULT LED (Amber)	On· Off · Blinking ()
	(7) CONT READY LED (Green)	On· Off · Blinking ()
	(8-1) FAN0 FAULT LED (Amber)	On· Off · Blinking ()
	(8-2) FAN1 FAULT LED (Amber)	On· Off · Blinking ()
	(9) BBU FAULT LED (Amber)	On· Off · Blinking ()

Table I-2: Disk Array Controller - Back

CLUSTER0	(1) PS Status LED (Amber/Green)	On() · Off() · Blinking ()
	(2-1) Maintenance Port LINK LED (Green)	On · Off · Blinking ()
	(2-2) Maintenance Port ACTIVE LED (Amber/Green)	On() · Off() · Blinking ()
	(2-3) Management Port LINK LED (Green)	On · Off · Blinking ()
	(2-4) Management Port ACTIVE LED (Amber/Green)	On() · Off() · Blinking ()
	(2-5) CONT UID LED (Blue)	On · Off · Blinking ()
	(3-1) DPE READY LED (Green)	On · Off · Blinking ()
	(3-2) DPE FAULT LED (Amber)	On · Off · Blinking ()
	(3-3) DPE#0 LINK LED (Green)	On · Off · Blinking ()
	(3-4) DPE#0 FAULT LED (Amber)	On · Off · Blinking ()
	(3-5) DPE#1 LINK LED (Green)	On · Off · Blinking ()
	(3-6) DPE#1 FAULT LED (Amber)	On · Off · Blinking ()
	(4-1) HPE READY LED (Green)	On · Off · Blinking ()
	(4-2) HPE ACCESS LED (Green)	On · Off · Blinking ()
	(4-3) HPE#0 LINK LED (Green)	On · Off · Blinking ()
	(4-4) HPE#0 ACCESS LED (Green)	On · Off · Blinking ()
	(4-5) HPE#1 LINK LED (Green)	On · Off · Blinking ()
	(4-6) HPE#1 ACCESS LED (Green)	On · Off · Blinking ()
	(4-7) HPE#2 LINK LED (Green)	On · Off · Blinking ()
	(4-8) HPE#2 ACCESS LED (Green)	On · Off · Blinking ()
(4-9) HPE#3 LINK LED (Green)	On · Off · Blinking ()	
(4-10) HPE#3 ACCESS LED (Green)	On · Off · Blinking ()	

Table I-2: Disk Array Controller - Back(Contd.)

CLUSTER1	(1) PS Status LED (Amber/Green)	On() · Off() · Blinking ()
	(2-1) Maintenance Port LINK LED (Green)	On · Off · Blinking ()
	(2-2) Maintenance Port ACTIVE LED (Amber/Green)	On() · Off() · Blinking ()
	(2-3) Management Port LINK LED (Green)	On · Off · Blinking ()
	(2-4) Management Port ACTIVE LED (Amber/Green)	On() · Off() · Blinking ()
	(2-5) CONT UID LED (Blue)	On · Off · Blinking ()
	(3-1) DPE READY LED (Green)	On · Off · Blinking ()
	(3-2) DPE FAULT LED (Amber)	On · Off · Blinking ()
	(3-3) DPE#0 LINK LED (Green)	On · Off · Blinking ()
	(3-4) DPE#0 FAULT LED (Amber)	On · Off · Blinking ()
	(3-5) DPE#1 LINK LED (Green)	On · Off · Blinking ()
	(3-6) DPE#1 FAULT LED (Amber)	On · Off · Blinking ()
	(4-1) HPE READY LED (Green)	On · Off · Blinking ()
	(4-2) HPE ACCESS LED (Green)	On · Off · Blinking ()
	(4-3) HPE#0 LINK LED (Green)	On · Off · Blinking ()
	(4-4) HPE#0 ACCESS LED (Green)	On · Off · Blinking ()
	(4-5) HPE#1 LINK LED (Green)	On · Off · Blinking ()
	(4-6) HPE#1 ACCESS LED (Green)	On · Off · Blinking ()
	(4-7) HPE#2 LINK LED (Green)	On · Off · Blinking ()
	(4-8) HPE#2 ACCESS LED (Green)	On · Off · Blinking ()
	(4-9) HPE#3 LINK LED (Green)	On · Off · Blinking ()
	(4-10) HPE#3 ACCESS LED (Green)	On · Off · Blinking ()

Appendix J Notes-Using iSCSI Supported Disk Array Unit

This appendix describes the notes in using and setting the disk array unit that supports iSCSI protocol (hereinafter called iSCSI supported disk array unit).

1. Notes on Setting

Host recognize volume is unnecessary for iSCSI supported disk array unit. However, if the host recognize volume is set, it does not affect the operation.

2. Notes on Using


a. Combination of following environment does not support ESMPRO/ServerAgent.

At this time, Storage monitoring function (ESMStorageService) does not work.

- Windows Server 2003 or Windows Server 2003 R2
- Microsoft Software Initiator is installed

When monitoring internal disks in the Bull Server by using Microsoft Software Initiator and Storage monitoring function (ESMStorageService), use Windows Server 2008 or later.

b. Available initiator name at Storage Manager is as follows.

Available character	Single byte alphanumeric characters*, ':' (colon), '.' (period), and '-' (hyphen)
	 The character entered in uppercase will be registered as lowercase.
Number of characters	223 characters

Available number of characters of the initiator name used in Windows software initiator is as follows. (as of January, 2009)

Windows Server 2003 (Microsoft iSCSI Software Initiator 2.08)	Equal or less than 221 characters
Windows Server 2008 (included in OS)	

- c. Following message may be written to syslog, when using Red Hat Enterprise Linux. This does not affect the operation.

```
iscsid: received iferror -22  
iscsid: received iferror -38
```

- d. Following message may appear when performing discovery at each OS to detect the disk array unit. This does not affect the operation.

■ Windows Server 2003 (Microsoft iSCSI Software Initiator 2.08)

```
Authorization Failure.
```

■ Windows Server 2008 (include in OS)

```
Authorization Failure.
```

■ Red Hat Enterprise Linux 5.2 (iscsi-initiator-utils-6.2.0.868-0.7.el5)

```
iscsiadm: discovery login to xx.xx.xx.xx rejected: initiator error  
(02/02), non-retryable, giving up
```

Appendix K iSCSI Connection Configuration-Examples

This appendix provides examples of iSCSI connection configuration.

K.1 Connection Between Application Server and LAN

iSCSI network supports only independent configuration of public LANs (intranet).

Shared-storage configurations are not supported (but are enabled when using a VLAN).

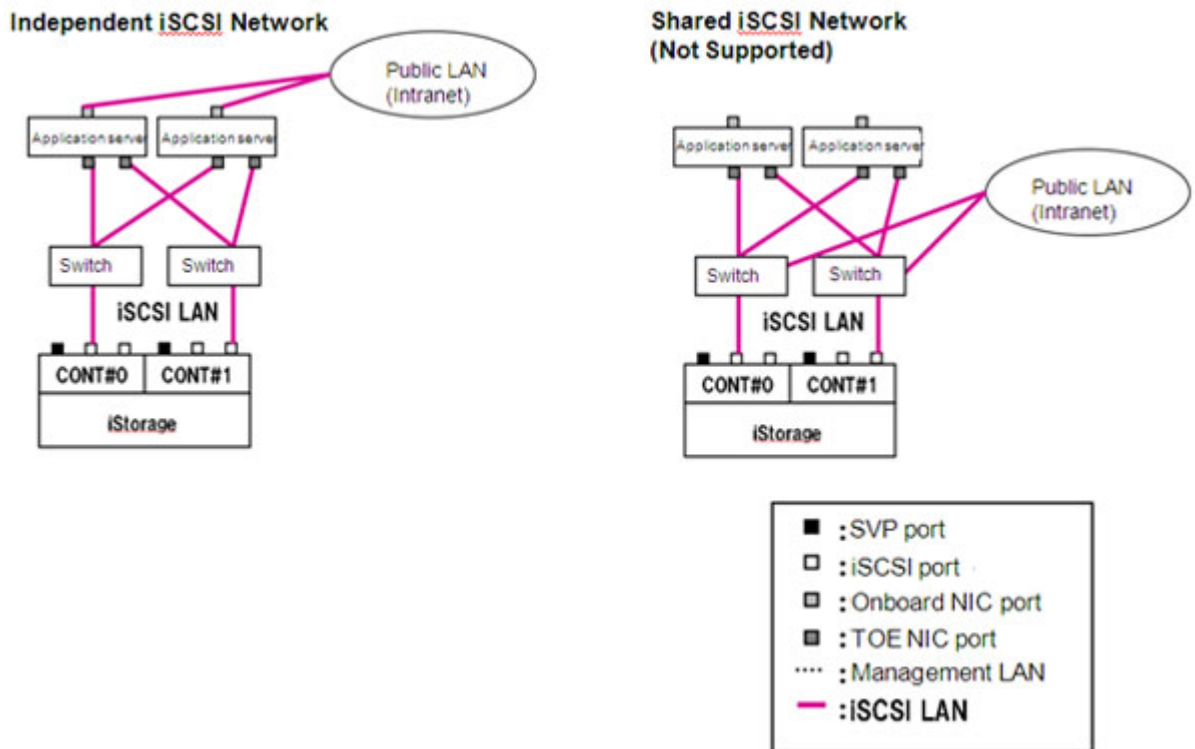


Figure K-1: Connection Between Application Server and LAN

K.2 Connection Between Management Server and LAN

iSCSI networks and management networks can be interconnected in either separate or shared configurations.

However, note with caution that Bull Storage connections cannot be made using iHP0/1 (iSCSI port).

1. Direct Connection Configuration

Separate from application server (recommended)

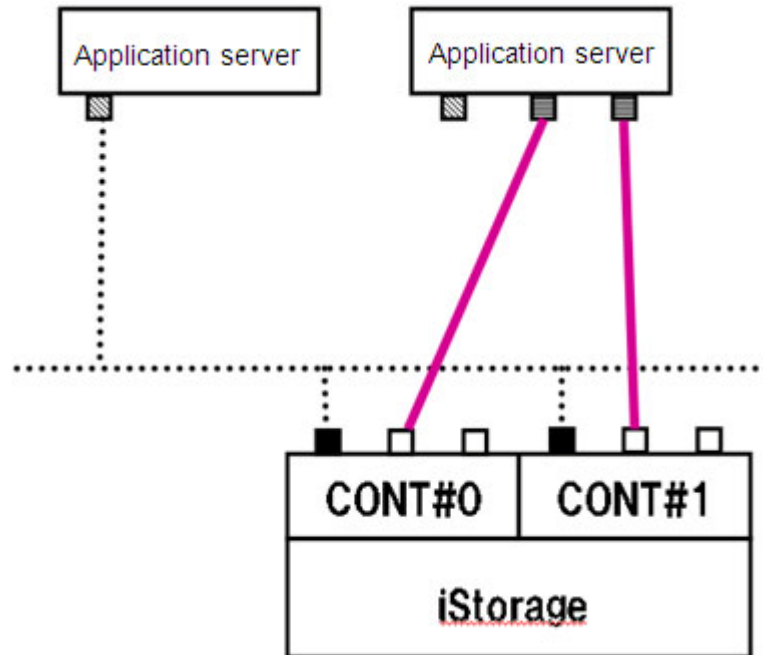


Figure K-2: Connection Between Management Server and LAN - Direct Configuration

2. Switch Connection Configuration

1. Application server, Shared iSNS server configuration

2. Management network and Shared iSCSI network configuration

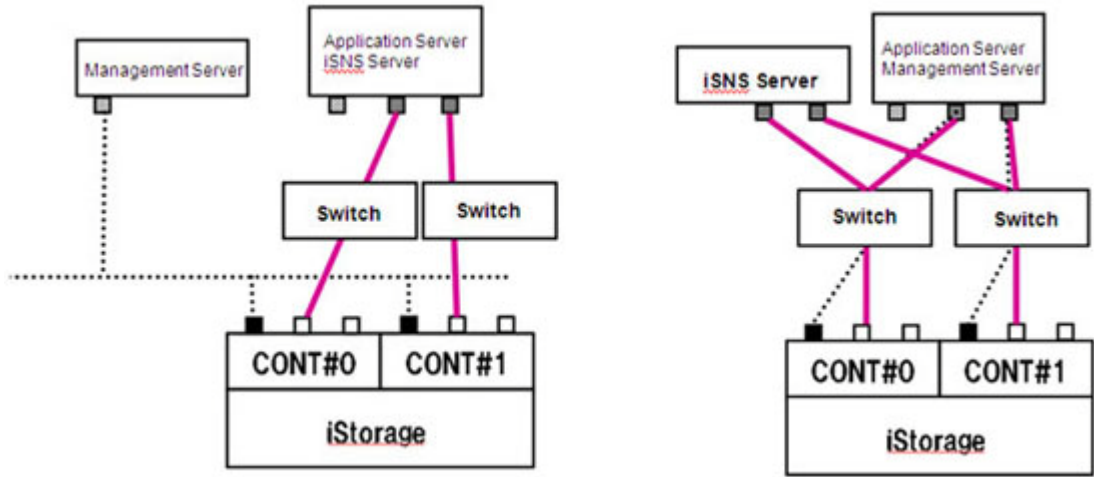


Figure K-3: Connection Between Management Server and LAN - Switch Configuration

3. Non-Supported Connection Configurations (Storage Manager connection using iSCSI port)

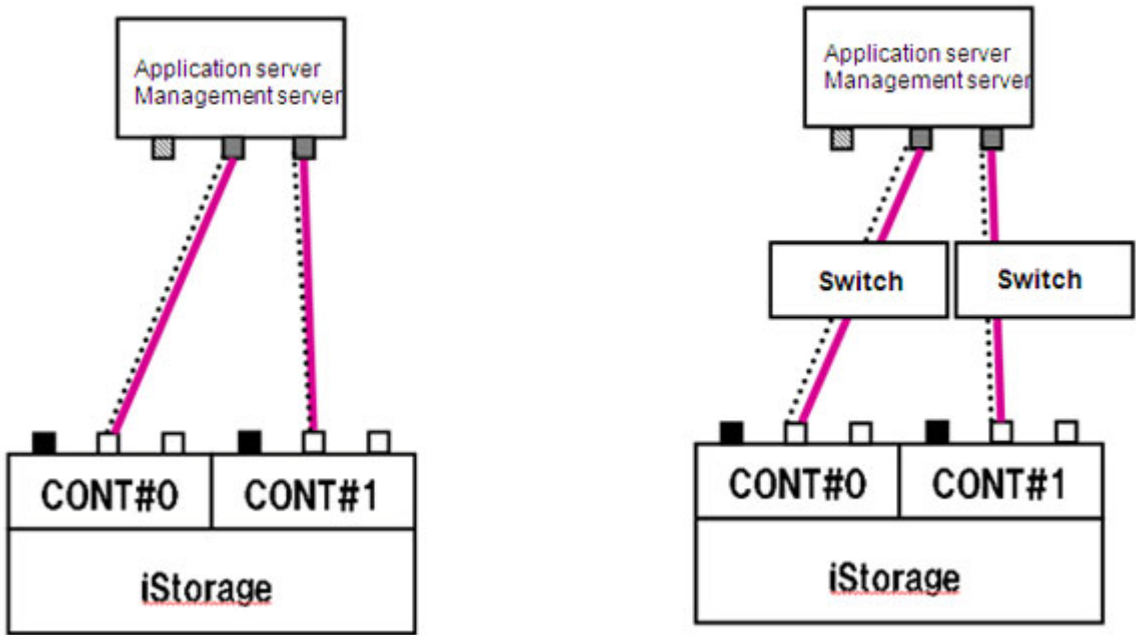


Figure K-4: Connection Between Management Server and LAN - Non-Supported Configuration

Appendix L Script for Reporting Information Registered with iSNS Server

If large volume of information on initiators and targets is registered with iSNS Server, information displayed by the `isnsccli ListAllNodesWithDetails` command becomes large and makes identifying initiator names difficult. You can use a vbs script to quickly perform identification and to report only information required to identify initiator names.

Script name: `isns.vbs`

```
strComputer = "."

Set objWMIService = GetObject("winmgmts:\\\" & strComputer & "\root\WMI")

Set colItems = objWMIService.ExecQuery( "SELECT * FROM
MSiSNSServerProvider_NodeClass",,48)

For Each objItem in colItems

    If objItem.iSCSINodeType = 2 Then

        Wscript.Echo "iSCSIName=" + objItem.iSCSIName

        If objItem.iSCSINodeAlias <> "" Then

            Wscript.Echo "iSCSINodeAlias=" + objItem.iSCSINodeAlias

        Else

            Wscript.Echo "iSCSINodeAlias="

        End If

    End If

End If

Next
```

Following is the sample output displayed when `isns.vbs` script is run.

```
C:\>cscript //Nologo isns.vbs
iSCSIName=iqn.1991-05.com.microsoft:server1
iSCSINodeAlias=<MS SW iSCSI Initiator>
iSCSIName=iqn.1994-05.com.redhat:41139fb1987e
iSCSINodeAlias=server2
```

Initiator name of
the server2.

Appendix M Retrieve Initiator Information on Application Servers Registered with iSNS Server

You can retrieve the initiator information on application servers registered with iSNS server and use it for configuring the iSCSI settings of the disk array.

Follow the steps below to retrieve the initiator information:

1. Run the command to show and save the initiator information registered with the iSNS server.

Run the CLI that belongs to the iSNS server from the command prompt on the server where the iSNS server works to show the initiator information registered with the iSNS server.

For details of the initiator information to be displayed, see [Example 1](#) and [Example 2](#).

Copy the initiator name of the target application server from the displayed information and save it (in a text file or the like).

2. Transfer the saved initiator information.

Transfer the initiator information saved in a file by using a function such as file transfer to the PC where Storage Manager Client (Web GUI) is used.

3. Configure the iSCSI of the disk array.

Example 1

When the host name can be identified by initiator name (typically used when the application server is on Windows):

Run the `isncli ListNodes` command from the command prompt to retrieve the initiator name of the target application server

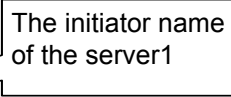
Following information is displayed on initiators and targets registered with iSNS server:.

```
C:\>isncli ListNodes

Nodes:

iqn.1991-05.com.microsoft:server1
iqn.2001-03.jp.nec:storage01:ist-3-10-sn-0000000010000032.wn-server1.ta
rget0000
MSiSNSControlNode:0000050c

Success
```



Example 2

If the host name cannot be identified by initiator name (typically used when the application server is on Linux):

Run the `isncli ListAllNodesWithDetails` command from the command prompt to identify the target application server by using the alias information, and then retrieve the initiator name (*).

Following detailed information is displayed on initiators and targets registered with iSNS server:

```
C:\>isncli ListAllNodesWithDetails
```

```
Nodes:
```

```
iqn.1994-05.com.redhat:41139fb1987e
```

The initiator name of the server2

```
---
```

```
Entity Identifier: [server2]
Entity Registration Period: 900
```

```
---
```

```
Portal IP address: 172.16.11.101
Portal port: 58367
ESI Interval: 300
ESI port: 54872
```

```
---
```

```
iSCSI Name: [iqn.1994-05.com.redhat:41139fb1987e]
iSCSI node type: Initiator
```

The alias of the initiator

```
Alias: [server2]
```

```
---
```

```
PG iSCSI Name: [iqn.1994-05.com.redhat:41139fb1987e]
PG Portal IP address: 172.16.11.101
PG Portal port: 58367
PGT: 1
```

```
iqn.2001-03.jp.nec:storage01:ist-3-10-sn-0000000010000032.wn-server1.target0000
```

```
---
```

```
Entity Identifier:
[iqn.2001-03.jp.nec:storage01:ist-3-10-sn-0000000010000032]
Entity Registration Period: 900
---
Portal IP address: 172.168.1.111
Portal port: 3260
```

```
---
Portal IP address: 172.168.2.113
Portal port: 3260
---

iSCSI Name:
[iqn.2001-03.jp.nec:storage01:ist-3-10-sn-0000000010000032.
wn-server1.target0000]
iSCSI node type: Target
Alias: [wn-server1]
---

PG iSCSI Name:
[iqn.2001-03.jp.nec:storage01:ist-3-10-sn-0000000010000032.
wn-server1.target0000]
PG Portal IP address: 172.168.1.111
PG Portal port: 3260
PGT: 0
---

PG iSCSI Name:
[iqn.2001-03.jp.nec:storage01:ist-3-10-sn-0000000010000032.
wn-server1.target0000]
PG Portal IP address: 172.168.2.113
PG Portal port: 3260
PGT: 0

MSiSNSControlNode:00000738
---
Entity Identifier: [isns:00000003]
Entity Registration Period: 900
---
iSCSI Name: [MSiSNSControlNode:00000738]
iSCSI node type: Control

Success
```



When large volume of information on initiators and targets is registered with iSNS Server, you can use a script to quickly perform identification of the initiator name of the target application server.

For details, see [Appendix L, "Script for Reporting Information Registered with iSNS Server"](#).

Appendix N CHAP Authentication

Challenge Handshake Authentication Protocol (CHAP) is an authentication method. This appendix describes the CHAP authentication and its settings.

N.1 General

A random text string called a “challenge” is sent from the server to the client, and the client uses it as the basis for encrypting its own “Secret” (password), which it returns. Because the server has the client’s Secret (password), it performs the same encryption and compares the result to the encrypted code returned from the client to enable authentication of users.

N.2 Constraints on Secrets

- Although this device enables use of 12- to 32-character string lengths, typically Initiator restricts the CHAP Secrets to 16-character (128-bit) strings. (As of February 2009)
- Do not set the same values to the Initiator CHAP Secret and the target CHAP Secret that are used for bidirectional CHAP authentication.

N.3 Description of Operation Modes

1. CHAP authentication for Initiator

Only authentication of the application server (Initiator) from the disk array unit (iSCSI target) is performed.

Only target CHAP Secret is set.

2. Bidirectional CHAP authentication

Authentication is performed mutually for the disk array unit (iSCSI target) and the application server (Initiator). Both a target CHAP Secret and an Initiator CHAP Secret are set.



Microsoft iSCSI Software Initiator refers to this as "Mutual CHAP".

N.4 CHAP Username Setting

1. Set the target name (when it can be set) as the CHAP username (target side).
2. Unless otherwise specified, set the Initiator name as the CHAP username (Initiator side).
(If using another name, maximum length is 256 characters.)

N.5 Correspondence between Microsoft iSCSI Software Initiator Secret Setting and iSMCLI

1. CHAP authentication for Initiator

<Microsoft iSCSI Software Initiator> iSCSI Initiator Properties "target"

- Log on
- Log on to target
- Advanced Settings (General tab) screen

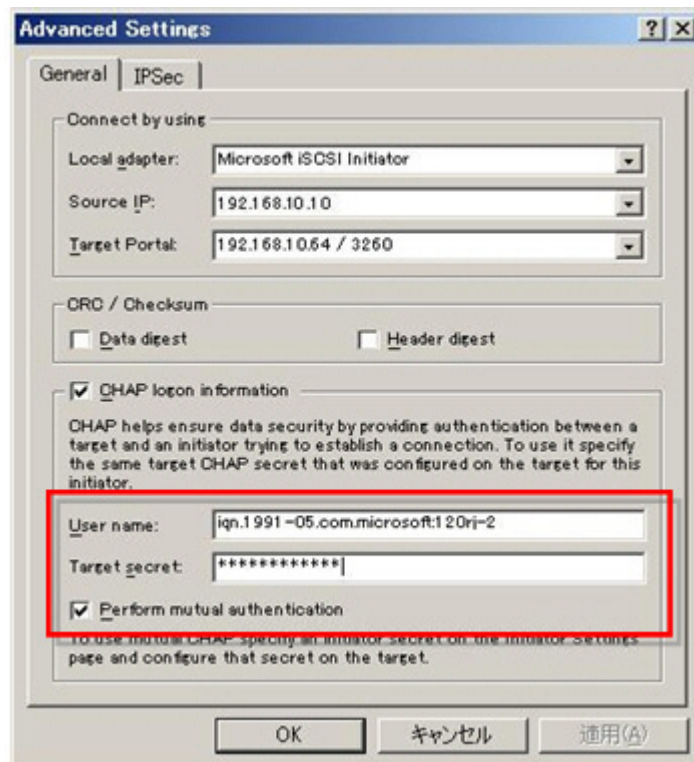


Figure N-1: iSCSI Initiator Authentication Setting (General Tab) Screen

iSMCLI

```
iSMcfg setldsetchap -ldsetname ldset name -initiatorpwd CHAP Secret for Initiator
```

2. Bidirectional CHAP authentication (mutual CHAP authentication)

<Microsoft iSCSI Software Initiator> iSCSI Initiator Properties (General tab) screen

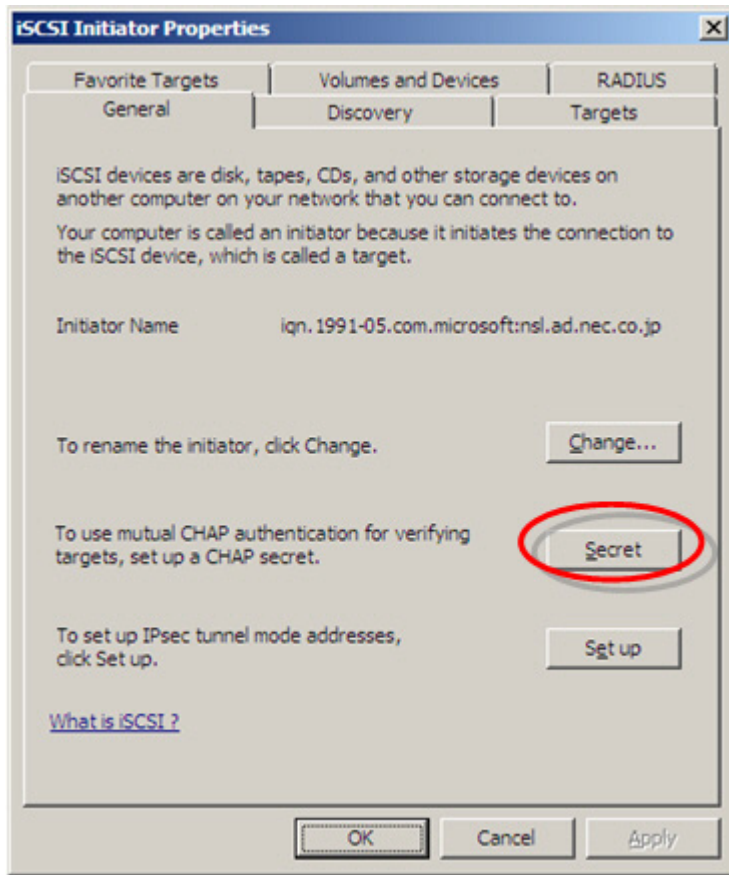


Figure N-2: iSCSI Initiator (General Tab) Screen

Click **Secret** to view the iSCSI Initiator window.

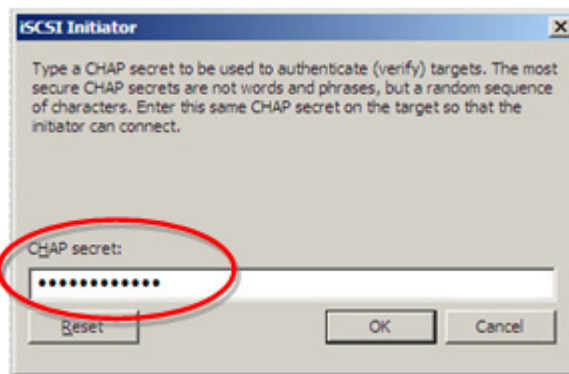


Figure N-3: iSCSI Initiator CHAP Secret Input Window

iSMCLI

```
iSMcfg setldsetchap -ldsetname ldset name -initiatorpwd CHAP Secret for Initiator -targetpwd bidirectional CHAP Secret
```


Glossary

A

AccessControl

A program product ensuring security for a disk array, which is shared among multiple servers. It determines if access to logical disks in the disk array is permitted from the application server.

ActiveX controls

ActiveX controls are software modules based on Microsoft's Component Object Model (COM) architecture. An ActiveX control can be reused by many application programs within a computer or among computers in a network. The ActiveX controls are comparable with Java applets.

Ambient temperature

Air temperature of the environment where the hardware equipment is kept. Maintaining an appropriate ambient temperature is important for the proper functioning and longevity of equipment.

Antistatic bags

See [Antistatic device](#).

Antistatic device

Any item like antistatic mat and antistatic bags is used to reduce static electricity charges on a person's body or equipment. These are used for safety purpose like preventing fire when working with flammable gases or liquids, or to prevent damage to static sensitive objects like electronic components.

Antistatic gloves

See [Antistatic device](#).

Antistatic mat

See [Antistatic device](#).

Antistatic shoes

See [Antistatic device](#).

Application server

A server that runs business applications using storage area on a storage system, which is connected to the server through FC and/or iSCSI.

B

Battery backup retention time

The time for which the battery backup can keep the system functional in case of power supply failure.

Battery Backup Unit

A Battery Backup Unit (BBU) provides reserve power in case of main power failure to ensure data integrity.

BBU

See [Battery Backup Unit](#).

C**Cache**

Cache is a high speed memory component implemented at the controller level that temporarily holds data so that any subsequent access to that data is faster. If requested data is contained in the cache, this request can be served by simply reading the cache, which is faster. Otherwise, the data has to be recomputed or fetched from its original storage location, which is comparatively slower.

Cache Fast Write

Cache Fast Write is a feature that allows data to be held only in cache instead of being written to disk unless necessary. This improves the data I/O performance.

Challenge Handshake Authentication Protocol

Challenge Handshake Authentication Protocol (CHAP) is a three-way authentication protocol defined in RFC 1994. During initiator CHAP authentication, the initiator is authenticated from an iSCSI target (disk array side). In mutual CHAP authentication, the iSCSI target (disk array side) and the initiator (application server side) perform the authentication mutually.

CHAP

See [Challenge Handshake Authentication Protocol](#).

CHAP secret

CHAP secret is a password which is used during CHAP authentication.

Cross cable

This cable is used to directly connect two identical devices to each other without the use of a hub or a switch.

D**Data replication**

See [Replication](#).

DE

See [Disk Enclosure](#).

Disk array

A device that treats multiple disks as one large capacity disk. RAID technology is employed for improving reliability and processing capability.

Disk Array Controller

The Disk Array Controller contains control system components and control disk enclosure(s) where multiple physical disks are installed.

Disk Enclosure

A unit that contains multiple physical disks.

Dummy carrier

An exclusive tray used for an uninstalled hard disk drive. A dummy carrier fills the slot for hard disk drives.

Duplex

Duplex settings specify whether or not two devices can communicate in both directions simultaneously. Duplex mode can be half duplex or full duplex. Half duplex allows communication in both directions, but only one direction at a time. Full duplex allows communication in both directions simultaneously.

F

FC

See [Fibre channel](#).

FC Switch

See [Fibre Channel Switch](#).

Fibre channel

The Fibre Channel standard defines a high-speed data transfer interface that is primarily used in SANs.

Fibre Channel Switch

It is a network switch compatible with Fibre Channel protocol.

Firewall

Component of a computer system or a network that is designed to block unauthorized access while permitting authorized communications.

Full duplex

See [Duplex](#).

G

Gateway address

Indicates an address of the device such as router, which serves as an access point to a network.

H

Half duplex

See [Duplex](#).

HBA

See [Host Bus Adapter](#).

Host Bus Adapter

Host Bus Adapter (HBA) is the Fibre Channel (FC) interface card which connects a host server to a SAN (Storage Area Network). It offers input/output (I/O) operations and physical connectivity between the server and the storage device.

Host connection port

A port at the disk array controller, which is used to connect to application server.

Host information file

This file stores the host (application server) related information like host name, OS identification information, and Host Bus Adapter (HBA) information.

Hub

A common connection point for devices in a network to form a single network segment. The hub allows each device to talk to the other devices.

I**Initiator**

See [iSCSI initiator](#).

Internet Small Computer System Interface

A network storage protocol, which enables the transfer of SCSI commands between machines over TCP/IP networks.

Internet Storage Name Service

A protocol that allows automatic discovery, management, and configuration of iSCSI and FC devices on a TCP/IP network.

IPSec tunnel mode

IPsec is a suite of protocols for securing network connections. IPSec tunnel mode is useful for protecting traffic between different networks where traffic passes through an intermediate, untrusted network.

iqn

See [iSCSI Qualified Name](#).

iSCSI

See [Internet Small Computer System Interface](#).

iSCSI initiator

This serves as an iSCSI client and sends SCSI commands over an IP network to request services from device (such as a disk array), known as targets.

iSCSI Qualified Name

Each iSCSI initiator and iSCSI target are given a unique iSCSI name known as iSCSI Qualified Name (IQN), that conforms to the format specified in RFC 3720. Apart from IQN, other type of addressing like Extended Unique Identifier (EUI) is also used.

iSCSI target

iSCSI target is a device (such as a disk array) to which the initiator sends data. iSCSI targets accept sessions from the initiator, and receive and execute SCSI commands.

iSNS

See [Internet Storage Name Service](#).

J

Java Runtime Environment

A software component that is required to be installed on a computer system to be able to run Java applets and applications.

JRE

See [Java Runtime Environment](#).

L

LED

See [Light Emitting Diode](#).

Light Emitting Diode

Light Emitting Diode (LED) is a semiconductor light source used in devices to provide visual indications of hardware status or malfunctions.

Logical disk

A software technology, which recognizes a virtual disk (area) as an independent disk in a computer system. Logical disk(s) are created from the pool using Storage Manager. Also, see [Pool](#).

M

Management server

A server that runs the Storage Manager Suite for centralized configuration and management of multiple disk arrays, including the old D/S series, connected through a LAN.

Maximum Transmission Unit

A Maximum Transmission Unit (MTU) is the largest size packet, specified in bytes, that can be sent over a network.

MTU

See [Maximum Transmission Unit](#).

Mutual CHAP authentication

See [Challenge Handshake Authentication Protocol](#).

P

Multipath

A software that allows multi-path connection between a application server and a disk array unit. This is useful for path failover when a failure occurred on a path and load balancing using multiple paths.

PD

See [Physical Disk](#).

Persistent Target

iSCSI targets to which the iSCSI initiator reconnects whenever the computer is rebooted so that the initiator always appear to be connected to the target.

Physical Disk

A disk, which provides storage capacity and exists as a physical entity. It can be of different type such as SAS, SATA, and SSD.

Pool

A virtual medium in which multiple physical disks configured using the RAID technology, are regarded as one large disk. The pool is created using the Storage Manager.

Port

A physical connection point on devices such as computers, switches, and disk arrays, which is used to connect to other devices on a network.

Port Number

Port Number is a part of the internet addressing information used to identify the specific process to which the network data is to be delivered.

Proxy exception

Proxy exceptions allows you to specify domain names and/or IP address ranges, which are to be accessed directly bypassing the proxy server.

Proxy server

A server that acts as an intermediary between a client and the other servers in order to achieve network security, administrative control, caching, filtering, and anonymity. A client connects to the proxy server, requesting some service available from a different server. The proxy server evaluates the request according to its filtering rules.

R**RAID**

See [Redundant Array of Independent Disks](#).

Redundant Array of Independent Disks

A storage technology that provides increased data performance and reliability through data redundancy and striping, combining multiple disk drives components into a single logical unit.

Replicate

When Replicate is performed, data copy from Master Volume (MV) to Replica Volume (RV) starts, to reflect the content of the MV into the RV. Updates made in the MV after Replicate is performed are also reflected into the RV.

Replication

Replication is a technique that copies the exact same data from a Master to a Replica. Since the Master and the Replica are completely independent, data reliability is high.

Restore

When Restore is performed, data copy from Replica Volume (RV) to Master Volume (MV) starts to reflect the data stored in the RV at the start of Restore into the MV. When Restore (update) is performed, updates made in MV after Restore are reflected in RV.

Revolutions Per Minute

It measures the number of times a disk revolve in a minute. It determines the speed of data access on the disk drive. The higher RPM value specifies the higher data access speed.

rpm

See [Revolutions Per Minute](#).

S**SAN**

See [Storage Area Network](#).

SAS

See [Serial Attached SCSI](#).

SD memory card

See [Secure Digital card](#).

Secret

See [CHAP secret](#).

Secure Digital card

Secure Digital (SD) card is a compact non volatile memory card used for storing data.

Separate

When Separate is performed, the difference between Master Volume (MV) and Replica Volume (RV) at the start of Separate is reflected into the RV to separate it. Updates made in MV after Separate is performed are not reflected in RV.

Serial Attached SCSI

A high speed data transfer technology using SCSI which employs serial data transfer to and from storage devices like hard disk drives.

Simple Network Management Protocol

Simple Network Management Protocol (SNMP) is used to manage devices on the network. This protocol defines how communication occurs between SNMP-capable devices and defines the SNMP message types. SNMP facilitates network administrators to manage network performance, solve network problems, and plan for network growth.

Snapshot

Snapshot is a technique that copies only difference data from a Master to a Replica. Compared to a full copy, a Replica can be created using little capacity, so storage can be operated efficiently.

SNMP

See [Simple Network Management Protocol](#).

Solid State Drive

A data storage device, which uses non-volatile memory chips to store persistent data. They are characterized by not having any moving parts and hence are more resistant to physical shocks, quieter, and have lower access time and latency.

Spare

Unused physical disks in a pool that can be used to replace a failed disk. In case of failure, the data can be restored on a spare.

SSD

See [Solid State Drive](#).

Storage Area Network

A storage architecture that connects storage devices such as disk arrays and servers across the network for enhanced reliability, scalability, and performance.

Straight cable

This cable is used to connect different types of devices. A straight cable can be used to connect the computer to a hub or a switch.

Subnet mask

Subnet mask determines the subnetwork an IP address belong to. A subnet mask allows to identify which part of an IP address is reserved for the network, and which part is available for host use.

T

TCP

See [Transmission Control Protocol](#).

Transmission Control Protocol

Communication protocol that enables two hosts to connect to one another and exchange streams of data. This protocol ensures that the data is transferred and guarantees that the data is received in the same sequence in which it was sent.

U

UDP

See [User Datagram Protocol](#).

User Datagram Protocol

A data transmission protocol used to transfer messages (datagram) between hosts without providing any ordering or sequencing capability as in TCP.

V

Virtual LAN

A group of devices that behave as if they are connected to the same network segment regardless of their physical location.

VLAN

See [Virtual LAN](#).

W

World Wide Name

World Wide Name (WWN) is a unique identifier assigned to a Host Bus Adapter (HBA) in the Fibre Channel network. WWN is an 8 byte number and its format is defined by IEEE OUI and vendor supplied information.

World Wide Port Name

World Wide Port Name is a World Wide Name (WWN) assigned to the Fibre Channel (FC) port. It is equivalent to the MAC address in Ethernet protocol and is a unique identifier in the network.

WWN

See [World Wide Name](#).

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