OceanStor S2600 Controller Enclosure

V100R001

User Guide

Issue 05

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About This Document

Purpose

This document describes the appearance, installation, maintenance and technical specifications of the OceanStor S2600 storage system's controller enclosure. The five chapters of the body describe the functions, architecture, technical specifications, installation, maintenance and fault location of the S2600 controller enclosure.

Related Versions

The following table lists the product versions related to this document.

Product Name	Version
OceanStor S2600 Storage System	V100R001

Intended Audience

This document is intended for:

- Technical support personnel
- Maintenance engineers

Organization

This document is organized as follows.

Chapter	Content
1 Overview	This chapter describes the advantages, appearance, functions and features, architecture, and components of the S2600 controller enclosure.

Chapter	Content
2 Installation	This chapter describes the installation requirements, installation precautions, installation preparations, installation process, cable connection, power-on and power-off and initialization of the S2600 controller enclosure.
3 Routine Maintenance	This chapter describes the basic principles of maintaining the S2600 controller enclosure, fault handling and parts replacement.
4 Troubleshooting	This chapter describes the principles, resources and methods for troubleshooting the S2600 controller enclosure.
5 Technical Specifications	This chapter describes the specifications, environment requirements and compliant standards of the S2600 controller enclosure.
A How to Obtain Help	Introduces preparations for and ways of obtaining help from Huawei.
B Glossary	Lists the terms used in this document.
C Acronyms and Abbreviations	Lists the acronyms and abbreviations used in this document.

Conventions

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
DANGER	Indicates a hazard with a high level of risk, which if not avoided, will result in death or serious injury.
WARNING	Indicates a hazard with a medium or low level of risk, which if not avoided, could result in minor or moderate injury.
CAUTION	Indicates a potentially hazardous situation, which if not avoided, could result in equipment damage, data loss, performance degradation, or unexpected results.
TIP	Indicates a tip that may help you solve a problem or save time.
NOTE	Provides additional information to emphasize or supplement important points of the main text.

General Conventions

The general conventions that may be found in this document are defined as follows.

Convention	Description
Times New Roman	Normal paragraphs are in Times New Roman.
Boldface	Names of files, directories, folders, and users are in **boldface**. For example, log in as user **root**.
Italic	Book titles are in *italics*.
`Courier New`	Examples of information displayed on the screen are in Courier New.

Command Conventions

The command conventions that may be found in this document are defined as follows.

Convention	Description
Boldface	The keywords of a command line are in **boldface**.
Italic	Command arguments are in *italics*.
[ ]	Items (keywords or arguments) in brackets [ ] are optional.
{ x | y | ... }	Optional items are grouped in braces and separated by vertical bars. One item is selected.
[x | y | ...]	Optional items are grouped in brackets and separated by vertical bars. One item is selected or no item is selected.
{ x | y | ... }*	Optional items are grouped in braces and separated by vertical bars. A minimum of one item or a maximum of all items can be selected.
[x | y | ...]*	Optional items are grouped in brackets and separated by vertical bars. Several items or no item can be selected.

GUI Conventions

The GUI conventions that may be found in this document are defined as follows.

Convention	Description
Boldface	Buttons, menus, parameters, tabs, window, and dialog titles are in **boldface**. For example, click **OK**.
>	Multi-level menus are in **boldface** and separated by the ">" signs. For example, choose **File** > **Create** > **Folder**.

Keyboard Operations

The keyboard operations that may be found in this document are defined as follows.

Format	Description
Key	Press the key. For example, press **Enter** and press **Tab**.
Key 1+**Key 2**	Press the keys concurrently. For example, pressing **Ctrl**+**Alt**+**A** means the three keys should be pressed concurrently.
Key 1, **Key 2**	Press the keys in turn. For example, pressing **Alt**, **A** means the two keys should be pressed in turn.

Mouse Operations

The mouse operations that may be found in this document are defined as follows.

Action	Description
Click	Select and release the primary mouse button without moving the pointer.
Double-click	Press the primary mouse button twice continuously and quickly without moving the pointer.
Drag	Press and hold the primary mouse button and move the pointer to a certain position.

Update History

Updates between document issues are cumulative. Therefore, the latest document issue contains all updates made in previous issues.

Updates in Issue 05 (2010-04-20)

The fifth commercial release has the following updates:

Changed the capacity of the hard disks.

Optimized the structure.

Updates in Issue 04 (2009-09-30)

The fourth commercial release has the following updates:

The SATA disks with 750 GB is stopped producing, delete the SATA disks with 750 GB.

Updates in Issue 03 (2009-08-14)

The third commercial release has the following updates:

Document version update.

Updates in Issue 02 (2009-07-31)

The second commercial release has the following updates:

Add the description of the DC PEM and BBU module.

Modify the maximum number of D120S disk enclosures that the S2600 controller enclosure cascaded to seven.

Updates in Issue 01 (2009-04-16)

Initial commercial release.

1 Overview

About This Chapter

This chapter describes the appearance, functions, structure, and parts of the S2600 controller enclosure.

1.1 Introduction

This topic delivers a brief introduction to the S2600 controller enclosure.

The S2600 controller enclosure has the following advantages:

- Mature software and hardware platforms
- Redundant configuration for functional modules
- Overall data protection
- RAID groups
- Global hot-spare disk
- Data check mechanism
- Redundant connection
- Online check, fault location, and online replacement of all functional modules

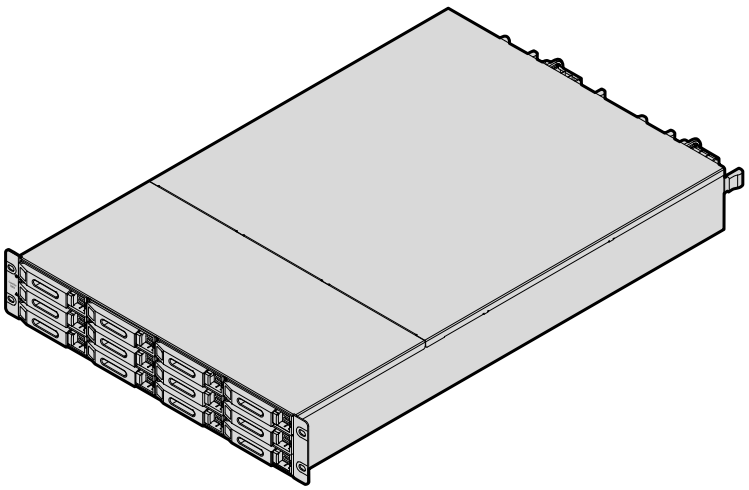
NOTE

RAID: redundant array of independent disks

The height of the S2600 controller enclosure is 2 U (1 U = 44.45 mm). The S2600 controller enclosure can be installed in a standard 19-inch cabinet (1 inch = 25.4 mm). It uses modular design to meet requirements for system expansion. For example, the S2600 controller enclosure and the D120S disk enclosures provide a smart storage system of high reliability, high performance, and large capacity. It also provides the functions of performance monitoring and fault alarming.

Figure 1-1 shows the appearance of the S2600 controller enclosure.

Figure 1-1 Appearance of the S2600 controller enclosure



1.2 Functions and Configurations

This topic describes functions and configurations of the S2600 controller enclosure.

1.2.1 Functions

This topic describes the functions of the S2600 controller enclosure.

NOTE

- The S2600 controller enclosure supports Serial Attached SCSI (SAS) disks and Serial ATA (SATA) disks. Disks in the controller enclosure and the D120S disk enclosure can be SAS or SATA disks.
- The S2600 controller enclosure supports intermixing of SAS and SATA disks.

The S2600 controller enclosure provides the following functions:

- RAID
  - Supporting RAID 0, RAID 1, RAID 5, RAID 6 and RAID 10
  - Supporting global hot-spare disk
  - Supporting the online creation, configuration, and deletion of RAID groups
- Cache
  - Supporting writing back cache and writing through cache
  - Supporting cache prefetch
  - Supporting cache power-off protection
  - Supporting cache water level modification
  - Supporting cache mirroring between controllers
- Management
  - Supporting inband management
  - Supporting redundant controllers
  - Supporting up to 256 ASs
  - Supporting up to 512 LUNs
  - Supporting two management modes: GUI and CLI
- Redundancy and alarm
  - Supporting 1+1 redundancy and hot swap for each module
  - Supporting multi-path access
  - Monitoring the status of devices and generating alarms
- Hibernation

  Supporting the hibernation mode of RAID groups
- Powerful software support
  - Supporting the multi-path software
  - Supporting cluster software

NOTE

AS: application server

LUN: logical unit number

GUI: graphical user interface

CLI: Command Line Interface

1.2.2 Configurations

This topic describes the configurations of the S2600 controller enclosure.

The S2600 controller enclosure can be configured with one or two controllers.

Table 1-1 shows the configurations of the S2600 controller enclosure configured with one controller (hereinafter referred to as the single-controller S2600 controller enclosure).

Table 1-2 shows the configurations of the S2600 controller enclosure configured with two controllers (hereinafter referred to as the dual-controller S2600 controller enclosure).

Table 1-1 Configurations of the single-controller S2600 controller enclosure

Item	Sub Item
Processor	64-bit processor
Cache	2 GB/4 GB
Controller	• Supporting SAS or SATA disks • Providing a 4 x 3 Gbit/s mini SAS expander port
Front-end Host Port	The S2600 controller enclosure can be configured with any of the following: • Four 4 Gbit/s FC [a] host ports [b] • Two 4 x 3 Gbit/s SAS host ports • Four 1 Gbit/s iSCSI host ports • Two 4 Gbit/s FC host ports and two 1 Gbit/s iSCSI host ports
Other modules	Remote dialup for management through the RS-232
a: Fiber Channel (FC) b: FC host ports are compatible with rates of 1 Gbit/s, 2 Gbit/s, and 4 Gbit/s.	

Table 1-2 Configurations of the dual-controller S2600 controller enclosure

Item	Sub Item
Processor	64-bit processor
Cache	4 GB/8 GB
Controller	• Supporting SAS or SATA disks • Providing two 4 x 3 Gbit/s mini SAS expander ports

Item	Sub Item
Front-end Host Port	The S2600 controller enclosure can be configured with any one of the following: ● Eight 4 Gbit/s FC host ports ● Four 4 x 3 Gbit/s SAS host ports ● Eight 1 Gbit/s iSCSI host ports ● Four 4 Gbit/s FC host ports and four 1 Gbit/s iSCSI host ports
Other modules	● Remote dialup for management through the RS-232 ● Built-in dedicated channel for the communication between controllers

1.3 Components

This topic describes the components of the S2600 controller enclosure.

1.3.1 System Enclosure

This topic describes the system enclosure of the S2600 controller enclosure.

Structure

The S2600 controller enclosure uses modular design and consists of the following parts:

- System enclosure
- Hard disk module
- Cover panel
- Fan module
- Power entry module (PEM)

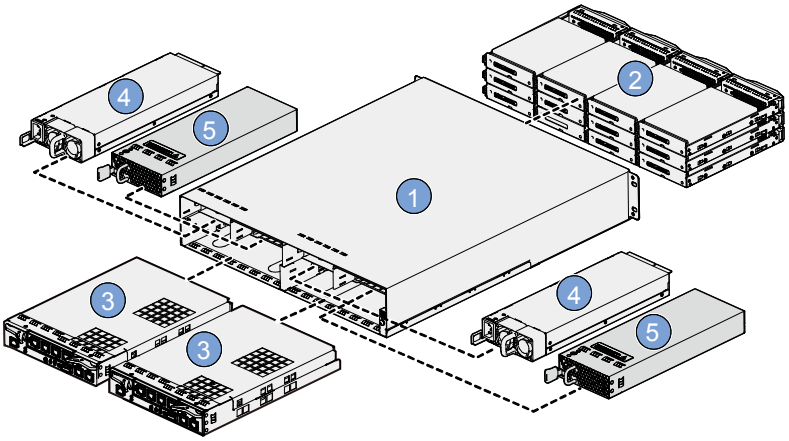
- Controller

NOTE

The controller, hard disk module, fan module, PEM and UPS module of the S2600 controller enclosure support hot swap.

The S2600 controller enclosure configured with two controllers, two PEMs, and four iSCSI host ports is considered as an example. **Figure 1-2** shows the structure of the S2600 controller enclosure.

Figure 1-2 Structure of the S2600 controller enclosure



1	System enclosure	2	Hard disk module
3	Controller	4	PEM
5	Fan module		

Front View and Rear View

According to the type of front-end host ports, the S2600 controller enclosures are divided into four types. Each type can be configured with one or two controllers.

- S2600F controller enclosure

  Single (or dual) controller with FC front-end host

  ports
- S2600S controller enclosure

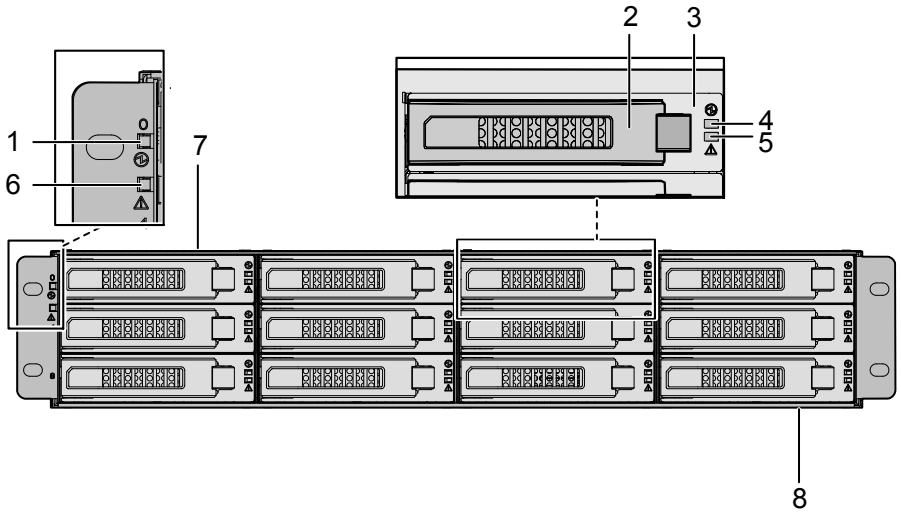
  Single (or dual) controller with SAS front-end host ports
- S2600i controller enclosure

  Single (or dual) controller with iSCSI front-end host ports
- S2600C controller enclosure

  Single (or dual) controller with FC front-end host ports and iSCSI front-end host ports

Figure 1-3 shows the front view of the previously mentioned four types of the S2600 controller enclosures (configured with one or two controllers).

Figure 1-3 Front view of the S2600 controller enclosure



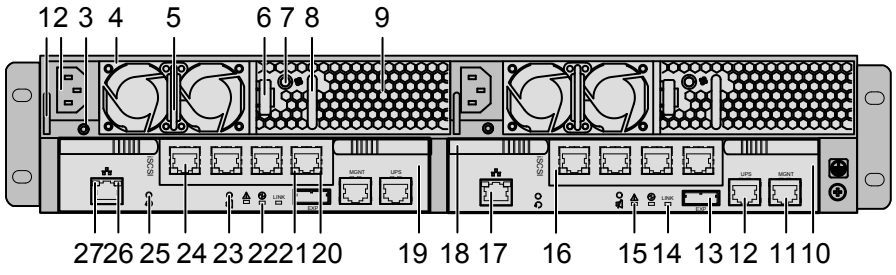
1	Controller enclosure power indicator	2	Hard disk handle
3	Hard disk module	4	Hard disk running indicator
5	Hard disk alarm/location indicator	6	Controller enclosure startup/alarm indicator
7	Slot 0	8	Slot 11

From left to right and then from up to down, the 12 slots of the S2600 controller enclosure are numbered from 0 to 11. The slot on the upper left side of the S2600 controller enclosure is slot 0.

The hard disks in slots 0, 1, 2, and 3 of the S2600 controller enclosure are the coffer disks of the system and store the important data of the system.

The dual-controller S2600 controller enclosure with two PEMs, and four iSCSI host ports is considered as an example. **Figure 1-4** shows the rear view of the S2600 controller enclosure.

Figure 1-4 Rear view of the S2600 controller enclosure



1	PEM spring leaf	2	Power socket
3	Power running/alarm indicator	4	PEM
5	PEM handle	6	Fan module spring leaf
7	Fan running/alarm indicator	8	Fan module handle

9	Fan module	10	Controller B (secondary controller)
11	CLI serial port	12	Uninterrupted power supply (UPS) serial port
13	Mini SAS expander port	14	Link indicator of the mini SAS expander port
15	Controller alarm indicator	16	Port module
17	Management network interface	18	Controller spring leaf
19	Controller A (primary controller)	20	Link indicator of the iSCSI host port
21	Active indicator of the iSCSI host port	22	Controller power indicator
23	Mute button of the buzzer	24	iSCSI host port
25	Reset button	26	Link indicator of the management network interface
27	Active indicator of the management network interface		

Table 1-3 lists the components of the S2600 controller enclosure.

Table 1-3 Components of the S2600 controller enclosure

Component	Sub Component	Description
Controller	- [a]	A controller provides: ● One mini SAS expander port ● One 10/100 M adaptive management network interface [b] ● One CLI serial port ● One UPS serial port ● One Mute button of the buzzer ● One reset button
	FC port module [c]	An FC port module provides four FC host ports.
	SAS port module [d]	A SAS port module provides two mini SAS host ports.
	iSCSI port module [e]	An iSCSI port module provides four iSCSI host ports.
	Combo port module [f]	A Combo port module provides two FC host ports and two iSCSI host ports.
Hard disk module	-	A controller enclosure supports up to 12 SAS or SATA disks.

Component	Sub Component	Description
Fan module	-	• A controller enclosure is configured with two fan modules. • Each fan module has two fans.
PEM	-	A controller enclosure can be configured with one or two PEMs[g].
UPS module[h]	-	A controller enclosure can be configured with one or two UPS modules.
BBU module[i]	-	A controller enclosure can be configured with one or two BBU modules.
a: Not available. b: The iSCSI host ports and the management network interfaces must be located in different subnets to guarantee the normal operation of the management network interfaces. c: The S2600F controller enclosure is configured with one or two FC port modules. d: The S2600S controller enclosure is configured with one or two SAS port modules. e: The S2600i controller enclosure is configured with one or two iSCSI port modules. f: The S2600C controller enclosure is configured with one or two Combo port modules. g: The dual-controller S2600 controller enclosure must be configured with two PEMs. h: The UPS module is an optional part. i: Battery Backup Unit (BBU). The UPS module is an optional part.		

Indicator

Table 1-4 lists the indicators on the front panel and the rear panel of the S2600 controller enclosure. These indicators show the current working status of the S2600 controller enclosure.

Table 1-4 Indicators of the S2600 controller enclosure

Module	Indicator	Color	State	Description
Front panel				
System enclosure	Startup/alarm indicator of the controller enclosure	Red	On	The controller enclosure is out of service or an alarm is generated on the controller enclosure. **NOTE** If the indicator is red for a long time, the system encounters an emergent fault.

Module	Indicator	Color	State	Description
		Orange	Blinking	The controller enclosure is being started. **NOTE** If the indicator blinked more than ten minutes, the system started unsuccessfully.
		-	Off	The controller enclosure is working normally.
	Power indicator of the controller enclosure	Green	On	The controller enclosure is powered on.
		-	Off	The controller enclosure is not powered on.
Hard disk module	Running indicator of the SAS disk	Green	Blinking	The SAS disk is transmitting data.
		Green	On	The SAS disk is powered on normally.
		-	Off	The SAS disk is powered on abnormally.
	Alarm indicator of the SAS disk	Red	On	An alarm is generated on the SAS disk.
		Red	Blinking	The SAS disk is located.
		-	Off	No alarm is generated on the SAS disk.
	Running indicator of the SATA disk	Green	Blinking	The SATA disk is transmitting data.
		Green	On	The SATA disk is powered on normally.
		-	Off	The SATA disk is powered on abnormally.
	Alarm indicator of The SATA disk	Red	On	An alarm is generated on the SATA disk, or the SATA disk is located.
		-	Off	No alarm is generated on the SATA disk.
Rear panel				
Fan module	Fan running/ alarm indicator	Green	On	The fans works normally.
		Red	On	An alarm is generated on the fans.

Module	Indicator	Color	State	Description
		-	Off	The fans are powered on abnormally.
PEM	Power running/alarm indicator	Green	On	The power supply is normal.
		Orange	Blinking	An alarm is generated on the PEM.
		-	Off	The controller enclosure is not powered on, or the PEM is powered on abnormally.
Controller	Active indicator of the management network interface	Orange	Blinking	Data is being transmitted.
			Off	No data is being transmitted.
	Link indicator of the management network interface	Green	On	The link to the management network interface is normal.
		-	Off	The link to the management network interface is abnormal.
	Controller power indicator	Green	On	The controller is powered on normally.
		-	Off	The controller is powered on abnormally.
	Controller alarm indicator	Red	On	An alarm is generated.
		Red	Turns on, and then turns off in 5s; turns off after the controller is started normally.	The controller is starting.
		-	Off	The system is normal.
	Link indicator of the mini	Green	On	The disk channel is normal.

Module	Indicator	Color	State	Description
	SAS expander port	-	Off	The disk channel is abnormal.
	Link indicator of the FC host port	Green	On	The link to the ASs is normal.
		-	Off	The link to the ASs is abnormal.
	Rate indicator of the FC host port	Green	On	The data transmission rate between the storage system and the ASs is 4 Gbit/s.
		-	Off	The data transmission rate between the storage system and the ASs is 2 Gbit/s or 1 Gbit/s.
	Active indicator of the mini SAS host port	Orange	Blinking	Dada is being transmitted.
		-	Off	No data is being transmitted.
	Link indicator of the mini SAS host port	Green	On	The link to the ASs is normal.
		-	Off	The link to the ASs is abnormal.
	Active indicator of the iSCSI host port	Orange	Blinking	Dada is being transmitted.
		-	Off	No data is being transmitted.
	Link indicator of the iSCSI host port	Green	On	The link to the ASs is normal.
		-	Off	The link to the ASs is abnormal.

1.3.2 Controller

This topic describes the controller of the S2600 controller enclosure.

The controller provides the following functions:

- Handling storage services

  The controller receives read/write commands from the network ports of the ASs, executes these commands, and returns the results to the ASs.
- Receiving configuration management commands from users and saving configuration information through Web UI or CLI
- Connecting SAS or SATA disks

  The controller connects the SAS or SATA disks in the S2600 controller enclosure or the D120S disk enclosure to the S2600 storage system.
- Controlling the output of the UPS

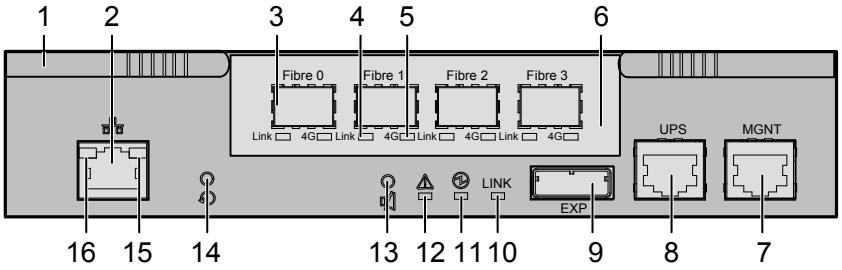
- When the input of the mains is normal, the controller monitors the running status of the UPS.
- When the input of the mains is abnormal or a power failure occurs, the controller receives the information that the power supply is abnormal from the UPS serial port, and writes data in the cache to the coffer. After data in the cache is written to the coffer, the controller sends a command to shut down the output of the UPS.

- Saving information on configuration, alarms, and logs to the local coffer

The S2600F controller enclosure provides the FC SAN function. The S2600S controller enclosure provides the DAS function. The S2600i controller enclosure provides the IP SAN function. The S2600C controller enclosure provides the FC SAN and IP SAN functions.

Figure 1-5 shows the controller of the S2600F controller enclosure.

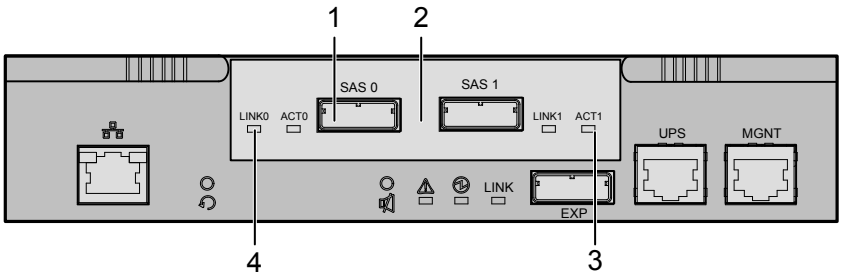
Figure 1-5 The controller of the S2600F controller enclosure



1	Controller spring leaf	2	Management network interface
3	FC host port	4	Link indicator of the FC host port
5	Rate indicator of the FC host port	6	FC port module
7	CLI serial port	8	UPS serial port
9	Mini SAS expander port	10	Link indicator of the mini SAS expander port
11	Controller power indicator	12	Controller alarm indicator
13	Mute button of the buzzer	14	Reset button
15	Link indicator of the management network interface	16	Active indicator of the management network interface

Figure 1-6 shows the controller of the S2600S controller enclosure.

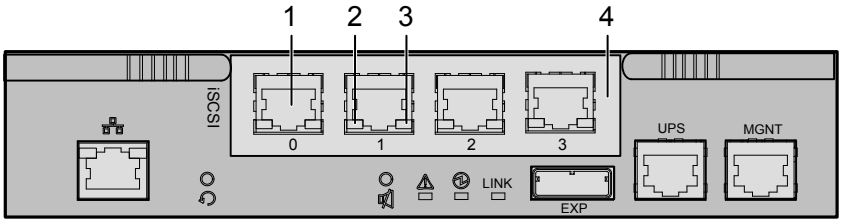
Figure 1-6 The controller of the S2600S controller enclosure



1 mini SAS host port
2 SAS port module
3 Active indicator of the SAS host port
4 Link indicator of the SAS host port

Figure 1-7 shows the controller of the S2600i controller enclosure.

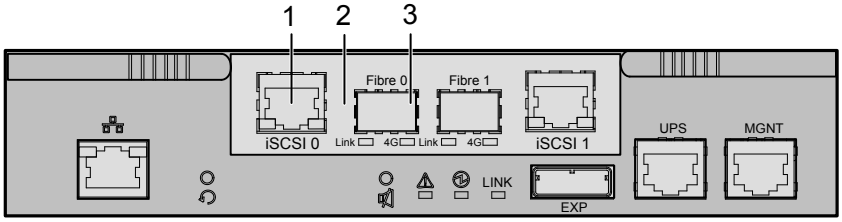
Figure 1-7 The controller of the S2600i controller enclosure



1 iSCSI host port
2 Active indicator of the iSCSI host port
3 Link indicator of the iSCSI host port
4 iSCSI port module

Figure 1-8 shows the controller of the S2600C controller enclosure.

Figure 1-8 The controller of the S2600C controller enclosure



1 iSCSI host port
2 Combo port module
3 FC host port

NOTE

For descriptions on indicators on the controller, see **Table 1-4**.

1.3.3 Hard Disk Module

This topic describes the hard disk module of the S2600 controller enclosure.

Function

The hard disk module provides the following functions:

- Storing system configuration information

  System configuration information is stored on the coffer disks of the S2600 controller enclosure, that is, disks in slot 0, 1, 2, and 3.

- Saving the data in cache in case that the input power supply of the system is faulty

  When the external power supply of the system fails, the UPS module supplies power to the controller enclosure. The system writes data in the cache to the coffer disks within two minutes.

- Providing storage capacity

  The S2600 controller enclosure stores the system data in the coffer disks and uses the remaining capacity for storage.

Type, Capacity, and Rotation Rate

The S2600 controller enclosure supports up to 12 hard disks. It supports the following types of hard disks:

- 500 GB, 1 TB, and 2 TB SATA disks at the rotation speed of 7200 r/min
- 300 GB, 450 GB, and 600 GB SAS disks at the rotation speed of 15000 r/min

NOTE

- The S2600 controller enclosure supports intermixing of SAS disks and SATA disks.
- To save storage capacity and to obtain better performance, you are recommended to use disks of the same capacity and rotation speed in a RAID group.

CAUTION

Do not insert or remove a hard disk at will; otherwise, data loss might occur.

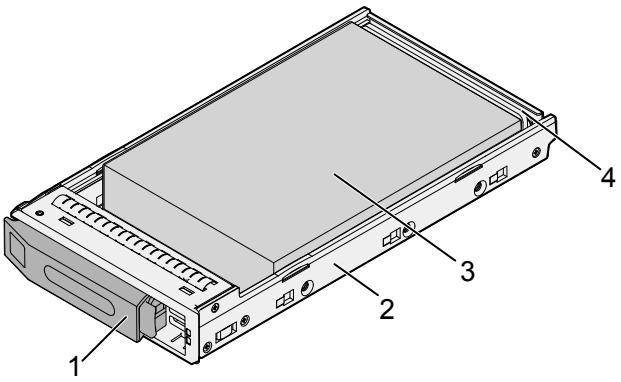
Structure

A SAS disk module consists of a handle, a hard disk tray, a SAS disk, and a SAS conversion board.

A SATA disk module consists of a handle, a hard disk tray, a SATA disk, and a SATA conversion board.

Figure 1-9 shows a hard disk module.

Figure 1-9 Hard disk module



1	Handle	2	Hard disk tray
3	SAS/SATA disk	4	SAS/SATA conversion board

Coffer Disks

Disks in slot 0, 1, 2, and 3 of the S2600 controller enclosure are the coffer disks, storing important data of the system. **Figure 1-3** shows the locations of slot 0, 1, 2, and 3 of the S2600 controller enclosure.

CAUTION

- Make sure that a hard disk is present in slot 0 or slot 1. The same applies to slot 2 or slot 3.
- The four coffer disks must be of the same type produced by the same manufacturer.
- Do not remove or insert a coffer disk or adjust the order of the coffer disks; otherwise, the system data might be damaged.
- Do not use a coffer disk as a hot-spare disk. For details, see the *OceanStor S2600 Controller Enclosure User Guide*.

1.3.4 Fan Module

This topic describes the fan module of the S2600 controller enclosure.

CAUTION

The S2600 controller enclosure must be equipped with fan modules with the same version of software and from the same manufacturer.

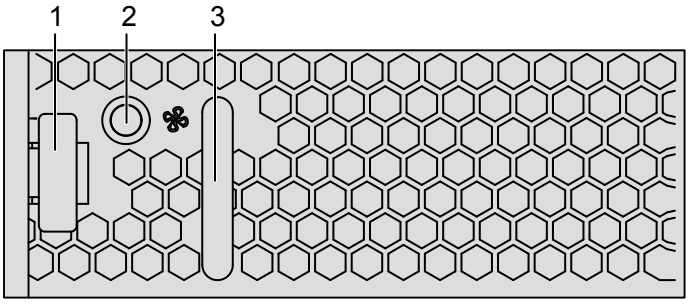
Fan modules are responsible for the heat dissipation of the S2600 controller enclosure.

Fan modules of the S2600 controller enclosure work in 1+1 redundancy mode.

Fan modules support hot swap. One fan module meets the requirements of the S2600 controller enclosure (fully loaded) on heat dissipation under the temperature of 5℃ to 35℃ within 1.5 minutes. Each fan module has two built-in fans. When one fan is faulty, the entire system is not affected.

Figure 1-10 shows the fan module of the S2600 controller enclosure.

Figure 1-10 Fan module



1 Fan module spring leaf
2 Fan running/alarm indicator
3 Fan module handle

NOTE

For descriptions of the indicators of fan modules, see **Table 1-4**.

1.3.5 PEM

This topic describes the PEM module of the S2600 controller enclosure.

CAUTION

The S2600 controller enclosure must be equipped with PEMs with the same version of software and from the same manufacturer.

The S2600 controller enclosure supports the following two types of PEM modules:

- AC PEM module

  The AC PEM module provides the following functions:

  - Supplying power to the S2600 controller enclosure when the AC input voltage ranges from 100 V to 127 V and 200 V to 240 V.
  - Supplying power to the S2600 controller enclosure though the UPS (if the S2600 controller enclosure is equipped with) for at least two minutes when the input power is off.
  - Supplying power to the S2600 controller enclosure though the BBU module (if the S2600 controller enclosure is equipped with) for at least two minutes when the input power is off.

- DC PEM module

  The DC PEM module provides the following functions:

Supplying power to the S2600 controller enclosure when the DC input voltage ranges from -36V to -76V.

CAUTION

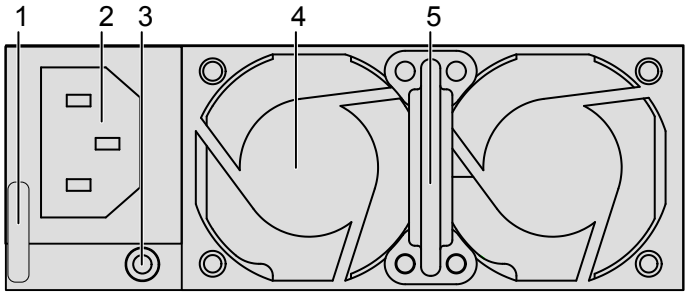
The AC PEM and DC PEM cannot be mixed interchangeably in the one S2600 controller enclosure.

The S2600 controller enclosure can be configured with one or two PEMs.

One PEM is able to support the S2600 controller enclosure to work in maximum power consumption mode. When configured with two PEMs, the S2600 controller enclosure supports hot swap of PEM. When one of the two PEMs is faulty, the S2600 controller enclosure still works normally.

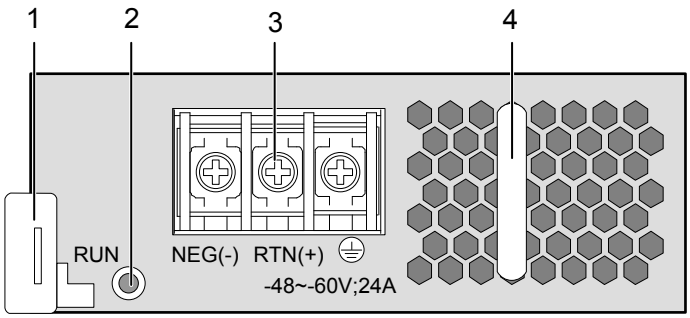
Figure 1-11 shows the AC PEM of the S2600 controller enclosure.**Figure 1-12** shows the DC PEM of the S2600 controller enclosure.

Figure 1-11 AC PEM



1	PEM spring leaf	2	Power socket
3	Power running/alarm indicator	5	Power fan
5	PEM handle		

Figure 1-12 DC PEM



1	PEM spring leaf	2	Power running/alarm indicator
3	Power socket	4	PEM handle

NOTE

For description of the indicators of the PEM, see **Table 1-4**.

1.3.6 UPS

This topic describes the UPS of the S2600 controller enclosure.

Function

The S2600 controller enclosure can be equipped with one or two UPSs, which provide power-off protection for the controllers.

When the external power supply is normal, the UPS supplies 200 V AC power to the S2600 controller enclosure. When the external power is abnormal, the UPS supplies 200 V DC power to the S2600 controller enclosure for at least two minutes to ensure that all data in cache can be written to the coffer disks.

Front View and Rear View

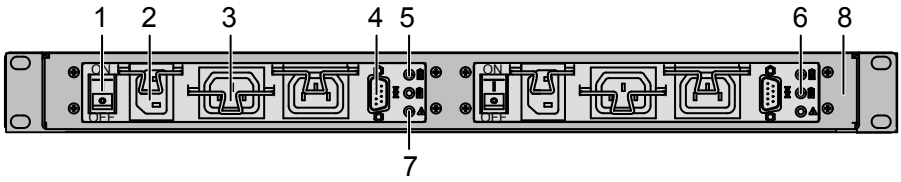
This following two figures consider the S2600 controller enclosure configured with two UPSs as an example. **Figure 1-13** shows the front view of the UPS.

Figure 1-13 Front view of the UPS

1	UPS handle

Figure 1-14 shows the rear view of the UPS.

Figure 1-14 Rear view of the UPS



1 UPS power switch
2 Power input jack
3 Power output socket
4 Serial port
5 Battery charging and power supply status indicator
6 Battery discharging indicator
7 UPS power alarm indicator
8 UPS module enclosure

Indicator

Table 1-5 lists the indicators on the back panel of the UPS module. After the system is powered on, you can determine the working status of the UPS module by viewing the indicators.

Table 1-5 Descriptions of indicators on the UPS module

Indicator	Color	Status	Description
Battery charging and power supply status indicator	Green	On	Power in the battery is enough.
		Blinking	The battery is charging.
	-	Off	The battery stops charging or is discharging.
Battery discharging indicator	Green	On	The battery is discharging.
	-	Off	The battery stops discharging.
UPS power alarm indicator	Red	On	An alarm is generated on the power supply.
	-	Off	No alarm is generated on the power supply.

1.3.7 BBU Module

This topic describes the BBU module.

The S2600 can be configured with one or two BBUs as required, to provide power-off protection function for the controller.

For the controller configured with AC power module, BBU can provide power to the controller after power-off. When the input power is off, the AC power module can provide power to the controller subrack for at least 2 minutes by BBU, which ensures that the data in the write cache can be completely written to the coffer disk and avoids data loss in the write cache. Each controller is configured with one BBU module.

CAUTION

If the device is powered off for a long time, the voltage of the BBU embedded in the device will jump down and even the BBU may be damaged. Thus, routine maintenance for the BBU is required. As recommended, power on the device every two months to fully charge the BBU and then power off the device again.

2 Installation

About This Chapter

This topic describes how to install the S2600 controller enclosure.

2.1 Installation Requirements

This topic describes the installation requirements of the S2600 controller enclosure.

2.1.1 Site Requirements

This topic describes the site requirements of the S2600 controller enclosure.

Before installing the device, ensure that the external environment (for example, power supply and heat dissipation) meets the requirements for the normal running of the device.

Power Supply

The rated input AC voltage of the S2600 controller enclosure is 220 V or 110 V and the rated input DC voltage is -48V. The S2600 controller enclosure uses the centralized power supply mode. The PEM (modules) supplies (supply) power to the other modules in the enclosure. In case that one PEM fails, the other one is able to support the services of the S2600 controller enclosure (for the S2600 controller enclosure configured with two PEMs).

The S2600 controller enclosure configured with one or two UPSs (or BBUs) provides the function of power-off protection.

Heat Dissipation

The S2600 controller enclosure is cooled by the fan modules. It can run for a long term in the environment where the altitude is -60 m to +3000 m, the ambient temperature is 5℃ to 40℃, and the humidity is 5% RH to 85% RH.

NOTE

For better maintenance, ventilation, and heat dissipation, note the following when installing the S2600 controller enclosure to the cabinet.

- Leave a space of no less than 100 cm between a cabinet and the wall and a space of no less than 120 cm between two cabinets to ensure ventilation.
- Ensure that the cabinet does not have an enclosed space inside and that air inside the cabinet effectively exchanges with air in the machine room. Leave a space of 1 U over and under the device respectively.

For details on the operating environment of the S2600 controller enclosure, see section **5.2 Environmental Requirements**.

2.1.2 Cable Requirements

This topic describes the cable requirements of the S2600 controller enclosure.

During the installation of the S2600 controller enclosure, the following types of cables are needed:

- Grounding cable

- Power cable
  - AC power cable
  - DC power cable
  - UPS leadout
- SAS cable
  - Mini SAS to SAS cable
  - Mini SAS cable
- Optical fiber
- Network cable
- Serial port cable

2.2 Precautions

This topic describes the precautions when installing the S2600 controller enclosure.

DANGER

Do not touch the connectors of power cables or communication cables. Otherwise, human bodies might get an electrical shock if there is current in the cables.

CAUTION

Do not touch the S2600 controller enclosure with bare hands. When you touch the controller, hard disks, fan modules, or the PEMs, the static electricity of your body might damage the electrostatic sensitive devices on the circuit board.

 This symbol indicates the electrostatic sensitive area. When operating a device in this area, you must take ESD-preventive measures, such as wearing an ESD-preventive wrist strap or ESD-preventive gloves.

During the installation, pay attention to the following:

- Do not install the device in the case of lightening.
- Wear an ESD-preventive wrist strap or ESD-preventive gloves during installation to prevent static electricity from injuring your body or damaging the device.
- Ensure that the power cables are intact and effective grounding measures are taken.
- Keep the installation environment clean and dry.
- To remove a hard disk, first remove the cables connected to the ports of the hard disk. Wait 10 seconds before removing the hard disk from the system enclosure. To insert a hard disk, place the hard disk horizontally and slowly and insert the hard disk to the correct slot of the system enclosure.

2.3 Installing the Controller Enclosure

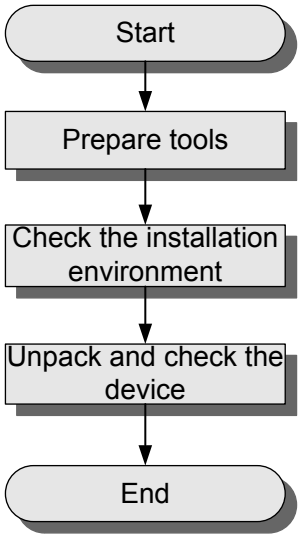
This topic describes the installation preparations and procedures of the controller enclosure.

2.3.1 Preparations

This topic describes the preparations of installing the controller enclosure.

Figure 2-1 shows the preparation flow chart.

Figure 2-1 Installation preparation flow chart



Preparing Tools

Table 2-1 lists the tools required for the installation.

Table 2-1 List of tools

Common Tools	Dedicated Tools
Crosshead screwdriver	ESD-preventive wrist strap, antistatic gloves, ESD-preventive suite, floating nut mount bar, cable peeler, crimping pliers, and crimping pliers for RJ-45 connectors

Checking the Installation Environment

Table 2-2 lists the items of and requirements for the installation environment.

Table 2-2 Installation environment checklist

SN	Item	Requirement
1	Site selection	The communication equipment room must be located in an environment without the following factors: ● High temperature ● Dust ● Harmful gases ● Flammable or explosive articles ● Electro-magnetic interference vulnerability (near large radar stations, radio stations or transformer substations) ● Unstable electricity voltage ● Strenuous vibration or strong noise During engineering design, consider hydrological, geographical, earthquake, electrical, and traffic factors according to technical requirements for network programming and devices.
2	Civil construction	The size of the equipment room must be enough for product installation and capacity expansion. The floor can meet the requirements for the bearing weight. The wiring trough, ladder, and hole are complete or ready. The decoration is complete.
3	Air conditioner	Air conditioners (supporting restart after a power-off) are required when the temperature in the equipment room exceeds 35℃ in the local hottest month. The air conditioners should be able to restart after the power fails. Do not let the air conditioner blow directly to the device.
4	Moisture-proof measures	If the relative humidity is greater than 70%, install the dehumidifying device, such as the air conditioner with dehumidification function or special dehumidifier. Ensure that the equipment room is protected from moisture, water seepage and dewing.

SN	Item	Requirement
5	Heating	If there are 90 or more days in a year when the average daily temperature is lower than 5℃, install the heating system. It is suggested to install a heating system if the daily average temperature in 60 to 90 days of a year is lower than 5℃.
6	Dust-proof measures	For the equipment room near dust source (such as the coal mine, the country road, or the farm land), seal the window with the double-deck aluminum alloy properly, and use an anti-theft and fire proof door. Separate the device from the door of the room with barrier effect to avoid part of dust.
7	Lightning protection	The equipment room should be provided with anti-lightning strike equipment, such as the lightning rod and lightning belt. The lightning conductors share the same grounding body group with the protective grounding of the equipment room.
9	AC input voltage	The AC input voltage is from 100 V to 127 V or 200 V to 240 V. Ensure that the AC power distribution switches and AC power cables are properly installed.
10	AC power grounding	Do not connect the neutral line of the power cable with the protection grounding of any storage device in the equipment room. You are suggested to use some leading out terminals for AC safety ground in the equipment room for connection.
11	AC lightning protection	The AC power system in the equipment room should be equipped with a lightning arrester with the rated discharging current no less than 20 kA. The arrestor should be properly grounded.

In addition, make sure that the following special requirements are satisfied on site:

- Before transportation, ensure that the goods transportation passages (elevators and passageways) meet the requirements of the dimensions of the cabinets.
- Before installation, decide whether or not to provide the qualification certificate of the installation company for the property management entity in charge of the installation site.
- Confirm the delivery time and installation time in advance, for example, from 8:00 to 18:00.

CAUTION

Confirm the delivery time and installation time in advance, for example, from 8:00 to 18:00.

Unpacking and Checking the Devices

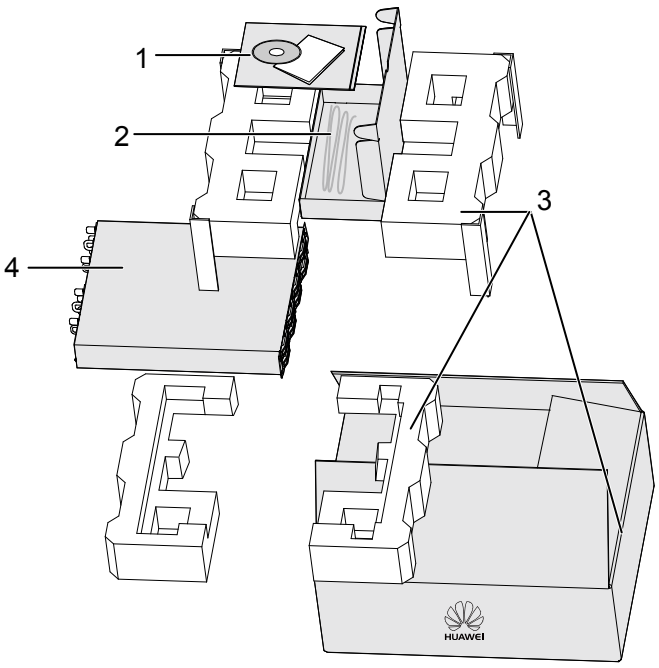
Before installation, unpack the equipment to check whether the parts are complete. To unpack and check the goods, do as follows:

CAUTION

The electrical circuit is very prone to ESD damage. Properly wear the ESD-preventive wrist strap when handling the hard disk, especially the raw disk. Hold the edge of the disk only.

1. Unpack the device, as shown in **Figure 2-2**.

Figure 2-2 Exploded view of the package



2. Check every package according to the order and packing list to ensure that all the parts are received.
3. Check each package for obvious damage.
4. Open each package to check whether the parts are damaged.
5. If there are parts damaged or lost, contact the sales representatives.

2.3.2 Installing the UPS Module into the Cabinet

This topic describes the steps for installing the UPS module into a cabinet.

Context

NOTE

The UPS module is optional. Determine whether to equip the S2600 controller enclosure with the UPS module in accordance with the actual application environment.

Procedure

Step 1 Wearing an ESD-Preventive Wrist Strap

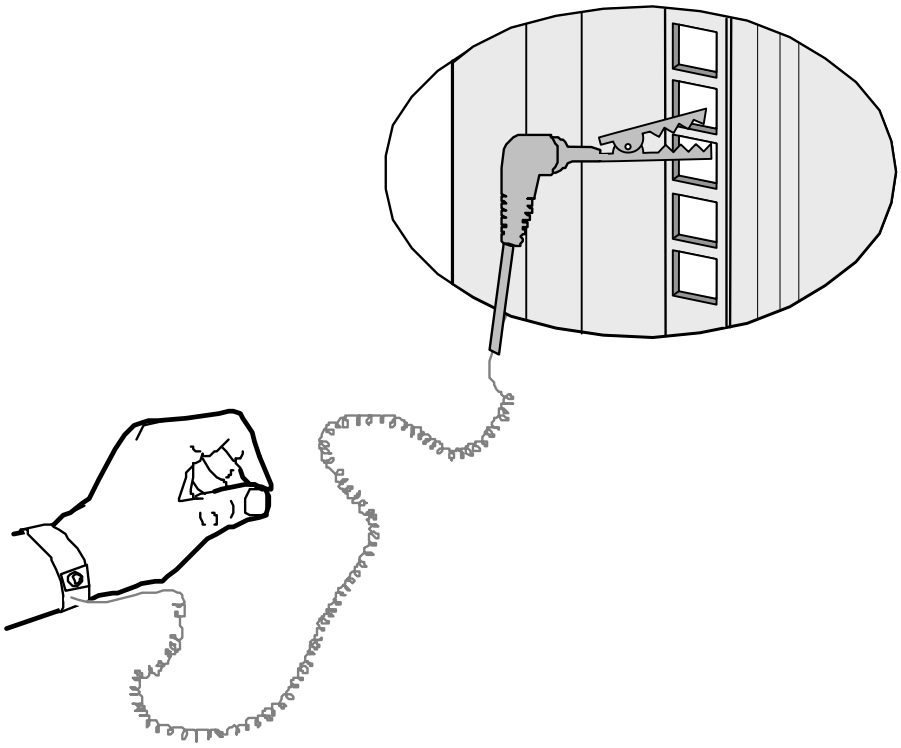
CAUTION

Since an ESD-preventive wrist strap prevents only the static electricity of your body, you need to wear an ESD-preventive coat to prevent the static electricity of the clothes.

To wear an ESD-preventive wrist strap, do as follows:

1. Stretch the hand into the ESD-preventive wrist strap.
2. Fasten the latch and ensure the wrist strap tightly touches the skin.
3. Clip the metal clip of the wrist strap to the square hole on the side of the cabinet, as shown in **Figure 2-3**.

Figure 2-3 Wearing an ESD-preventive wrist strap



4. Ensure that the lock of the wrist strap is fastened and the metal clip is tightly clipped to the square hole on the cabinet.

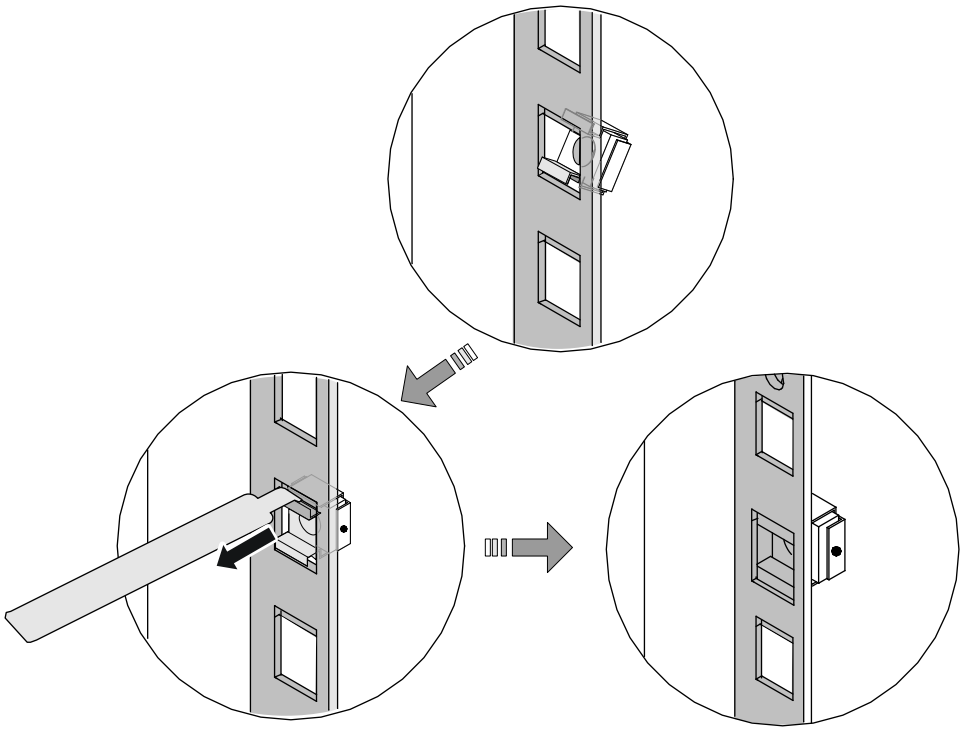
Step 2 Installing the UPS Module

The UPS module, whose installation height is 1 U, can be installed in a standard 19-inch cabinet. Before installing the UPS module, determine an appropriate location.

To install the UPS module, do as follows:

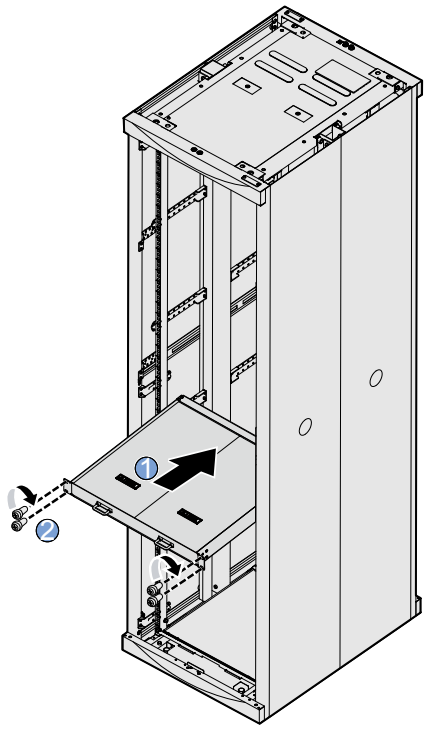
1. Wear an ESD-preventive wrist strap or ESD-preventive gloves.
   For the method, see **Step 1**.
2. Make sure of the installation locations of the UPS module on both sides of the cabinet, and then install the floating nuts, as shown in **Figure 2-4**.

Figure 2-4 Installing the floating nuts



3. Slide the UPS module through the guide rails into the cabinet. See step (1) in **Figure 2-5**.
4. Insert the bolts to the floating nuts and fasten the floating nuts. See step (2) in **Figure 2-5**.

Figure 2-5 Installing the UPS module into the cabinet



5. Fasten all the bolts with a screwdriver.
6. Ensure that the D120S disk enclosure is placed stably and all the bolts are fastened.

NOTE

For the idle D120S disk enclosures, pack them with the original package materials. Keep them in a dry and cool environment and away from direct sunlight and interference of strong electromagnetic radiation sources.

----End

2.3.3 Installing the S2600 Controller Enclosure into the Cabinet

This topic describes the steps for installing the S2600 controller enclosure into the cabinet.

Context

The installation height of the S2600 controller enclosure is 2 U. For detailed dimensions of the S2600 controller enclosure, see section **5.1.3 Dimensions and Weight**. Before installing the S2600 controller enclosure, determine an appropriate installation location.

DANGER

The weight of the S2600 controller enclosure in full configuration is 30 kg. Arrange two or more persons to carry the equipment with caution to avoid physical injury.

Procedure

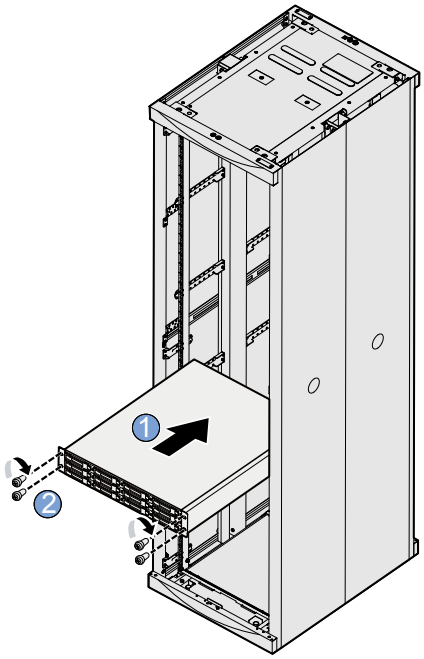
Step 1 Wear an ESD-preventive wrist strap and antistatic gloves. For details on wearing an ESD-preventive wrist strip, see **Step 1** in section **2.3.2 Installing the UPS Module into the Cabinet**.

Step 2 Make sure of the installation locations of the S2600 controller enclosure on both sides of the cabinet, and then install the floating nuts, as shown in **Figure 2-4**.

Step 3 Slide the S2600 controller enclosure through the guide rails into the cabinet. See step (1) in **Figure 2-6**.

Step 4 Insert the bolts to the floating nuts and fasten the floating nuts. See step (2) in **Figure 2-6**.

Figure 2-6 Installing the S2600 controller enclosure into the cabinet



Step 5 Stick the warning labels for removing or inserting the coffer disks.

CAUTION

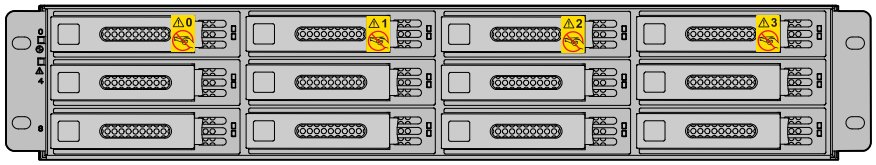
The hard disks in slot 0, 1, 2, and 3 of the S2600 controller enclosure are the coffer disks of the system and store the important data of the system. Do not remove or insert them at will or adjust their sequence; otherwise, system data might be damaged.

Take the warning labels out of the package. **Figure 2-7** shows the warning label for removing or inserting the coffer disks.

Figure 2-7 Warning label for removing or inserting the coffer disks

Stick the warning labels on the handles of the hard disks in the coffer, as shown in **Figure 2-8**.

Figure 2-8 Location of warning labels for removing or inserting the coffer disk



Step 6 Make sure that the S2600 controller enclosure is placed stably, the bolts are fastened, and the warning labels are stuck properly.

NOTE

For the S2600 controller enclosures that have not been installed, pack them with the packaging materials delivered with the devices, and store them in a dry and cool environment to avoid interference from sunshine and strong electromagnetic radiation.

----End

2.3.4 Checking the Installed Controller Enclosure

This section describes the checklist after the controller enclosure is installed.

DANGER

Before checking device installation and cable connections, make sure that the power supply is cut off to avoid physical or device damage due to improper connection.

Check whether the device is installed properly according to the instructions for checking the device installation.

Table 2-3lists the installation checklist of the S2600 controller enclosure.

Table 2-3 Installation checklist

Item	Normal	Abnormal
S2600 controller enclosure	Sits properly without displacement.	The device is slanted and loosened.

2.4 Connecting Cables

This topic describes the cable connection of the S2600 controller enclosure after finishing installation.

2.4.1 Connecting External Cables
This topic describes how to connect the external cables of the S2600 controller enclosure.

2.4.2 Connecting D120S Disk Enclosures
This topic describes how to connect the D120S disk enclosures to the S2600 controller enclosure.

2.4.3 Checking the Cable Connections
This topic describes how to check the cable connections.

2.4.1 Connecting External Cables

This topic describes how to connect the external cables of the S2600 controller enclosure.

Context

After installing the S2600 controller enclosure into the cabinet, connect the external cables, including grounding cables, AC power cables, DC power cables, SAS cables, optical fibers, network cables, and serial port cables. For the single-controller S2600 controller enclosure and the dual-controller S2600 controller enclosure, the steps to connect cables are the same. This section considers the dual-controller S2600 controller enclosure as an example.

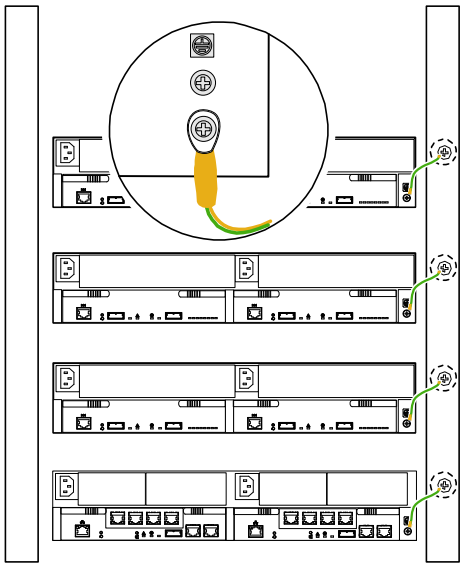
Procedure

Step 1 Connecting the Grounding Cables

To connect grounding cables, do as follows:

1. Unpack and take out grounding cables.
2. Loosen the screws of the grounding clip at the back of the S2600 controller enclosure.
3. Use a screw to fix the round connector of the grounding cable on the grounding clip at the rear side of the S2600 controller enclosure.
4. Connect the other end of the grounding cable to the grounding terminal of the cabinet, as shown in **Figure 2-9**.

Figure 2-9 Grounding of the S2600 controller enclosure



5. Check whether the two ends of the grounding cable are loose. If they are not loose, it indicates that the grounding cable is installed successfully.

Step 2 Connecting Power Cables

CAUTION

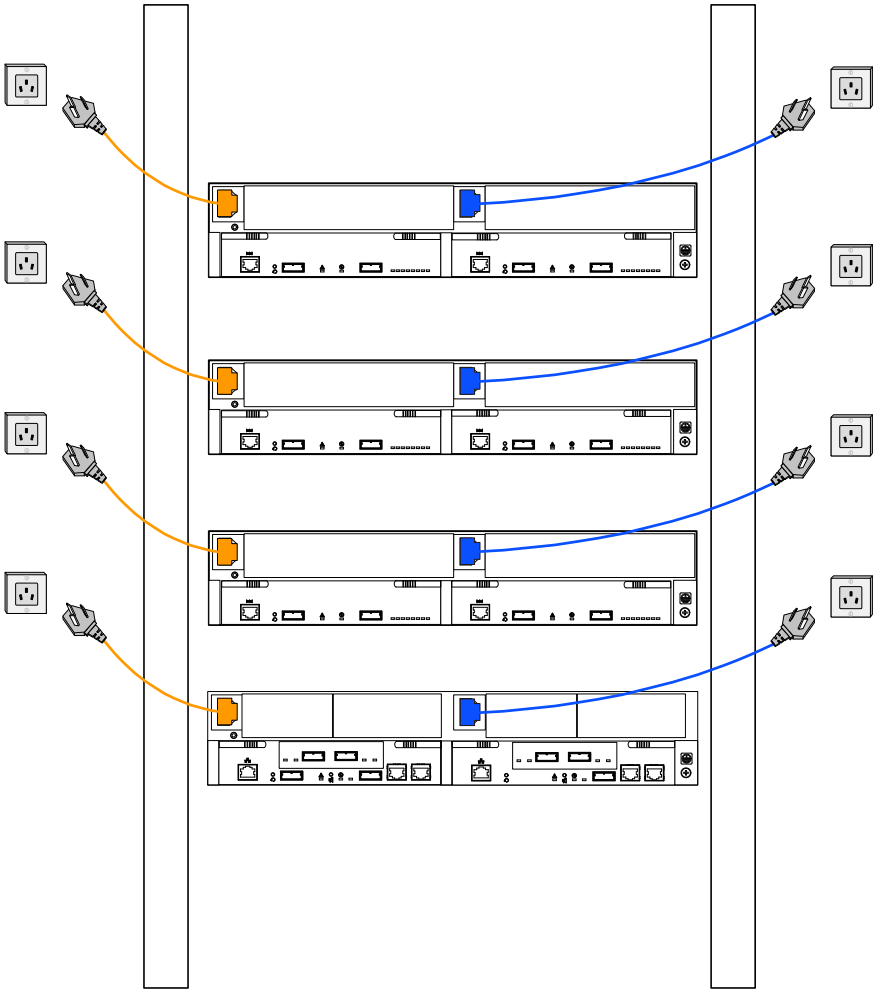
Before connecting power cables, ensure that all power supplies of the storage system have been shut down.

The S2600 controller enclosure can be configured with one or two AC PEMs, also can be configured with one or two DC PEMs. Connect AC power cables if the controller enclosure is configured with AC PEMs. Connect DC power cables if the controller enclosure is configured with DC PEMs.

The S2600 controller enclosure configured with two PEMs is considered as an example here. To connect AC power cables, do as follows:

1. Unpack and take out the AC power cables.
2. Connect the AC power cables to the power sockets of the S2600 controller enclosure.
3. Insert the connectors of the AC power cables to the power sockets. To realize the redundancy of AC power cables, connect the two PEMs of the S2600 controller enclosure to different power interfaces, as shown in **Figure 2-10**.

Figure 2-10 Connecting power cables



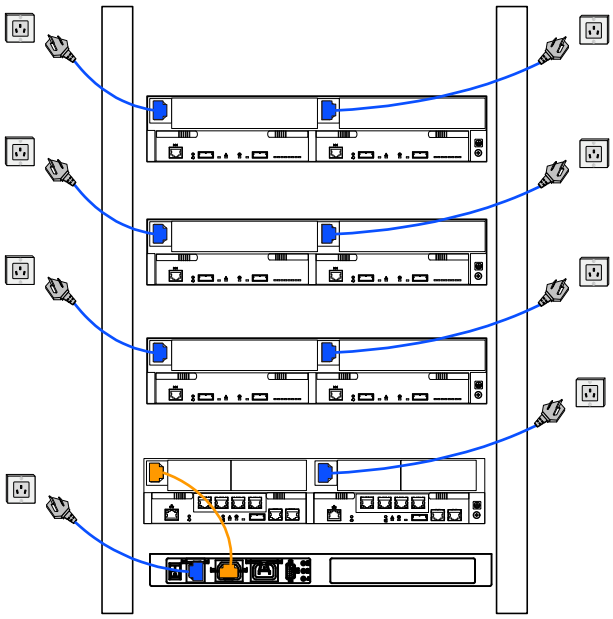
4. Make sure that AC power cables are connected properly in redundancy mode.

For the S2600 controller enclosure configured with two PEMs and a UPS, connect power cables as follows:

1. Unpack and take out AC power cables and the UPS leadout.

2. Connect an AC power cable to the power socket on the right of the S2600 controller enclosure.
3. Connect the UPS leadout to the power socket on the left of the S2600 controller enclosure.
4. Connect the AC power cable to the power input jack of the UPS module.
5. Insert the connector of the AC power cable and the connector of the UPS leadout to the power sockets. To realize the redundancy of AC power cables, Connect the two PEMs of the S2600 controller enclosure to different power interfaces, as shown in **Figure 2-11**.

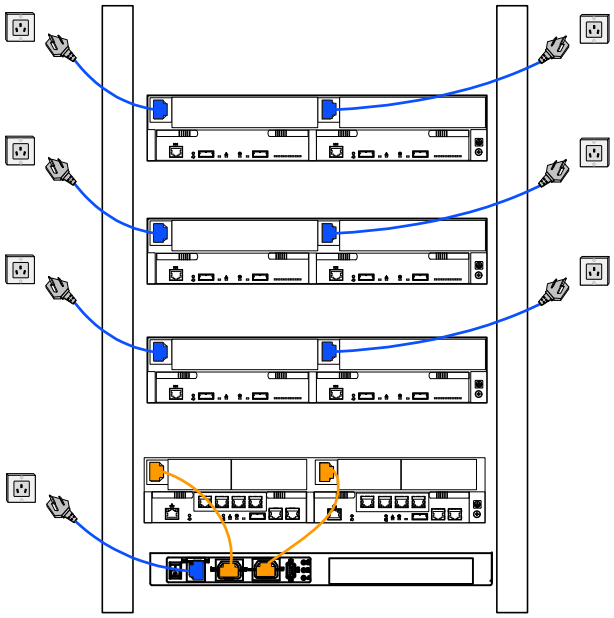
Figure 2-11 Connecting power cables for the S2600 controller enclosure with one UPS



6. Make sure that the power cables are connected properly in redundancy mode.

Figure 2-12 shows how to connect power cables for the S2600 controller enclosure configured with two PEMs and one UPS.

Figure 2-12 Connecting power cables for the S2600 controller enclosure with two PEMs and one UPS



Take the controller enclosure configured with DC PEMs as an example, to connect DC power cables, do as follows:

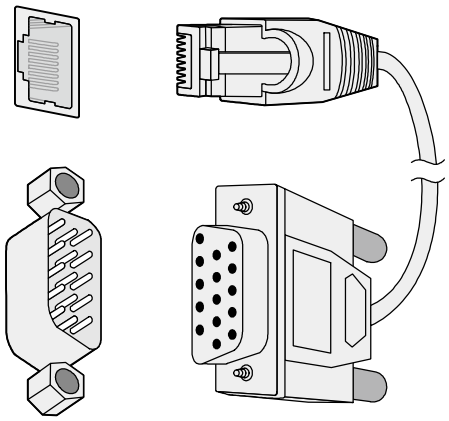
1. Screw off the bolt of the protective cover at the power connection position of the cabinet, and remove the plastics sheet.
2. Loosen the fixing bolts of a group of -48V and RTN wiring terminals in the DC distribution box -48V OUT module by using a straight screwdriver.
3. Connect one end (cold end terminal) of the blue DC power cable to the -48V wiring terminal of the DC distribution box -48V OUT module, and fasten the fixing bolts. Connect one end (cold end terminal) of the black DC power cable to the RTN wiring terminal of the DC distribution box -48V OUT module, and fasten the fixing bolts.
4. Screw off the bolt of the protective cover at the power connection position of the controller subrack, and remove the plastics sheet. Loosen the M6 bolts at the NEG and RTN wiring terminals of the controller subrack by using a cross screwdriver.
5. Connect one end (OT terminal) of the blue DC power cable to the NEG wiring terminal of the controller subrack, and fasten the M6 bolts. Connect one end (OT terminal) of the black DC power cable to the RTN wiring terminal of the controller subrack, and fasten the M6 bolts.
6. Mount the plastics sheets of the protective cover at the power connection position of the controller subrack, and fasten the bolts. It prevents personnel from contacting naked power cables
7. Check whether the DC power cables are installed successfully. For details, see **Table 2-4**.

Step 3 Connecting Serial Port Cables

The S2600 controller enclosure communicates with the maintenance terminal through serial port cables.

Considering the RJ-45 to DB-9 serial port cable as an example, **Figure 2-13** shows how to connect the maintenance terminal to the CLI serial port with a serial port cable.

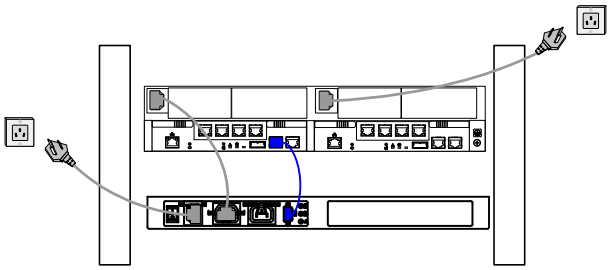
Figure 2-13 Connecting the maintenance terminal to the CLI serial port with a serial port cable



The S2600 controller enclosure communicates with its UPS module through serial port cables. To connect serial port cables, do as follows:

1. Unpack and take out the serial port cables.
2. Insert the DB-9 connector of a serial port cable into the UPS serial port, and then fasten the captive screws.
3. Insert the RJ-45 connector of the serial port cable into the UPS serial port of the S2600 controller enclosure.
4. Connect the serial port and the power output socket of the UPS module to the UPS serial port and power socket of the same controller, as shown in **Figure 2-14**.

Figure 2-14 Connecting the serial port cable to the UPS serial port



5. Make sure that the serial port cable is connected to the requirements, and that the captive screws are fastened tightly.

Step 4 Connecting mini SAS to SAS Cables

The S2600 controller enclosure communicates with ASs through mini SAS to SAS cables. To connect mini SAS to SAS cables, do as follows:

1. Unpack and take out the mini SAS to SAS cables.

2. Insert the mini SAS connector of a mini SAS to SAS cable to the SAS host port of the S2600S controller enclosure.
3. Insert the SAS connector of the mini SAS to SAS cable to the SAS HBA card of an AS, and fasten the captive screws.
4. Check whether the mini SAS connector of the mini SAS to SAS cable is connected to the SAS host port, and check whether the captive screws on the SAS connector of the mini SAS to SAS cable are fastened tightly.

   NOTE

   For details on connecting mini SAS cables, see section **2.4.2 Connecting D120S Disk Enclosures**.

Step 5 Installing the Optical Module and Optical fibers

WARNING

During the installation and maintenance of optical fibers or the optical module, never stare directly into the terminals of the optical fibers or the exit of the optical module, and your eyes should never be close to the optical fibers or the exit of the optical module.

CAUTION

- The optical module is electrostatic sensitive. Place it in an antistatic and dust-proof environment during transportation, storage, and use.
- Optical fibers and the optical module, which are not in use, must be covered with protective cap in time. If the optical module has been polluted or has been swapped for many times, clean the optical interface in time.
- Keep the surface of the optical connector clean and protect it from scratches.
- Do not bend, fold, or repair an optical fiber or bend it into a ring with a radius of less than 5 cm; otherwise, the optical fiber might be damaged. The damage results in performance degradation of the system or data loss.

The S2600F controller enclosure and the S2600C controller enclosure communicate with ASs through optical fibers.

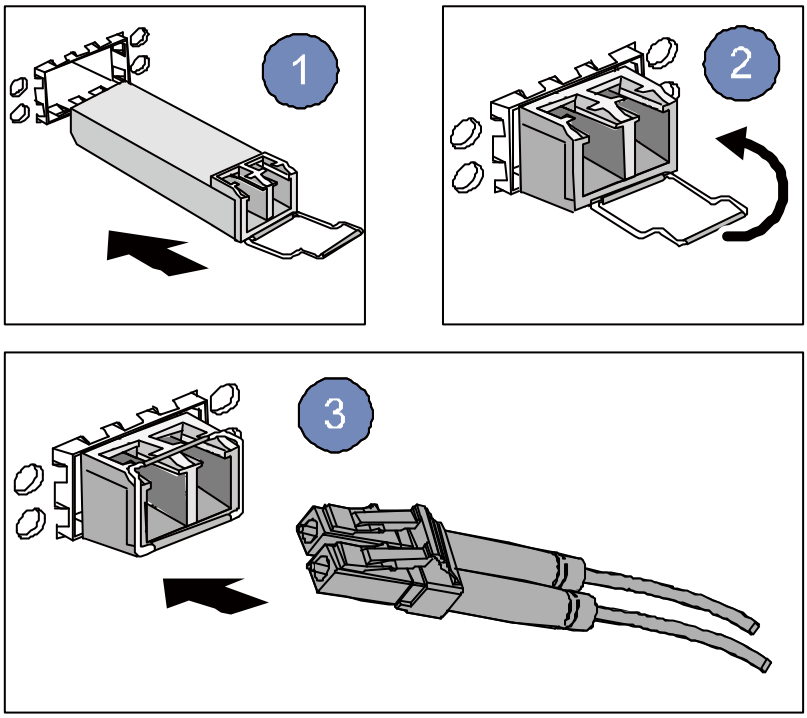
To connect the optical fibers and to install the optical module, do as follows:

1. Unpack and take out the optical fibers. **Figure 2-15** shows the optical fibers.

Figure 2-15 Optical fibers

2. Firstly, insert the optical module into an FC host port of the controller in the direction shown in step (1) in **Figure 2-16**.
3. Close the lever of the optical module, as shown in step (2) in **Figure 2-16**.
4. Make sure that the optical module is inserted correctly and that the lever is closed.
5. Insert the optical fiber into the optical module. See step (3) in **Figure 2-16**.

Figure 2-16 Installing the optical module and optical fibers



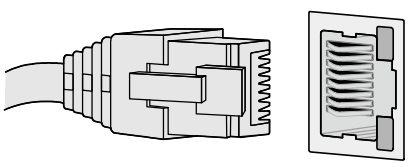
6. Make sure that the buckle of the optical fiber is placed into the optical module.
7. Repeat **2** to **6** to connect the other end of the optical fiber to the AS.

Step 6 Connecting Network Cables

The S2600i controller enclosure and the S2600C controller enclosure communicates with ASs through network cables.

Figure 2-17 shows how to connect network cables.

Figure 2-17 Connecting network cables



----End

2.4.2 Connecting D120S Disk Enclosures

This topic describes how to connect the D120S disk enclosures to the S2600 controller enclosure.

After connecting the grounding cables and power cables, you can connect the D120S disk enclosures to the S2600 controller enclosure. The S2600 controller enclosure can be connected with up to seven D120S disk enclosures.

NOTE

A mini SAS cable has an uplink connector and a downlink connector. Insert the uplink connector into the PRI expander port, and insert the downlink connector into the EXP expander port.

NOTE

For details on the D120S disk enclosure, see the *OceanStor D120S Disk Enclosure User Guide*.

Principles for Connecting the D120S Disk Enclosures

The single-controller S2600 controller enclosure and the dual-controller S2600 controller enclosure have different principles for connecting the D120S disk enclosures.

CAUTION

The connection failure of the mini SAS cable might lead to the operation interruption. You need to power off the S2600 storage system and reboot it to recover the operation.

When connecting the mini SAS cables to the single-controller S2600 controller enclosure, follow these principles:

- When connecting D120S disk enclosures to the S2600 controller enclosure, you must connect the D120S disk enclosures to the expander modules on the same side with the controllers.
- Connect the mini SAS expander port of the S2600 controller enclosure to the PRI expander port of the D120S.

When connecting the mini SAS cables to the dual-controller S2600 controller enclosure, follow these principles:

- Principles for connecting the mini SAS cables
  - When connecting the S2600 controller enclosure to a D120S disk enclosure, you must connect the mini SAS expander port of the S2600 controller enclosure to the PRI expander port of the D120S disk enclosure.
  - When connecting two D120S disk enclosures, you must connect the EXP expander module of one D120S disk enclosure to the PRI expander port of the other.
- Cabling principle for the storage system
  - The wiring topology must be one that the entire storage system would not break down due to a single point failure.

The single-point failure might be the failure of the D120S disk enclosure or the failure of a component of D120S hard disks. In the case the D120S disk enclosure fails, all the other D120S disk enclosures fail to communicate with the S2600 controller enclosure.

- Connect the D120S disk enclosures to the S2600 controller enclosure in redundancy mode.

  The redundancy mode enables the storage system to work normally in the case that the S2600 controller enclosure fails. In this document, all connections between the S2600 controller enclosure and the D120S disk enclosures are in redundancy mode.

Connecting One D120S Disk Enclosure to the Single-Controller S2600 Controller Enclosure

To connect one D120S disk enclosure to the single-controller S2600 controller enclosure, do as follows:

1. Wear an ESD-preventive wrist strap and antistatic gloves. For details on wearing an ESD-preventive wrist strip, see **Step 1** in section **2.3.2 Installing the UPS Module into the Cabinet**.
2. Unpack and take out the mini SAS cables shipped with the D120S disk enclosure.

CAUTION

Each D120S disk enclosure can be shipped with one-meter or three-meter mini SAS cables. Choose mini SAS cables of the suitable length according to your needs.

3. Connect the downlink connector of a mini SAS cable into the mini SAS expander port on controller A of the S2600 controller enclosure. Insert the uplink connector of the mini SAS cable into the PRI expander port on the expander module of the D120S enclosure.
4. As shown in **Figure 2-18**, check whether the mini SAS cable is connected to the right places. If the mini SAS cable is connected correctly, the D120S enclosure is connected to the S2600 controller enclosure successfully.

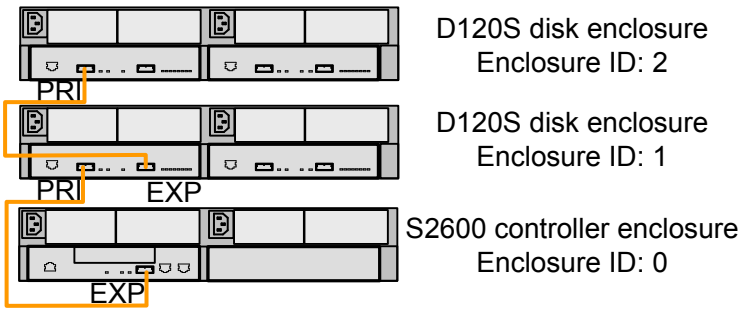
Figure 2-18 Connecting one D120S enclosure to the single-controller S2600 controller enclosure

Connecting Two D120S Disk Enclosures to the Single-Controller S2600 Controller Enclosure

You need two mini SAS cables to connect two D120S disk enclosures to the single-controller S2600 controller enclosure. For connecting principles, see "Principles for Connecting the D120S Disk Enclosures" in section **2.4.2 Connecting D120S Disk Enclosures**.

Connect two D120s disk enclosures to the single-controller S2600 controller enclosure, as shown in **Figure 2-19**.

Figure 2-19 Connecting two D120S disk enclosures to the single-controller S2600 controller enclosure

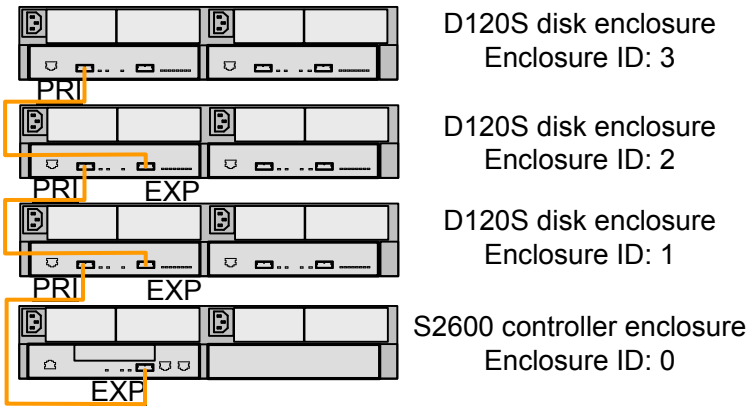


Connecting Three D120S Disk Enclosures to the Single-Controller S2600 Controller Enclosure

You need three mini SAS cables to connect three D120S disk enclosures to the single-controller S2600 controller enclosure. For connecting principles, see "Principles for Connecting the D120S Disk Enclosures" in section **2.4.2 Connecting D120S Disk Enclosures**.

Connect three D120S disk enclosures to the single-controller S2600 controller enclosure as shown in **Figure 2-20**.

Figure 2-20 Connecting three D120S disk enclosures to the single-controller S2600 controller enclosure



Connecting Four D120S Disk Enclosures to the Single-Controller S2600 Controller Enclosure

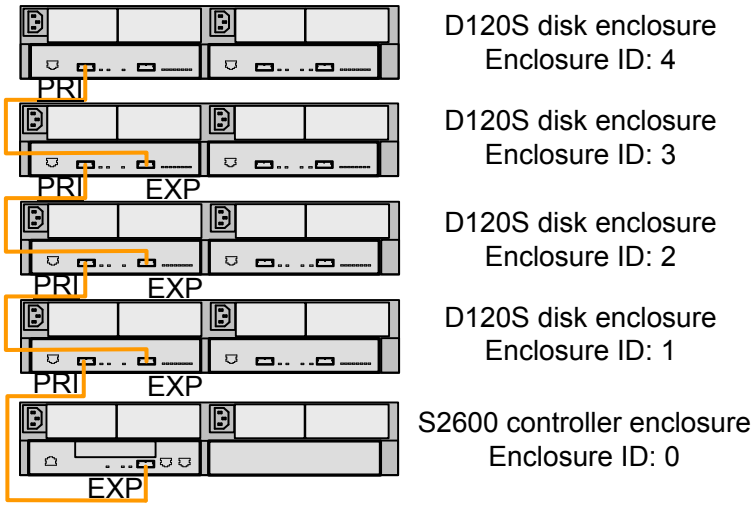
You need four mini SAS cables to connect four D120S disk enclosures to the single-controller S2600 controller enclosure. For connecting principles, see "Principles for Connecting the D120S Disk Enclosures" in section **2.4.2 Connecting D120S Disk Enclosures**.

CAUTION

It is recommended to connect four or less disk enclosures to the single-controller enclosure to ensure the system stability and avoid data loss.

Connect four D120S disk enclosures to the single-controller S2600 controller enclosure, as shown in **Figure 2-21**.

Figure 2-21 Connecting four D120S disk enclosures to the single-controller S2600 controller enclosure

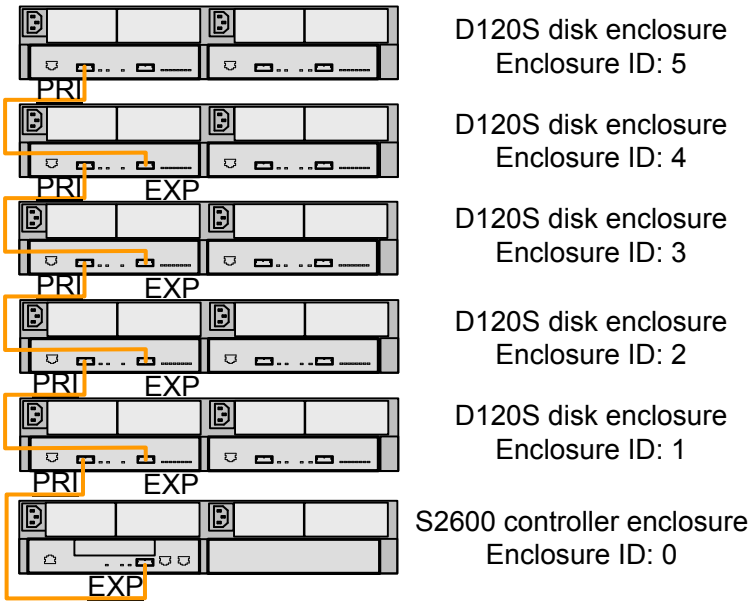


Connecting Five D120S Disk Enclosures to the Single-Controller S2600 Controller Enclosure

You need five mini SAS cables to connect five D120S disk enclosures to the single-controller S2600 controller enclosure. For connecting principles, see "Principles for Connecting the D120S Disk Enclosures" in section **2.4.2 Connecting D120S Disk Enclosures**.

Connect five D120S disk enclosures to the single-controller S2600 controller enclosure, as shown in **Figure 2-22**.

Figure 2-22 Connecting five D120S disk enclosures to the single-controller S2600 controller enclosure

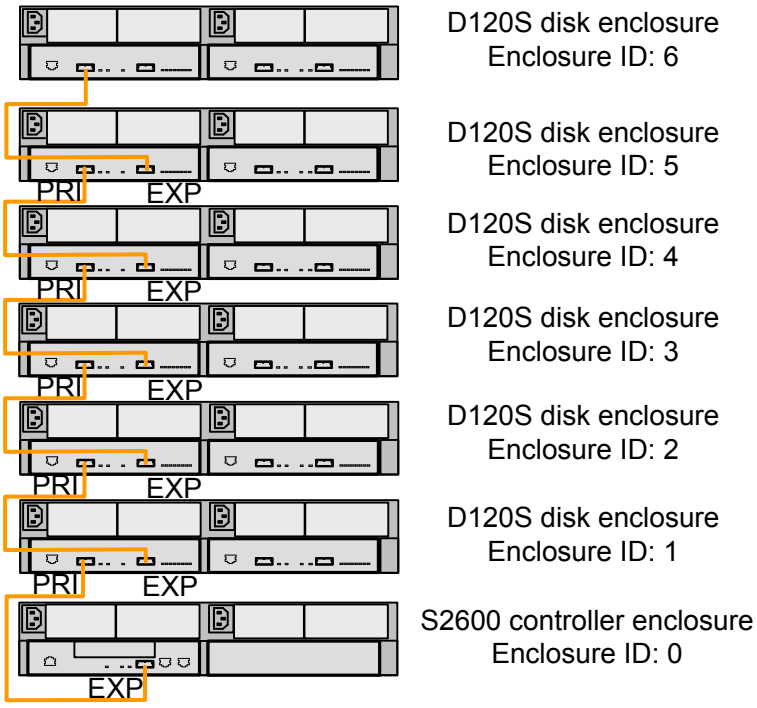


Connecting Six D120S Disk Enclosures to the Single-Controller S2600 Controller Enclosure

You need six mini SAS cables to connect six D120S disk enclosures to the single-controller S2600 controller enclosure. For connecting principles, see "Principles for Connecting the D120S Disk Enclosures" in section **2.4.2 Connecting D120S Disk Enclosures**.

Connect six D120S disk enclosures to the single-controller S2600 controller enclosure, as shown in **Figure 2-23**.

Figure 2-23 Connecting six D120S disk enclosures to the single-controller S2600 controller enclosure

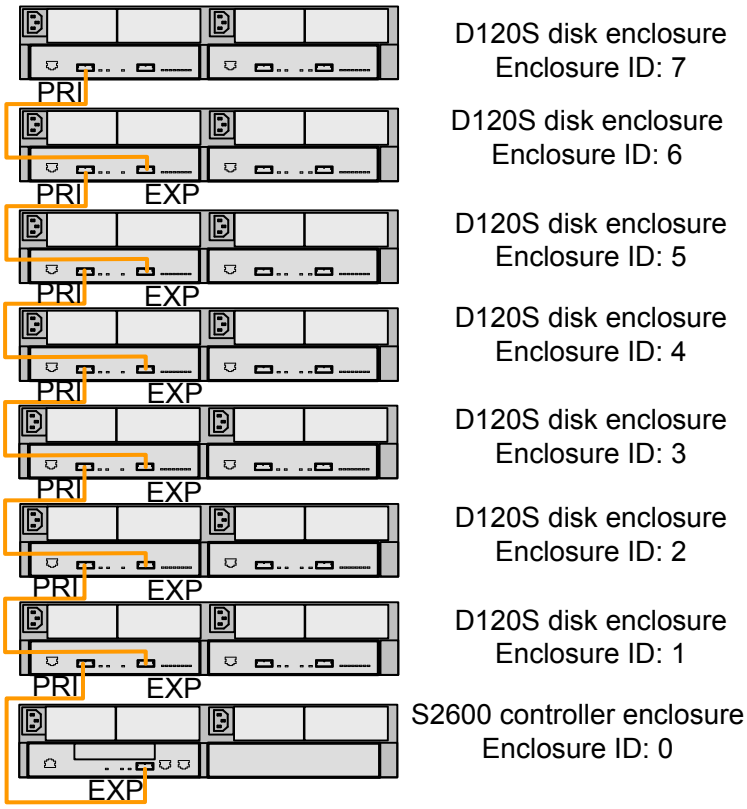


Connecting Seven D120S Disk Enclosures to the Single-Controller S2600 Controller Enclosure

You need seven mini SAS cables to connect seven D120S disk enclosures to the single-controller S2600 controller enclosure. For connecting principles, see "Principles for Connecting the D120S Disk Enclosures" in section **2.4.2 Connecting D120S Disk Enclosures**.

Connect seven D120S disk enclosures to the single-controller S2600 controller enclosure, as shown in **Figure 2-24**.

Figure 2-24 Connecting seven D120S disk enclosures to the single-controller S2600 controller enclosure

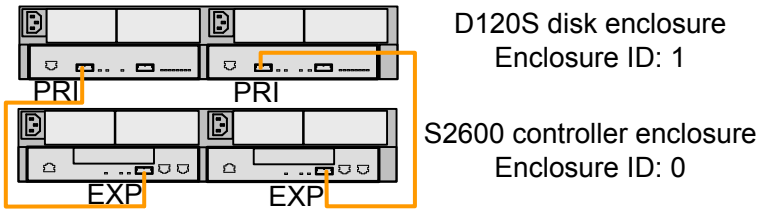


Connecting One D120S Disk Enclosure to the Dual-Controller S2600 Controller Enclosure

To connect one D120S disk enclosure to the dual-controller S2600 controller enclosure, do as follows:

1. Wear an ESD-preventive wrist strap and antistatic gloves. For details on wearing an ESD-preventive wrist strip, see **Step 1** in section **2.3.2 Installing the UPS Module into the Cabinet**.
2. Unpack and take out the mini SAS cables shipped with the D120S disk enclosure.
3. Connect the downlink connector of a mini SAS cable into the mini SAS expander port on controller A of the S2600 controller enclosure. Insert the uplink connector of the mini SAS cable into the PRI expander port on the expander module of the D120S enclosure.
4. Connect the downlink connector of the other mini SAS cable into the mini SAS expander port on controller B of the S2600 controller enclosure. Insert the uplink connector of the mini SAS cable into the PRI expander port on the expander module of the D120S disk enclosure.
5. As shown in **Figure 2-25**, check whether the mini SAS cables are connected to the right places. If the mini SAS cables are connected correctly, the D120S enclosure is connected to the S2600 controller enclosure successfully.

Figure 2-25 Connecting one D120S disk enclosure to the dual-controller S2600 Controller Enclosure

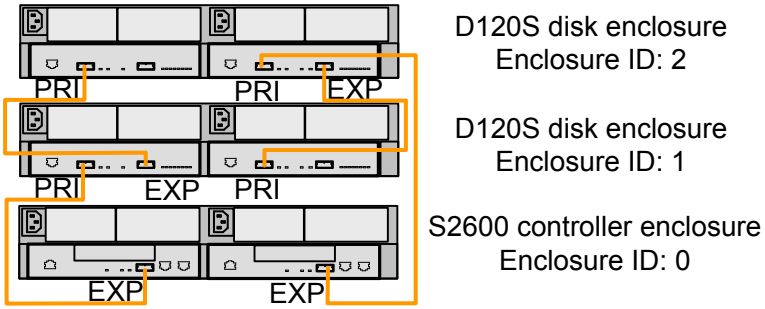


Connecting Two D120S Disk Enclosures to the Dual-Controller S2600 Controller Enclosure

You need four mini SAS cables to connect two D120S disk enclosures to the dual-controller S2600 controller enclosure. For connecting principles, see "Principles for Connecting the D120S Disk Enclosures" in section **2.4.2 Connecting D120S Disk Enclosures**.

Connect two D120S disk enclosures to the dual-controller S2600 controller enclosure in redundancy mode, as shown in **Figure 2-26**.

Figure 2-26 Connecting two D120S disk enclosures to the dual-controller S2600 controller enclosure

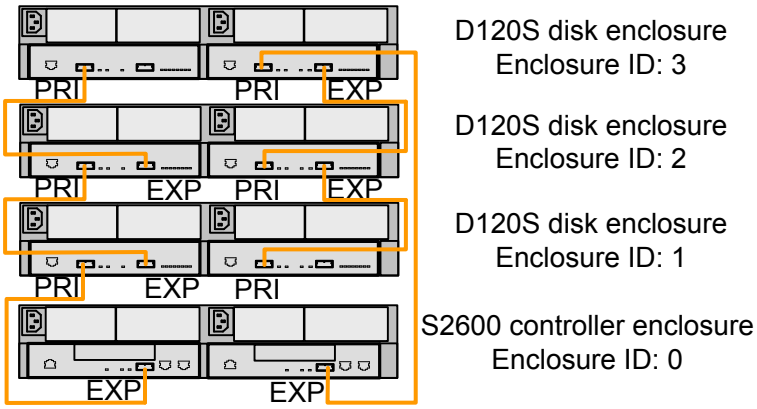


Connecting Three D120S Disk Enclosures to the Dual-Controller S2600 Controller Enclosure

You need six mini SAS cables to connect three D120S disk enclosures to the dual-controller S2600 controller enclosure. For connecting principles, see "Principles for Connecting the D120S Disk Enclosures" in section **2.4.2 Connecting D120S Disk Enclosures**.

Connect three D120S disk enclosures to the dual-controller S2600 controller enclosure in redundancy mode, as shown in **Figure 2-27**.

Figure 2-27 Connecting three D120S disk enclosures to the dual-controller S2600 controller enclosure

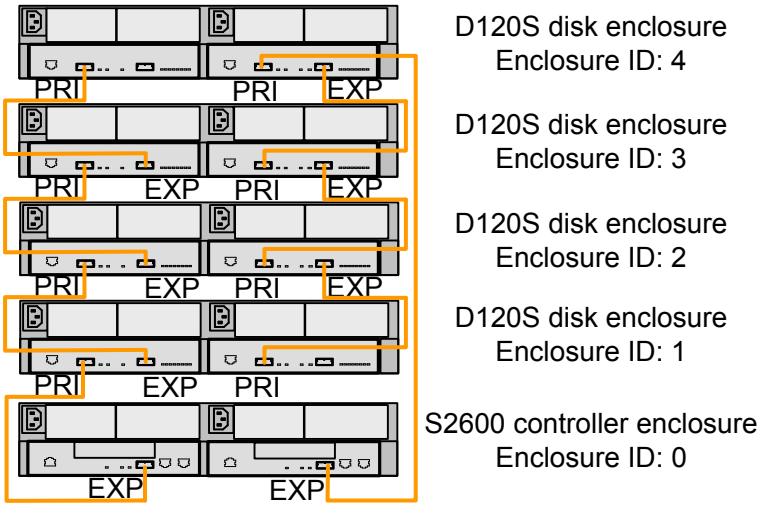


Connecting Four D120S Disk Enclosures to the Dual-Controller S2600 Controller Enclosure

You need eight mini SAS cables to connect four D120S disk enclosures to the dual-controller S2600 controller enclosure. For connecting principles, see "Principles for Connecting the D120S Disk Enclosures" in section **2.4.2 Connecting D120S Disk Enclosures**.

Connect four D120S disk enclosures to the dual-controller S2600 controller enclosure in redundancy mode, as shown in **Figure 2-28**.

Figure 2-28 Connecting four D120S disk enclosures to the dual-controller S2600 controller enclosure

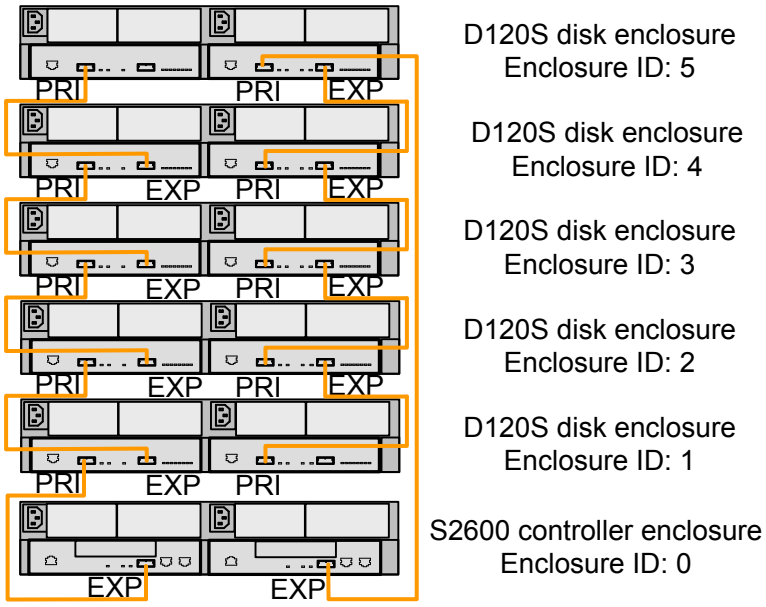


Connecting Five D120S Disk Enclosures to the Dual-Controller S2600 Controller Enclosure

You need ten mini SAS cables to connect five D120S disk enclosures to the dual-controller S2600 controller enclosure. For connecting principles, see "Principles for Connecting the D120S Disk Enclosures" in section **2.4.2 Connecting D120S Disk Enclosures**.

Connect five D120S disk enclosures to the dual-controller S2600 controller enclosure in redundancy mode, as shown in **Figure 2-29**.

Figure 2-29 Connecting five D120S disk enclosures to the dual-controller S2600 controller enclosure

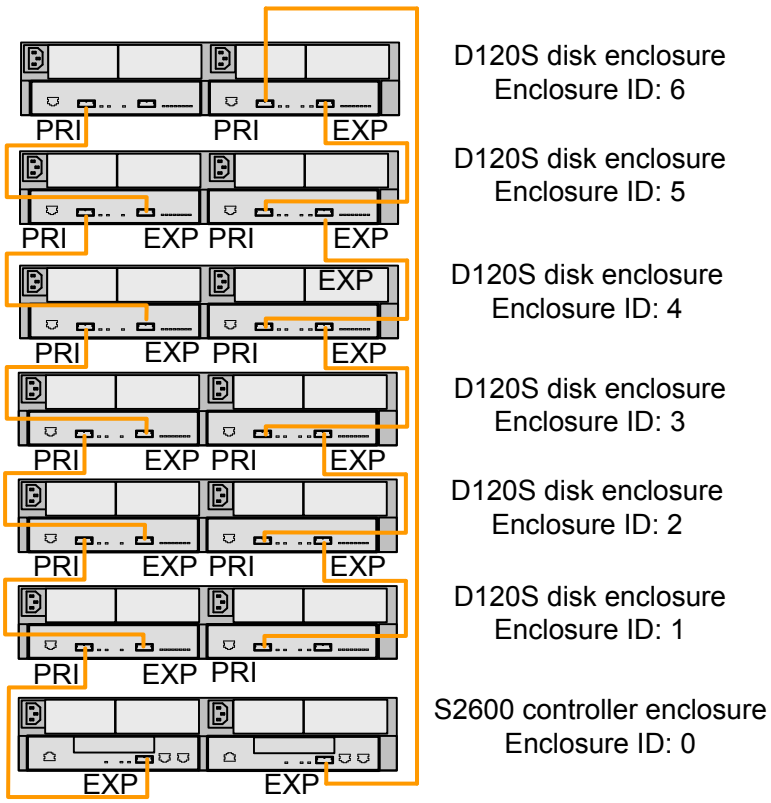


Connecting Six D120S Disk Enclosures to the Dual-Controller S2600 Controller Enclosure

You need twelve mini SAS cables to connect six D120S disk enclosures to the dual-controller S2600 controller enclosure. For connecting principles, see "Principles for Connecting the D120S Disk Enclosures" in section **2.4.2 Connecting D120S Disk Enclosures**.

Connect six D120S disk enclosures to the dual-controller S2600 controller enclosure in redundancy mode, as shown in **Figure 2-30**.

Figure 2-30 Connecting six D120S disk enclosures to the dual-controller S2600 controller enclosure

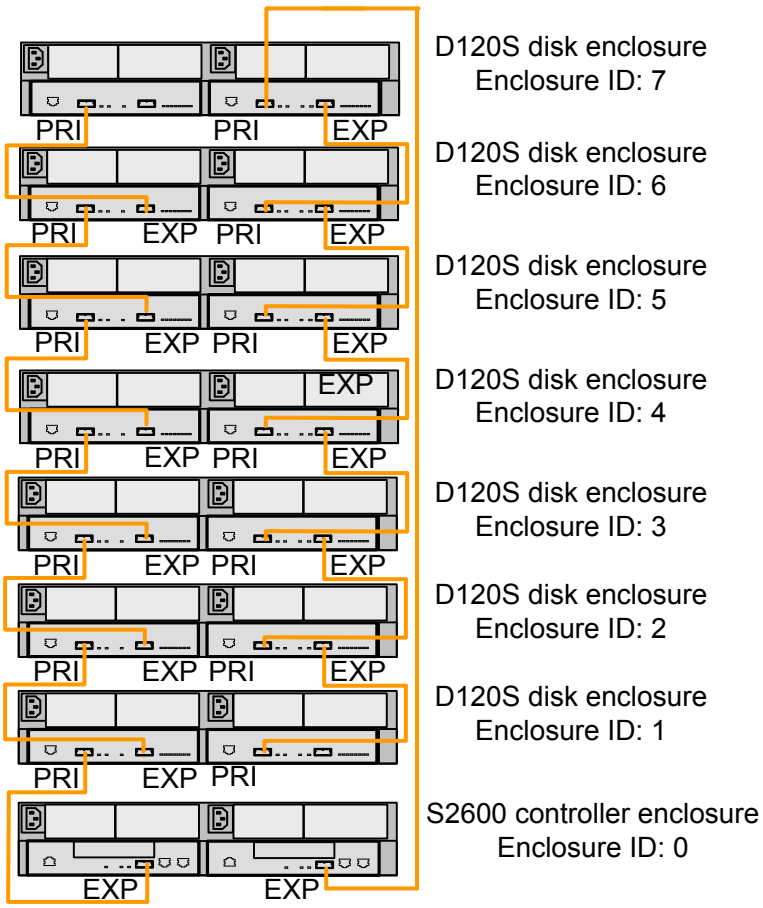


Connecting Seven D120S Disk Enclosures to the Dual-Controller S2600 Controller Enclosure

You need fourteen mini SAS cables to connect seven D120S disk enclosures to the dual-controller S2600 controller enclosure. For connecting principles, see "Principles for Connecting the D120S Disk Enclosures" in section **2.4.2 Connecting D120S Disk Enclosures**.

Connect seven D120S disk enclosures to the dual-controller S2600 controller enclosure in redundancy mode, as shown in **Figure 2-31**.

Figure 2-31 Connecting seven D120S disk enclosures to the dual-controller S2600 controller enclosure



2.4.3 Checking the Cable Connections

This topic describes how to check the cable connections.

DANGER

Before checking device installation and cable connections, make sure that the power supply is cut off to avoid physical or device damage due to improper connection.

Check cable connections as instructed in the following tables.

Table 2-4 describes the cable connection checklist.

Table 2-4 Cable connection checklist

Item	Normal	Abnormal
Grounding cables	The grounding cables are connected to the grounding clips of the S2600 controller enclosure and grounding connectors of the cabinet, and the screws of the clips are fastened.	The grounding cables are not properly connected to the grounding clips of the S2600 controller enclosure and grounding connectors of the cabinet.
AC Power cables	● The AC power cables connect to the UPS module to the power supply of the cabinet in compliance with the requirements [a]. ● The AC power cables connects the S2600 controller enclosure to the UPS modules in compliance with the requirements [a]. ● The AC power cables are connected to the power supply of the S2600 controller enclosure in redundancy mode.	● The power supply of the UPS module is not correctly connected. ● The S2600 controller enclosure is not correctly connected to the UPS module through the AC power cables. ● The power supply of the S2600 controller enclosure is not connected in redundancy mode.
DC Power cables	● The DC power cables are properly connected to the DC PDB and the power connecting part of the controller subrack, and the screws are fastened. ● The plastic sheet of the cover protecting the power connecting part of the controller subrack is installed.	● The DC power cables are not connected to the PDB or the power connecting part of the controller subrack properly, or the screws are loose. ● The plastic sheet of the cover protecting the power connecting part of the controller subrack is not installed.
Mini SAS to SAS cables [b]	● The mini SAS to SAS cables are connected from the SAS HBA card interfaces of the ASs to the SAS host ports of the S2600S controller enclosure. ● The captive screws on one end of the mini SAS to SAS cable are fastened tightly.	● The mini SAS to SAS cables are not connected from the SAS HBA card interfaces of the ASs to the SAS host ports of the S2600S controller enclosure. ● The captive screws on one end of the mini SAS to SAS cable are loosened.

Item	Normal	Abnormal
mini SAS cables	• The mini SAS cables are connected properly in compliance with the principles for connecting the D120S disk enclosures. • The mini SAS cables are fixed to the rack.	• The mini SAS cables are not connected from the mini SAS expander ports of the S2600 controller enclosure to the PRI expander ports of the D120S disk enclosures. • The mini SAS cable is not connected from the PRI expander port of one D120S disk enclosure to the EXP expander port of another D120S disk enclosure. • The mini SAS cables are not fixed on the rack.
Serial port cables	• The serial port cables are connected from the UPS serial ports of the S2600 controller enclosure to the UPS modules. • The serial port cables are connected from the CLI serial port of the S2600 controller enclosure to the maintenance terminal. • The captive screws of the serial port cables are fastened.	• The UPS serial port cables are not connected from the serial ports of the S2600 controller enclosure to the UPS modules. • The serial port cables are not connected from the CLI serial port of the S2600 controller enclosure to the maintenance terminal. • The captive screws of the serial port cables are loosened.
Optical fibers [c]	The optical fibers are connected from the ASs to the FC host ports of the S2600F controller enclosure or the S2600C controller enclosure.	The optical fibers are not connected from the ASs to the FC host ports of the S2600F controller enclosure or the S2600C controller enclosure.
Network cables [d]	The network cables are connected from the ASs to the iSCSI host ports of the S2600i controller enclosure or the S2600C controller enclosure.	The network cables are not connected from the ASs to the iSCSI host ports of the S2600i controller enclosure or the S2600C controller enclosure.
a: applies to the S2600 controller enclosure configured with UPS modules. b: applies to the S2600S controller enclosure. c: applies to the S2600F controller enclosure or the S2600C controller enclosure. d: applies to the S2600i controller enclosure or the S2600C controller enclosure.		

2.5 Power-On

This topic describes how to power-on the S2600 controller enclosure.

Context

After installing all parts and connecting all cables properly, power on the S2600 controller enclosure.

CAUTION

Before powering on the S2600 controller enclosure, make sure that the main power switch of the cabinet is off and that the power switch of the UPS module is switched to the **OFF** end.

CAUTION

- When the controller enclosure is powering on, do not insert or remove the mini SAS cables, hard disk modules, controllers, expander modules, optical fibers, network cables, or serial port cables; otherwise, data might be lost.
- Do not switch off or on the power before the hard disks stop reading or writing data. Otherwise, this might induce damage to the hard disks or data loss. Wait at least one minute after you cut off the power. Then connect to the power again.

Procedure

Step 1 Remove the power cable that is connected to the S2600 controller enclosure from the power socket of the cabinet. If the S2600 controller enclosure is configured with a UPS module, disconnect the UPS module from the power socket of the cabinet.

Step 2 Connect the cabinet to the power to power on the D120S disk enclosure.

Step 3 Check the status of the indicators of the D120S disk enclosure to judge whether the D120S disk enclosure is started normally. If the D120S disk enclosure is started normally, perform the next step. For details on the D120S disk enclosure, see the *OceanStor D120S Disk Enclosure User Guide*.

NOTE

Step 4 is only for the S2600 controller enclosure configured with the UPS module. For the S2600 controller enclosure without a UPS module, go to **Step 5**.

Step 4 Reconnect the UPS module to the power socket of the cabinet by AC power cables. Switch the power switches of the UPS module to the **ON** end.

Step 5 Reconnect the S2600 controller enclosure to the power socket of the cabinet by the power cable.

Step 6 Connect the FC switch or the Ethernet switch to the power.

Step 7 Connect the ASs to the power.

Step 8 Start the services of the ASs.

Step 9 Wait at least five minutes, and then check the status of the indicators of the S2600 controller enclosure to judge whether the S2600 controller enclosure is working normally. **Table 2-5** lists the normal status of the indicators of the S2600 controller enclosure. If the status of an indicator or some indicators is abnormal, see section **3.2 Checking the S2600 Controller Enclosure**.

Table 2-5 Normal status of the indicators of the S2600 controller enclosure after the power-on

Module	Indicator	Normal Status
System enclosure	Controller enclosure power indicator	Green on
	Startup/alarm indicator of the controller enclosure	Off
Disk enclosure	Running indicator of the SATA disk	Green on
	Alarm indicator of the SATA disk	Off
	Running indicator of the SAS disk	Green on
	Alarm indicator of the SAS disk	Off
Fan module	Fan running/alarm indicator	Green on
PEM	Power running/alarm indicator	Green on
Controller	Controller power indicator	Green on
	Controller alarm indicator	Off
	Link indicator of the mini SAS expander port	Green on
	Link indicator of the FC host port	Green on
	Rate indicator of the FC host port	● Green on (The rate is set to 4.25 Gbit/s.) ● Off (The rate is set to 2.125 Gbit/s or 1.0625 Gbit/s.)
	Link indicator of the SAS host port	Green on
	Active indicator of the SAS host port	Green, blinking (Data is being transmitted.)
		Off (No data is being transmitted.)
	Active indicator of the iSCSI host port	Orange, blinking (Data is being transmitted.)
		Off (No data is being transmitted.)
	Link indicator of the iSCSI host port	Green on
	Management network port active indicator	Orange, blinking (Data is being transmitted.)
		Off (No data is being transmitted.)
	Management network port link indicator	Green on

Step 10 Initialize the storage system. For details on initializing the storage system, see the *OceanStor S2600 Controller Enclosure Storage System Initial Configuration Guide*.

----End

2.6 Power-Off

This topic describes how to power off the S2600 controller enclosure.

Context

The storage system is designed to run ceaselessly around the clock.

DANGER

Do not touch the connectors of power cables or communication cables. Otherwise, human bodies might get an electrical shock if there is current in the cables.

CAUTION

After switching off the power supply, wait at least one minute before switching on the power supply again to avoid damage to the hard disks or data loss.

Procedure

Step 1 Stop all the I/O data transmission between the AS and the storage system.

Step 2 Disconnect the AS from the S2600 controller enclosure, or power off the AS.

Step 3 Disconnect the FC switch or the Ethernet switch from the storage system, or power off the FC switch or the Ethernet switch.

Step 4 Check the indicators of the D120S disk enclosure. Make sure that no running indicators of the SAS disks or the SATA disks are blinking.

If the running indicator of a disk or running indicators of multiple disks are blinking, it indicates that data is being written into or read from the disk or disks. Do not perform the next step until the indicator or indicators stop blinking.

Step 5 Check the indicators of the S2600 controller enclosure. Judge whether the parts of the S2600 controller enclosure are normal with reference to **Table 2-5**. If an alarm is generated, see section **3.2 Checking the S2600 Controller Enclosure**.

Step 6 Disconnect the S2600 controller enclosure from the power socket of the cabinet.

NOTE

Step 7 and **Step 8** are only for the S2600 controller enclosure configured with a UPS module. For the S2600 controller enclosure without the UPS module, go to **Step 9**.

Step 7 Switch the power switch of the UPS module to the **OFF** end, and disconnect the UPS module from the power socket of the cabinet.

Step 8 Check the battery discharging indicator on the UPS module. Make sure that the battery discharging indicator is off.

If the battery discharging indicator is on, it indicates that the UPS module is supplying power to the S2600 controller enclosure. Do not perform the next step until the battery discharging indicator turns off.

Step 9 Disconnect the cabinet from the power supply to power off the D120S disk enclosure.

----End

3 Routine Maintenance

About This Chapter

This chapter describes how to conduct routine maintenance for the S2600 controller enclosure.

3.1 Basic Principles

This topic describes the basic rules for routine maintenance.

NOTE

Learn the latest update of the OS and application software. Update the OS and application software if necessary.

When maintaining the S2600 controller enclosure, follow the basic principles below:

- When using the device, pay attention to the related precautions to avoid accidents.
- When using the device, follow the proper operation procedure and instructions.
- Use resources and software provided to avoid potential problems or abnormalities.
- Lay down a reliable backup plan.
  - To protect integrity of the backup data, the data backup period and backup check time are user-defined.
  - Back up the data whenever necessary if the data frequently changes.
- Keep certain spare parts on the spot for timely replacement when a fault occurs.
  - Before adding the devices, make sure that no collisions occur to the devices.
  - Replenish spare parts timely.
- Log the process of troubleshooting for subsequent analysis and tracking.

  It is recommended to make one change each time and record the result of the change, including the collected error information and other information.

3.2 Checking the S2600 Controller Enclosure

This topic describes the steps of removing the faults of the S2600 controller enclosure.

You can monitor the status of the S2600 controller enclosure by using the OceanStor Integrated Storage Management (OceanStor ISM) software.

The OceanStor ISM provides a mature management platform for the storage system and supports online fault diagnosis. It configures and manages the S2600 storage system through a GUI. The administrator can perform the following operations:

- Creating, configuring, and deleting hosts or host groups.
- Creating, configuring, and deleting RAID groups.
- Creating, configuring, deleting, formatting and extending LUNs.
- Creating, adding, and deleting users, and changing the user level.
- Setting hot-spare disks.

The OceanStor ISM helps the administrator know the status of the S2600 controller enclosure and locate the fault.

To troubleshoot the S2600 controller enclosure, do as follows:

1. Check the status of the indicators of the S2600 controller enclosure. For details, see **Table 1-4**.

2. Log in to the OceanStor ISM through the Internet Explorer (IE). For details, see the *OceanStor S2600 Controller Enclosure Storage System User Guide*.
3. View the faulty parts. On the OceanStor ISM main interface, click the **Physical View** tab and select the faulty controller enclosure in the navigation tree. Select **Device Figure** in the operating area. View the faulty part of the controller enclosure by clicking the corresponding icon.
4. Choose **Alarm** > **Alarm Management...** on the menu bar. The **Alarm Management** interface is displayed. Select the corresponding alarm in the **Current Alarm** tab. Remove the fault according to the **Advice**.
5. If the problem persists, contact for technical support. For how to obtain technical support, see Appendix A "How to Obtain Help."

3.3 Prerequisites for Optional Parts

This topic describes prerequisites for optional parts.

3.3.1 Preparation

This topic describes how to get prepared before replacing the parts.

The controller (controllers), disk modules, fan modules, and the PEM (PEMs) are replaceable parts.

Before installing or replacing the parts, make the following preparations:

- Confirming operation feasibility
  - Optional parts for installation or replacement are available in the warehouse. When the optional parts are in short supply, contact for help. For how to obtain technical support, see Appendix A "How to Obtain Help."
  - Make sure that the new parts are free from defects such as oxidation, chemical erosion, loosened units, and shipment damage.
  - Understand the operations for installing and replacing parts, and master the basic skills required for installing and replacing the optional parts by reading this document.
- Arranging the required parts and tools
- Preparing the optional parts for installation or replacement

  To handle and transport the parts, use specific antistatic package bags. During routine maintenance, properly collect, log and repair the parts.
- Preparing tools such as cross screwdrivers, straight screwdrivers, and ESD-preventive wrist straps

  The supplier must provide the tool list and discuss with you which party should provide the tools.
- Determining the installation or replacement position

  Confirm the location information of the part to be replaced on the cabinet or on the controller enclosure. Label the desired cabinet and controller enclosure to avoid mis-operations.

If encountering some intractable problems during the replacement, seek technical support. For how to seek technical support, see Appendix A "How to Obtain Help."

3.3.2 Precautions

This topic describes the security precautions of replacing the parts.

DANGER

Do not touch the connectors of power cables or communication cables. Otherwise, human bodies might get an electrical shock if there is current in the cables.

CAUTION

When you replace a faulty component, you need to remove it and install the new component within two minutes.

Note the following when installing and replacing optional parts:

- Wear an ESD-preventive wrist strap to protect you and the devices from electrostatic damages.
- Keep the area of the parts clean. Keep the parts away from the devices that generate heat, such as a heat sink.
- When operating the parts, make sure that you tight the sleeves or roll the sleeves above the elbows. It is suggested that you should not wear jewelry, watches, metal frame glasses, or clothes with metal buttons.
- Do not plug or remove the parts fiercely. Otherwise, you might damage their appearance or cause faults of the connectors.
- Ensure that the devices are well grounded.

3.4 Replacing a Controller

This topic describes how to replace a controller.

3.4.1 Removing a Controller

This topic describes the steps of removing a controller.

Procedure

Step 1 Wear antistatic gloves or an ESD-preventive wrist strap. For details on wearing an ESD-preventive wrist strap, see **Step 1** in section **2.3.2 Installing the UPS Module into the Cabinet**.

NOTE

Step 2 is only for the dual-controller S2600 controller enclosure. For the single-controller S2600 controller enclosure, skip **Step 2**.

Step 2 Check the indicators on the front and rear sides of the S2600 controller enclosure. Then, log in to the OceanStor ISM to locate the faulty controller.

CAUTION

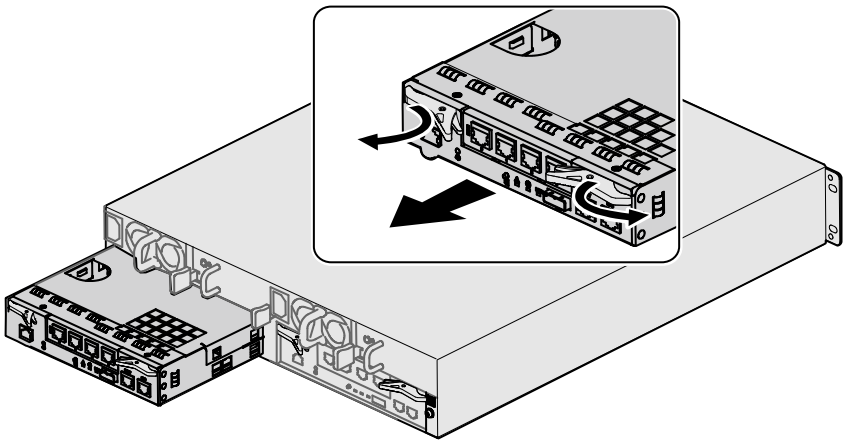
Before connecting power cables, ensure that all power supplies of the storage system have been shut down.

Step 3 For the dual-controller S2600 controller enclosure, switch the services of the faulty controller or the controller that needs to be replaced to the other controller on the OceanStor ISM. For the single-controller S2600 controller enclosure, shut down or transfer the services of the controller.

Step 4 Pull out the mini SAS cables.

Step 5 Open the left and right spring leafs of the controller in the arrow direction, and then pull the controller out, as shown in **Figure 3-1**.

Figure 3-1 Removing a controller



Step 6 Put the removed controller in an antistatic bag.

----End

3.4.2 Installing a Controller

This topic describes the steps of installing a controller.

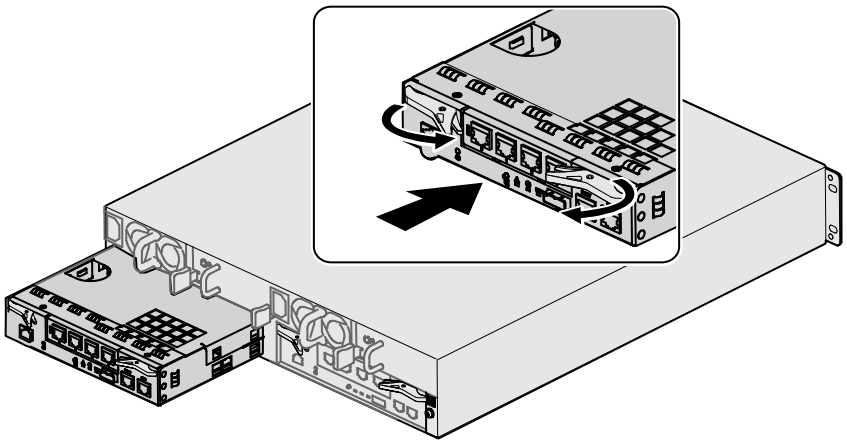
Procedure

Step 1 Wear antistatic gloves or an ESD-preventive wrist strap. For details on wearing an ESD-preventive wrist strap, see **Step 1** in section **2.3.2 Installing the UPS Module into the Cabinet**.

Step 2 Take out the controller to be installed from the antistatic bag.

Step 3 Insert the controller into a vacant slot, as shown in **Figure 3-2**.

Figure 3-2 Installing a controller



CAUTION

- Fasten the mini SAS cables to the cabinet to prevent cable damage or loosening.
- To ensure that the system can work properly, after installing the controller, you are recommended to pull the handle of the controller hard in the inverse direction of the arrow, which is shown in **Figure 3-2**. If the controller cannot be pulled out, it indicates that the controller is installed successfully. Otherwise, you need to reinstall the controller.

Step 4 Connect the mini SAS cables.

Step 5 View the status of the controller power indicator and the controller alarm indicator to determine whether the installation is successful.

NOTE

It takes 5 to 8 minutes for the controller to start up. Wait for the controller to be fully powered on before checking the status of the indicators.

- The controller power indicator is on and the controller alarm indicator is off: The installation is successful.
- The controller power indicator is off or the controller alarm indicator is on: The new controller might be installed improperly. Repeat **Step 3** to **Step 4** to install the controller again. If the

controller alarm indicator is still on after the controller is reinstalled, the controller is probably faulty. Please replace the controller.

Step 6 Log in to the OceanStor ISM, and click Controller Enclosure in the navigation tree to view whether the parts are normal.

- Yes: The installation is complete. Log in to the OceanStor ISM, and choose **Alarm** > **Alarm Management** on the menu bar. The **Alarm Management** interface is displayed. The recovery time of the alarm is displayed in the **Recovery Time** on the **Current Alarm** tab.
- No: Choose **Alarm** > **Alarm Management** on the menu bar of the OceanStor ISM. The **Alarm Management** interface is displayed. Remove the fault according to the **Advice** on the **Current Alarm** tab. If the problem persists, contact for technical support. For how to obtain technical support, see Appendix A "How to Obtain Help."

----End

3.5 Replacing a Hard Disk Module

This topic describes how to replace a hard disk module.

3.5.1 Removing a Hard Disk Module

This topic describes the steps of removing a hard disk module.

Context

CAUTION

When you remove or insert a hard disk, the interval between removing and inserting must be at least one minute to avoid damage to the hard disk.

Procedure

Step 1 Wear antistatic gloves or an ESD-preventive wrist strap. For details on wearing an ESD-preventive wrist strap, see **Step 1** in section **2.3.2 Installing the UPS Module into the Cabinet**.

CAUTION

- To avoid damaging the hard disk or the connector, you need to evenly and carefully remove or install the hard disk.
- To avoid data loss, you only need to replace the hard disk whose alarm indicator is on or the hard disk whose status on the OceanStor ISM is faulty. **Table 1-4** lists the details of the indicators.

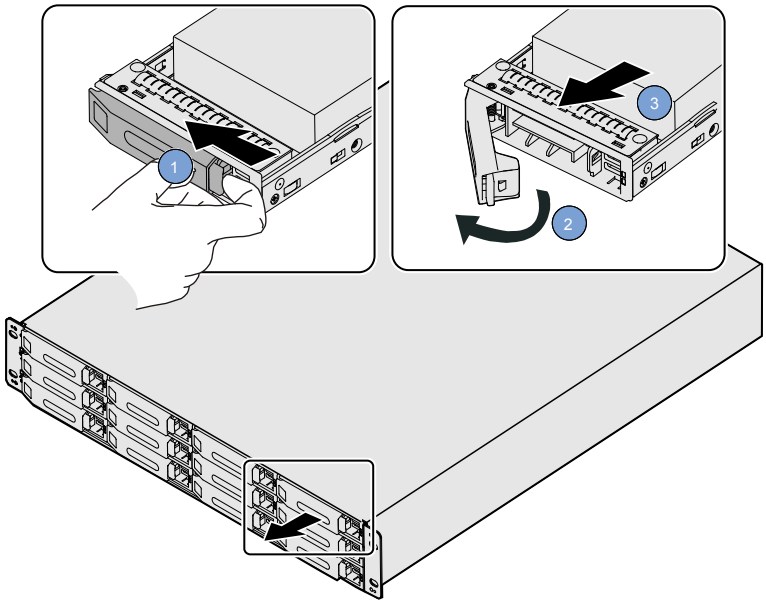
Step 2 Check the indicators on the front panel of the controller enclosure. At the same time, log in to the OceanStor ISM to locate the faulty hard disk module.

Step 3 Press the buckle on the handle, as shown in step (1) in **Figure 3-3**.

Step 4 Open the handle, as shown in step (2) in **Figure 3-3**.

Step 5 Pull out the faulty hard disk module, as shown in step (3) in **Figure 3-3**.

Figure 3-3 Removing a hard disk module



Step 6 Put the removed hard disk module in an antistatic bag.

Step 7 Wait one minute, and then log in to the OceanStor ISM. Choose **Alarm** > **Alarm Management**and then make sure that the hard disk module is removed on the **Current Alarm** tab.

----End

3.5.2 Installing a Hard Disk Module

This topic describes the steps of installing a disk module.

Procedure

Step 1 Wear antistatic gloves or an ESD-preventive wrist strap. For details on wearing an ESD-preventive wrist strap, see **Step 1** in section **2.3.2 Installing the UPS Module into the Cabinet**.

Step 2 Take the hard disk module out of the antistatic bag.

CAUTION

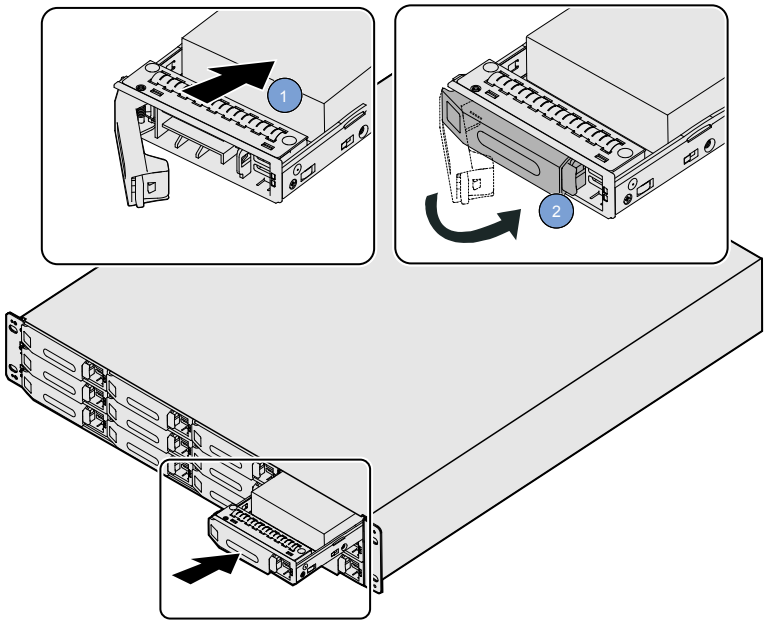
- Before you insert the hard disk, ensure that the handle on the hard disk module is fully opened; otherwise, the hard disk module cannot be inserted into a vacant slot completely.
- To insert a hard disk, aim the hard disk exactly at the interface and then gently insert the hard disk to the interface. Otherwise, the interface of the hard disk might be damaged.

Step 3 Insert the hard disk module to the vacant slot. See step (1) in **Figure 3-4**.

Step 4 Close the handle. See step (2) in **Figure 3-4**.

When the hard disk boots up, the running indicator of the hard disk blinks. It indicates that data is being restored to the new hard disk.

Figure 3-4 Installing a hard disk module



Step 5 View the status of the hard disk running indicator and the hard disk alarm and location indicator to judge whether the installation is successful.

- The hard disk running indicator and the hard disk alarm and location indicator are off: The installation is successful.

- The hard disk alarm and location indicator is on: The hard disk module might be installed improperly. See section **3.5.1 Removing a Hard Disk Module** and remove the hard disk module. Wait a minute, and then repeat **Step 3** and **Step 4** to reinstall the hard disk module.
- If the hard disk alarm and location indicator is still on after reinstallation, the newly installed hard disk module might be defective. Replace the hard disk module with a new one.

Step 6 Wait one minute, and then log in to the OceanStor ISM. Select the **Physical View** tab, and then select **Controller Enclosure** to view whether the parts are normal.

- Yes: The installation is complete. Log in to the OceanStor ISM, and choose **Alarm** > **Alarm Management...** on the menu bar. The **Alarm Management** interface is displayed. The recovery time of the alarm is displayed in the **Recovery Time** on the **Current Alarm** tab.
- No: Choose **Alarm** > **Alarm Management...** on the menu bar of the OceanStor ISM. The **Alarm Management** interface is displayed. Remove the fault according to the **Advice** on the **Current Alarm** tab. If the problem persists, contact for technical support. For how to obtain technical support, see Appendix A "How to Obtain Help."

----End

3.6 Replacing a Fan Module

This topic describes how to replace a fan module.

3.6.1 Removing a Fan Module
This topic describes the steps of removing a fan module.

3.6.2 Installling a Fan Module
This topic describes the steps of installing a fan module.

3.6.1 Removing a Fan Module

This topic describes the steps of removing a fan module.

Context

DANGER

The blades of the fan might still rotate fast after the fan is removed. Your hand will be injured if you touch the rotating blades.

CAUTION

- When you replace a faulty fan module, you must remove the faulty fan module and install a new one within 1.5 minutes.
- Do not remove two fan modules at the same time.

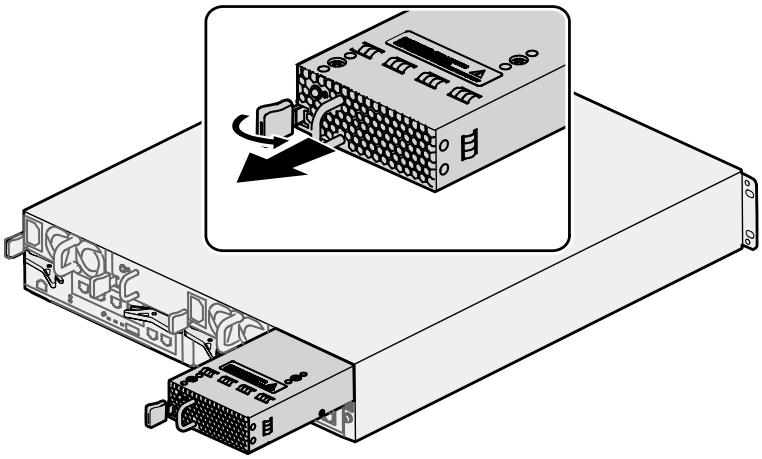
Procedure

Step 1 Wear antistatic gloves or an ESD-preventive wrist strap. For details on wearing an ESD-preventive wrist strap, see **Step 1** in section **2.3.2 Installing the UPS Module into the Cabinet**.

Step 2 Check the status of the fan running/alarm indicator. Log in to the OceanStor ISM to locate the faulty fan module.

Step 3 Press the fan module spring leaf, hold the fan module handle, and then pull the fan module out, as shown in **Figure 3-5**.

Figure 3-5 Removing a fan module



Step 4 Put the removed fan module in an antistatic bag.

----End

3.6.2 Installling a Fan Module

This topic describes the steps of installing a fan module.

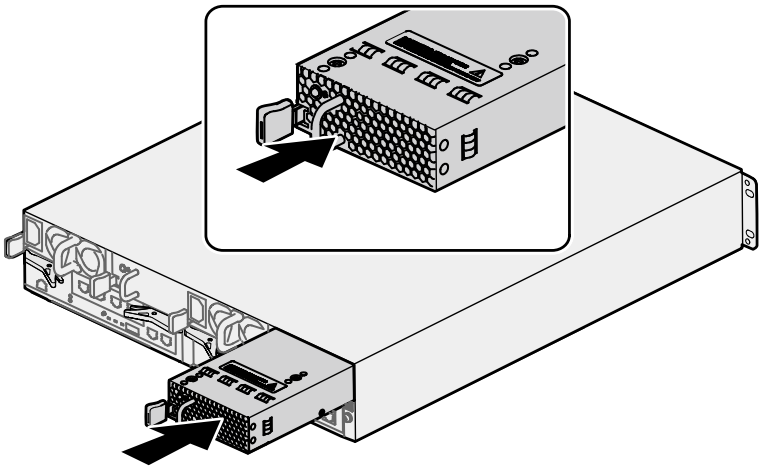
Procedure

Step 1 Wear antistatic gloves or an ESD-preventive wrist strap. For details on wearing an ESD-preventive wrist strap, see **Step 1** in section **2.3.2 Installing the UPS Module into the Cabinet**.

Step 2 Take the fan module to be installed out of the antistatic bag.

Step 3 Insert the fan module into the vacant slot, as shown in **Figure 3-6**.

Figure 3-6 Installing a fan module



Step 4 View the status of the fan running/alarm indicator to determine whether the installation is successful.

- The fan running/alarm indicator is green. The installation is successful.
- The fan running/alarm indicator is red or off. The fan module might be installed improperly. Repeat **Step 3** to **Step 4** to reinstall the fan module.

Step 5 Wait one minute, and then log in to the OceanStor ISM. Select the **Physical View** tab, and then select **Controller Enclosure** to view whether the parts are normal.

- Yes: The installation is complete. Log in to the OceanStor ISM, and choose **Alarm** > **Alarm Management** on the menu bar. The **Alarm Management** interface is displayed. The recovery time of the alarm is displayed in the **Recovery Time** on the **Current Alarm** tab.
- No: Choose **Alarm** > **Alarm Management**on the menu bar of the OceanStor ISM. The **Alarm Management** interface is displayed. Remove the fault according to the **Advice** on the **Current Alarm** tab. If the problem persists, contact for technical support. For how to obtain technical support, see Appendix A "How to Obtain Help."

----End

3.7 Replacing a PEM

This topic describes how to replace a PEM.

3.7.1 Removing a PEM

This topic describes the steps of removing a PEM.

Context

DANGER

Do not touch the connectors of electrical wires and communication cables, for there is electricity inside the electrical wires and communication cables. The electricity might result in electrical shock.

CAUTION

When you replace a faulty PEM, you must remove the faulty PEM and install a new one within two minutes.

The steps for removing a DC PEM module are the same as the steps for removing an AC PEM module. Take removing an AC PEM module from the controller subrack as an example.

Procedure

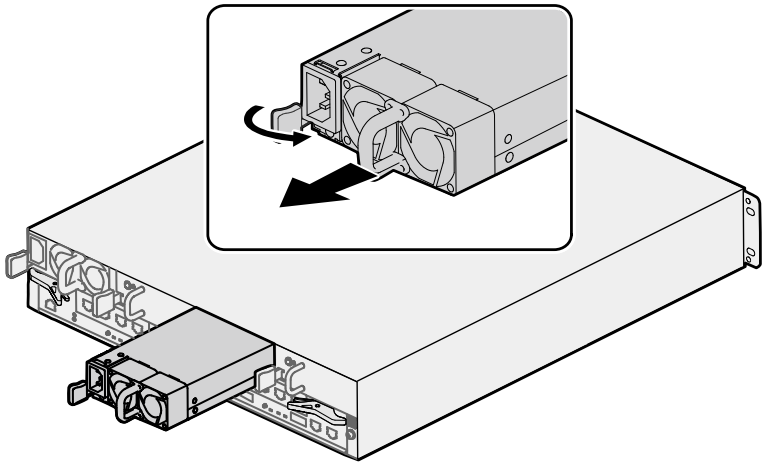
Step 1 Wear antistatic gloves or an ESD-preventive wrist strap. For details on wearing an ESD-preventive wrist strap, see **Step 1** in section **2.3.2 Installing the UPS Module into the Cabinet**.

Step 2 Check the status of the power running/alarm indicator of the controller enclosure. Log in to the OceanStor ISM to locate the faulty PEM.

Step 3 Remove the power cable.

Step 4 Press the PEM spring leaf, hold the PEM handle, and then pull the controller out, as shown in **Figure 3-7**.

Figure 3-7 Removing a PEM



Step 5 Put the removed PEM in an antistatic bag.

----End

3.7.2 Installing a PEM

This topic describes the steps of installing a PEM.

Context

DANGER

Do not touch the connectors of electrical wires and communication cables, for there is electricity inside the electrical wires and communication cables which could result in electrical shock.

The steps for installing a DC PEM module are the same as the steps for installing an AC PEM module. Take installing an AC PEM module from the controller subrack as an example.

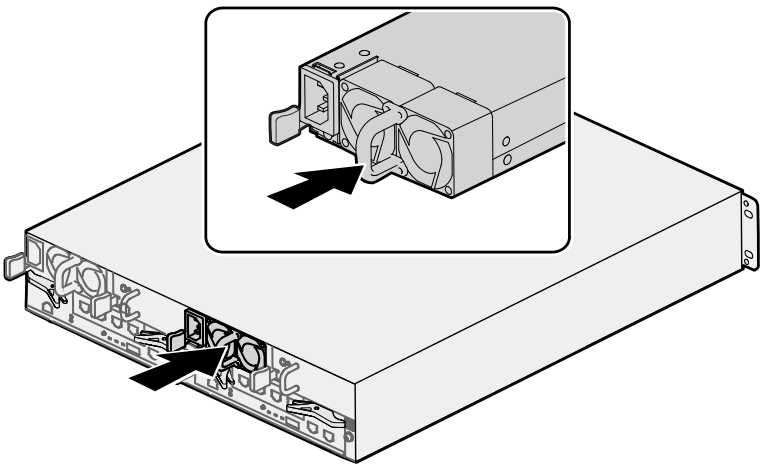
Procedure

Step 1 Wear antistatic gloves or an ESD-preventive wrist strap. For details on wearing an ESD-preventive wrist strap, see **Step 1** in section **2.3.2 Installing the UPS Module into the Cabinet**.

Step 2 Take the PEM to be installed out of the antistatic bag.

Step 3 Insert the PEM into the vacant slot, as shown in **Figure 3-8**.

Figure 3-8 Installing a PEM



Step 4 Insert the power cable.

Step 5 View the status of the power running/alarm indicator to determine whether the installation is successful.

- The power running/alarm indicator is green. The installation is successful.
- The fan running/alarm indicator is red or off. The fan module might be installed improperly. Repeat **Step 3** to **Step 4** to reinstall the fan module.

Step 6 Wait one minute, and then log in to the OceanStor ISM. Select the **Physical View** tab, and then select **Controller Enclosure** to view whether the parts are normal.

- Yes: The installation is complete. Log in to the OceanStor ISM, and choose **Alarm** > **Alarm Management** on the menu bar. The **Alarm Management** interface is displayed. The recovery time of the alarm is displayed in the **Recovery Time** on the **Current Alarm** tab.
- No: Choose **Alarm** > **Alarm Management**on the menu bar of the OceanStor ISM. The **Alarm Management** interface is displayed. Remove the fault according to the **Advice** on the **Current Alarm** tab. If the problem persists, contact for technical support. For how to obtain technical support, see Appendix A "How to Obtain Help."

----End

3.8 Replacing an UPS Module

This topic describes how to replace an UPS module.

3.8.1 Removing an UPS Module

This topic describes the steps of removing an UPS module.

Context

DANGER

- Do not open or move the shell of the UPS module to avoid an electrical shock.
- Do not repair a faulty UPS module by yourself. Send it to the manufacturer for repair.

CAUTION

Replace the UPS module with another UPS module of the same type, otherwise the UPS module may not be powered on normally.

Procedure

Step 1 Wear antistatic gloves or an ESD-preventive wrist strap. For details on wearing an ESD-preventive wrist strap, see **Step 1** in section **2.3.2 Installing the UPS Module into the Cabinet**.

NOTE

Step 2 is only for the S2600 controller enclosure configured with the UPSs. For the S2600 controller enclosure configured with one UPS module, skip Step 2.

Step 2 Check the indicators of the UPS modules or log in to the OceanStor ISM to locate the faulty UPS module.

Step 3 Screw the captive screws on the DB-9 connector of the serial port cable counter-clockwise, and then pull the cable out.

Step 4 Move the power switch of the faulty UPS module to the **OFF** end.

Step 5 Check the indicators of the UPS module after all indicators turn off then remove the UPS leadout to avoid an electrical shock.

Step 6 Loosen the four bolts that fix the UPS module in the UPS module enclosure.

Step 7 Hold the UPS handle, and pull it out.

Step 8 Put the UPS module in an antistatic bag.

----End

3.8.2 Installing an UPS Module

This topic describes the steps of installing an UPS module.

Context

CAUTION

- Before installing the UPS module, make sure that the UPS module is in the off status, that is, all indicators of the UPS module is off and the power switch of the UPS module is at the **OFF** end.
- If the UPS module to be installed is discharging, wait at least five minutes. Install the UPS module after the discharge is over.

Procedure

Step 1 Wear antistatic gloves or an ESD-preventive wrist strap. For details on wearing an ESD-preventive wrist strap, see **Step 1** in section **2.3.2 Installing the UPS Module into the Cabinet**.

Step 2 Take the UPS module out of the antistatic bag.

Step 3 Insert the UPS module to the UPS module enclosure, and screw the four bolts tightly.

Step 4 Connect the UPS leadout to the UPS power output socket.

Step 5 Insert the DB-9 connector of the serial port cable to the serial port of the UPS module, and screw the captive screws tightly.

Step 6 Connect the AC power cable to the power input jack of the UPS module, and move the power switch of the UPS module to the **ON** end.

----End

3.9 Replacing a BBU Module

This topic describes how to replace a BBU module.

3.9.1 Removing a BBU Module
This topic describes the steps of removing a BBU module.

3.9.2 Installing a BBU Module
This topic describes the steps of installing a BBU module.

3.9.1 Removing a BBU Module

This topic describes the steps of removing a BBU module.

Context

DANGER

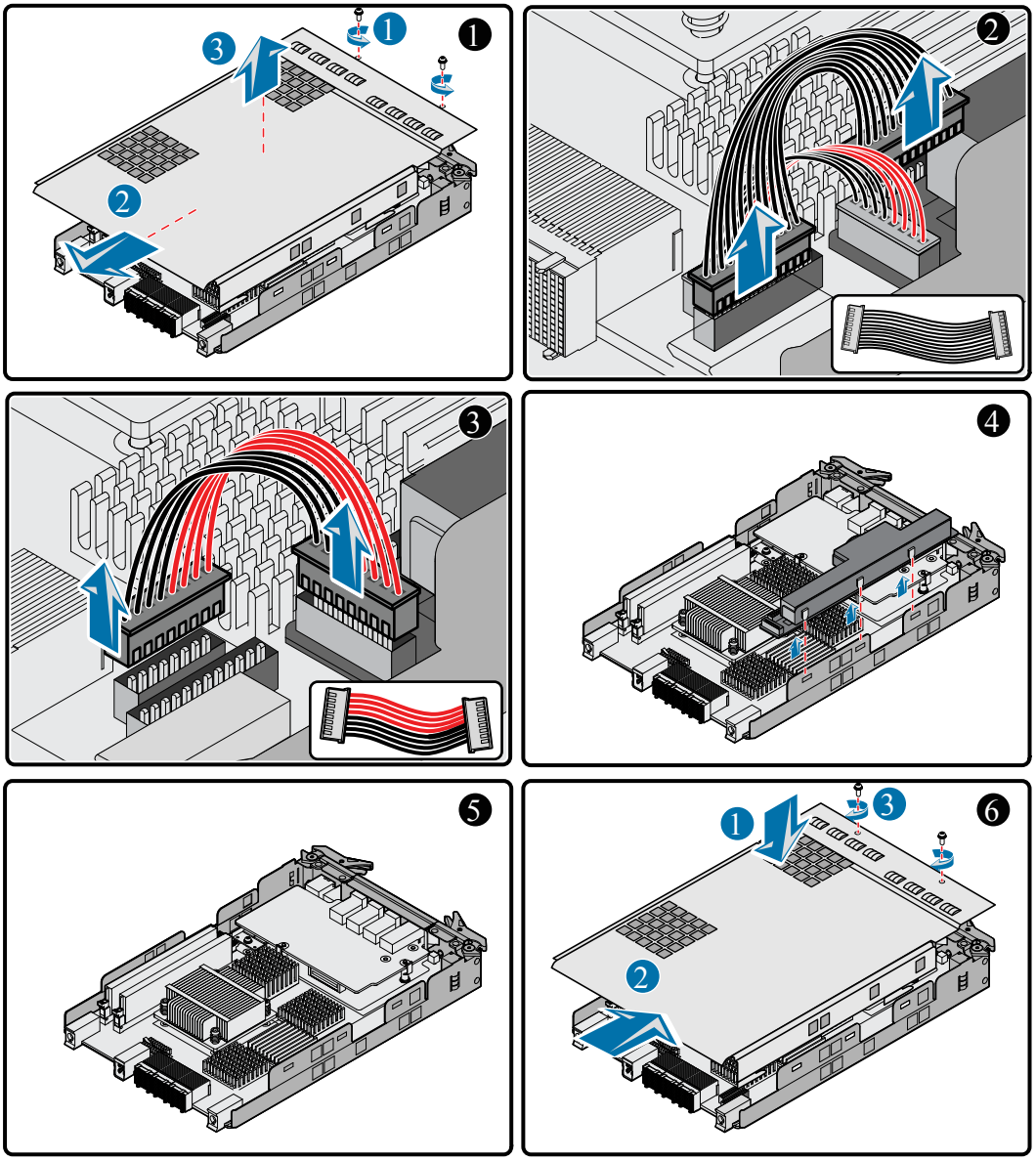
- The faulty BBU module must be replaced by a module of the same type.
- Do not repair the BBU module by yourself. Please send the faulty BBU module to the manufacturer for repair.

Procedure

Step 1 Wear antistatic gloves or an ESD-preventive wrist strap. For details on wearing an ESD-preventive wrist strap, see **2.3.2 Installing the UPS Module into the Cabinet**.

Step 2 Loosen the captive screw on the system subrack counterclockwise by using a screwdriver. Open the panel. See step (1) in **Figure 3-9**.

Figure 3-9 Removing a BBU Module



Step 3 Remove the black signal cable. See step (2) in **Figure 3-9**.

Step 4 Remove the power cable. See step (3) in **Figure 3-9**.

Step 5 Remove the three subcards on the side of the BBU module from the three slots on the controller subrack. See step (4) and step (5) in **Figure 3-9**.

Step 6 Close the panel. Fasten the captive screw. See step (6) in **Figure 3-9**.

----End

3.9.2 Installing a BBU Module

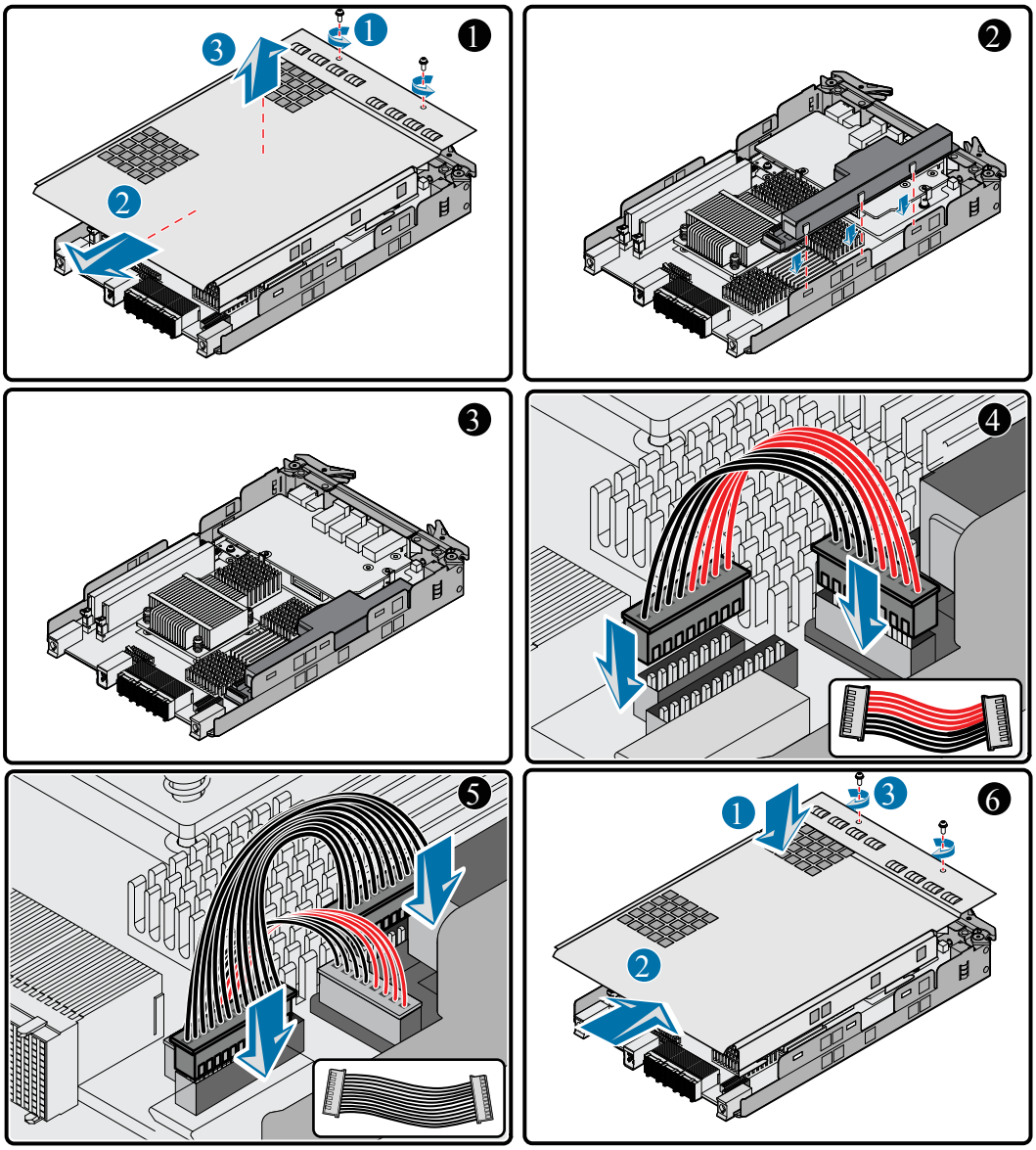
This topic describes the steps of installing a BBU module.

Procedure

Step 1 Wear antistatic gloves or an ESD-preventive wrist strap. For details on wearing an ESD-preventive wrist strap, see**2.3.2 Installing the UPS Module into the Cabinet**.

Step 2 Remove the faulty BBU module. See step (1) and step (2) in **Figure 3-10**.

Figure 3-10 Installing a BBU Module



Step 3 Slowly insert the three subcards on the side of the BBU module into the three slots on the controller subrack. See step (3) in **Figure 3-10**.

Step 4 Insert the power cable. See step (4) in **Figure 3-10**.

Step 5 Insert the signal cable. See step (5) in **Figure 3-10**.

Step 6 Close the panel. Fasten the captive screw. See step (6) in **Figure 3-10**.

----End

4 Troubleshooting

About This Chapter

This chapter describes how to conduct troubleshooting for the controller enclosure.

4.1 Precautions

This topic describes the precautions.

DANGER

Do not touch the connectors of electrical wires and communication cables, for there is electricity inside the electrical wires and communication cables which could result in electrical shock.

CAUTION

Wear the ESD-preventive gloves or wrist strap before installing or replacing the device. Otherwise, the static electricity of your body might damage the ESSDs on the circuit board.


This symbol indicates the electrostatic sensitive area. When operating a device in this area, you must take ESD-preventive measures, such as wearing an ESD-preventive wrist strap or ESD-preventive gloves.

Pay attention to the following items during troubleshooting:

- Do not troubleshoot in the case of lightening.
- Ensure that the power cables are intact and effective grounding measures are taken.
- Keep the troubleshooting area clean and dry.
- To remove a hard disk, first remove the interfaces. Wait 10 seconds before removing the hard disk from the system enclosure. To insert a hard disk, place the hard disk horizontally, and slowly insert the hard disk to the correct slot of the system enclosure.

4.2 Troubleshooting Principles

This topic describes the troubleshooting principles.

During troubleshooting, observe the following principles:

- Analyze the external factors and then the internal factors.

  In troubleshooting, consider the outside factors first, such as power interruption and the faults of a peer device.
- Analyze the network and then the network elements (NEs).

  According to the network topology, analyze whether the network environment is normal and whether an interconnected device is faulty. Try to locate the fault specifically.
- Analyze the alarms with a higher severity and then the alarms with a lower severity.

  Analyze the alarms with a higher severity first, such as a critical alarm or major alarm. Then, analyze the alarms with a lower severity, such as a warning alarm.

4.3 Troubleshooting Resources

This topic describes the troubleshooting resources.

4.3.1 Indicators

This topic describes the indicators for troubleshooting.

The S2600 controller enclosure has the following indicators:

- Controller enclosure startup/alarm indicator
- Controller enclosure power indicator
- Hard disk running indicator
- Hard disk alarm and location indicator
- Fan running/ alarm indicator
- Power running/ alarm indicator
- Management network interface active indicator
- Management network interface link indicator
- Controller alarm indicator
- Controller power indicator
- Mini SAS expander port link indicator
- FC host port link indicator
- FC host port rate indicator
- Mini SAS host port active indicator
- Mini SAS host port link indicator
- iSCSI host port active indicator
- iSCSI host port link indicator

You can preliminarily learn the current state of the S2600 controller enclosure by observing the indicators. For the description of the indicators, see **Table 1-4**.

4.3.2 OceanStor ISM

This topic describes the OceanStor ISM software.

The OceanStor ISM is a Java Web Start (JWS)-based storage system management software, which has the following advantages:

- Centralized device management

- User-friendly graphical interface
- Secure data transmission
- Diversified value-added tools

The OceanStor ISM also serves as a diagnostic tool and provides the following diagnosis functions:

- Viewing information on the controller enclosure

  You can view the information on the parts of the controller enclosure.
- Fault diagnosis

  When the system is faulty, the fault management module of the OceanStor ISM displays the latest fault information in a list. You can use the history alarm function to query history alarms based on different query conditions. For timely maintenance and monitor of the system, the fault management module notifies the administrator of current alarms by using emails, trap IP addresses, short messages, or buzzers.
- Viewing logs

  The logs record all the operations and system events. You can confirm operations to the device and thus locate the fault by querying these logs.

NOTE

- For details on the configuration of the OceanStor ISM, see the *OceanStor S2600 Controller Enclosure Storage System User Guide*.
- For details on the OceanStor ISM diagnosis process and recommended solutions, see the *OceanStor S2600 Controller Enclosure Storage System Online Help*.

4.3.3 Technical Documents

This topic describes how to obtain the technical documents for the troubleshooting.

To facilitate troubleshooting, you can obtain the latest technical documents by visiting **http://support.huawei.com**.

4.4 Troubleshooting Preparations

This topic describes the preparations before the troubleshooting.

Procedure

Step 1 Log in to the OceanStor ISM.

Step 2 Check the indicators of all the parts in the S2600 controller enclosure. For the description of the indicators, see **Table 1-4**.

Step 3 If the S2600 controller enclosure fails to run after replacing one part, remove this part and reinstall it.

----End

4.5 Troubleshooting Process

This topic describes the troubleshooting process.

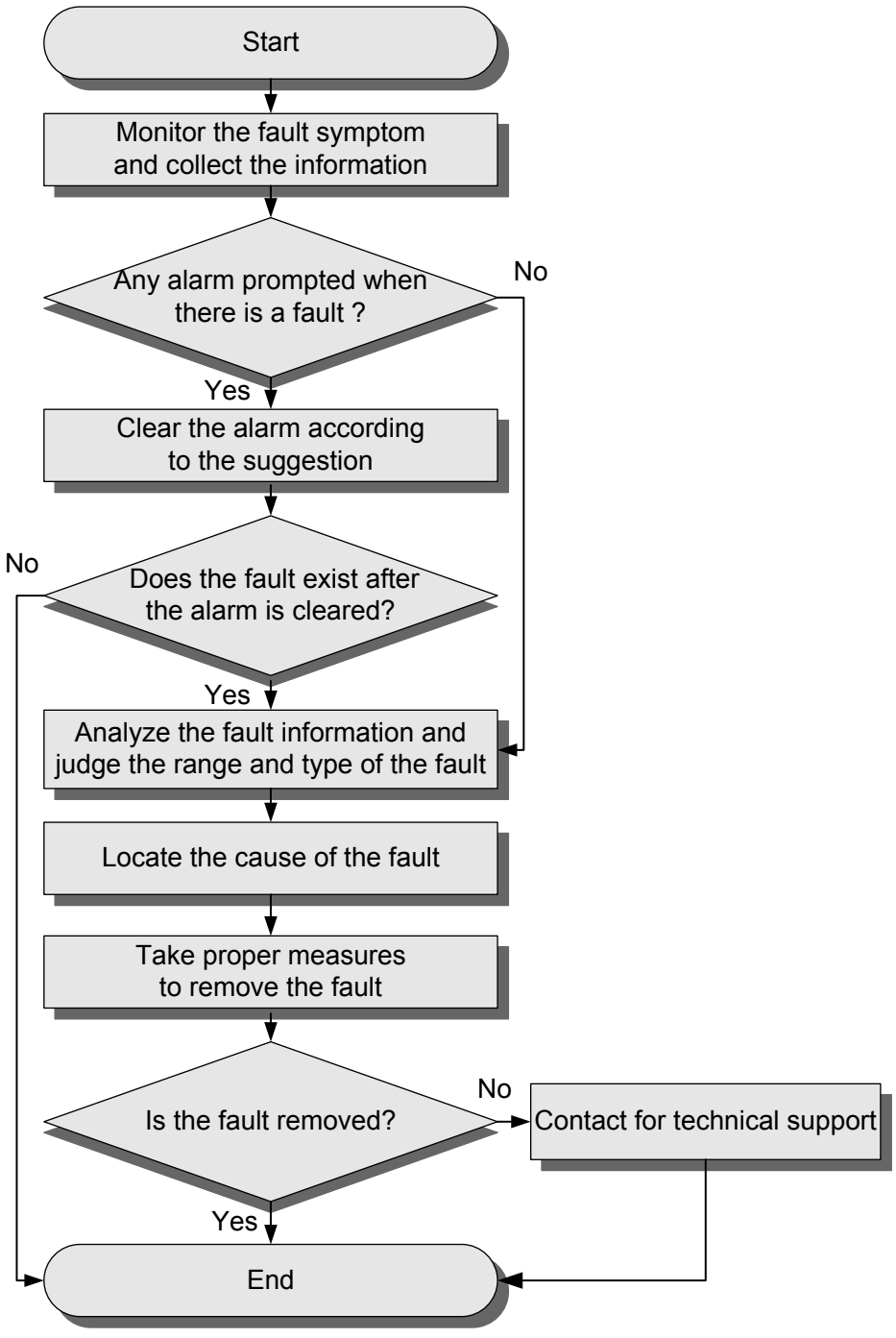
Troubleshooting means using a proper method to find the cause to a fault and remove the fault. The basic method is to shrink the range of the possible fault causes or divide the causes into several smaller ranges. Thus, it becomes easier to find the actual cause to the fault.

In general, a troubleshooting process consists of the following steps:

- Collecting information
- Determining the fault
- Locating the fault
- Removing the fault

Figure 4-1 shows the troubleshooting flow chart.

Figure 4-1 Troubleshooting process



NOTE

The process shown in **Figure 4-1** is a basic and recommended model for troubleshooting.

4.5.1 Collecting Information

This topic describes how to collect information for the troubleshooting.

4.5.2 Determining the Fault

This topic describes how to determine the fault.

4.5.1 Collecting Information

This topic describes how to collect information for the troubleshooting.

Since the size and complexity of the network are increasing, troubleshooting requires more complete and detailed original fault information. The information with such a feature helps you shrink the possible fault range and locate the fault quickly and accurately, thus increasing the troubleshooting efficiency.

Information You Need to Collect

You need to collect information not limited to the following:

- Versions of the hardware and software of the device
- Time and period of the fault
- Operations performed before and when the fault occurs
- Output information, log information, and alarm information about the device when the fault occurs
- Measures taken after the fault occurs

Sources of the Information

You can collect information from the following sources:

- Statements on faults from customers or customer service centers
- Exceptions found in routine maintenance and patrols (including the alarms queried through the OceanStor ISM)
- Fault bulletins on the AS
- Device state information and log information obtained during operating the device
- Debugging information exported through CLI

4.5.2 Determining the Fault

This topic describes how to determine the fault.

After obtaining enough information, and combining with the related principles and troubleshooting experience, you can preliminarily determine the range and type of the fault.

Determining the Fault Range

- All the services are faulty.

  You need to further check whether the AS is faulty at the same time.
- Some of the services are faulty.

  You need to further check the type and distribution of the faulty services on the AS, and check whether other services are faulty at the same time.

4.5.3 Locating the Fault

This topic describes how to locate the fault.

Fault location provides guidance and reference for the fault removal.

At a specific time point, a fault corresponds to a single cause. This feature determines the basic method of fault location, which is to find this single cause among all the possible causes through analysis, comparison, and rule-out.

Accurate and quick location helps you improve the troubleshooting efficiency and avoid accidents due to improper operations. For example, a more serious fault might occur if you wrongly operate the device.

4.5.4 Removing the Fault

This topic describes how to remove the fault.

Troubleshooting is the process of taking proper measures or steps to remove a fault and recover the system. The measures or steps include:

- Checking and repairing cables
- Replacing a part
- Modifying configuration data
- Resetting the system

During fault removal, keep detailed records of each operation, the operation result and symptom. When you contact for technical support, those records serve as an important reference.

4.6 Common Faults

This topic describes how to deal with the common faults.

4.6.1 Improper Power-On

This topic describes the solutions to the improper power-on.

Description

After switching on the power supply, the following symptoms occur to the PEMs and fan modules of the S2600 controller enclosure:

- The power running/alarm indicators of the two PEMs keep off.
- The fan running/alarm indicators of the two fan modules keep off.
- Only one of the power running/alarm indicators of the two PEMs is on and green.
- Only one of the fan running/alarm indicators of the two fan modules is on and green.
- The power running/alarm indicators are orange and on.
- The fan running/alarm indicators are red and on.

Solution

- Symptom: The power running/alarm indicators of the two PEMs keep off.
  1. Reinstall the PEMs, and make sure that they are inserted properly.
  2. Make sure that the power cables are in good condition. If the power cables are not in good condition, replace them.
  3. For the dual-controller S2600 controller enclosure, remove the two controllers respectively to find the module that causes the improper power-on. For details on removing a controller, see section **3.4 Replacing a Controller**.
  4. Remove the two PEMs respectively, and power on each PEM respectively to find the abnormal PEM and replace it. For details on removing and installing a PEM, see section **3.7 Replacing a PEM**.
  5. If the problem persists, contact technical support engineers.
- Symptom: The fan running/alarm indicators of the two fan modules keep off.
  1. Reinstall the fan modules, and make sure that the fan modules are inserted properly.
  2. Remove the two fan modules respectively, and power on each fan module respectively to find the abnormal fan module and replace it. For details on removing and installing a fan module, see section **3.6 Replacing a Fan Module**.
  3. If the problem persists, contact technical support engineers.
- Symptom: Only one of the power running/alarm indicators of the two PEMs is on and green.
  1. Reinstall the PEM (whose power running/alarm indicator is off), and make sure that the PEM is inserted properly.
  2. Make sure that the power cable of the PEM is in good condition. If the power cable is not in good condition, replace it.
  3. If the problem persists, contact technical support engineers.
- Symptom: Only one of the fan running/alarm indicators of the two fan modules is on and green.
  1. Reinstall the fan module (whose fan running/alarm indicator is off), and make sure that the fan module is inserted properly.
  2. If the problem persists, contact technical support engineers.
- Symptom: The power running/alarm indicators are orange and on.

  Remove and reinsert the PEMs. If the problem persists, replace the PEMs. For details on removing and installing a PEM, see section **3.7 Replacing a PEM**.

- Symptom: The fan running/alarm indicators are red and on.

  Remove and reinsert the fan modules. If the problem persists, replace the fan modules. For details on removing and installing a fan module, see section **3.6 Replacing a Fan Module**.

4.6.2 No Output from the Serial Port

This topic describes the solutions to the problem of no output from the serial port.

Description

The maintenance terminal is connected to the controller of the storage system through the DB-9 serial port, but no output is available on the maintenance terminal.

Procedure

Step 1 Make sure that the serial port cable is connected properly.

Step 2 Make sure that the serial ports are correctly set.

Step 3 Make sure that the controller power indicator is normal.

Step 4 Make sure that the serial port cable is in good condition. If the serial port cable can work normally after it is connected to another serial port, it indicates that the serial port cable is in good condition.

Step 5 Make sure that the controller is inserted properly.

Step 6 If the problem persists, contact technical support engineers.

----End

4.6.3 The OceanStor ISM Cannot Discover Arrays

This topic describes the solutions to the problem of the OceanStor ISM cannot discover arrays.

Description

After you log in to the OceanStor ISM, the OceanStor ISM cannot discover arrays.

Procedure

Step 1 Make sure that the management network link indicator is normal.

Step 2 Check whether the maintenance terminal is connected to the network.

Step 3 Log in to the OceanStor ISM again.

Step 4 Check whether the maintenance terminal and the arrays have correct settings of the IP addresses and whether they can be pinged between each other.

Step 5 Check whether the user name and the password are correct.

Step 6 Check whether the user has logged in already.

Step 7 Check whether the proxy service is enabled in the IE.

Step 8 Replace the network cable between the management network interface and the maintenance terminal.

Step 9 If the problem persists, contact technical support engineers.

----End

4.6.4 Connection Failure on an FC Host Port

This topic describes the solutions to the problem of the connection failure on an FC host port.

Description

The storage system cannot normally communicate with an AS.

Procedure

Step 1 Check whether the FC host port indicator is normal. For details on checking FC host port indicator, see section **Table 1-4**.

Step 2 Replace the optical fiber between the AS and the FC host port.

Step 3 Replace the controller.

Step 4 If the problem persists, contact technical support engineers.

----End

4.6.5 Connection Failure on a mini SAS Host Port

This topic describes the solutions to the problem of the connection failure on a mini SAS host port.

Description

The storage system cannot normally communicate with an AS.

Procedure

Step 1 Check whether the link indicator of the mini SAS host port is normal.

Step 2 Replace the mini SAS cable between the AS and the mini SAS host port.

Step 3 If the problem persists, contact technical support engineers.

----End

4.6.6 Connection Failure on an iSCSI Host Port

This topic describes the solutions to the problem of the connection failure on an iSCSI host port.

Description

The storage system cannot normally communicate with an AS.

Procedure

Step 1 Check whether the link indicator of the iSCSI host port is normal.

Step 2 Replace the network cable between the AS and the iSCSI host port.

Step 3 Check whether the Microsoft iSCSI Initiator is installed on the AS.

Step 4 Check whether the IE and IP settings are correct. For details, see the *OceanStor S2600 Controller Enclosure Storage System User Guide*.

Step 5 If the problem persists, contact technical support engineers.

----End

4.7 Contacting For Technical Support

This topic describes the ways to contact for technical support.

If a problem persists after you try to handle it under the guidance of this document, contact the local office or the customer service center timely by dialing 86-0755-28560000 or 4008302118.

When reporting the problem to engineers, you also need to provide the following information:

- Detailed name and address of the customer
- Contact name and telephone number
- Time when the fault occurs
- Detailed description of the fault symptom
- Device type and software version
- Measures taken after the fault occurs and related results
- Fault level and required solution deadline

NOTE

For detailed information on technical support, refer to Appendix A "How to Obtain Help."

5 Technical Specifications

About This Chapter

This topic describes the technical specifications of the controller enclosure.

5.1 Specifications

This topic describes the specifications of the controller enclosure.

5.1.1 Technical Parameters

This topic describes the technical parameters of the controller enclosure.

System Performance Parameters

Table 5-1, **Table 5-2**, **Table 5-3**, and **Table 5-4** list the system performance parameters of the S2600 controller enclosure.

Table 5-1 System performance parameters of the S2600F controller enclosure

Parameter	Value
Supported hard disk type	SAS and SATA
Minimum/Maximum number of hard disks	2/12
Maximum capacity of a SATA disk	2 TB
Maximum capacity of a SAS disk	600 GB
Number of mini SAS expander ports (for the dual-controller S2600 controller enclosure)	2
Number of mini SAS expander ports (for the single-controller S2600 controller enclosure)	1
Rate of the mini SAS expander port	4 x 3 Gbit/s
Number of FC host ports (for the dual-controller S2600 controller enclosure)	8
Number of FC host ports (for the single-controller S2600 controller enclosure)	4
Rate of the FC host port	4.25 Gbit/s, 2.125 Gbit/s, or 1.0625 Gbit/s
Maximum number of LUNs	512

Parameter	Value
Supported RAID level	RAID 0, RAID 1, RAID 5, RAID 6, and RAID 10

Table 5-2 System performance parameters of the S2600S controller enclosure

Parameter	Value
Supported hard disk type	SAS and SATA
Minimum/Maximum number of hard disks	2/12
Maximum capacity of a SATA disk	2 TB
Maximum capacity of a SAS disk	600 GB
Number of mini SAS expander ports (for the dual-controller S2600 controller enclosure)	2
Number of mini SAS expander ports (for the single-controller S2600 controller enclosure)	1
Rate of the mini SAS expander port	4 x 3 Gbit/s
Number of SAS host ports (for the dual-controller S2600 controller enclosure)	4
Number of SAS host ports (for the single-controller S2600 controller enclosure)	2
Rate of the SAS host port	4 x 3 Gbit/s
Maximum number of LUNs	512
Supported RAID level	RAID 0, RAID 1, RAID 5, RAID 6, and RAID 10

Table 5-3 System performance parameters of the S2600i controller enclosure

Parameter	Value
Supported hard disk type	SAS and SATA
Minimum/Maximum number of hard disks	2/12
Maximum capacity of a SATA disk	2 TB
Maximum capacity of a SAS disk	600 GB
Number of mini SAS expander ports (for the dual-controller S2600 controller enclosure)	2

Parameter	Value
Number of mini SAS expander ports (for the single-controller S2600 controller enclosure)	1
Rate of the mini SAS expander port	4 x 3 Gbit/s
Number of iSCSI host ports (for the dual-controller S2600 controller enclosure)	8
Number of iSCSI host ports (for the single-controller S2600 controller enclosure)	4
Rate of the iSCSI host port	1 Gbit/s
Maximum number of LUNs	512
Supported RAID level	RAID 0, RAID 1, RAID 5, RAID 6, and RAID 10

Table 5-4 System performance parameters of the S2600C controller enclosure

Parameter	Value
Supported hard disk type	SAS and SATA
Minimum/Maximum number of hard disks	2/12
Maximum capacity of a SATA disk	2 TB
Maximum capacity of a SAS disk	600 GB
Number of mini SAS expander ports (for the dual-controller S2600 controller enclosure)	2
Number of mini SAS expander ports (for the single-controller S2600 controller enclosure)	1
Rate of the mini SAS expander port	4 x 3 Gbit/s
Number of FC host ports (for the dual-controller S2600 controller enclosure)	4
Number of FC host ports (for the single-controller S2600 controller enclosure)	2
Rate of the FC host port	4.25 Gbit/s, 2.125 Gbit/s, or 1.0625 Gbit/s
Number of iSCSI host ports (for the dual-controller S2600 controller enclosure)	4
Number of iSCSI host ports (for the single-controller S2600 controller enclosure)	2
Rate of the iSCSI host port	1 Gbit/s

Parameter	Value
Maximum number of LUNs	512
Supported RAID level	RAID 0, RAID 1, RAID 5, RAID 6, and RAID 10

Reliability Parameters

Table 5-5 lists the reliability parameters of the S2600 controller enclosure.

Table 5-5 Reliability parameters

Parameter	Value
System availability	⩾ 99.999%

5.1.2 Power Requirements

This topic describes the requirements for cabling, power supply, AC power and power cables of the S2600 controller enclosure.

Cabling and Power Supply

The S2600 controller enclosure uses redundant power supplies and can adapt itself to AC voltages automatically.

To select an appropriate installation site for the S2600 controller enclosure, take the following factors into account:

- AC power grounding protection: The protection ground must be connected to the AC power supply.
- Sufficient power supply and overload protection: The circuits and related circuit breakers must provide sufficient power supply and overload protection. Separate power supply from a large distribution load, such as the air conditioner engine, elevator engine, or factory load, to prevent possible damage to the S2600 controller enclosure.

Power Indexes

Table 5-6 lists the power indexes of the single-controller (or dual-controller) S2600 controller enclosure.

Table 5-6 Power indexes of the single-controller (or dual-controller) S2600 controller enclosure

Index	Value Range
Range of the AC power input voltage	100 V to 127 V or 200 V to 240 V
Range of the input AC voltage frequency	50 Hz to 60 Hz

Index	Value Range
Maximum input AC power	450W
Range of the DC power input voltage	-36V to -76V
Maximum input DC power	410 W

NOTE

The maximum input AC power in Table 5-6 refers to the power when the S2600 controller enclosure is configured with twelve 450 GB SAS disks in the ambient temperature of 40°C. The lower the ambient temperature is, the lower the input power is. The smaller the capacity of the disk is, the lower the power is.

Power Cables

- When configured with one PEM, each S2600 controller enclosure provides one AC power cable or one DC power cable.
- When configured with two PEMs, each S2600 controller enclosure provides two AC power cables or two DC power cable.

Each AC/DC power cable connects one PEM in the S2600 controller enclosure to an independent external power supply.

5.1.3 Dimensions and Weight

This topic describes the dimensions and weight of the S2600 controller enclosure.

Dimensions

Table 5-7 lists the dimensions of the S2600 controller enclosure.

Table 5-7 Dimensions

Length	Width	Height
536 mm	446 mm	86.1 mm

Weight

The weight of the S2600 controller enclosure depends on the number of installed components. Table 5-8 lists the weight of the S2600 controller enclosure. Table 5-9 lists the weight of the components of the S2600 controller enclosure.

Table 5-8 Weight of the S2600 controller enclosure

Name	Weight		
S2600 controller enclosure	Maximum [a]	Empty [b]	Shipping [c]
	27.7 kg	7.7 kg	30.0 kg
a: The maximum weight refers to the weight of the S2600 controller enclosure after all the components are installed. b: The empty weight refers to the weight of the S2600 controller enclosure without any component. c: The shipping weight refers to the maximum weight of the S2600 controller enclosure plus the weight of the shipping materials.			

Table 5-9 Weight of the components of the S2600 controller enclosure

Item	Weight
Controller	2.0 kg/controller
SAS disk module	0.9 kg/module
SATA disk module	0.8 kg/module
Fan module	1.0 kg/module
PEM	1.8 kg/module
UPS module	6.3 kg/module

5.2 Environmental Requirements

This topic describes the environment requirements.

5.2.1 Temperature and Humidity

This topic describes the temperature and humidity requirement of the S2600 controller enclosure.

Table 5-10 lists the requirements of the S2600 controller enclosure on temperature and humidity.

Table 5-10 Requirements of the S2600 controller enclosure on temperature and humidity

Condition	Parameter	Value
Temperature [a]	Operating temperature	5℃ to 40℃
	Storage temperature	5℃ to 40℃
	Transportation temperature	5℃ to 40℃
	Temperature gradient	10℃ /h
Relative humidity	Operating humidity	5% RH to 85% RH
	Storage humidity	5% RH to 95% RH
	Transportation humidity	5% RH to 85% RH
a: The environment temperature ranges from 5℃ to 40℃ when the system runs at an altitude of 0 meters to +3,000 meters, and 5℃ to 35℃ when the system runs at an altitude of 1,500 meters to 3,000 meters.		

5.2.2 Altitude

This topic describes the altitude requirement of the S2600 controller enclosure.

Table 5-11 lists the proper altitude for the running, storage, and transportation of the S2600 controller enclosure.

Table 5-11 Altitude of the S2600 controller enclosure

Environment	Altitude
Operating	-60 m to +3,000 m
Storage	-60 m to +3,000 m
Transportation	-60 m to +12,000 m

5.2.3 Heat Dissipation and Air Flow

This topic describes the heat dissipation and air flow requirement of the S2600 controller enclosure.

The cooled air enters from the gaps between the hard disks at the front, and passes through the backplane into the power and controller module area. The cooled air is used by the power and controller modules for heat dissipation and discharged by the fans.

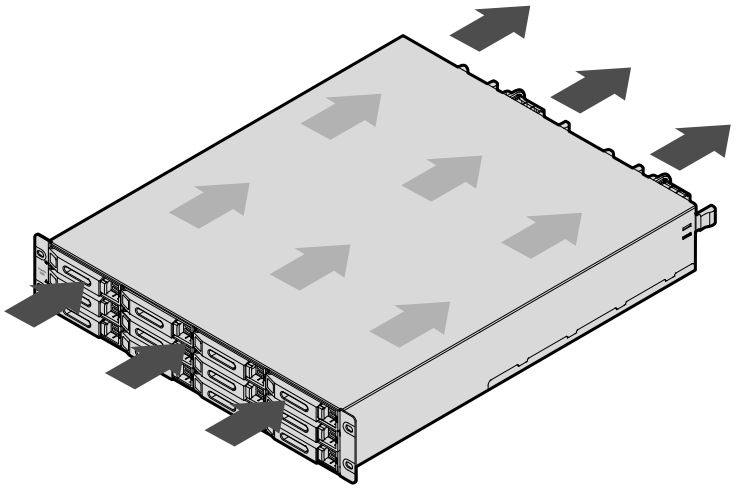
The whole heat dissipation system consists of two fan modules. Each fan module has two fans. When one fan fails, the other three fans can satisfy the dissipation requirement of the whole S2600 controller enclosure under the temperature of 5℃ to 35 ℃.

NOTE

- Leave a space no less than 100 cm between a cabinet and the wall and a space of no less than 120 cm between two cabinets to ensure ventilation.
- Ensure that the cabinet does not have an enclosed space inside and that air inside the cabinet effectively exchanges with air in the machine room. Leave a space of 1 U over and under the device respectively.

Figure 5-1 shows the airflow of the S2600 controller enclosure.

Figure 5-1 Air flow of the S2600 controller enclosure



To select an appropriate installation site for the S2600 controller enclosure, take the following factors into account:

- Leave a space no less than 100 cm between a cabinet and the wall and a space of no less than 120 cm between two cabinets to ensure ventilation.
- Ensure that the cabinet does not have an enclosed space inside and that air inside the cabinet effectively exchanges with air in the machine room. Leave a space of 1 U over and under the device respectively.

5.2.4 Noise

This topic describes the noise of the S2600 controller enclosure.

Table 5-12 lists the largest noise generated by the S2600 controller enclosure when the environment temperature is 23°C.

Table 5-12 Noise generated by the S2600 controller enclosure

Measurement Parameter	Maximum Noise
Voice pressure	72 dBA

5.3 Standards

This topic describes the standard that the S2600 controller enclosure complies with.

5.3.1 Protocols

This topic describes the protocol standards that the S2600 controller enclosure complies with.

Table 5-13 lists the protocol standards that the S2600 controller enclosure complies with.

Table 5-13 Protocols that the S2600 controller enclosure follows

Item	Standard
FC	• FC -PH: ANSI x 3.230 • FC-PH2: NSI x 3.297 • SCSI-FCP: ANSI x 269 • FC-AL: ANSI x 272 • FC-AL-2: ANSI NCITS332-1999 • FC-SW: ANSI NCITS321 • FC-SW-2: ANSI NCITS 355-2001 • FC-GS: ANSI X.288 (for FC switches) • FC-GS2: ANSI NCITS 288 (for FC switches)
SAS	• Serial Attached SCSI - 1.1 (SAS-1.1) • T10/1562D Rev. 05 Serial Attached SCSI (SAS) • T10/1601D Rev. 07 Serial Attached SCSI Model-1.1 (SAS 1.1) • Serial ATA Specification, revision 2.5 • SFF 8301 Form Factor of 3.5-inch Disk Drives • SFF 8323 3.5-inch drive form factor with serial connector • SFF 8482 SAS plug connector
SCSI 3	• SAM-2: ANSI INCITS 366-2003 • SPC-2: ANSI INCITS 351-2001 • SBC: ANSI INCITS 306-1998
RAID	• The RAID book
PICMG3.0	• Advanced telecommunications Computing Architecture
PICMG3.1	• Ethernet/Fiber Channel Over PICMG3.0
SNMP trap	• RFC2578 (SNMP v2)

5.3.2 Safety Regulations and EMC

This topic describes the safety specifications and EMC standards complied by the S2600 controller enclosure.

Table 5-14 lists the safety and EMC standards that the S2600 controller enclosure complies with.

Table 5-14 Safety and EMC standards

Item	Standard
Safety standard in North America	UL 1950
Safety standard in North America	UL 60950
European safety standard	LVD 73/23/EEC
European safety standard	EN 60950
USA EMC standard	47 CFR Part 15, Subpart B
European EMC standard	EMC Directive 89/336/EEC
European EMC standard	EN 55022
European EMC standard	EN 55024

5.3.3 Industrial Standards

This topic describes the industrial standards complied by the S2600 controller enclosure.

Table 5-15 lists the industrial standards that the S2600 controller enclosure complies with.

Table 5-15 Industrial standards

Item	Standard
Ethernet	IEEE 802.3
Fast Ethernet	IEEE 802.3u
Gigabit Ethernet	IEEE 802.3z
IEEE standard test access port and boundary-scan architecture	IEEE 1149.1-2001
Procedure for failure modes and effects analysis (FMEA)	IEC 812
Presentation of reliability, maintainability and availability predictions	IEC 863
ETSI standard (environment)	ETS 300 019
ETSI standard (power supply)	ETS 300 132

Item	Standard
ETSI standard (noise)	ETS 300 753
ETSI standard (environment)	ETS 300 119
ETSI standard (grounding)	ETS 300 253
ITUT standard (grounding)	ITUT K.27
Environmental protection	ECMA TR/70
Reliability	GR-929.Telcordia SR-332

5.4 Certification

This topic describes the certification that the S2600 controller enclosure passes.

Table 5-16 lists the certification that the S2600 controller enclosure passes.

Table 5-16 Certification that the S2600 controller enclosure passes

Certification	Description
CB	The IEC System for conformity Testing and Certification of Electrotechnical equipment and Components (IECEE). This certification mainly involves safety regulations.
CCC	China compulsory certification (CCC) mainly involves the products related to human health and security, animal and plant life and health, environmental protection, and public security.
CE	Conformite Europeenne. Products that bear the Conformite Europeenne (CE) marking comply with the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of the European Union.
GOSTR	A certification in the Commonwealth and Russia. A CE or CB certificate is necessary for a product to pass the GOSTR certification.
RoHS	RoHS is a European Union (EU) compulsory standard that is designed to regulate the materials and the technical standard of the electrical and electronic products. In this way, it does good to human health and environment protection.
UL	Underwriters Laboratories Inc (UL) is a non-profitable product safety test and certification institute.

A How to Obtain Help

If a tough or critical problem persists in routine maintenance or troubleshooting, contact Huawei for technical support.

A.1 Preparations For Contacting Huawei

To better solve the problem, you need to collect troubleshooting information and make debugging preparations before contacting Huawei.

A.1.1 Collecting Troubleshooting Information

You need to collect troubleshooting information before troubleshoot.

You need to collect the following information:

- Name and address of the customer
- Contact person and telephone number
- Time when the fault occurred
- Description of the fault phenomena
- Device type and software version
- Measures taken after the fault occurs and the related results
- Troubleshooting level and required solution deadline

A.1.2 Making Debugging Preparations

When you contact Huawei for help, the technical support engineer of Huawei might assist you to do certain operations to collect information about the fault or rectify the fault directly.

Before contacting Huawei for help, you need to prepare the boards, port modules, screwdrivers, screws, cables for serial ports, network cables, and other required materials.

A.2 How to Use the Document

Huawei provides guide documents shipped with the device. The guide documents can be used to handle the common problems occurring in daily maintenance or troubleshooting.

To better solve the problems, use the documents before you contact Huawei for technical support.

A.3 How to Obtain Help from Website

Huawei provides users with timely and efficient technical support through the regional offices, secondary technical support system, telephone technical support, remote technical support, and onsite technical support.

Contents of the Huawei technical support system are as follows:

- Huawei headquarters technical support department
- Regional office technical support center
- Customer service center
- Technical support website: **http://support.huawei.com**

You can query how to contact the regional offices at **http://support.huawei.com**.

A.4 Ways to Contact Huawei

Huawei Technologies Co., Ltd. provides customers with comprehensive technical support and service. For any assistance, contact our local office or company headquarters.

Huawei Technologies Co., Ltd.

Address: Huawei Industrial Base Bantian, Longgang Shenzhen 518129 People's Republic of China

Website: **http://www.huawei.com**

Telephone number: 86-755-28780808

Customer Service Center

Phone: 86-755-28560000; 4008302118

Huawei Service fax: 86-755-28560111

Service E-mail: **support@huawei.com**

B Glossary

A

Active network port The service port that is working currently on the AS.

Acronyms and Abbreviations The I/O operation can be performed on either of two controllers.

Alarm buzzer A component of the controller enclosure. When a critical fault occurs in the OceanStor storage system, the alarm buzzer can generate some buzz.

Application server The computer system that is connected to the storage system, stores data, and implements I/O access.

Application server LUN The LUN that is mapped from storage devices to the application server. When the host is numbered, for example, LUN 0 on host 1 may be internal LUN 100 of devices.

Array LUN To differentiate the number between the device LUN and the host LUN.

B

Back-end disk port The port for the connection between the controller enclosure and the disk enclosure. There are two types of the back-end disk port: SAS and FC.

Baud rate The maximum rate of signal state changes per second on a communications circuit. In low-speed communications, each signal state corresponds to a code bit, then the baud rate and the bit rate are the same, that is, the reciprocal of code bits in one second.

Bit error rate The percentage of bits that have errors relative to the total number of bits received in a transmission.

Boundary scan	A test methodology that uses shift registers in the output connections of integrated circuits. One IC often is connected to the next. A data pattern is passed through the chain and the observed returned data stream affected by the circuit conditions gives an indication of any faults present. The system is defined under IEEE standard 1149.1 and is also often known as JTAG (Joint Test Action Group).
Browser / server	An architecture that defines the roles of browser and server, where the browser is the service request party and the server is the service provider.

C

Cache	A special area of memory, managed by a cache controller, which improves performance by storing the contents of frequently accessed memory locations and their addresses.
Cache hit ratio	The ratio of directly accessed I/O from Cache to all the I/O operation during the read operation.
Cache prefetch strategy	According to the operation in which data has been read or is being read, the required data is read from a disk into the cache in advance.
CALL HOME	The function that devices send the detected critical events, such as faults, to maintenance engineers through an E-mail or a short message.
Captive screw	After the screw is loosened, screw caps and bolts do not fall off the main body.
Cascade	Connect the OceanStor storage system to more disk enclosures through connection cables, thus expanding the capacity of the OceanStor storage system.
Cascaded module	A component used for expanding.
CHAP	Challenge handshake authentication protocol. An authentication protocol based on the password. This protocol checks that a user has the right to access a system by using a challenge.
CloneGroup	The clone group includes one master LUN and at most eight slave LUNs.
Coffer	A technology for ensuring data security and integrity in the OceanStor storage system. The hard disks in slot 0, 1, 2, and 3 serving as coffers, which store the data of system configuration, data of alarm logs, and the data in the cache. that is not written to the disk when the system power is off for emergency and alarm log data.
Coffer disk	Physical storage media. It refers to the hard disks in slot 0, 1, 2, and 3 of the controller enclosure.
Command device	Command device for OceanStor Command Line Interface.

Connected LUN	Logically consecutive LUNs are connected through connecting multiple LUN space.
Consistency check	LUN consistency check is an advanced maintenance function of the controller. Through the consistency check, the controller can check the consistency of data on arrays in advance, that is, the validity and integrity of data.
Constant prefetch	A cache prefetch strategy. The size of the data to be prefetched is the size as set. This strategy applies to the applications that require reading data of a fixed size in a certain order. An example is the streaming media demanded by multiple subscribers who use the same bit rate.
Controller enclosure	It is the core component of the OceanStor storage system, and is mainly responsible for the storage service. A controller enclosure consists of the controller, hard disk, interface card, PEM/fan module, battery, and DIP switch board.
Conversion board	A circuit board in the OceanStor storage system for the conversion of disks ports.
Cookie	A technology that allows a Web site server to store a bit of data in the disk or memory of a client or read data from the disk of a client.
Copyback	The process of copying the data from the hot-spare disk back to the previous disk when the faulty member disk is restored or replaced by a new one.
Copying	The status of hyper copy. The task of hyper copy is being executed.
Create RAID group	To organize free disks into a RAID group with certain RAID level.
Created	The status of hyper copy. The status of creating hyper copy and yet not starting coper copy.
Cyclic redundancy check	CRC consists of a great number of bits computed as the data to be protected and append to the data.

D

Data disk	The disk for saving service data in RAID groups.
Defragment	The process of rewriting LUN data on disks, which helps to continue the unoccupied free space among LUNs.
Degraded RAID group	When member disk in a RAID group fails, part or all of the redundancy is lost
Delete RAID group	To delete a RAID group so that member disk in a RAID group becomes a free disk.
DIP switch board	It is used to adjust the FC cascading rate and FC disk rate, and can mute the alarm buzzer.
Dirty page	The data that is stored in only the cache but not written into disks.

Disk array	A set of disks from one or more commonly accessible disk subsystem, combined with a body of control software. The control software presents the disks' storage capacity to hosts as one or more virtual disks.
Disk location	Locate a hard disk, that is, determine the enclosure number and slot number of the hard disk in the OceanStor storage system.
Disk enclosure	It consists of the following parts: expander board, hard disk, PEM/fan module, and DIP switch board. System capacity can be expanded by cascading multiple disk enclosures.
Disk utilization	The percentage of used capacity in the total available capacity.
Dynamic LUN	During the operations of defragment, expanding the member disk of RAID group, modifying the stripe unit size and transferring the level of RAID group dynamically, create a temporary LUN that can help data transfer.
E	
Expand the member disk of RAID group dynamically	To add member disk in a RAID group without interrupting the normal services of RAID group.
Expander module	A component used for expanding.
Expansion master LUN	The first LUN composing the connected LUNs is called expansion master LUN.
F	
F_Port	A port of the fiber channel on the optical network. Each F_Port of the fiber channel on the optical network connects to the N_Port of a certain node. F_Port is a kind of data frame route port. This kind of port is transparent for its upper-layer protocol.
Failed RAID group	The number of failed member disk in a RAID group exceeds the maximum number, which causes data loss.
Failure tolerance	The storage system can provide storage resources normally (system performance may be compromised) when its one or multiple components fail.
Fibre channel arbitrated loop	A form of Fibre Channel network in which up to 126 nodes are connected in a loop topology. Nodes connected to Fibre Channel Arbitrated Loop arbitrates for the single transmission that can occur the loop at any instant.
Field replaceable unit (FRU)	A module or component which will typically be replaced in its entirety as part of a field service repair operation. Any entity that can be replaced by a user in the field. Examples of this type of FRU might include: backplane (the Shelf housing, for all practical purposes), PEM/fan module, optical module, and battery module. (Not all FRU supports hot swapping.)

Firmware The program that is embedded in a programmable non volatile memory.

Fragment The free physical space that has not been divided among different LUNs on a disk.

Free disk A hard disk which is available in the OceanStor storage system.

Free hot-spare disk A hot-spare disk that is available.

Front-end host port The port on the controller enclosure to connect to the application server and transmit service data. There are three types of the front-end host port: SAS, FC and iSCSI.

G

Gateway The entrance node on another network.

Gateway binding A mode of binding an application server and the network entrance node it is located in.

Global hot-spare disk A type of hot spare disk. A global spare disk can serve as the spare disk for multiple RAID groups of an array while a local hot spare disk can only serve as the spare disk for only one RAID group.

GSM modem A wireless modem used to send the information about alarms.

H

Hard disk tray The tray that bears the hard disk.

Heartbeat cable The heartbeat cable is a dedicated line on the backplane. It can check the running state of the remote controller in real time. Once the running controller is in the abnormal state, the remote controller can use the heartbeat cable to check the related state and take proper measures.

High watermarks The high level of the dirty page stored in cache. When the amount of the dirty page in cache reaches the high level, cache begins to store the dirty page into disks.

High-low watermarks The low level and high level of the dirty page stored in cache. When the amount of the dirty page in cache reaches the high level, cache begins to store the dirty page into disks. When the amount of the dirty page reaches the low level, cache stops storing the dirty page into disks.

Host The "host" displayed in the OSM3.0 interface is a created virtual host. After a port is added to the host, the host can correspond to a physical application server.

Host port module A module that bears the various types of host ports, for example, SAS host port, FC host port, and iSCSI host port.

Hot backup/Online backup A form of backup in which the data being backed up may be accessed by applications during the backup.

Hot swap	In a running system, inserting or removing a blade does not affect normal running of the system.
Hot-spare disk	The disk that is used to replace the damaged member disk in a RAID group. A spare disk carries the data that is saved on faulty disks.
Hot-spare disk reconstruction	A function of the OceanStor storage system. It refers to the process of restoring the data from the faulty member disk in a RAID group to the spare disk.
I	
I/O	Data movement process between memory and peripheral devices in the computer system. I/O is a collective name, indicating the operations reading data into the memory and writing data to other places from computer memory.
Inband management	A method of transmission between the management control information on the network and the bearer service information on the user network through the same logical channel. Inband management enables users to manage disk arrays through commands. Management commands are sent through the service channel, that is, the I/O read-and-write channel. The advantage is quick and stable transmission, which requires no other management network interface.
Inconsistent stripe	The protection of the check data block in a redundancy group stripe for the protected space in the stripe is invalid.
Initialize	The process of writing 0 bits in the data area on the logical drive and generating related parity bits so that the logical drive can be in the ready state.
initiator	A system component that can initiate an I/O operation on an I/O bus or on a network.
Intelligent prefetch	A cache prefetch strategy. The system software calculates a proper size of prefetched data. This strategy applies to a read application involving a single bit stream or to the situations where you do not know whether the data is read in a certain order. An example is reading or writing a file.
iSCSI host port	A port which is on the controller enclosure connects to the AS. The port transmits service data (used in the network and bearing the SCSI protocol in the IP packet).
L	
Link	A physical connection between two nodes of a network. Load balance A method of adjusting the system, application components and data to averagely distribute the applied I/O or computing requests for physical resources of the system.

Logical unit	The entity is located inside the SCSI object, and can execute I/O commands. After a SCSI I/O command is sent to an object, the logic unit inside the object executes this command. Usually, each SCSI physical disk has one logic unit. A tape drive and array controller may have multiple logic units, which process different I/O commands. Each logic unit inside an array controller corresponds to a virtual disk.
Logical unit number	The SCSI identifier of the internal logical unit of a target.
Loose coupling	A system based on messages in which the client and the remote services do not know how the peer side is realized. The communication between the client and the services is based on message architecture. As long as the messages comply with the negotiated architecture, the realization of the client or services can be changed as required without damaging the peer side.
Low watermarks	The low level of the dirty page stored in the cache. When the amount of the dirty page in the cache reaches the low level, cache stops storing the data in cache into disks.
LUN format	The process of preparation for enabling LUNs. During the process, necessary information is written to member disks where LUNs are located.
LUN mapping	The OceanStor storage system maps LUNs to ASs so that the ASs can access the storage reorganization.

M

Maintenance terminal	The computer that is connected through a serial port or management network interface and maintains the OceanStor storage system.
Management network	An entity that provides a means to transmit and process the information related to network management.
Management network interface	The network interface on the controller enclosure that is connected to the maintenance terminal. It is provided for the remote maintenance terminal.
Medium scanning	A background program that is run by controllers and provides the function of detecting disk errors. The medium scanning program detects and reports errors to the event log module.
Member disk	A disk in a redundant array of inexpensive disks (RAID) group in the OceanStor storage system.
Member disk reconstruction	A function of the OceanStor storage system. It refers to the process of restoring the data from the faulty disk to the new disk after you replace a faulty member disk in a RAID group with a new one.
Mirroring	A form of storage array in which two or more identical copies of data are maintained on separate media. This prevents data loss due to disk errors.

Mirroring group	In a group of RAID at the RAID 10 level, the member disks that are mirrors of each other are known as a mirroring group.
Modify the stripe unit size dynamically	To modify the stripe unit size without interrupting the normal services of LUN.

N

N_Port	A port that connects a node to the optical network or another node. The N_Port of the node connects to the F_Port of the optical network or the N_Port of another node. The N_Port handles the creation and detection of a message unit and input or output the packages which connect to the system. The N_Port is the end point between points.
Native devices	The application server LUN viewed through the device management software on the application server. The application server can access the same array LUN through multiple physical paths. Therefore, for the same array LUN, the number of the application server that is displayed as the local device is consistent with the number of physical paths.
NL_Port	A special port that is on the fiber channel arbitrated loop. The NL_Port and the N_Port have the same function, logical structure, and ability for processing information; however, the NL_Port is connected to the arbitrated loop and the N_Port is connected to the optical network. Some port products can be used as an N_Port or an NL_Port based on the network that they are connected to. When the NL_Port is in passive loop mode, the NL_Port must copy and transmit the frame.

O

OceanStor	A trademark of Huawei storage device.
Outband management	A management mode used during outband networking. In the outband management mode, the management and control information of the network and the bearer service information of the user network are transmitted through different logical channels.
Overload protection	The measure of installing addition protection devices in case that the overloaded main power lines cause damage to the protector as result of overheat.
Owning controller	For a LUN, the user configures the owing controller, that is, specified the created LUN to a certain controller. When the owning controller of the LUN is invalid, another controller manages the LUN automatically. When the owning controller of the LUN is restored, the original controller manages the LUN again.

P

Parity disk	The disk for saving check data in RAID groups.

PEM/fan module	The PEM/fan module consists of power supply, fans, power switches, and power sockets.
Physical path	The actual path from the HBA card of the application server to the front-end host port of storage arrays. Regardless of switches on the path, the physical path is only decided by the corresponding relation between the host HBA card and the array port.
Port module	Port module connects various types of front-end host port, such as the front-end host ports of SAS, FC and iSCSI.
Power failure protection	When the external power failure occurs, the alternating circuit (AC) power entry module in the OceanStor storage system can use the battery to supply power. This ensures that dirty page in cache can be written into the coffer safely and avoids data inconsistency caused by data lost.
Primary Storage Controller	The controller which plays a leading role in controlling the management is primary storage controller. It can perform relevant management operations on the controller enclosure.
Primary/Secondary switchover	A procedure during which the two controllers of the OceanStor storage system change their master/slave states.
Prior controller	For the application server LUN, prior controller means that the working controller is the owner controller of the corresponding array LUN.

R

RAID level	The application of different redundant types in the logical drive. The RAID level can improve the fault tolerance and performance and reduce the available capacity of the logical drive. You must specify a RAID level for each logical drive.
Reconstruct	To restore the data in a member disk, when the member disk in a RAID group is faulty.
Reconstruct hot-spare disk	To restore the data from the faulty member disk in a RAID group to the spare disk.
Reconstruct member disk	To restore the data from the faulty disk to the new disk after you replace a faulty member disk in a RAID group with a new one.
Reconstruction	A function of the OceanStor storage system. It refers to the process of restoring the data saved in the faulty member disk in a RAID group.
Redhat package manager	Redhat package manager widely applied in Linux.
Redundancy	The inclusion of extra components of a given type in a system (beyond those required by the system to carry out its function) for the purpose of enabling continued operation in the event of a component failure.

Redundant Array of Independent Disks	A family of techniques for managing multiple disks to deliver desirable cost, data availability, and performance characteristics to host environments.
Redundant copy	When the system monitors that a member disk in the RAID groups is about to fail, the system copies the data in the disk to a hot-spare disk. This technology is called redundant copy.
Repair inconsistent stripe	To correct the invalid protection of the check data block in a redundancy group stripe for the protected space in the stripe.

S

Script	A collection of data statements used to perform an operation.
Secondary Storage Controller	In relation to the primary storage controller, the secondary storage controller is the backup for the primary storage controller. When the primary storage controller fails, the secondary controller can be replaced to be the primary storage controller and performs management operations on the controller enclosure.
Serial port	An input/output location (channel) that sends and receives data to and from a computer's CPU or a communications device one bit at a time. Serial ports are used for serial data communication and as interfaces with some peripheral devices, such as mouse and printers.
Service data	Data which is saved in data disk. Service data is the data source for computing check data in parity disk.
SFP optical module	A component that can make data conversion between optical signals and electrical signals and that can receive and transmit data.
Simple network management protocol (SNMP)	An internet engineering task force (IETF) protocol used to monitor and manage the systems and devices on a network. The monitored and managed data is defined by the management information base (MIB). The protocol supports the following functions: data request, data retrieval, data setting or data writing, and trap.
Single point failure	Since some components or channels are not redundant, the failure of a device or component causes the breakdown of all devices or components.
Smooth expansion	A process of expanding capacity online without interrupting services.
Standby network port	In relation to the active network port, the standby network port is a redundant network port on an AS. When the active network port fails, the standby network port is activated to work.
Storage controller	The component performs the following functions: operation conversion, RAID, LUN mapping, disk-striping setting, and other service and fault alarm. It consists of the controller board and port module.

Storage system	An integrated system. It consists of the following parts: controller, storage array, host bus adaptor, physical connection between storage devices, and all control software.
Streaming media	A transmission mode in which data is consumed (read, listened to, or watched) while it is being sent.
Stripe	The process of dividing the consecutive data into the same-sized data blocks and writing the data on each block into different disks. This technology provides a faster read/write speed than a single disk can provide.
Stripe depth	The number of blocks in a strip in a disk array which uses striped data mapping. Also, the number of consecutively addressed virtual disk blocks mapped to consecutively addressed blocks on a single member extent of a disk array.
Stripe unit	The physical extent block that consists of stripes in each physical extent of a redundancy group.
Stripe verify	To verify whether the check data block in a redundancy group stripe protects the protected space in the stripe.
Subnet mask	The technology used by the IP protocol to determine where network segment packets are destined for. The subnet mask is in binary format. Stored in a client, server, or router. The subnet mask matches the IP address.
System bus	A mechanism of the computer system to achieve connections between devices. It is characterized by the signal transmission between two devices on the bus. One device sends commands and data and the other device receives commands and data. Only one transmission can be operated on the bus at any time. Transmission requests of each device are ranked according to their priorities.
T	
target	A system component that can receive SCSI I/O operation commands.
topology	The logical layout where computer systems and network components are interconnected with one another. The topological structure gives the interconnection relationship among the components from the viewpoint of communication, but the topological structure does not specify the exact locations of components and the interconnection mode.
Transfer the level of RAID group dynamically	To transfer the level of RAID group dynamically without interrupting the normal services of RAID group.
Trap	A type of SNMP message that indicates the occurrence of an event. This type of message is transmitted to the received through UDP. The transmission process is not completely reliable.

Trunk	It refers to port trunking which aggregates multiple physical ports into a logical path through setting configuration software. By combining the bandwidth of multiple ports, the bandwidth between switches and network nodes are expanded and the ports are provided an wholly occupied bandwidth with the speed several times higher than an independent port.
U	
UltraPath	The trademark of multi-path software provided by Huawei.
Unload slave LUN	The process of unloading the last slave LUN from the connected LUNs.
Used hot-spare disk	A hot-spare disk that is in use.
User interface	The interface on which users enter commands for operation.
V	
Variable prefetch	A cache prefetch strategy. The size of the data to be prefetched is the multiple for prefetching multiplied by the length of a read command. This strategy applies to the applications that require reading data of variable size in a certain order or to the situations where multiple subscribers read data concurrently but no fixed prefetch size can be set, because the amount of pre-read data cannot be judged. An example is the streaming media demanded by multiple subscribers who use different bit rates.
W	
Working controller	The controller used by the array LUN to read and write a disk.
Write hole	A potential data corruption problem for parity RAID technology resulting from any array failure while application I/O is outstanding, followed by an unrelated member disk failure (some time after the array has been returned to service). Data corruption can occur if member data and parity become inconsistent due to the array failure, resulting in a false regenerating when data failed member disk is subsequently requested by an application.
Write-back cache	A cache technology. When the write operation is completed, the data continues to be stored in the cache and therefore, the operation of writing the data to disks will be delayed. No need to access disks during each write operation.
Write-back cache mirroring	A cache technology. Data is written to the local cache and at the same time written to the opposite cache.
Write-through cache	A cache technology. Data is written to disks. And only when the data is safely written to disks, the procedure of write requests can be ended. Disks need to be accessed during each write operation.

Z

Zone In the fiber channel, a collection of the N_Port or the NL_Port which can communicate with each other in the optical network. Only the N_Port or the NL_Port in the same partition can communicate with each other through the optical network.

C Acronyms and Abbreviations

B	
CLI	Command Line Interface
CPU	Central Processing Unit
E	
EMC	Electromagnetic Compatibility
F	
FC	Electromagnetic Compatibility
G	
GUI	Graphical User Interface
I	
IEC	International Electrotechnical Commission
iSCSI	Internet Small Computer Systems Interface
ISM	Integrated Storage Management
J	
JWS	Java Web Start
L	
LUN	Logical Unit Number
M	
MTTR	Mean Time To Repair

R	
RAID	Redundant Array of Independent Disks
S	
SAS	Serial attached SCSI
SATA	Serial Advanced Technology Attachment
SCSI	Small Computer Systems Interface
U	
UL	Underwriters Laboratories Inc
UPS	Uninterrupted Power Supply