

ES3000 V5 SAS SSD

User Guide

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Huawei Technologies Co., Ltd.

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

Website: <http://www.huawei.com>

Email: support@huawei.com

About This Document

Purpose

This document provides the product information about the Huawei ES3000 V5 SAS SSD (ES3000 V5 for short) and describes how to install, configure, operate, and maintain the ES3000 V5.

NOTE

The document does not contain the commands for production, equipment, and return detection. These commands are commonly used during engineering implementation and fault locating. Incorrect use of the commands results in device faults or service interruption. To obtain the commands, contact Huawei technical support.




Intended Audience



This document is intended for:

- Server installation engineers
- Server maintenance engineers

Symbol Conventions

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

Symbol	Description
 DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
 CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
 NOTICE	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. NOTICE is used to address practices not related to personal injury.

Symbol	Description
 NOTE	<p>Calls attention to important information, best practices and tips.</p> <p>NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.</p>
 TIP	<p>Provides a tip that may help you solve a problem or save time.</p>

Change History

Changes between document issues are cumulative. The latest document issue contains all the changes made in earlier issues.

Issue	Date	Description
06	2019-03-19	Modified notes on the hot swap function.
05	2019-03-11	Modified the outputs of some commands.
04	2018-12-22	Modified the Information Collection chapter.
03	2018-10-23	Modified information about how to upgrade controller firmware.
02	2018-08-06	Added operations for querying basic information of a specified device.
01	2018-07-20	This issue is the first official release.

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1 Safety

About This Chapter

This section describes the safety precautions to be observed when you install and maintain devices.

[1.1 General Safety Notice](#)

[1.2 Labels on Devices](#)

[1.3 Electrical Safety](#)

1.1 General Safety Notice

This section describes the safety precautions you must take before installing or maintaining Huawei equipment.

Overview

- To ensure safety of humans and the equipment, pay attention to the safety symbols on the equipment and all the safety instructions in this document.
- The "NOTE", "CAUTION", and "WARNING" marks in other documents do not represent all the safety instructions. They are only supplements to the safety instructions.

Local Safety Regulations

When operating Huawei equipment, you must follow the local laws and regulations. The safety instructions in this document are only supplements to the local laws and regulations.

Basic Requirements

- Installation and maintenance personnel must understand basic safety precautions to avoid hazards.
- When operating Huawei equipment, in addition to following the general precautions in this document, follow the specific safety instructions given by Huawei.
- Only trained and qualified personnel are allowed to install, operate, and maintain Huawei equipment.

Ground

- Do not damage the ground conductor or operate the device in the absence of a properly installed ground conductor. Conduct the electrical inspection carefully.
- The device must be connected permanently to the protection ground before an operation.

Human Safety

- During lightning strikes, do not operate the device or cables, use fixed terminals, or touch terminals or antenna connectors. Do not remove AC power connectors.

 **NOTE**

This requirement applies to wireless fixed terminals.

- To prevent electric shocks, do not connect safety extra-low voltage (SELV) circuit terminals to telecommunication network voltage (TNV) circuit terminals.
- Do not look into the optical port without eye protection.
- Before operating the device, wear ESD clothes, ESD gloves, and an ESD wrist strap. Remove conductive objects such as jewelry and watches to avoid electric shocks or burns.
- If a fire occurs, evacuate the building or equipment area and press the fire alarm bell or make a fire call. In any case, it is prohibited to enter the burning building again.

Device Safety



- Before operating the device, secure the device to the floor or other solid objects, such as walls or mounting brackets.
- Do not block air vents while the device is operating.
- When installing panels, use a tool to tighten screws.
- After installation is complete, clear packing materials in the equipment area.



1.2 Labels on Devices

This section describes the warning labels, grounding labels, and electrostatic discharge (ESD) labels on devices.

Table 1-1 describes the safety labels on devices.

Table 1-1 Safety labels

Label	Meaning	Description
	Warning	This label indicates that wrong operations may cause device damage or human injury.
	External grounding	This label indicates grounding of external devices. The terminals of the ground cable are connected to different devices. This ensures normal running of the devices and the safety of the operator.

Label	Meaning	Description
	Internal grounding	This label indicates grounding of internal devices. The terminals of the ground cable are connected to different components of the same device. This ensures normal running of the devices and the safety of the operator.
	ESD-Preventive Label	This label indicates a static sensitive area. Do not touch the device with your hands. When operating the device within this area, take electrostatic discharge (ESD)-preventive measures. For example, wear an ESD-preventive wrist strap.

1.3 Electrical Safety

This section describes safety notice about high voltage, thunderstorm, high electrical leakage, power cable, fuse, electrostatic discharge.

High Voltage

 **CAUTION**

The high voltage power supply provides power for the device operation. Direct or indirect contact (through damp objects) with high voltage and AC mains supply may result in serious injury.

Non-standard and improper high voltage operations may result in fire and electric shock.

Thunderstorm

 **CAUTION**

Do not perform any operation, including high voltage and AC operations, on a steel tower or mast during a thunderstorm.

High Electrical Leakage

 **CAUTION**

Ground the device before powering it on. Otherwise, personal injury or device damage may be caused by high leakage current.

If a "high electrical leakage" tag is present on the power terminal of the device, you must ground the device before powering it on.

Power Cable

⚠ CAUTION

Do not install or remove power cables when the device is on. Transient contact between the core of the power cable and the conductor may generate electric arcs or sparks, which may cause fire or hurt human eyes.

- Before installing or removing the power cable, turn off the power switch.
- Before connecting a power cable, check that the label on the power cable is correct.

Fuse

⚠ CAUTION

If a fuse is to be replaced, the new fuse must be of the same type and specifications.

Electrostatic Discharge

⚠ CAUTION

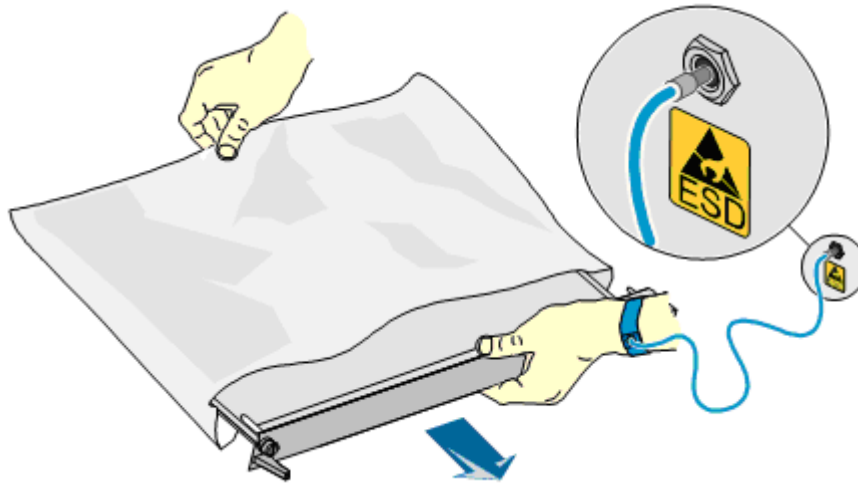
The static electricity generated by human bodies may damage the electrostatic-sensitive components on boards, for example, the large-scale integrated (LSI) circuits.

Human body movement, friction between human bodies and clothes, friction between shoes and floors, or handling of plastic articles causes static electromagnetic fields on human bodies. These static electromagnetic fields cannot be eliminated until the static is discharged.

To prevent electrostatic-sensitive components from being damaged by the static on human bodies, you must wear a well-grounded ESD wrist strap when touching the device or handling boards or application-specific integrated circuits (ASICs).

Figure 1-1 shows how to wear an ESD wrist strap.

Figure 1-1 Wearing an ESD wrist strap



2 Getting to Know the ES3000 V5

About This Chapter

This document describes the features of ES3000 V5 SAS SSDs V100R001C00, including ES3500S V5 and ES3600S V5.

[2.1 Security](#)

[2.2 Overview](#)

[2.3 Features](#)

[2.4 Specifications](#)

[2.5 System Requirements](#)

2.1 Security

This section describes the information security features of the ES3000 V5.

Huawei is committed to ensuring stability and security of customer networks and services.

As a storage device within a server or storage host, the ES3000 V5 provides the following security features based on the security hardening measures taken according to the minimum permission security rules:

- **Rights control:** The ES3000 V5 allows only system administrators to use its device maintenance management tools.
- **Operation logs:** The tool logs all the set operations on the ES3000 V5.
- **Security assurance:** A complete data clearance tool is provided to destroy data at the NAND flash memory chip level, preventing data leakage.
- **Firmware upgrade:** Firmware upgrade through in-band management channels ensures upgrade reliability and network security. The upgrade tool verifies the integrity of the ES3000 V5 firmware upgrade file to ensure that the upgrade is successful. Firmware can be loaded only after it is authenticated by the Hi1812E controller, which ensures firmware validity and data security.

2.2 Overview

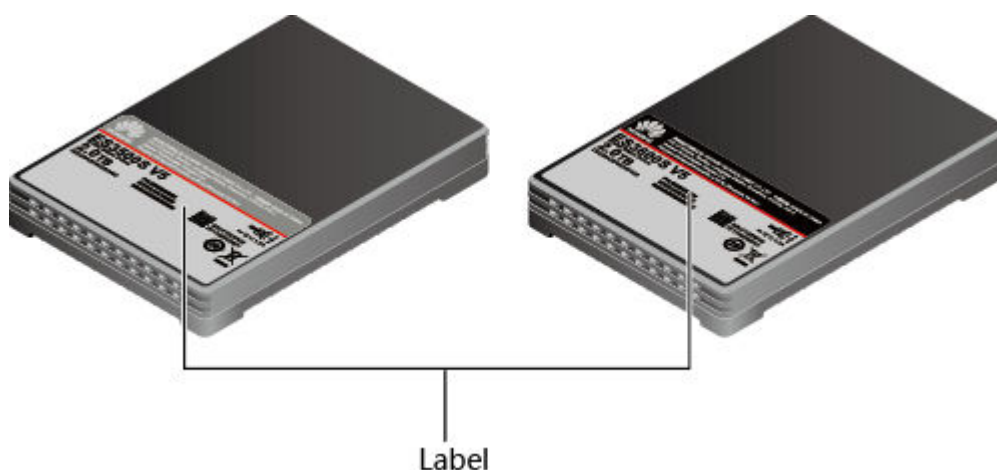
This section describes the ES3000 V5 appearance and standards.

Huawei ES3000 V5 series SAS SSD is an enterprise-class high-performance storage and acceleration component. It features high performance, fast response, and high reliability, greatly improving storage I/O performance. The ES3000 V5 SAS SSD consists of the ES3500S V5 and ES3600S V5 series.

The ES3000 V5 SAS SSD is a 2.5-inch Serial Attached SCSI (SAS) SSD that uses the HiSilicon Hi1812E chip and complies with the SFF-8639 standard. It can be installed in universal servers, such as rack servers.

Figure 2-1 shows the appearance of the ES3000 V5 SAS SSD.

Figure 2-1 ES3000 V5 SAS SSD



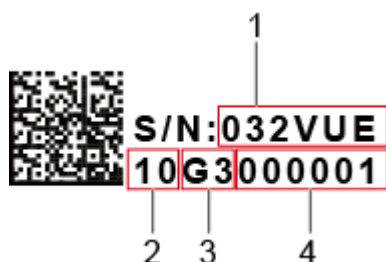
Label

The label on an ES3000 V5 SAS SSD provides the World Wide Name (WWN) and serial number (S/N).

A WWN uniquely identifies an ES3000 V5 SAS SSD and is a string generated from the MAC address. A WWN is required when you apply for technical support from Huawei.

An example S/N is 031YSW10G3000001. **Figure 2-2** describes the S/N format.

Figure 2-2 Example S/N



No.	Description
1	Indicates the material identification code (6 characters).
2	Indicates the vendor code (two characters).
3	Indicates the year and month (two characters).
4	Indicates the serial number (six digits).

2.3 Features

The ES3000 V5 SAS SSD provides the following SAS features:

- Two 12 GB/s SAS 3.0 ports, backward compatible with 6 GB/s and 3 GB/s networks
- SCSI SAM-5, SPC-4, and SBC-3

The ES3000 V5 SAS SSD provides the following features:

- Uses the SAS 3.0 interface, complies with SAS 3.0 electrical specifications, and is backward compatible with SAS 2.0 and 1.0.
- Provides various single-drive capacities to meet different application requirements.
 - ES3500S V5 series single-drive capacities: 960 GB, 1920 GB, 3840 GB, 7680 GB, and 15360 GB
 - ES3600S V5 series single-drive capacities: 800 GB, 1600 GB, 3200 GB, and 6400 GB
- Supports standard storage device operations.
 - Block device operations in Linux
 - Drive device operations in Windows
 - Drive device operations in ESXi
- Supports device diagnosis and detecting, and SMART information reporting.
 - Checks the power supply, temperature, voltage, capacitance, and number of bad blocks.
 - Checks whether the flash component is normal.
 - Monitors, queries, and warns about the SSD service life.
 - Checks the SSD power consumption.
 - Performs I/O statistics.
- Supports surprise hot swap (ES3500S V5 and ES3600S V5 series).
- Uses multiple technologies to ensure device reliability.
 - Enhanced Low-Density Parity-Check (LDPC) algorithm: provides higher error correction capability than that required by flash chips and ensures device reliability.
 - Embedded RAID-like algorithm: implements channel-based error correcting. Data can be restored if an error occurs in a channel.
 - Flexible RAID algorithm: automatically restores data on the flash memory when the flash memory has failed and continues to perform RAID data protection.
 - Intelligent wear leveling algorithm: intelligently levels the flash chip wear pressure and prolongs the device service life.

- Advanced flash access technology: combines the read retry and adaptive read technologies of flash chips and ensures data validity.
- Data inspection technology: periodically inspects data and prevents errors.
- Power-off protection: prevents drive data loss when a power failure occurs on the server.
- Provides multiple maintenance and management tools with comprehensive functions and high performance.
 - Provides in-band online upgrades to facilitate routine maintenance.
 - Provides comprehensive command line management functions for users to perform routine device management by using various commands.
 - Provides the manufacture dates and serial numbers to facilitate asset management.

2.4 Specifications

The ES3000 V5 SAS SSD consists of the ES3500S V5 and ES3600S V5 series.

2.4.1 ES3500S V5 Specifications

Figure 2-3 shows the nameplate for the ES3500S V5 series.

Figure 2-3 ES3500S V5 series nameplate



Table 1 lists the power consumption specifications for the ES3500S V5 series.

Table 2-1 Power consumption specifications for the ES3500S V5 series

Parameter	Specifications
Power consumption	<ul style="list-style-type: none"> ● 960 GB: 9.7 W maximum power consumption^a and 4 W standby power consumption. ● 1920 GB: 12 W maximum power consumption and 4 W standby power consumption. ● 3840 GB: 13 W maximum power consumption and 4.5 W standby power consumption. ● 7680 GB: 14.4 W maximum power consumption and 4.7 W standby power consumption. ● 15360 GB: 15 W maximum power consumption and 5 W standby power consumption.
Form	Standard 2.5-inch drive
a: The maximum power consumption is the test result with the maximum sequential write bandwidth.	

Table2 lists the reliability specifications for the ES3500S V5 series.

Table 2-2 Reliability specifications for the ES3500S V5 series

Parameter	Specifications
Mean time between failures (MTBF)	2.5 x 10 ⁶ hours
Annual failure rate (AFR)	≤ 0.35%
Bit error rate (BER)	10 ⁻¹⁸
Data protection	≥ 3 months (40°C, powered off)

Table3 lists the environmental specifications for the ES3500S V5 series.

Table 2-3 Environmental specifications for the ES3500S V5 series

Parameter	Specifications
Temperature	<ul style="list-style-type: none"> ● Storage temperature: - 40°C to +70°C (- 40°F to +158°F) ● Drive case temperature: 0°C to 70°C (32°F to 158°F)

Parameter	Specifications
Altitude	<ul style="list-style-type: none"> ● Operating: - 305 m to +5486 m (- 1000.64 ft to +17998.47 ft) ● Non-operating: - 305 m to 12192 m (- 1000.64 ft to 39999.51 ft) <p>The highest operating temperature decreases by 1°C (1.8°F) for every increase of 220 m (721.78 ft) in altitude.</p>
Air speed	960 GB <ul style="list-style-type: none"> ● > 155 LFM at a room temperature of 25°C (77°F) ● > 650 LFM at a room temperature of 35°C (95°F)
	1920 GB <ul style="list-style-type: none"> ● > 155 LFM at a room temperature of 25°C (77°F) ● > 650 LFM at a room temperature of 35°C (95°F)
	3840 GB <ul style="list-style-type: none"> ● > 155 LFM at a room temperature of 25°C (77°F) ● > 650 LFM at a room temperature of 35°C (95°F)
	7680 GB <ul style="list-style-type: none"> ● > 155 LFM at a room temperature of 25°C (77°F) ● > 650 LFM at a room temperature of 35°C (95°F)
	15360 GB <ul style="list-style-type: none"> ● > 155 LFM at a room temperature of 25°C (77°F) ● > 650 LFM at a room temperature of 35°C (95°F)
Humidity	<ul style="list-style-type: none"> ● Storage humidity: 5% RH to 95% RH ● Operating humidity: 5% RH to 95% RH
Vibration	<ul style="list-style-type: none"> ● Operating vibration: 2.17 G_{RMS} (5 Hz to 700 Hz) ● Non-operating vibration: 3.13 G_{RMS} (5 Hz to 800 Hz)
Shock	<ul style="list-style-type: none"> ● Operating shock: 1000 G/0.5 ms ● Non-operating shock: 1000 G/0.5 ms

2.4.2 ES3600S V5 Specifications

Nameplates

[Figure 2-4](#) shows the nameplate for the ES3600S V5 series.

Figure 2-4 ES3600S V5 series nameplate



Table 1 lists the power consumption specifications for the ES3600S V5 series.

Table 2-4 Power consumption specifications for the ES3600S V5 series

Parameter	Specifications
Power consumption	<ul style="list-style-type: none"> ● 800 GB: 9.7 W maximum power consumption^a and 4 W standby power consumption. ● 1600 GB: 12 W maximum power consumption and 4 W standby power consumption. ● 3200 GB: 13 W maximum power consumption and 4.5 W standby power consumption. ● 6400 GB: 14.4 W maximum power consumption and 4.7 W standby power consumption.
Form	Standard 2.5-inch drive
a: The maximum power consumption is the test result with the maximum sequential write bandwidth.	

Power consumption specifications in the preceding table are test results based on CentOS 7.0 and the standard storage test tool fio 2.6, with the ES3600S V5 formatted into a 512-byte LBA block device.

Table 2 lists the reliability specifications for the ES3600S V5 series.

Table 2-5 Reliability specifications for the ES3600S V5 series

Parameter	Specifications
Mean time between failures (MTBF)	2.5 x 10 ⁶ hours

Parameter	Specifications
Annual failure rate (AFR)	≤ 0.35%
Bit error rate (BER)	10 ⁻¹⁸
Data protection	≥ 3 months (40°C, powered off)

Table 2-6 lists the environmental specifications for the ES3600S V5 series.

Table 2-6 Environmental specifications for the ES3600S V5 series

Parameter	Specifications
Temperature	<ul style="list-style-type: none"> ● Storage temperature: - 40°C to +70°C (- 40°F to +158°F) ● Drive case temperature: 0°C to 70°C (32°F to 158°F)
Altitude	<ul style="list-style-type: none"> ● Operating: - 305 m to +5486 m (- 1000.64 ft to +17998.47 ft) ● Non-operating: - 305 m to +12192 m (- 1000.64 ft to +39999.51 ft) <p>The highest operating temperature decreases by 1°C (1.8°F) for every increase of 220 m (721.78 ft) in altitude.</p>
Air speed	<p>800 GB</p> <ul style="list-style-type: none"> ● > 155 LFM at a room temperature of 25°C (77°F) ● > 650 LFM at a room temperature of 35°C (95°F) <p>1600 GB</p> <ul style="list-style-type: none"> ● > 155 LFM at a room temperature of 25°C (77°F) ● > 650 LFM at a room temperature of 35°C (95°F) <p>3200 GB</p> <ul style="list-style-type: none"> ● > 237 LFM at a room temperature of 25°C (77°F) ● > 650 LFM at a room temperature of 35°C (95°F) <p>6400 GB</p> <ul style="list-style-type: none"> ● > 237 LFM at a room temperature of 25°C (77°F) ● > 650 LFM at a room temperature of 35°C (95°F)
Humidity	<ul style="list-style-type: none"> ● Storage humidity: 5% RH to 95% RH ● Operating humidity: 5% RH to 95% RH
Vibration	<ul style="list-style-type: none"> ● Operating vibration: 2.17 G_{RMS} (5 Hz to 700 Hz) ● Non-operating vibration: 3.13 G_{RMS} (5 Hz to 800 Hz)
Shock	<ul style="list-style-type: none"> ● Operating shock: 1000 G/0.5 ms ● Non-operating shock: 1000 G/0.5 ms

2.5 System Requirements

This section describes the ES3000 V5 requirements for server software and hardware.

Hardware Requirements

The minimum requirements for server hardware are as follows:

- 2 GB memory
- To use the ES3000 V5 SAS SSD, the server must provide at least one 2.5-inch SSD slot that supports the SAS SFF-8639 connector.

3 Installation and Configuration

About This Chapter

This section describes the process for installing and configuring the ES3000 V5.

CAUTION

If the ES3000 V5 exceeds the overtemperature threshold, handle the problem promptly; otherwise, management operations on the SSD may fail. For details about the command for querying temperature information, see [6.8.1 Querying the Temperature Information About a Device](#).

- [3.1 Installation and Configuration Process](#)
- [3.2 Installing the ES3000 V5 SAS SSD](#)
- [3.3 Verifying the Upgrade Package Integrity](#)
- [3.4 Transferring Files by Using WinSCP](#)
- [3.5 Installing the Tool Package](#)

3.1 Installation and Configuration Process

The installation and configuration process includes the overall procedures for installing and configuring the ES3000 V5. You can learn about ES3000 V5 installation and configuration logic.

The flowchart for installing and configuring ES3000 V5 is shown in [Figure 3-1](#).

Figure 3-1 Installation and configuration flowchart



3.2 Installing the ES3000 V5 SAS SSD

Preparations

- Stop all services on the server and back up data.
- Unpack and inspect the devices.
Check that the items shipped are complete and intact based on the following list:
 - ES3000 V5 SAS SSD
 - Quick Start Guide
 - Warranty card
- Tools
 - ESD gloves
Used to prevent ESD damage when you insert, remove, or hold the ES3000 V5 or a precision device.

⚠ CAUTION

Pay attention to the following in Linux:

- Do not perform direct read or write operations on a raw SSD to avoid processing the wrong SSD due to a changed drive letter. Restarting the server, installing or uninstalling the SSD driver, inserting and removing the SSD may change the SSD drive letter.
- If you have to perform direct read or write operations on a raw SSD, use the **hioadm info** command to check the SSD information and confirm the drive letter through the SSD SN.
- It is recommended that you use the **mount** command to mount the SSD partitions to a specified path before performing read and write operations. To ensure normal release of system resources, use the **umount** command to cancel the mounted SSD partitions before installing or uninstalling the driver, and inserting or removing the SSD.
- You can also add information to the **/etc/fstab** file so that SSD partitions are automatically mounted during system startup, driver installation and uninstallation, and SSD insertion and removal. For details, run the **man fstab** command to view help information. After enabling the automatic mounting of SSD partitions, you do not need to run the **umount** command before installing or uninstalling the driver, and inserting or removing the SSD.

Procedure

Step 1 Wear ESD gloves.

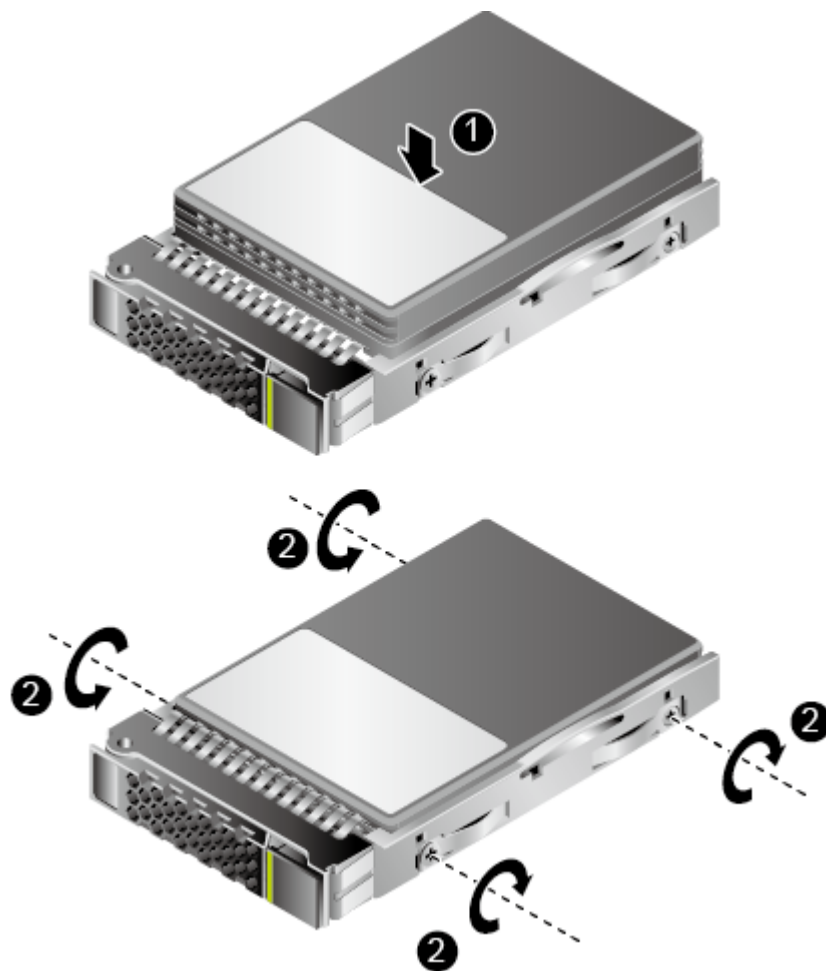
Step 2 Take the ES3000 V5 out of the ESD bag. Check whether a 2.5-inch or 3.5-inch drive tray is used.

- For a 2.5-inch drive tray, go to **Step 3**.
- For a 3.5-inch drive tray, go to **Step 5**.

Step 3 Place the ES3000 V5 into the drive tray. See (1) in **Figure 3-2**.

Step 4 Use four screws to secure the ES3000 V5 to the drive tray. See (2) in **Figure 3-2**. Then go to **Step 8**.

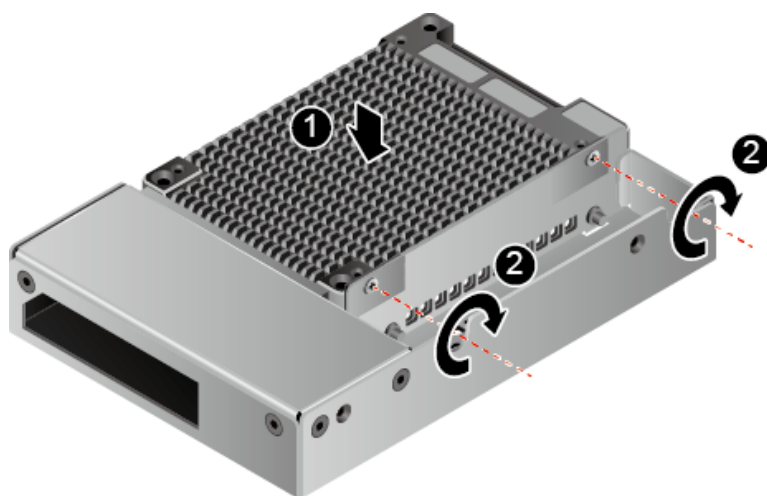
Figure 3-2 Placing the ES3000 V5 into the drive tray



Step 5 Place the ES3000 V5 to the converter. See (1) in [Figure 3-3](#).

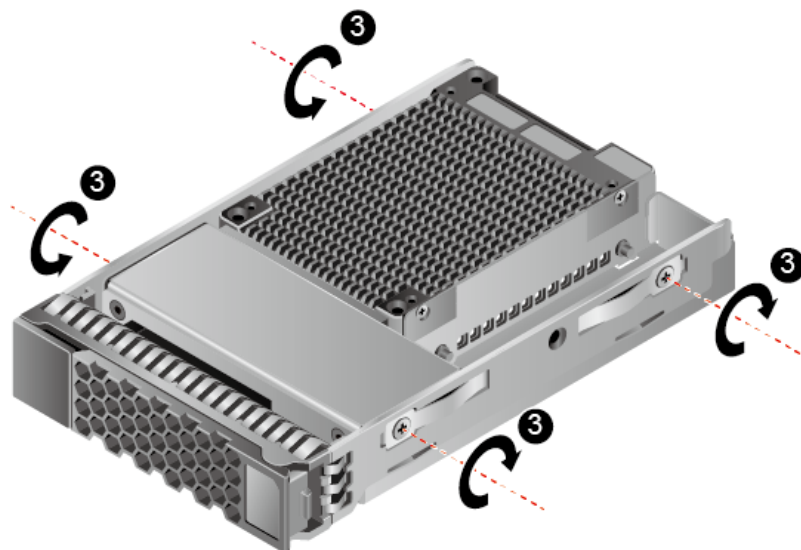
Step 6 Use two screws to secure the ES3000 V5 to the converter. See (2) in [Figure 3-3](#).

Figure 3-3 Securing the ES3000 V5 to the converter



Step 7 Use four screws to secure the ES3000 V5 to the drive tray. See (3) in [Figure 3-4](#).

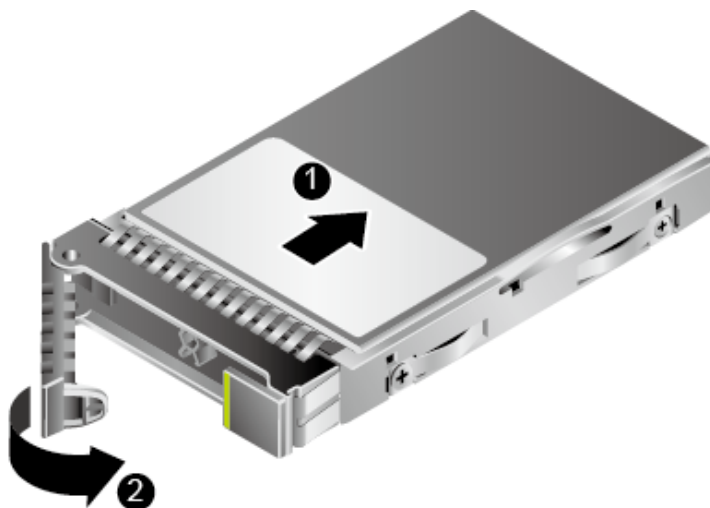
Figure 3-4 Securing the ES3000 V5 to the drive tray



Step 8 Open the ejector lever and push the ES3000 V5 into the server until it does not move. See (1) in [Figure 3-5](#).

Step 9 Close the ejector lever to push the ES3000 V5 into place. See (2) in [Figure 3-5](#).

Figure 3-5 Installing the ES3000 V5



----End

Follow-up Procedure



After the ES3000 V5 is connected to power, the startup process takes about 30 seconds.

If the activity indicator associated with the ES3000 V5 SAS SSD is on and the fault indicator is off, the SSD hardware is installed successfully.

3.3 Verifying the Upgrade Package Integrity

Visit <http://support.huawei.com/enterprise>, choose **Products > Cloud Data Center > Servers > Intelligent Accelerator Components > ES3000 V5 SAS SSD Disk > Technical Support**, and click **Download Software** to download the **ES3000_V5_Tool_x.x.x.x.zip** tool package.

Verify that the obtained upgrade package is consistent with the original one at the website <http://support.huawei.com/enterprise>.

Click  and , load the digital certificate and software package respectively.

For details about the verification tool and method, visit the following link:

[Software digital signature \(Open Verify\) validation tool](#)

3.4 Transferring Files by Using WinSCP

This section describes how to transfer files by using WinSCP. You can also transfer files by using other software.

Scenarios

Use WinSCP to transfer files from a PC to a remote host.

Prerequisites

Conditions

The File Transfer Protocol (FTP) service has been enabled on the remote host.

Data

You have obtained the following data:

- IP address of the remote host to be connected
- User name and password for logging in to the remote host to be connected

Software

WinSCP.exe: free software available on the Internet.

Procedure

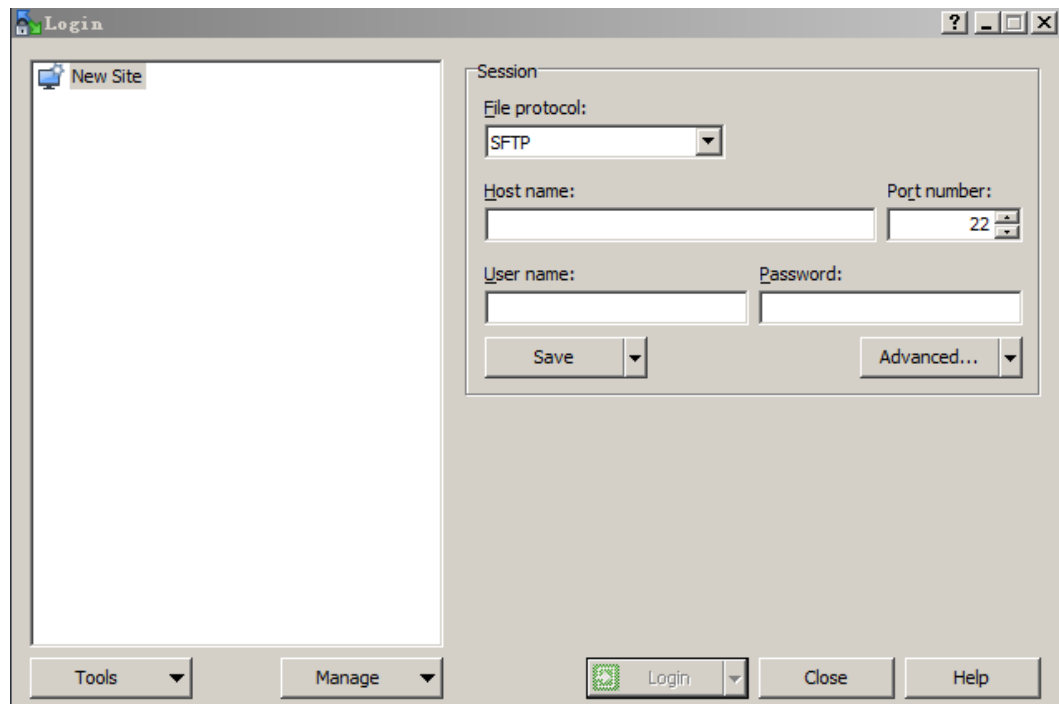
Step 1 Open the **WinSCP** folder, and double-click **WinSCP.exe**.

The **WinSCP Login** dialog box is displayed, as shown in [Figure 3-6](#).

NOTE

To change the UI language, click **Languages**.

Figure 3-6 WinSCP login



Step 2 Set the login parameters.

The parameters are described as follows:

- **Host name:** Enter the IP address of the remote host to be connected. For example, **191.100.34.32**.
- **Port number:** The default value is **22**.
- **User name:** Enter the user name. For example, **admin**.
- **Password:** Enter the password.

Step 3 Click **Login**.

The **WinSCP** file transfer window is displayed.

 **NOTE**

- If a key file was not selected during the first login, a warning Continue connecting and add host key to cache is displayed. Click Yes. The WinSCP file transfer page is displayed.
- By default, the C:\Documents and Settings\Administrator\My Documents directory of the local PC is opened in the left pane, and the /root directory of the remote host is opened in the right pane.

Step 4 In the right pane, choose a directory of the remote host for storing files, for example, **/root/firmware**.

Step 5 In the left pane, select a directory of the local PC for storing files, for example **E:\Software**, and then select the file to be transferred.

Step 6 Choose **File > Copy**.

The **Copy** dialog box is displayed.

Step 7 Confirm the file to be copied and the directory of the remote host, and then click **Copy**.

The system starts to copy the file from the local PC to the remote host.

---End

3.5 Installing the Tool Package

This section describes how to install the tool package in Linux, Windows, and ESXi operating systems (OSs).

3.5.1 Installing the Tool Package (Linux)

Operation Scenario

Install the tool package for managing the ES3000 V5 SAS SSD.

The tool package naming rules are as follows:

- For RHEL, CentOS, OEL, or SLES, the package name is *hioadm-version number-release number.hardware architecture.rpm*, for example, **hioadm-3.3.5.2-1.x86_64.rpm**.
- For Ubuntu or Debian, the package name is *hioadm-version number-release number.hardware architecture.deb*, for example, **hioadm-3.3.5.2-1.amd64.deb**.
- Citrix tool package: **hioadm-<version number>-<system version>.iso**, for example, **hioadm-5.0.0.6-6u2.iso**

Preparations

- Install the ES3000 V5 SAS SSD on the server.
- Download the tool package and verify the integrity of the software package.
- Use WinSCP or other software to upload the tool package to the server. For example, upload the software package to **/home**.

NOTE

For the Citrix system, if the system version is Citrix 6.2, use a 32-bit tool package, for example, **i386**. If the system version is Citrix6.5 or 7.1, use a 64-bit tool package, for example, **x86_64**.

Procedure

- Step 1** Log in to the operating system (OS) as an administrator.
- Step 2** Go to the directory that stores the tool package, for example, **/home**.
- Step 3** Run the installation command based on the OS type.
 - For RHEL, CentOS, OEL, or SLES, run **rpm -ivh tool package name**.
Example: **rpm -ivh hioadm-3.3.5.2-1.x86_64.rpm**
 - For Ubuntu or Debian, run **dpkg -i tool package name**.
Example: **dpkg -i hioadm-3.3.5.2-1.amd64.deb**
 - For Citrix:
 - a. Check the version of Citrix
 - If Citrix is earlier than 7.1, perform **b**, **c**, and **d**.
 - If Citrix is later than 7.1, perform **e** and **f**.

- b. Run the **mount -o loop <tool package name>** command to mount the ISO package to a directory, for example, **/tmp/Citrix**.

The following uses Citrix 6.2 as an example: **mount -o loop hioadm-5.0.0.6-6u2.iso /tmp/Citrix**.

- c. Access the mount directory where the ISO package is located, for example, **/tmp/Citrix**.

cd /tmp/Citrix

- d. Run **install.sh** in **/tmp/Citrix** to install the tool.
- e. Run **xe update-upload file-name=hioadm-citrix7u1-5.0.0.8.iso** to upload the ISO package.

 **NOTE**

The UUID of the pack is returned when the upload completes.

- f. Run **xe update-apply uuid=320232df-7adb-4cbe-a7a3-8515240879e1** to apply the package.

Step 4 Run the following commands to obtain help information about the tool or query the tools installed:

hioadm -h or **hioadm -help**

rpm -qa | grep hioadm

For Citrix 7.1, run **xe update-list** to query tool information

----End

3.5.2 Installing the Tool Package (Windows)

Operation Scenario

Install the tool package for managing the ES3000 V5 SAS SSD.

Preparations

- You have correctly installed the ES3000 V5 SAS SSD on the server.
- You have downloaded the tool package and verified its integrity.
- You have uploaded the tool package to the server by using Windows Secure Copy (WinSCP) or other software.

Procedure

Step 1 Log in to the operating system (OS) as an administrator or administrator group member.

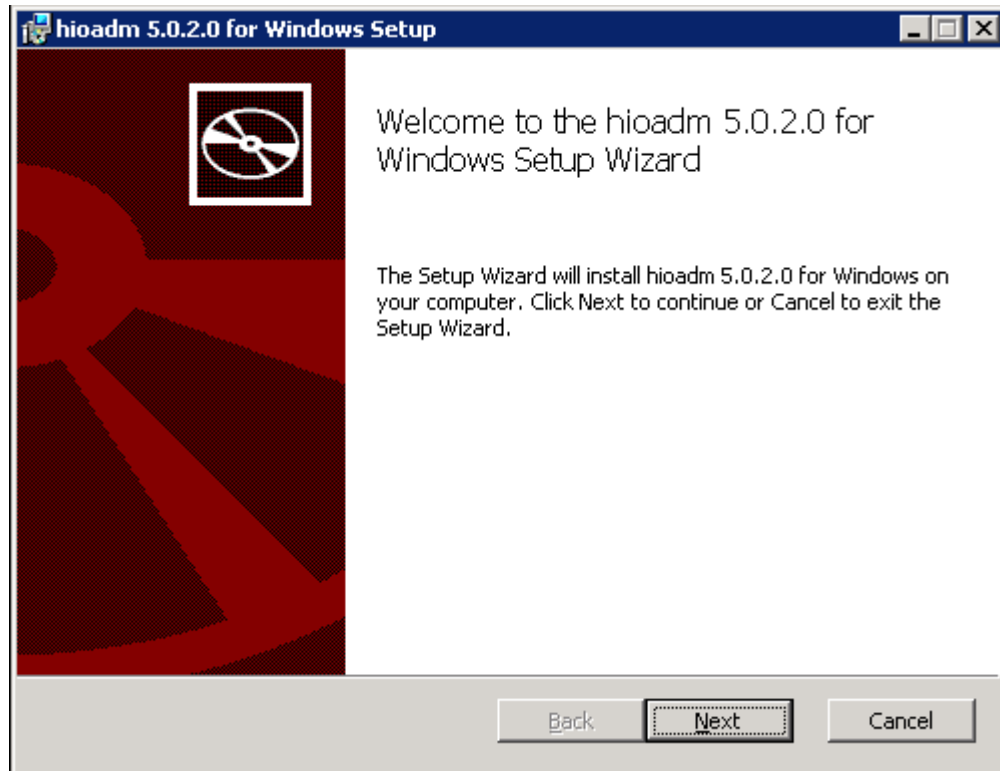
Step 2 Double-click the tool package file **hioadm_v5.0.2.0_x86_64.msi**.

 **NOTE**

v5.0.2.0 indicates a tool version. This procedure uses **hioadm_v5.0.2.0_x86_64.msi** as an example.

The installation interface is displayed, as shown in [Figure 3-7](#).

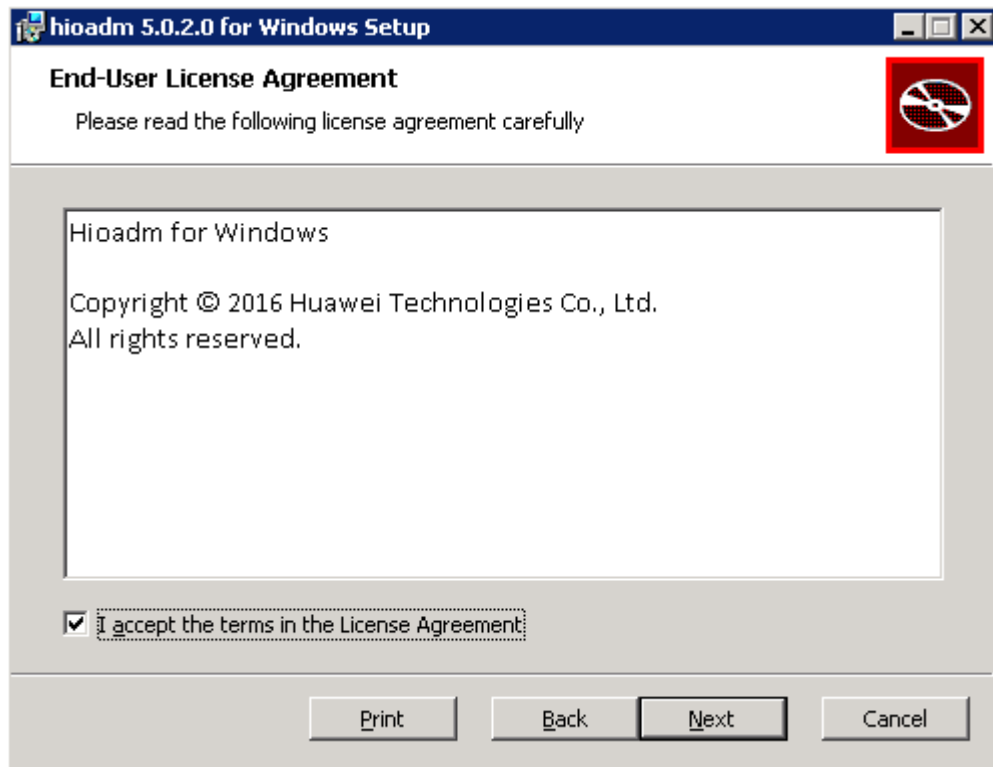
Figure 3-7 Installation interface



Step 3 Click Next.

The **End-User License Agreement** window is displayed, as shown in [Figure 3-8](#).

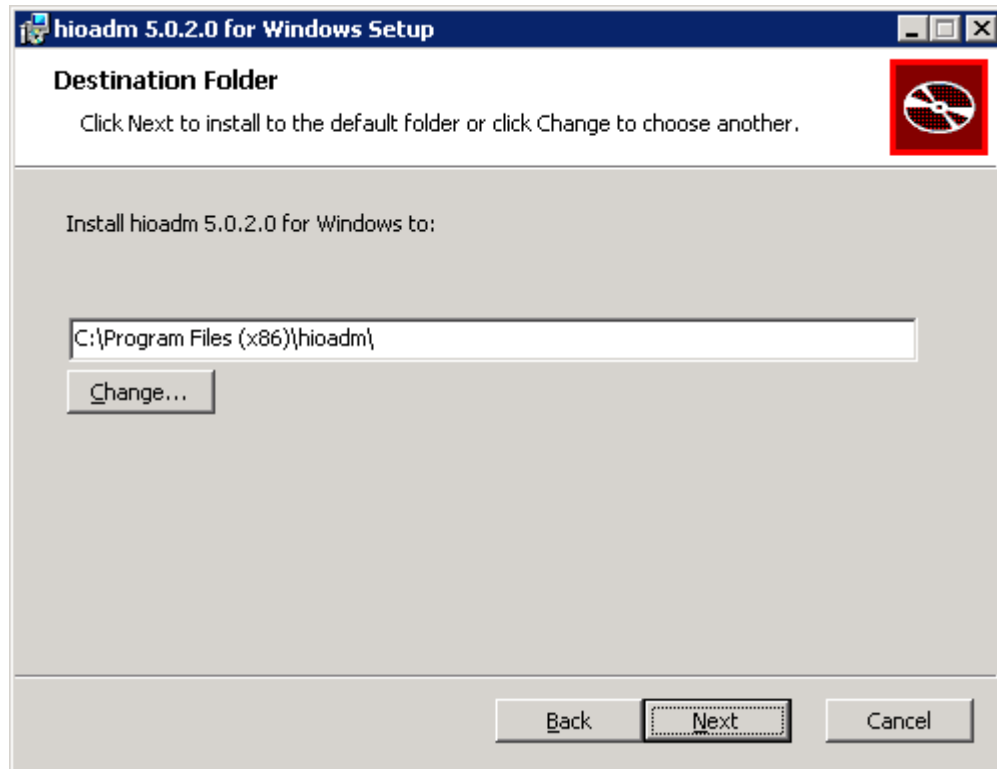
Figure 3-8 End-User License Agreement window



Step 4 Select **I accept the terms in the License Agreement** and click **Next**.

The Destination Folder window is displayed, as shown in [Figure 3-9](#).

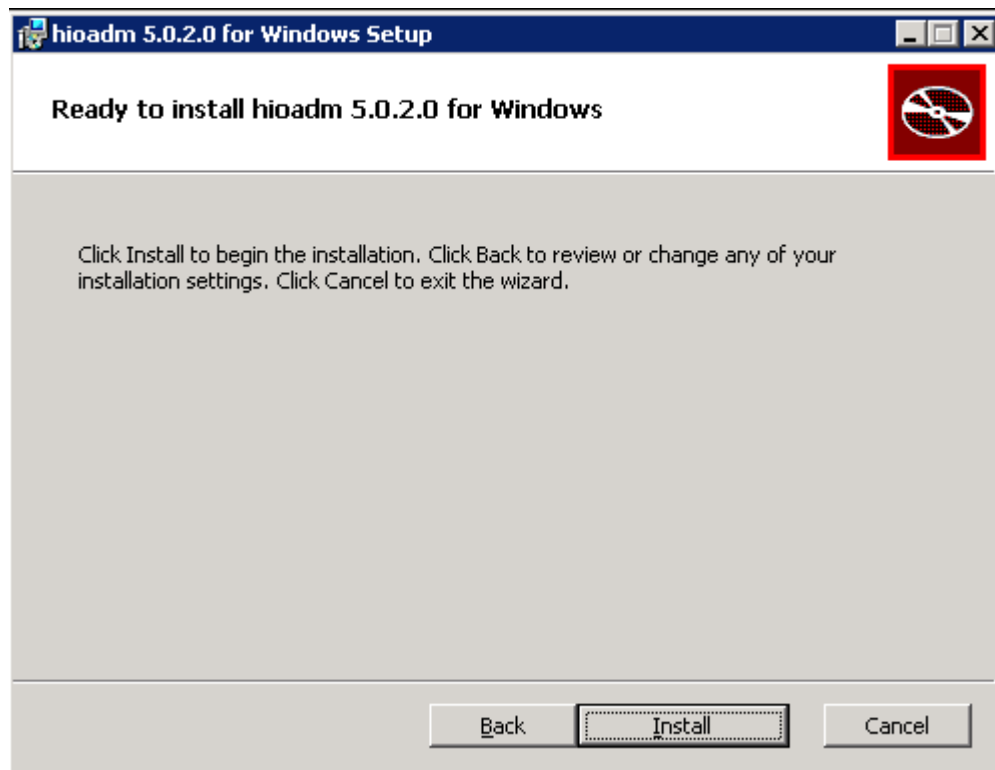
Figure 3-9 Destination Folder



Step 5 Select a folder for installing the tool and click **Next**.

The **Ready to install** window is displayed, as shown in [Figure 3-10](#).

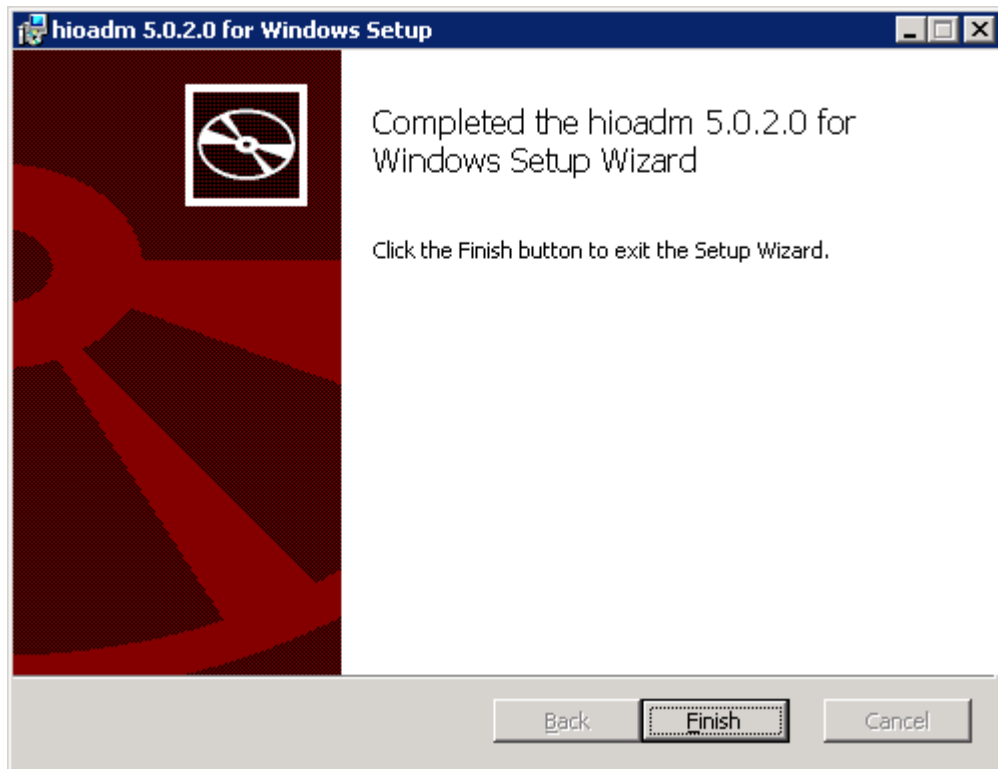
Figure 3-10 Ready to install window



Step 6 Click **Install** to start installation.

When the installation is complete, the **Completing Setup Wizard** window is displayed, as shown in [Figure 3-11](#).

Figure 3-11 Completing Setup Wizard window



Step 7 Click **Finish**.

----End

3.5.3 Installing the Tool Package (ESXi)

Operation Scenario

Install the tool for managing the ES3000 V5.

Preparations

- Install the ES3000 V5 SAS SSD on the server.
- Download the tool package and verify the integrity of the software package.
- Use WinSCP or other software to upload the tool package to the server. For example, upload the software package to **/home**.

Procedure

Step 1 Log in to the OS as an administrator or a member of the administrator group.

Step 2 Install the ES3000 V5 tool package.

Assume that the tool package is stored in **/tmp** and the package name is **hioadm-5.0.0.7-1OEM.vib**.

Run the following command to install the ES3000 V5 tool:

esxcli software vib install -v *Tool package in the directory* --no-sig-check

For example:

esxcli software vib install -v /tmp/hioadm-5.0.0.7-10.vib --no-sig-check

 **NOTE**

- In the tool file name, 5.0.0.7 is the tool version. The actual tool version may differ.
- Enter a complete directory after -v.
- Add the **--no-sig-check** parameter at the end of the command to ignore the signature check.

Step 3 Determine whether the tool needs to support LSI/Avago RAID controller cards.

- If yes, perform **Step 4** to **Step 10**.
- If no, go to **Step 11**.

Step 4 Download the latest MegaRAID Storcli package.

Visit <https://www.broadcom.cn/support/download-search>, search for "Latest MegaRAID Storcli", and click the search result to download the package.

Step 5 Run the **esxcli software vib install -v *Tool package in the directory* --no-sig-check** command to install the latest MegaRAID Storcli package.

Step 6 Run the **vi /etc/profile.local** command to open the **profile.local** file.

Step 7 Enter the directory of **libstorelib.so** after **LD_LIBRARY_PATH** in the **/etc/profile.local** file.

```
[root@localhost:/opt]
vi /etc/profile.local
# profile.local
# This file is not used when UEFI secure boot is enabled.
#
export LD_LIBRARY_PATH=$LD_LIBRARY_PATH:/opt/lsi/storcli
```

Step 8 Press Esc to exit the editing mode, and press **Shift+;** to enter the CLI mode.

Step 9 Enter **:wq** and press **Enter** to save the changes and exit.

Step 10 Run the **source /etc/profile.local** command for the environment variable to take effect.

Step 11 Restart the server, and run the **esxcli software vib list | grep hioadm** command. If the following command output is displayed, the tool package is installed properly:

```
[root@esxi113:~] esxcli software vib list | grep hioadm
hioadm-5.0.0.7-10EM.550.0.0.1391871 Huawei ESXiCertified 2016-01-04
```

If yes, no further action is required.

If no, Contact Huawei technical support for help. For details, see [C Getting Help](#).

----End

4 Hot Swap

About This Chapter

This section describes how to hot-swap an SSD.

The ES3000 V5 SAS SSD supports surprise hot swap.

CAUTION

Swap only one ES3000 V5 SSD at a time. After one ES3000 V5 SSD is removed or inserted, wait for at least 3 seconds before swapping or inserting another SSD.

SSD hot swap may affect services running on the SSD. Before performing a hot swap, notify system maintenance personnel to ensure service security.

If you insert the ES3000 V5 SSD when it is not installed on a SSD tray, it may fail to be detected.

After the ES3000 V5 SSD is removed, wait for at least 3 seconds before inserting it again. If you insert the ES3000 V5 SSD again when it is halfway removed, it may fail to be detected.

Do not pause when inserting the ES3000 V5 SSD, otherwise, it may fail to be detected and leads to system exceptions. If the SSD cannot be detected or system exceptions occur, power cycle the server after the SSD is properly installed.

If the ES3000 V5 fails to be detected due to improper insertion, remove and insert it again.

[4.1 OSs Supporting Hot Swap](#)

[4.2 Surprise Hot Swap](#)

4.1 OSs Supporting Hot Swap

Ensure that the server and BIOS supports hot swap.

4.2 Surprise Hot Swap

You can insert and remove the ES3000 V5 directly.

5 Maintenance and Upgrade

About This Chapter

This section describes how to perform hardware maintenance, software upgrades, and troubleshooting for the ES3000 V5.

[5.1 Uninstalling and Upgrading the Tool Package](#)

[5.2 Upgrading the Controller Firmware](#)

[5.3 Querying Health Status](#)

[5.4 Information Collection](#)

[5.5 Securely Erasing SSD Data](#)

[5.6 Querying SSD Lifespans](#)

[5.7 Common Faults](#)

[5.8 Indicator Status Descriptions](#)

[5.9 Removing an ES3000 V5 SAS SSD](#)

5.1 Uninstalling and Upgrading the Tool Package

You can download the software package as follows: log in to Huawei Enterprise support website <http://support.huawei.com/enterprise>, choose **Products > Cloud Data Center > Servers > Intelligent Accelerator Components > ES3000 V5 SAS SSD Disk > Technical Support**, click **Download Software**, and download the required software package. The software package contains host tools (including hioadm).

5.1.1 Uninstalling the Tool Package (Linux)

Operation Scenario

Uninstall the tool package to free up space when ES3000 V5 management is not needed.

Procedure

- Step 1** Log in to the operating system (OS) as an administrator.
- Step 2** Run the uninstallation command based on the OS type.
- For RHEL, CentOS, OEL, or SLES, run the **rpm -e hioadm** command.
 - For Ubuntu or Debian, run the **dpkg -r hioadm** command.
 - For Citrix:
 - a. Run the **rpm -qa | grep hioadm** command to query the installed hioadm package.
 - b. Run the **rpm -e xxxxxx** command to uninstall the ISO packages.
 - c. Run **rpm -qa | grep hioadm** to check whether the hioadm ISO package is uninstalled.

---End

5.1.2 Uninstalling the Tool Package (Windows)

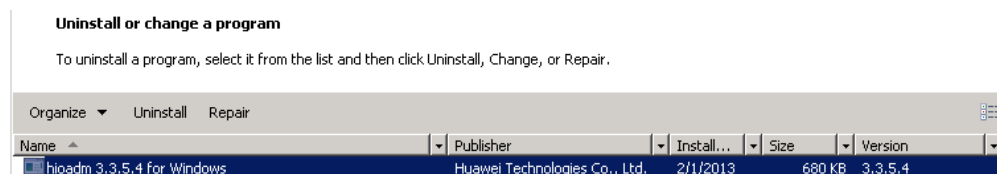
Operation Scenario

Uninstall the tool package to free up space when ES3000 V5 management is not needed.

Procedure

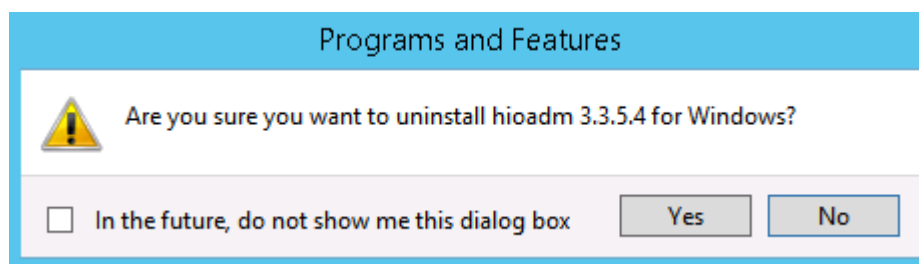
- Step 1** Log in to the operating system (OS) as an administrator or administrator group member.
- Step 2** Choose **Start > Control Panel**.
- The **Control Panel** window is displayed.
- Step 3** Click **Uninstall a program**.
- The **Uninstall or change a program** window is displayed, as shown in [Figure 5-1](#).

Figure 5-1 Uninstall or change a program



- Step 4** Find and right-click the tool package, and choose **Uninstall**.
- A confirmation dialog box is displayed, as shown in [Figure 5-2](#).

Figure 5-2 Confirming the uninstallation



Step 5 Click **Yes**.

----End

5.1.3 Uninstalling the Tool (ESXi)

Procedure

Step 1 Log in to the OS as an administrator or a member in the administrator group.

Step 2 Stop the programs or close files that access the ES3000 V5.

Step 3 Run the following command to uninstall the ES3000 V5 tool:

```
esxcli software vib remove -n hioadm
```

----End

5.1.4 Upgrading the Tool Package (Linux)

Operation Scenario

Upgrade the tool package to better manage the ES3000 V5 when a new version is available.

The tool package naming rules are as follows:

- For RHEL, CentOS, OEL, or SLES, the package name is *hioadm-version number-release number.hardware architecture.rpm*, for example, **hioadm-3.3.5.2-1.x86_64.rpm**.
- For Ubuntu or Debian, the package name is *hioadm-version number-release number.hardware architecture.deb*, for example, **hioadm-3.3.5.2-1.amd64.deb**.

Preparations

- You have correctly installed the ES3000 V5 on the server.
- You have downloaded the new tool package version and verified its integrity.
- You have used WinSCP or other software to upload the tool package to the server, such as the **/home** directory.

Procedure

Step 1 Log in to the operating system (OS) as an administrator.

Step 2 Go to the directory that stores the tool package, for example, **/home**.

Step 3 Run the upgrade command based on the OS type.

- For RHEL, CentOS, OEL, or SLES, run **rpm -Uvh tool package name**.

Example: **rpm -Uvh hioadm-3.3.6.1-1.x86_64.rpm**

- For Ubuntu or Debian, run **dpkg -i tool package name**.

Example: **dpkg -i hioadm-3.30.60.1-1.amd64.deb**

Step 4 Run the following command to obtain help information about the tool:

```
hioadm -h or hioadm --help
```

----End

5.1.5 Upgrading the Tool Package (Windows)

Operation Scenario

Upgrade the tool package to better manage the ES3000 V5 when a new version is available.

Two upgrade methods are available:

- Uninstall the old version and install the new version.
- Upgrade the old version directly.

Preparations

- You have correctly installed the ES3000 V5 on the server.
- You have downloaded the new tool package version and verified its integrity.
- You have uploaded the tool package to the server by using Windows Secure Copy (WinSCP) or other software.

Procedure

Step 1 Uninstall the old tool package. For details, see [5.1.2 Uninstalling the Tool Package \(Windows\)](#).

Step 2 Install the new tool package. For details, see [3.5.2 Installing the Tool Package \(Windows\)](#).

---End

5.1.6 Upgrading the Tool (ESXi)

Upgrade the tool to better manage the ES3000 V5 when a new version is available.

Procedure

Step 1 Run the **hioadm -v** command to check whether the tool version is later than 3.3.7.5.

- If yes, go to [Step 3](#).
- If no, go to [Step 2](#).

Step 2 Run the following command to uninstall the hioadm tool:

```
esxcli software vib remove -n hioadm
```

Step 3 Install the new tool. For details, see [3.5.3 Installing the Tool Package \(ESXi\)](#).

NOTE

Install the new driver package directly. The system will automatically replace the old driver.

---End

5.2 Upgrading the Controller Firmware

This section describes how to upgrade the ES3000 V5 controller firmware in different OSs.

 **NOTE**

The ES3500S and ES3600S series use the same firmware software package.

You can also use eSight to upgrade the ES3000 V5 controller firmware. For details, see the server firmware upgrade section (link: <https://support.huawei.com/enterprise/zh/doc/EDOC1100044396/ea4d8907>) in the eSight user guide.

5.2.1 Upgrade Paths

Only ES3000 V5 SSDs are supported.

NOTICE

ES3000 V5 V100R001SPC100 (firmware version: 1010) can be upgraded in reset activation mode only. Versions later than 1010 can be upgraded either in reset activation or immediate activation mode.

5.2.2 Upgrading the SSD Firmware in Linux (SAS SSD)

Operation Scenario

You can upgrade the controller firmware when a new version is released.

Preparations

Before upgrading the firmware, check that:

- Stop or exit the ES3000 V5 SSD applications or services, and unmount the file system that uses the SSD device.
- The firmware upgrade does not damage data on SSDs. However, you are advised to back up important data on SSDs.
- You have downloaded the firmware package to the server, and verified the package integrity.
- You have uploaded the controller firmware file to the server.

Before upgrade, check the usage mode, direct-connection mode or RAID card mode, of the SAS SSD to be upgraded. If a RAID card is configured, restart the system and go to BIOS to check the RAID card type and whether RAID groups are created.

 **NOTE**

This section uses a system configured with a single RAID card as an example. The procedure of upgrading SAS SSD firmware in a system where multiple RAID cards are configured is similar. The only difference is the device name after parameter **-d** in the firmware upgrade command.

If multiple RAID cards are configured for a system and three SAS SSDs connect to each RAID card, the physical disks connecting to the first RAID card are **pd0**, **pd1**, and **pd2**. Physical disks connecting to the second, third, and more physical disks are displayed in the format of **pdxyz**, where *x* indicates the RAID card index and *yz* indicates the index of the physical disk connecting to the RAID card. For example, physical disks connecting to the second RAID card are **pd100**, **pd101**, and **pd102**, those connecting to the third RAID card are **pd200**, **pd201**, and **pd202**, and so on.

Therefore, the command used to upgrade the firmware of the second SAS SSD connecting to the second RAID card is as follows:

```
hioadm updatefw -d pd101 -f ES3000V5_FW_1030.bin
```

5.2.2.1 Upgrading the SSD Firmware if a 3108, 3408, or 3508 RAID Card Is Configured

5.2.2.1.1 No RAID Group Created (JBOD Mode)

Step 1 Log in to the OS as an administrator.

Step 2 Run the following command to view the name of the SSD to be upgraded:

hioadm info

The command output contains information similar to the following:

```
Raid SSD Information
  Controller      Namespace
|---- pd0 (HS00024YVK10J5000146)
|----- pd0[LSI raid physical disk 110] (7680.0GB)
|---- pd1 (HS00024YVK10J5000105)
|----- pd1[LSI raid physical disk 132] (8000.0GB)
```

Step 3 Run the following command to view the controller firmware version of the SSD. (**pd0** is used as an example. If there are multiple SAS SSDs, perform steps 3 to 8 for each SAS SSD.)

hioadm updatefw -d pd0

The command output contains information similar to the following:

```
slot version activation
1      1011      current
```

 **NOTE**

In the **activation** column, **current** indicates the firmware version in use, whereas **next** indicates the firmware version that takes effect after next reset.

Step 4 Go to the directory where the controller firmware resides, for example, **/home**.

 **NOTE**

Firmware upgrade supports either an absolute path or a relative path. If you skip this step, you need to enter an absolute path in commands in next steps.

Step 5 Upgrade controller firmware. It is assumed that the upgrade file is **ES3000V5_FW_1030.bin**.

Select an upgrade mode based on the current SSD firmware version. For details, see [5.2.1 Upgrade Paths](#).

Reset activation mode:

Run the **hioadm updatefw -d pd0 -f ES3000V5_FW_1030.bin** command and perform steps 6 to 8.

Immediate activation mode:

Run the **hioadm updatefw -d pd0-f ES3000V5_FW_1030.bin -a 1** command and perform steps 6 and 8.

Step 6 Input **y** and press **Enter** to confirm the upgrade.

Step 7 Restart the OS after the upgrade.

Step 8 Run the following command to check whether the SSD controller firmware is upgraded:

hioadm updatefw -d pd0

----End

5.2.2.1.2 RAID Group Created (RAID Mode)

Step 1 Log in to the OS as an administrator.

Step 2 Run the following command to view the name of the SSD to be upgraded:

hioadm info

It is assumed that **pd0** and **pd1** have formed a RAID group. The command output contains information similar to the following:

```
Raid SSD Information
  Controller      Namespace
|---- pd0 (HS00024YVK10J5000146)
|----- pd0[LSI raid physical disk 110] (7680.0GB)
|---- pd1 (HS00024YVK10J5000105)
|----- pd1[LSI raid physical disk 132] (8000.0GB)
```

Step 3 Run the following command to view the controller firmware version of the SSD. (**pd0** is used as an example. If there are multiple SAS SSDs, perform steps 3 to 9 for each SAS SSD.)

hioadm updatefw -d pd0

The command output contains information similar to the following:

```
slot version activation
1      1011      current
```

NOTE

In the **activation** column, **current** indicates the firmware version in use, whereas **next** indicates the firmware version that takes effect after next reset.

Step 4 Go to the directory where the controller firmware resides, for example, **/home**.

NOTE

Firmware upgrade supports either an absolute path or a relative path. If you skip this step, you need to enter an absolute path in commands in next steps.

Step 5 Run the following command to upgrade controller firmware. It is assumed that the upgrade file is **ES3000V5_FW_1030.bin**.

```
hioadm updatefw -d pd0 -f ES3000V5_FW_1030.bin
```

Step 6 Input **y** and press **Enter** to confirm the upgrade.

Step 7 Power off and on the server after the upgrade.

Step 8 Go to BIOS and check whether the RAID group is normal. If the RAID group is abnormal, contact Huawei for after-sales services.

Step 9 Log in to the OS as an administrator and run the following command to check whether the SSD controller firmware is upgraded:

```
hioadm updatefw -d pd0
```

```
----End
```

5.2.2.2 Upgrading the SSD Firmware if a 3008 RAID Card Is Configured

5.2.2.2.1 No RAID Group Created (JBOD Mode)

Step 1 Log in to the OS as an administrator.

Step 2 Run the following command to view the name of the SSD to be upgraded:

hioadm info

The command output contains information similar to the following:

```
SAS SSD Information
  Controller      Namespace
|---- sda (HS00024YVK10J5000146)
|----- sda (7680.0GB)
|---- sdb (HS00024YVK10J5000105)
|----- sdb (8000.0GB)
```

Step 3 Run the following command to view the controller firmware version of the SSD. (**sda** is used as an example. If there are multiple SAS SSDs, perform steps 3 to 8 for each SAS SSD.)

hioadm updatefw -d sda

The command output contains information similar to the following:

```
slot version activation
1      1011      current
```

NOTE

In the **activation** column, **current** indicates the firmware version in use, whereas **next** indicates the firmware version that takes effect after next reset.

Step 4 Go to the directory where the controller firmware resides, for example, **/home**.

NOTE

Firmware upgrade supports either an absolute path or a relative path. If you skip this step, you need to enter an absolute path in commands in next steps.

Step 5 Upgrade controller firmware. It is assumed that the upgrade file is **ES3000V5_FW_1030.bin**.

Select an upgrade mode based on the current SSD firmware version. For details, see [5.2.1 Upgrade Paths](#).

Reset activation mode:

Run the **hioadm updatefw -d sda -f ES3000V5_FW_1030.bin** command and perform steps 6 to 8.

Immediate activation mode:

Run the **hioadm updatefw -d sda -f ES3000V5_FW_1030.bin -a 1** command and perform steps 6 and 8.

Step 6 Input **y** and press **Enter** to confirm the upgrade.

Step 7 Power off and on the server after the upgrade.

Step 8 Run the following command to check whether the SSD controller firmware is upgraded:

hioadm updatefw -d sda

----End

5.2.2.2 RAID Group Created (RAID Mode)

The LSI SAS3008 RAID controller card does not support upgrading the firmware of SSDs that have formed a RAID group. If you need to upgrade the firmware of SSDs that have formed a RAID group, perform the following steps:

NOTE

The server of the firmware of the SSD to be upgraded is target server. You need to prepare an auxiliary server. Note that the auxiliary server works in the direct-connection mode, or is configured with a 3108, 3408, or 3508 RAID card and has vacant disk slots. Besides, the hioadm management tool must be installed on the auxiliary server. Although the upgrade will not damage data on the SSD, you are advised to back up critical data on the SSD before the upgrade.

- Step 1** Log in to the OS on the target server as an administrator, restart the system, and go to BIOS to check the RAID group's member disks to be upgraded.
- Step 2** Power off the target server and auxiliary server.
- Step 3** Remove the SSD to be upgraded from the target server and insert it to the auxiliary server. Note down the old and new slot IDs of the SSD. Perform the same step for other member disks of the RAID group.

CAUTION

On the auxiliary server, the newly inserted SSD must be reported to the OS as a direct-connection disk and cannot be used to create a RAID group. Otherwise, original data on the SSD will be lost.

-
- Step 4** Power on the auxiliary server, log in to the OS as an administrator, and go to the directory where the controller firmware resides, for example, **/home**.

NOTE

Firmware upgrade supports either an absolute path or a relative path. If you skip this step, you need to enter an absolute path in commands in next steps.

- Step 5** Run the following command to view the name of the SSD to be upgraded:

hioadm info

It is assumed that **pd0** and **pd1** have formed a RAID group. The command output contains information similar to the following:

```
Raid SSD Information
  Controller      Namespace
|---- pd0 (HS00024YVK10J5000146)
      |----- pd0[LSI raid physical disk 110] (7680.0GB)
|---- pd1 (HS00024YVK10J5000105)
      |----- pd1[LSI raid physical disk 132] (8000.0GB)
```

- Step 6** Run the following command to view the controller firmware version of the SSD. (**pd0** is used as an example. Also perform steps 6 to 12 for **pd1**.)

hioadm updatefw -d pd0

The command output contains information similar to the following:

```
slot version activation
1      1011   current
```

 **NOTE**

In the **activation** column, **current** indicates the firmware version in use, whereas **next** indicates the firmware version that takes effect after next reset.

Step 7 Upgrade controller firmware. It is assumed that the upgrade file is **ES3000V5_FW_1030.bin**.

Select an upgrade mode based on the current SSD firmware version. For details, see [5.2.1 Upgrade Paths](#).

Reset activation mode:

Run the **hioadm updatefw -d pd0 -f ES3000V5_FW_1030.bin** command and perform steps 8 to 12.

Immediate activation mode:

Run the **hioadm updatefw -d pd0-f ES3000V5_FW_1030.bin -a 1** command and perform step 8 and steps 10 to 12.

Step 8 Input **y** and press **Enter** to confirm the upgrade.

Step 9 Power off and on the auxiliary server after the upgrade.

Step 10 Log in to the OS of the auxiliary server as an administrator and run the following command to check whether the SSD controller firmware is upgraded:

```
hioadm updatefw -d pd0
```

Step 11 Power off the auxiliary server, remove the upgraded SSD from the auxiliary server, and reinsert it to its original slot on the target server.

Step 12 Power on the target server, go to BIOS, and check whether the RAID group is normal. If the RAID group is abnormal, contact Huawei engineers.

----End

5.2.2.3 No RAID Card (Direct-Connection Mode)

If SAS SSDs directly connect to a server instead of through a RAID card, follow instructions in [5.2.2.2.1 No RAID Group Created \(JBOD Mode\)](#) to upgrade SAS SSD firmware.

5.2.3 Upgrading the SSD Firmware in Windows (SAS SSD)

Operation Scenario

You are advised to upgrade the controller firmware immediately after a new version is released.

Preparations

Before upgrading the firmware, check that:

- You have uploaded the ES3000 V5 software package to a directory on the server, for example, the **D:** directory.
- Stop or exit the ES3000 V5 SSD applications or services, and uninstall the file system that uses the SSD device (make the to-be-upgraded SSD to be offline in the disk manager).

- The firmware upgrade does not damage data on SSDs. However, you are advised to back up important data on SSDs.
- You have downloaded the latest firmware file to a specified folder on the server and verified the file integrity.
- You have upgraded the firmware driver to a compatible version.

Before upgrade, check the usage mode, direct-connection mode or RAID card mode, of the SAS SSD to be upgraded. If a RAID card is configured, restart the system and go to BIOS to check the RAID card type and whether RAID groups are created.

NOTE

This section uses a system configured with a single RAID card as an example. The procedure of upgrading SAS SSD firmware in a system where multiple RAID cards are configured is similar. The only difference is the device name after parameter **-d** in the firmware upgrade command.

If multiple RAID cards are configured for a system and three SAS SSDs connect to each RAID card, the physical disks connecting to the first RAID card are **pd0**, **pd1**, and **pd2**. Physical disks connecting to the second, third, and more physical disks are displayed in the format of **pdxyz**, where *x* indicates the RAID card index and *yz* indicates the index of the physical disk connecting to the RAID card. For example, physical disks connecting to the second RAID card are **pd100**, **pd101**, and **pd102**, those connecting to the third RAID card are **pd200**, **pd201**, and **pd202**, and so on.

Therefore, the command used to upgrade the firmware of the second SAS SSD connecting to the second RAID card is as follows:

```
hioadm updatefw -d pd101 -f ES3000V5_FW_1030.bin
```

5.2.3.1 Upgrading the SSD Firmware if a 3108, 3408, or 3508 RAID Card Is Configured

5.2.3.1.1 No RAID Group Created (JBOD Mode)

Step 1 Log in to the OS as an administrator.

Step 2 Choose **Start > Run**.

The Windows CLI is displayed.

Step 3 Run the **cd** command to go to the directory where the **hioadm.exe** file is stored.

Step 4 Run the following command to view the name of the SSD to be upgraded:

hioadm.exe info

The command output contains information similar to the following:

```
Raid SSD Information
  Controller   Namespace
|---- pd0 (HS00024YVK10J5000146)
|----- pd0[LSI raid physical disk 110] (7680.0GB)
|---- pd1 (HS00024YVK10J5000105)
|----- pd1[LSI raid physical disk 132] (8000.0GB)
```

Step 5 Run the following command to view the controller firmware version of the SSD. (**pd0** is used as an example. If there are multiple SAS SSDs, perform steps 5 to 10 for each SAS SSD.)

hioadm.exe updatefw -d pd0

The command output contains information similar to the following:

```
slot version activation
1      1011   current
```

 **NOTE**

In the **activation** column, **current** indicates the firmware version in use, whereas **next** indicates the firmware version that takes effect after next reset.

Step 6 Move the firmware upgrade file, for example, **ES3000V5_FW_1030.bin**, to the path where **hioadm.exe** resides.

Step 7 Upgrade controller firmware. Select an upgrade mode based on the current SSD firmware version. For details, see [5.2.1 Upgrade Paths](#).

Reset activation mode:

Run the **hioadm.exe updatefw -d pd0 -f ES3000V5_FW_1030.bin** command and perform steps 8 to 10.

Immediate activation mode:

Run the **hioadm.exe updatefw -d pd0-f ES3000V5_FW_1030.bin -a 1** command and perform steps 8 and 10.

Step 8 Input **y** and press **Enter** to confirm the upgrade.

Step 9 Power off and on the server after the upgrade.

Step 10 Run the following command to check whether the SSD controller firmware is upgraded:

hioadm.exe updatefw -d pd0

---End

5.2.3.1.2 RAID Group Created (RAID Mode)

Step 1 Log in to the OS as an administrator.

Step 2 Choose **Start > Run**.

The Windows CLI is displayed.

Step 3 Run the **cd** command to go to the directory where the **hioadm.exe** file is stored.

Step 4 Run the following command to view the name of the SSD to be upgraded:

hioadm.exe info

It is assumed that **pd0** and **pd1** have formed a RAID group. The command output contains information similar to the following:

```
Raid SSD Information
  Controller      Namespace
|---- pd0 (HS00024YVK10J5000146)
|----- pd0[LSI raid physical disk 110] (7680.0GB)
|---- pd1 (HS00024YVK10J5000105)
|----- pd1[LSI raid physical disk 132] (8000.0GB)
```

Step 5 Run the following command to view the controller firmware version of the SSD. (**pd0** is used as an example. Also perform steps 5 to 11 for **pd1**.)

hioadm.exe updatefw -d pd0

The command output contains information similar to the following:

```
slot version activation
1      1011    current
```

 **NOTE**

In the **activation** column, **current** indicates the firmware version in use, whereas **next** indicates the firmware version that takes effect after next reset.

- Step 6** Move the firmware upgrade file, for example, **ES3000V5_FW_1030.bin**, to the path where **hioadm.exe** resides.
- Step 7** Run the following command to upgrade controller firmware:
- Step 8** Input **y** and press **Enter** to confirm the upgrade.
- Step 9** Power off and on the server after the upgrade.
- Step 10** Go to BIOS and check whether the RAID group is normal. If the RAID group is abnormal, contact Huawei engineers.
- Step 11** Log in to the OS as an administrator and run the following command to check whether the SSD controller firmware is upgraded:

```
hioadm.exe updatefw -d pd0
```

```
----End
```

5.2.3.2 Upgrading the SSD Firmware if a 3008 RAID Card Is Configured

5.2.3.2.1 No RAID Group Created (JBOD Mode)

- Step 1** Log in to the OS as an administrator.
- Step 2** Choose **Start > Run**.
- The Windows CLI is displayed.
- Step 3** Run the **cd** command to go to the directory where the **hioadm.exe** file is stored.
- Step 4** Run the following command to view the name of the SSD to be upgraded:

```
hioadm.exe info
```

The command output contains information similar to the following:

```
SAS SSD Information
  Controller      Namespace
|---- sda (HS00024YVK10J5000146)
|----- sda (7680.0GB)
|---- sdb (HS00024YVK10J5000105)
|----- sdb (8000.0GB)
```

- Step 5** Run the following command to view the controller firmware version of the SSD. (**sda** is used as an example. If there are multiple SAS SSDs, perform steps 5 to 10 for each SAS SSD.)

```
hioadm.exe updatefw -d sda
```

The command output contains information similar to the following:

```
slot version activation
1      1011      current
```

 **NOTE**

In the **activation** column, **current** indicates the firmware version in use, whereas **next** indicates the firmware version that takes effect after next reset.

- Step 6** Move the firmware upgrade file, for example, **ES3000V5_FW_1030.bin**, to the path where **hioadm.exe** resides.
- Step 7** Upgrade controller firmware. Select an upgrade mode based on the current SSD firmware version. For details, see [5.2.1 Upgrade Paths](#).
- Reset activation mode:
- Run the **hioadm.exe updatefw -d sda -f ES3000V5_FW_1030.bin** command and perform steps 8 to 10.
- Immediate activation mode:
- Run the **hioadm.exe updatefw -d sda -f ES3000V5_FW_1030.bin -a 1** command and perform steps 8 and 10.
- Step 8** Input **y** and press **Enter** to confirm the upgrade.
- Step 9** Power off and on the server after the upgrade.
- Step 10** Run the following command to check whether the SSD controller firmware is upgraded:
- ```
hioadm.exe updatefw -d sda
----End
```

#### 5.2.3.2.2 RAID Group Created (RAID Mode)

The LSI SAS3008 RAID controller card does not support upgrading the firmware of SSDs that have formed a RAID group. If you need to upgrade the firmware of SSDs that have formed a RAID group, perform the following steps:

##### NOTE

The server of the firmware of the SSD to be upgraded is target server. You need to prepare an auxiliary server. Note that the auxiliary server works in the direct-connection mode, or is configured with a 3108, 3408, or 3508 RAID card and has vacant disk slots. Besides, the hioadm management tool must be installed on the auxiliary server. Although the upgrade will not damage data on the SSD, you are advised to back up critical data on the SSD before the upgrade.

- Step 1** Log in to the OS on the target server as an administrator, restart the system, and go to BIOS to check the RAID group's member disks to be upgraded.
- Step 2** Power off the target server and auxiliary server.
- Step 3** Remove the SSD to be upgraded from the target server and insert it to the auxiliary server. Note down the old and new slot IDs of the SSD. Perform the same step for other member disks of the RAID group.

---

##### CAUTION

On the auxiliary server, the newly inserted SSD must be reported to the OS as a direct-connection disk and cannot be used to create a RAID group. Otherwise, original data on the SSD will be lost.

---

- Step 4** Power on the auxiliary server, log in to the OS as an administrator, and go to the directory where the controller firmware resides, for example, **/home**.

 **NOTE**

Firmware upgrade supports either an absolute path or a relative path. If you skip this step, you need to enter an absolute path in commands in next steps.

**Step 5** Run the following command to view the name of the SSD to be upgraded:

**hioadm info**

It is assumed that **pd0** and **pd1** have formed a RAID group. The command output contains information similar to the following:

```
Raid SSD Information
 Controller Namespace
|---- pd0 (HS00024YVK10J5000146)
 |----- pd0[LSI raid physical disk 110] (7680.0GB)
|---- pd1 (HS00024YVK10J5000105)
 |----- pd1[LSI raid physical disk 132] (8000.0GB)
```

**Step 6** Run the following command to view the controller firmware version of the SSD. (**pd0** is used as an example. Also perform steps 6 to 12 for **pd1**.)

**hioadm updatefw -d pd0**

The command output contains information similar to the following:

```
slot version activation
1 1011 current
```

 **NOTE**

In the **activation** column, **current** indicates the firmware version in use, whereas **next** indicates the firmware version that takes effect after next reset.

**Step 7** Upgrade controller firmware. It is assumed that the upgrade file is **ES3000V5\_FW\_1030.bin**.

Select an upgrade mode based on the current SSD firmware version. For details, see [5.2.1 Upgrade Paths](#).

Reset activation mode:

Run the **hioadm updatefw -d pd0 -f ES3000V5\_FW\_1030.bin** command and perform steps 8 to 12.

Immediate activation mode:

Run the **hioadm updatefw -d pd0-f ES3000V5\_FW\_1030.bin -a 1** command and perform step 8 and steps 10 to 12.

**Step 8** Input **y** and press **Enter** to confirm the upgrade.

**Step 9** Power off and on the auxiliary server after the upgrade.

**Step 10** Log in to the OS of the auxiliary server as an administrator and run the following command to check whether the SSD controller firmware is upgraded:

**hioadm updatefw -d pd0**

**Step 11** Power off the auxiliary server, remove the upgraded SSD from the auxiliary server, and reinsert it to its original slot on the target server.

**Step 12** Power on the target server, go to BIOS, and check whether the RAID group is normal. If the RAID group is abnormal, contact Huawei engineers.

----**End**

### 5.2.3.3 No RAID Card (Direct-Connection Mode)

If SAS SSDs directly connect to a server instead of through a RAID card, follow instructions in [5.2.3.2.1 No RAID Group Created \(JBOD Mode\)](#) to upgrade SAS SSD firmware.

## 5.2.4 Upgrading the SSD Firmware in VMware (SAS SSD)

### Operation Scenario

You can upgrade the controller firmware when a new version is released.

### Preparations

Before upgrading the firmware, check that:

- Stop or exit the ES3000 V5 SSD applications or services.
- The firmware upgrade does not damage data on SSDs. However, you are advised to back up important data on SSDs.
- You have downloaded the firmware package to the server, and verified the package integrity.
- You have uploaded the controller firmware file to the server.

Before upgrade, check the usage mode, direct-connection mode or RAID card mode, of the SAS SSD to be upgraded. If a RAID card is configured, restart the system and go to BIOS to check the RAID card type and whether RAID groups are created.

#### NOTE

This section uses a system configured with a single RAID card as an example. The procedure of upgrading SAS SSD firmware in a system where multiple RAID cards are configured is similar. The only difference is the device name after parameter **-d** in the firmware upgrade command.

If multiple RAID cards are configured for a system and three SAS SSDs connect to each RAID card, the physical disks connecting to the first RAID card are **pd0**, **pd1**, and **pd2**. Physical disks connecting to the second, third, and more physical disks are displayed in the format of **pdxyz**, where *x* indicates the RAID card index and *yz* indicates the index of the physical disk connecting to the RAID card. For example, physical disks connecting to the second RAID card are **pd100**, **pd101**, and **pd102**, those connecting to the third RAID card are **pd200**, **pd201**, and **pd202**, and so on.

Therefore, the command used to upgrade the firmware of the second SAS SSD connecting to the second RAID card is as follows:

```
hioadm updatefw -d pd101 -f ES3000V5_FW_1030.bin
```

### 5.2.4.1 Upgrading the SSD Firmware if a 3108, 3408, or 3508 RAID Card Is Configured

#### 5.2.4.1.1 No RAID Group Created (JBOD Mode)

**Step 1** Log in to the OS as an administrator.

**Step 2** Run the following command to view the name of the SSD to be upgraded:

```
hioadm info
```

The command output contains information similar to the following:

```
Raid SSD Information
 Controller Namespace
```

```
|---- pd0 (HS00024YVK10J5000146)
|----- pd0[LSI raid physical disk 110] (7680.0GB)
|---- pd1 (HS00024YVK10J5000105)
|----- pd1[LSI raid physical disk 132] (8000.0GB)
```

**Step 3** Run the following command to view the controller firmware version of the SSD. (**pd0** is used as an example. If there are multiple SAS SSDs, perform steps 3 to 8 for each SAS SSD.)

**hioadm updatefw -d pd0**

The command output contains information similar to the following:

```
slot version activation
1 1011 current
```

 **NOTE**

In the **activation** column, **current** indicates the firmware version in use, whereas **next** indicates the firmware version that takes effect after next reset.

**Step 4** Go to the directory where the controller firmware resides, for example, **/tmp**.

 **NOTE**

Firmware upgrade supports either an absolute path or a relative path. If you skip this step, you need to enter an absolute path in commands in next steps.

**Step 5** Upgrade controller firmware. It is assumed that the upgrade file is **ES3000V5\_FW\_1030.bin**.

Select an upgrade mode based on the current SSD firmware version. For details, see [5.2.1 Upgrade Paths](#).

Reset activation mode:

Run the **hioadm updatefw -d pd0 -f ES3000V5\_FW\_1030.bin** command and perform steps 6 to 8.

Immediate activation mode:

Run the **hioadm updatefw -d pd0-f ES3000V5\_FW\_1030.bin -a 1** command and perform steps 6 and 8.

**Step 6** Input **y** and press **Enter** to confirm the upgrade.

**Step 7** Power off and on the server after the upgrade.

**Step 8** Run the following command to check whether the SSD controller firmware is upgraded:

**hioadm updatefw -d pd0**

----End

### 5.2.4.1.2 RAID Group Created (RAID Mode)

**Step 1** Log in to the OS as an administrator.

**Step 2** Run the following command to view the name of the SSD to be upgraded:

**hioadm info**

It is assumed that **pd0** and **pd1** have formed a RAID group. The command output contains information similar to the following:

```
Raid SSD Information
Controller Namespace
|---- pd0 (HS00024YVK10J5000146)
|----- pd0[LSI raid physical disk 110] (7680.0GB)
```

```
|---- pd1 (HS00024YVK10J5000105)
|----- pd1[LSI raid physical disk 132] (8000.0GB)
```

**Step 3** Run the following command to view the controller firmware version of the SSD. (**pd0** is used as an example. Also perform steps 3 to 9 for **pd1**.)

**hioadm updatefw -d pd0**

The command output contains information similar to the following:

```
slot version activation
1 1011 current
```

 **NOTE**

In the **activation** column, **current** indicates the firmware version in use, whereas **next** indicates the firmware version that takes effect after next reset.

**Step 4** Go to the directory where the controller firmware resides, for example, **/tmp**.

 **NOTE**

Firmware upgrade supports either an absolute path or a relative path. If you skip this step, you need to enter an absolute path in commands in next steps.

**Step 5** Run the following command to upgrade controller firmware. It is assumed that the upgrade file is **ES3000V5\_FW\_1030.bin**.

**hioadm updatefw -d pd0 -f ES3000V5\_FW\_1030.bin**

**Step 6** Input **y** and press **Enter** to confirm the upgrade.

**Step 7** Power off and on the server after the upgrade.

**Step 8** Go to BIOS and check whether the RAID group is normal. If the RAID group is abnormal, contact Huawei engineers.

**Step 9** Log in to the OS as an administrator and run the following command to check whether the SSD controller firmware is upgraded:

**hioadm updatefw -d pd0**

----End

## 5.2.4.2 Upgrading the SSD Firmware if a 3008 RAID Card Is Configured

### 5.2.4.2.1 No RAID Group Created (JBOD Mode)

**Step 1** Log in to the OS as an administrator.

**Step 2** Run the following command to view the name of the SSD to be upgraded:

**hioadm info**

The command output contains information similar to the following:

```
SAS SSD Information
Controller Namespace
|---- sda (HS00024YVK10J5000146)
|----- sda (7680.0GB)
|---- sdb (HS00024YVK10J5000105)
|----- sdb (8000.0GB)
```

**Step 3** Run the following command to view the controller firmware version of the SSD. (**sda** is used as an example. If there are multiple SAS SSDs, perform steps 3 to 9 for each SAS SSD.)



**hioadm updatefw -d sda**

The command output contains information similar to the following:

```
slot version activation
1 1011 current
```

 **NOTE**

In the **activation** column, **current** indicates the firmware version in use, whereas **next** indicates the firmware version that takes effect after next reset.

**Step 4** Go to the directory where the controller firmware resides, for example, **/home**.

 **NOTE**

Firmware upgrade supports either an absolute path or a relative path. If you skip this step, you need to enter an absolute path in commands in next steps.

**Step 5** Upgrade controller firmware. It is assumed that the upgrade file is **ES3000V5\_FW\_1030.bin**.

Select an upgrade mode based on the current SSD firmware version. For details, see [5.2.1 Upgrade Paths](#).

Reset activation mode:

Run the **hioadm updatefw -d sda -f ES3000V5\_FW\_1030.bin** command and perform steps 6 to 8.

Immediate activation mode:

Run the **hioadm updatefw -d sda -f ES3000V5\_FW\_1030.bin -a 1** command and perform steps 6 and 8.

 **NOTE**

After immediate activation, the firmware version is not updated because the system has its own driver, but actually the firmware has been upgraded successfully. Restart the system and check the firmware version.

**Step 6** Input **y** and press **Enter** to confirm the upgrade.

**Step 7** Power off and on the server after the upgrade.

**Step 8** Run the following command to check whether the SSD controller firmware is upgraded:

```
hioadm updatefw -d sda
```

```
----End
```

### 5.2.4.2.2 RAID Group Created (RAID Mode)

The LSI SAS3008 RAID controller card does not support upgrading the firmware of SSDs that have formed a RAID group. If you need to upgrade the firmware of SSDs that have formed a RAID group, perform the following steps:

 **NOTE**

The server of the firmware of the SSD to be upgraded is target server. You need to prepare an auxiliary server. Note that the auxiliary server works in the direct-connection mode, or is configured with a 3108, 3408, or 3508 RAID card and has vacant disk slots. Besides, the hioadm management tool must be installed on the auxiliary server. Although the upgrade will not damage data on the SSD, you are advised to back up critical data on the SSD before the upgrade.

**Step 1** Log in to the OS on the target server as an administrator, restart the system, and go to BIOS to check the RAID group's member disks to be upgraded.

- Step 2** Power off the target server and auxiliary server.
- Step 3** Remove the SSD to be upgraded from the target server and insert it to the auxiliary server. Note down the old and new slot IDs of the SSD. Perform the same step for other member disks of the RAID group.

**CAUTION**

On the auxiliary server, the newly inserted SSD must be reported to the OS as a direct-connection disk and cannot be used to create a RAID group. Otherwise, original data on the SSD will be lost.

- Step 4** Power on the auxiliary server, log in to the OS as an administrator, and go to the directory where the controller firmware resides, for example, `/tmp`.

**NOTE**

Firmware upgrade supports either an absolute path or a relative path. If you skip this step, you need to enter an absolute path in commands in next steps.

- Step 5** Run the following command to view the name of the SSD to be upgraded:

**hioadm info**

It is assumed that **pd0** and **pd1** have formed a RAID group. The command output contains information similar to the following:

```
Raid SSD Information
 Controller Namespace
|---- pd0 (HS00024YVK10J5000146)
 |----- pd0[LSI raid physical disk 110] (7680.0GB)
|---- pd1 (HS00024YVK10J5000105)
 |----- pd1[LSI raid physical disk 132] (8000.0GB)
```

- Step 6** Run the following command to view the controller firmware version of the SSD. (**pd0** is used as an example. Also perform steps 6 to 12 for **pd1**.)

**hioadm updatefw -d pd0**

The command output contains information similar to the following:

```
slot version activation
1 1011 current
```

**NOTE**

In the **activation** column, **current** indicates the firmware version in use, whereas **next** indicates the firmware version that takes effect after next reset.

- Step 7** Upgrade controller firmware. It is assumed that the upgrade file is **ES3000V5\_FW\_1030.bin**.

Select an upgrade mode based on the current SSD firmware version. For details, see [5.2.1 Upgrade Paths](#).

Reset activation mode:

Run the **hioadm updatefw -d pd0 -f ES3000V5\_FW\_1030.bin** command and perform steps 8 to 12.

Immediate activation mode:

Run the **hioadm updatefw -d pd0-f ES3000V5\_FW\_1030.bin -a 1** command and perform step 8 and steps 10 to 12.

- Step 8** Input **y** and press **Enter** to confirm the upgrade.
- Step 9** Power off and on the auxiliary server after the upgrade.
- Step 10** Log in to the OS of the auxiliary server as an administrator and run the following command to check whether the SSD controller firmware is upgraded:
- ```
hioadm updatefw -d pd0
```
- Step 11** Power off the auxiliary server, remove the upgraded SSD from the auxiliary server, and reinsert it to its original slot on the target server.
- Step 12** Power on the target server, go to BIOS, and check whether the RAID group is normal. If the RAID group is abnormal, contact Huawei engineers.
- End

5.2.4.3 No RAID Card (Direct-Connection Mode)

If SAS SSDs directly connect to a server instead of through a RAID card, follow instructions in [5.2.4.2.1 No RAID Group Created \(JBOD Mode\)](#) to upgrade SAS SSD firmware.

5.3 Querying Health Status

Operation Scenario

Check the SSD health status.

Procedure

- Step 1** Log in to the OS as an administrator or a member in the administrator group.
- Step 2** Run the following command to query the health status of the SSD controller (such as **sda**):

```
hioadm info -d sda
```

device status in the command output indicates the SSD controller health status.

- **healthy** indicates that the SSD is healthy.
- **warning** indicates that the SSD is faulty.

```
root@ubuntu:~# hioadm info -d sda
formatted LBA size      : 512 Byte
formatted metadata size : 0 Byte

maximum capacity      : NA
current capacity      : 3200.6GB
volatile write cache  : Disable
serial number         :
model number          : HSSD-D5220AS0211
firmware version      : 1907
device status         : warning
```

----End

5.4 Information Collection

5.4.1 Collecting SSD Information

Operation Scenario

Collect SSD information when maintaining SSDs.

Procedure

- Step 1** Log in to the OS as an administrator or a member in the administrator group.
- Step 2** Run the following command to query basic information about the SSD controller (such as **sda**):

hioadm info -d sda

The command output is similar to the following:

```
[root@localhost tool]# hioadm info -d sda
Namespace<1> size: 3200.6GB,      3200631791Byte
               formatted LBA size:      512 Byte
               formatted metadata size:   0 Byte

maximum capacity      : 3200.6GB
current capacity      : 3200.6GB
volatile write cache  : Disable
serial number         : 0503023HDCN107C80013

model number          : HWE32P43032M0
firmware version      : 3.03
device status         : healthy
```

- Step 3** Run the following command to query the SMART information of the SSD controller (such as **sda**):

hioadm info -d sda -s

The command output is similar to the following:

```
[root@localhost tool]# hioadm info -d sda -s
critical warning      : no warning
composite temperature : 308 degrees Kelvin (35 degrees Celsius)
available spare       : 100%
available spare threshold : 10%
percentage used       : 0%
data units read       : 68.8 MB
data units written    : 0.0 MB
host read commands    : 17748
host write commands   : 0
controller busy time  : 0 mins
power cycles          : 89 times
power on hours        : 1164 h
unsafe shutdowns     : 35 times
media and data integrity errors: 0
number of error information log entries: 0
warning composite temperature time: 0 min
critical composite temperature time: 0 min
data status           : OK
```

----End

5.4.2 Collecting SSD Logs

Operation Scenario

Collect SSD information when maintaining SSDs.

Procedure

Step 1 Log in to the OS as an administrator or a member in the administrator group.

Step 2 Run the following command to collect the SSD controller (such as **sda**) log information:

```
hioadm log -d sda -a
```

The command output shows the log collecting result and file path.

```
[root@localhost tool]# hioadm log -d sda -a
firmware key log saving.....OK
save firmware key log file succeeded(/opt/hio/sda_key.log)
firmware all log saving.....OK
save firmware all log file succeeded(/opt/hio/sda_fw.log)
firmware core dump log saving.....OK
save firmware core dump log file succeeded(/opt/hio/sda_coredump.log)
other log saving.....OK
save other logs file succeeded(/opt/hio/sda_other.log)
logs has been saved.
```

----End

5.4.3 One-Click Log Collection

Scenario

Collect SSD and system operation logs when maintaining SSD devices.

Prerequisite

You have downloaded the software package from the **Download Software** tab at <http://support.huawei.com/enterprise> (**Products > Cloud Data Center > Servers > Intelligent Accelerator Components > ES3000 V5 SAS SSD Disk > Technical Support**).

You have already installed hioadm, which integrates one-click log collection scripts.

Linux

Step 1 Copy **host_info_collect.sh** from **/linux/tool** to **/opt/hio**.

Step 2 Log in to the OS as an administrator or a member in the administrator group.

Step 3 Run the **bash /opt/hio/host_info_collect.sh** command.

Step 4 Obtain the log file **hostInfoCollect.zip** from the **/opt/hio** directory.

Step 5 (Optional) Delete the log file after use to free drive space.

----End

Windows

- Step 1** Copy **diagnostic_win.bat** from **/windows/Windows_Tool** to **C:\Program Files (x86)\hioadm**.
- Step 2** Log in to the OS as an administrator or a member in the administrator group.
- Step 3** Double-click **host_info_collect.bat** in **C:\Program Files (x86)\hioadm**.
- Step 4** Obtain all log files from the **C:\Program Files (x86)\hioadm** directory.
- Step 5** (Optional) Delete the log files after use to free drive space.
- End

ESXi

- Step 1** Copy **host_okc.sh** from **/vmware** to **/scratch/hio/**.
- Step 2** Log in to the OS as an administrator or a member in the administrator group.
- Step 3** Run the **sh /scratch/hio/host_info_collect.sh** command.
- Step 4** Obtain all log files from the **/scratch/hio/okc** directory.
- Step 5** (Optional) Delete the log files after use to free drive space.
- End

5.5 Securely Erasing SSD Data

Operation Scenario

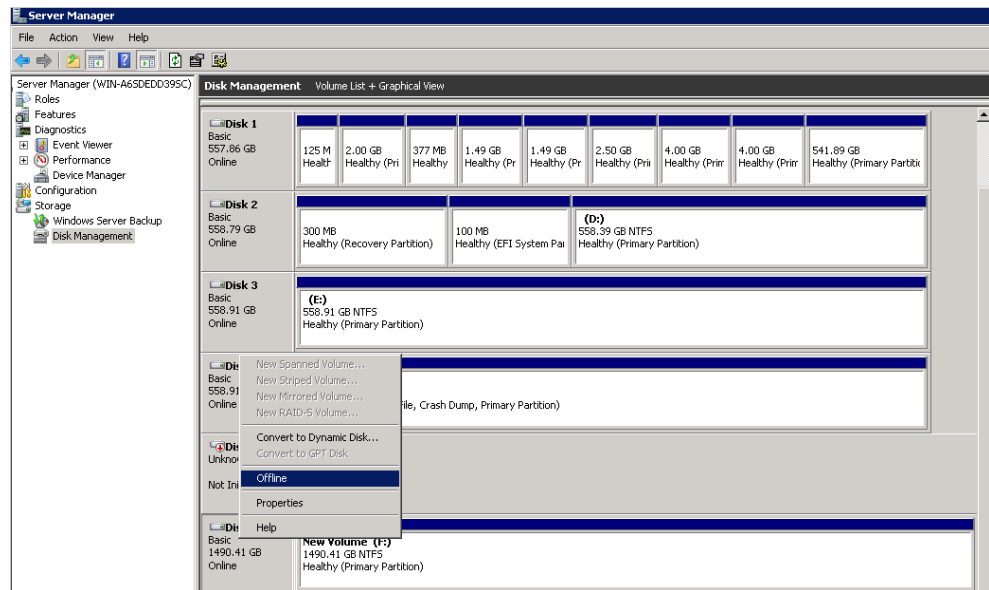
Collect SSD logs when maintaining SSD devices.

Preparations

Before performing operations, stop all I/O services of the SSD and perform the following:

- For Linux OSs, unmount all logical drives.
- For ESXi OSs, delete all partitions of all logical drives.
- For Windows OSs, make all logical drives offline, as shown in [Figure 5-3](#).

Figure 5-3 Making all logical drives offline



Procedure

- Step 1** Log in to the OS as an administrator or a member in the administrator group.
- Step 2** Run the following command to securely erase data from the SSD (such as **sda**):

hioadm secure -d sda

The warning of the risks of data erasure is displayed.

```
[root@localhost tool]# hioadm secure -d sda
WARNING! The secure operation will clear all data.
WARNING! You have selected the format operation.
Proceed with the secure? (Y|N):
```

- Step 3** After confirming the risks, enter **y** to start the secure erasure.

The operation result is displayed.

```
[root@localhost tool]# hioadm secure -d sda
WARNING! The secure operation will clear all data.
WARNING! You have selected the format operation.
Proceed with the secure? (Y|N): y
Format Progress.... 100%
The secure operate succeeded.
```

----End

5.6 Querying SSD Lifespans

Scenario

Query the lifespan of an SSD.

Procedure

- Step 1** Log in to the OS as an administrator or a member in the administrator group.
- Step 2** Run the following command to query the SMART information of the SSD controller (such as **sda**):

```
hioadm info -d sda -s
```

The command output is similar to the following:

```
[root@localhost tool]# hioadm info -d sda -s
critical warning           : no warning
composite temperature     : 308 degrees Kelvin (35 degrees Celsius)
available spare           : 100%
available spare threshold : 10%
percentage used           : 0%
data units read           : 68.8 MB
data units written        : 0.0 MB
host read commands        : 17748
host write commands       : 0
controller busy time      : 0 mins
power cycles              : 89 times
power on hours            : 1164 h
unsafe shutdowns          : 35 times
media and data integrity errors: 0
number of error information log entries: 0
warning composite temperature time: 0 min
critical composite temperature time: 0 min
data status               : OK
```

- Step 3** The **percentage used** parameter displays the used lifespan percentage of the SSD.

⚠ CAUTION

If the value of **percentage used** exceeds 100%, the SSD lifespan has expired, and Huawei's warranty service is unavailable. You need to back up data on the SSD as soon as possible and replace the SSD.

----End

5.7 Common Faults

5.7.1 Hardware Connection Faults or Other Faults

Hardware connection faults are mostly identified by indicators. If the yellow indicator of a device is on and the green indicator is off 30 seconds after a new drive is installed or during proper operating, hardware faults occur. See [5.8 Indicator Status Descriptions](#) to identify the faults.

Typical fault causes are as follows:

- The drive is not securely installed.
- The drive is installed in a non-SAS slot.
- A drive hardware port fault occurs.

5.7.2 Drive Identification Faults or Other Faults

Drive identification faults indicate scenarios where the host OS disk manager (for example, `fdisk-l` in Linux and the device manager in Windows) cannot properly identify ES3000 SSDs when hardware connections are correct. If drive identification faults occur, collect all logs. For details, see [5.4.3 One-Click Log Collection](#).

5.7.3 Drive Internal Faults or Other Faults

Drive internal faults indicate scenarios where drive internal alarms occur while the OS can properly identify drives. If such faults occur, the drives do not function properly or cannot be used. This section uses an example to describe how to identify such faults.

Use Instance

- Step 1** Determine the drive health status. For details, see [6.1.2 Querying Basic Information About an SSD Device List](#)

Query the basic information of `sda`.

```
[root@localhost tool]# hioadm info -d sda
formatted LBA size:          512 Byte
formatted metadata size:    0 Byte

maximum capacity           : NA
current capacity           : 100.0GB
volatile write cache       : Disable
serial number               : 024YUE10J7000025

model number                : HWE52SS31T9L002N
firmware version            : 1035
device status                : healthy
```

device status in the command output indicates the SSD controller health status.

The value **healthy** indicates that the device is healthy.

The value **warning** indicates that an exception occurs on the device. For details, see [Step 2](#).

- Step 2** Determine the SMART status of the drive. For details, see [6.1.4 Querying the SMART Information About a Device](#).

Query the SMART information of `sda`.

```
[root@localhost tool]# hioadm info -d sda -s
critical warning           : no warning
composite temperature      : 308 degrees Kelvin (35 degrees Celsius)
percentage used            : 0%
data units read            : 68.8 MB
data units written         : 0.0 MB
host read commands         : 17748
host write commands        : 0
power cycles               : 89 times
power on hours             : 1164 h
media and data integrity errors: 0
warning composite temperature time: 0 min
```

Critical Warning: Critical exceptions occur on the device, and emergency handling is required.

Table 5-1 Critical Warning parameters

Parameter	Description	Bit
critical warning	Critical warning, such as overtemperature and insufficient redundant space.	<ul style="list-style-type: none"> ● 0: No warning. ● 1: The available spare space has fallen below the threshold. ● 2: The temperature is above an over temperature threshold or below an under temperature threshold. ● 3: The NVM subsystem reliability has been degraded due to significant media related errors or any internal error that degrades NVM subsystem reliability. ● 4: The media has been placed in read only mode. ● 5: The volatile memory backup device has failed.

Typical fault causes are as follows:

- Available spare space below the threshold: Causes include excessive number of damaged blocks.
- Temperature above the overtemperature threshold or below the undertemperature threshold: Causes include drive temperature below 0°C or above 78°C.
- NVM subsystem reliability degraded due to internal errors: Causes include excessive number of failed drive granules or internal subsystem operating exceptions.
- Media placed in read only mode: Causes include capacitor failures.
- Volatile memory backup device failure: Causes include capacitor voltage below 28 V or above 35 V.

---End

Fault Diagnosis Instance

The service life exceeds the threshold.

Step 1 Check whether the value of **percentage used** in the SMART information exceeds 100%, if the value is greater than or equal to 100%, stop using the drive and back up data immediately. Otherwise, go to **Step 2**.

Step 2 Collect drive log information. For details, see **5.4.3 One-Click Log Collection**. Contact Huawei technical support.

---End

The temperature exceeds the threshold.

Step 1 Check that the server where the drive resides provides proper cooling. If the server reports no temperature alarm and the fan modules are operating properly, go to **Step 2**.

Step 2 Check that the server where the drive resides provides proper cooling. If the server reports no temperature alarm and the fan modules are operating properly, go to **Step 3**.

Step 3 Obtain drive logs by following instructions in **5.4.3 One-Click Log Collection** and contact Huawei technical support.

----End

- **The medium is read-only.**
- **Device backup failed.**

Step 1 Obtain drive logs by following instructions in **5.4.3 One-Click Log Collection** and contact Huawei technical support.

----End

5.8 Indicator Status Descriptions

5.8.1 ES3000 SSD Indicator Status

Table 5-2 ES3000 SSD indicator state description

Green Indicator	Yellow Indicator	SAS SSD State Description
Off	Off	The SSD cannot be detected.
On	Off	The SSD is detected and working properly.
2 Hz	Off	Data access to the SSD is in progress.
Off	2 Hz	The SSD is in the hot swap process.
Off	0.5 Hz	The SSD completes the hot swap process and is removable.
On/Off	On	The SSD is faulty.

5.9 Removing an ES3000 V5 SAS SSD

Preparations

Before removing an ES3000 V5 SAS SSD, make the following preparations:

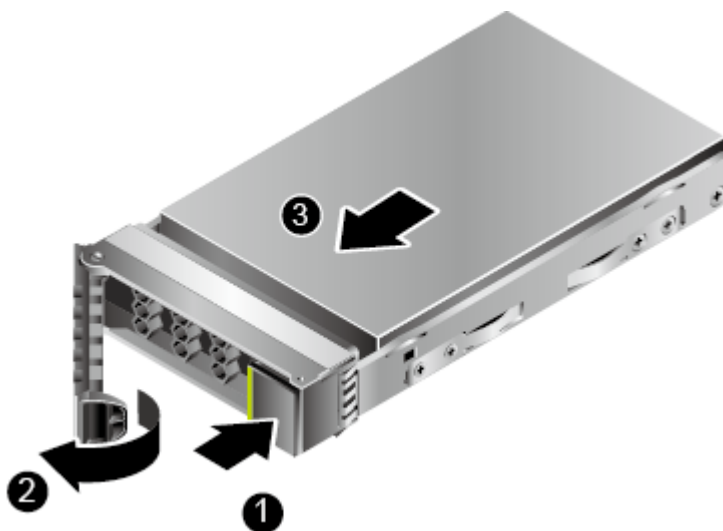
- Wear ESD gloves.
Used to prevent ESD damage when you insert, remove, or hold the ES3000 V5 or a precision device.
- Back up data.

Procedure

Step 1 Determine the position of the drive in the server.

Step 2 Press the ejector release button. See (1) in [Figure 5-4](#).

Figure 5-4 Removing a drive



Step 3 Holding onto the drive ejector lever, pull out the drive. See (2) and (3) in [Figure 5-4](#).

Step 4 Place the removed drive into an ESD bag.

---End

6 Command Description

About This Chapter

After installing the driver, you can use the **hioadm** tool to manage and configure the ES3000 V5. This chapter describes the **hioadm** command. The command output varies according to the actual operation result.

hioadm Tool

hioadm is an ES3000 management tool. You are advised to install this tool to facilitate environment maintenance and information collection. For details about the installation method, see [3.5 Installing the Tool Package](#). Its command format is as follows:

hioadm *<major cmd>* *<minor cmd1>* *<parameter1>* *<minor cmd2>* *<parameter2>* ...

<major cmd> can be any of the following:

- **info**: information query
- **format**: formatting
- **secure**: secure erasure of data
- **updatefw**: firmware upgrade management
- **capacity**: capacity management
- **log**: device log management
- **powerstate**: power consumption management
- **temperature**: temperature management
- **selftest**: diagnosis result query
- **label**: electronic label query
- **recovery**: data recovery
- **synctime**: time synchronization management
- **sanitize**: device clea-up

Operation Logs

All setting operations performed on the ES3000 by using the hioadm tool are recorded. The log file location is as follows:

- For Linux, `/opt/hio/operationLogs/operations.log`.
- For Windows, `.\operationLogs\operations.log` in the installation directory.
- For ESXi, `/scratch/hio/operationLogs/operations.log`.

If the log file size exceeds 4 MB, the file is automatically backed up as an `operations.log.old` file, overwriting the existing `operations.log.old` file.

The log file content includes the command start time, remote client IP address, user name, command, command output time, and operation result.

The operation result is one of the following:

- **SUCCEEDED:** The command was successfully executed.
- **FAILED:** The command failed to be executed.
- **CANCELED:** The command was canceled because the user selected **No** when asked for conformation.
- **KILLED:** The command was stopped abnormally. For example, the user performed a **Ctrl+C** operation, closed the client, killed the process, or restarted the OS.

The following is an operation log in Linux:

```
[2016-01-27 17:37:10] [root@128.5.92.176] [hioadm updatefw -d sdd -s 3 -a 1]  
[17:37:15] [SUCCEEDED].
```

[6.1 Querying Information.](#)

[6.2 Querying, Upgrading, and Activating Firmware](#)

[6.3 Querying and Setting the Capacity](#)

[6.4 Formatting](#)

[6.5 Safely Erasing User Data of an SSD](#)

[6.6 Querying and Setting the Power Consumption Level](#)

[6.7 Obtaining Logs](#)

[6.8 Querying and Setting Temperature Thresholds](#)

[6.9 Querying the Diagnosis Result of a Specified SSD](#)

[6.10 Querying the Electronic Label Information About an SSD](#)

[6.11 Setting and Querying Time Synchronization](#)

[6.12 Erasing a Specified SSD](#)

[6.13 Recovering Data](#)

6.1 Querying Information.

6.1.1 Querying the SSD List

Function

This command is used to query the SSD list.

Format

hioadm info

Parameters

None

Usage Guidelines

None

Example

#Query the list of existing SSDs.

Linux:

```
[root@localhost tool]# hioadm info
SAS SSD Information
  Controller
|---- sdd (HS0000000000000253015)
|----- sdd(512.0GB)
```

Windows:

```
C:\Program Files(x86)\hioadm> hioadm info
SAS SSD Information
  Controller
|---- sda (HS0000000000000253015)
|----- sda[Disk2] (512.0GB)
```

ESXI:

```
~# hioadm info
SAS SSD Information
  Controller
```

System Response

The command output in the preceding example is explained as follows:

- Controller names: sda and sdd
- Serial numbers: HS0000000000000253015
- Drive names: sda and sdd
- Capacities: 512.0 GB

sda and **sdd** in the command output are values of the parameter after **-d** in the following commands.

6.1.2 Querying Basic Information About an SSD Device List

Function

This command is used to query basic information about an SSD device list.

Format

hioadm info -l

Parameters

None

Usage Guidelines

None

Example

#Query the list of existing SSDs.

```
[root@localhost tool]# hioadm info -l
Device      SN                      MN                      FW
sda         HS0000000000000253015  HSSD-D5220AS0200      0643
```

Output Description

The command output in the preceding example is explained as follows:

- Controller names: sda
- Serial numbers: HS0000000000000253015
- MN code: HSSD-D5220AS0200
- Firmware version: 0643

6.1.3 Querying Basic Information About a Device

Function

This command is used to query basic information about an SSD (SSD controller) or logical drive. If you query information about an SSD, information about all of its logical drives is also displayed.

Format

hioadm info -d *devicename*

Parameters

Parameter	Description	Value
<i>devicename</i>	Name of a device	Examples: sda

Usage Guidelines

None

Example

Query the basic information about **sda**.

```
[root@localhost tool]# hioadm info -d sda
formatted LBA size          : 512 Byte
formatted metadata size    : 0 Byte

maximum capacity          : 800GB
current capacity          : 800GB
volatile write cache      : Disable
serial number             : HS0000000000000669299
model number              : HSSD-D5220AS0200
firmware version          : 1520
device status             : healthy
```

Query the basic information about **sda** when the size of formatted metadata is not 0.

```
[root@localhost yh]# hioadm info -d sda
formatted LBA size          : 512 Byte
formatted metadata size    : 8 Byte
protection type           : Type 3

maximum capacity          : NA
current capacity          : 1920.3GB
volatile write cache      : Disable
serial number             :
model number              : HSSD-D5220AS0211
firmware version          : 1520
device status             : healthy
```

System Response

Parameter	Description	Value
size	Available capacity of the namespace. Unit: GB In Linux and ESXi, 1 GB equals 1000 MB. In Windows, 1 GB equals 1024 MB.	Example: 1600.3 GB
formatted LBA size	Formatted logical block address (LBA) size of the namespace. Unit: byte	Example: 512 byte
formatted metadata size	Formatted metadata size of the namespace. Unit: byte	Example: 0 byte
protection type:	Protection type. NOTE This parameter is displayed only when the value of formatted metadata size is not 0 byte .	Example: Type 3
maximum capacity	Original maximum capacity of the controller. This value is included in basic port information, not in advanced port information.	Example: 1600.3GB

Parameter	Description	Value
current capacity	Current maximum capacity of the controller. This value is included in basic port information, not in advanced port information.	Example: 1600.3GB
volatile write cache	Whether write cache is supported.	Example: Enable
serial number	Serial number.	Example: 0503023HDCN107C80 013
model number	Model.	Example: HWE32P430016M00N
firmware version	Firmware version.	Example: 1.37
device status	Device health status. Values are as follows: <ul style="list-style-type: none"> ● healthy ● warning ● unknown NOTE If an unknown status occurs, contact Huawei technical support for help. For details, see C Getting Help .	Example: healthy

6.1.4 Querying the SMART Information About a Device

Function

This command is used to query the SMART (Self-Monitoring, Analysis and Reporting Technology) information about an SSD (SSD controller).

Format

hioadm info -d *devicename* **-s**

Parameters

Parameter	Description	Value
<i>devicename</i>	Name of a device	Examples: sdd

Usage Guidelines

None

Example

Query the SMART information about **sdd**.

```
[root@localhost tool]# hioadm info -d sdd -s
critical warning          : no warning
composite temperature    : 309 degrees Kelvin (36 degrees Celsius)
percentage used          : 0%
data units read          : 29.0 MB
data units written       : 0.0 MB
host read commands       : 1183
host write commands      : 0
power cycles             : 34 times
power on hours           : 14 h
media and data integrity errors: 0
warning composite temperature time: 0 min
```

System Response

Parameter	Parameter Description	Value
critical warning	Critical warning, such as overtemperature and insufficient redundant space.	Example: no warning There are the following types of critical warning: <ul style="list-style-type: none"> ● The available space is smaller than the threshold. ● The temperature exceeds the threshold. ● An internal error downgrades the NVM subsystem reliability. ● The medium is read-only. ● Device backup failed.
composite temperature	Temperature. Unit: degree Kelvin and Celsius	Example: 328 degree K (55 degree C)
percentage used	Percentage of used service life.	Example: 0%
data units read	Total read data volume. Unit: MB	Example: 22.4 MB
data units written	Total write data volume. Unit: MB	Example: 0.0 MB
host read commands	Number of read times.	Example: 488
host write commands	Number of write times.	Example: 0
power cycles	Number of power-ons.	Example: 2 times
power on hours	Power-on period.	Example: 0 h

Parameter	Parameter Description	Value
media and data integrity errors	Number of data errors.	Example: 0
warning composite temperature time	Minor composite temperature alarm time.	Example: 5 mins

6.1.5 Querying Advanced Information of a Device

Function

This command is used to query the advanced information about an SSD (SSD controller).

Format

hioadm info -d devicename -a

Parameters

Parameter	Description	Value
<i>devicename</i>	Name of a device.	Examples: sdd

Usage Guidelines

None

Example

Query the advanced information about sdd.

```
[root@localhost tool]# hioadm info -d sdd -a
manufacturer          : Huawei
WWN                   : 50022a107a967ab0
serial number         : 024YUD10J2800055
model number          : HSSD-D5220AS0200
highest temperature   : 310 degrees Kelvin (37 degrees Celsius)
exceed temperature threshold count: 0
exceed temperature threshold time: 0 mins
capacitance status    : OK
buck voltage          : 0 mV
capacitance           : 0 uF
capacitance voltage   : 0 mV
bad block rate        : 0.000000%
total blocks count    : 0
bad blocks count      : 54
factory bad blocks count : 0
flash program failed count : 0
flash erase failed count : 54
Soft Read Count       : 0
CRC Error Count(P0)   : 0
```

```

CRC Error Count(P1)      : 0
Rebuild Flag            : 0
Total Erase Count       : 6517
Map-Table Rebuild Count : 0
Former Pow_Cyc CRC Error(P0) : 0
Former Pow_Cyc CRC Error(P1) : 0
Hard Reset Count(P0)    : 0
Hard Reset Count(P1)    : 0
8b/10b Error Count(P0) : 0
8b/10b Error Count(P1) : 0
Current_Pending_Sector  : 0
Page Size               : 4096
maximum data transfer size : unlimit
    
```

System Response

Parameter	Parameter Description	Value
manufacturer	Manufacturer.	Huawei
WWN	Unique identifier.	Example: 50022A1012345678
serial number	Serial number.	Example: 023HDF10FB800303
model number	Model	Example: HWE32P430016M00N
highest temperature	Highest temperature recorded.	Example: 329 degree K (56 degree C)
exceed temperature threshold count	Number of times that the temperature threshold is exceeded.	Example: 0
exceed temperature threshold time	Period during which the temperature threshold is exceeded.	Example: 0 mins
capacitance status	Status of capacitance.	Example: OK
buck voltage	Buck voltage.	Example: 10603 mV
capacitance	Capacitor capacitance.	Example: 1219 uF
capacitance voltage	Capacitor voltage.	Example: 31416 mV
bad block rate	Bad block rate.	Example: 1.776449%
total blocks count	Total number of blocks, including bad blocks.	Example: 134144
bad blocks count	Total number of bad blocks.	Example: 2383
factory bad blocks count	Number of bad blocks before delivery.	Example: 0

Parameter	Parameter Description	Value
flash program failed count	Number of flash program failures.	Example: 0
flash erase failed count	Number of flash erasure failures.	Example: 0
Soft Read Count	Number of soft failures.	Example: 0
CRC Error Count(P0)	Number of CRC errors during the PORT0 SAS link power-on.	Example: 0
CRC Error Count(P1)	Number of CRC errors during the PORT1 SAS link power-on.	Example: 0
Rebuild Flag	Rebuild flag, used to determine and record the rebuild method after power-on. 0: NONE_BUILD , indicates no build. This is the default value. 1: NORMAL_BUILD , indicates normal rebuild (plog rebuild). 2: ALL_DISK_BUILD , indicates disk rebuild (deep rebuild).	Example: 0
Total Erase Count	Total number of erase operations on disks.	Example: 6517
Map-Table Rebuild Count	Number of rebuild operations.	Example: 0
Former Pow_Cyc CRC Error(P0)	Number of historical CRC errors on the PORT0 SAS link.	Example: 0
Former Pow_Cyc CRC Error(P1)	Number of historical CRC errors on the PORT1 SAS link.	Example: 0
Hard Reset Count(P0)	Number of hard resets on the PORT 0 SAS link.	Example: 0
Hard Reset Count(P1)	Number of hard resets on the PORT 1 SAS link.	Example: 0

Parameter	Parameter Description	Value
8b/10b Error Count(P0)	Number of 8b/10b errors on the PORT 0 SAS link.	Example: 0
8b/10b Error Count(P1)	Number of 8b/10b errors on the PORT 1 SAS link.	Example: 0
Current_Pending_Sector	Number of uncorrectable error-correcting code errors (UNCs for short) in the pending list.	Example: 0
Page Size	Size of a page.	Example: 4096
maximum data transfer size	Maximum data transfer size.	Example: unlimited

6.1.6 Querying Thresholds of a Device

Function

This command is used to query thresholds of an SSD (SSD controller). This command applies only to SAS SSDs.

Format

hioadm info -d *devicename* -t

Parameters

Parameter	Description	Value
<i>devicename</i>	Name of a device.	Examples: sdd

Usage Guidelines

None

Example

Query thresholds of sdd.

```
[root@localhost tool]# hioadm info -d sdd -t
Attribute Name      Cur      Max      Min      Thres
Flag
```

Raw Read Error Rate	0	100	0
5	0		
Raw Write Error Rate	0	100	0
5	0		
Soft Read Error Rate	0	100	0
5	0		
Block Erase Fail Rate	0	100	0
5	0		
Disk Temperature	34	100	0
78	0		
Reallocation Count	0	100	0
70	0		
Disk Life Expend	0	100	0
99	0		

System Response

Parameter	Parameter Description	Value
Raw Read Error Rate	Read error rate of underlying data	Example: Current value (Cur): 0 Maximum value (Max): 100 Minimum value (Min): 0 Threshold (Thres): 5 Flag hit (Flag): 0
Raw Write Error Rate	Write error of underlying data	Example: Current value (Cur): 0 Maximum value (Max): 100 Minimum value (Min): 0 Threshold (Thres): 5 Flag hit (Flag): 0
Soft Read Error Rate	Software read error rate	Example: Current value (Cur): 0 Maximum value (Max): 100 Minimum value (Min): 0 Threshold (Thres): 5 Flag hit (Flag): 0
Block Erase Fail Rate	Block erasing failure rate	Example: Current value (Cur): 0 Maximum value (Max): 100 Minimum value (Min): 0 Threshold (Thres): 5 Flag hit (Flag): 0

Parameter	Parameter Description	Value
Disk Temperature	Disk temperature	Example: Current value (Cur): 34 Maximum value (Max): 100 Minimum value (Min): 0 Threshold (Thres): 78 Flag hit (Flag): 0
Reallocation Count	Number of reallocated sectors	Example: Current value (Cur): 0 Maximum value (Max): 100 Minimum value (Min): 0 Threshold (Thres): 70 Flag hit (Flag): 0
Disk Life Expend	Disk service life	Example: Current value (Cur): 0 Maximum value (Max): 100 Minimum value (Min): 0 Threshold (Thres): 99 Flag hit (Flag): 0

6.2 Querying, Upgrading, and Activating Firmware

6.2.1 Querying the Firmware Version of an SSD

Function

This command is used to query the firmware version of an SSD.

Format

hioadm updatefw -d *devicename*

Parameters

Parameter	Description	Value
<i>devicename</i>	Name of an SSD	Example: sdd

Usage Guidelines

None

Example

Query the firmware version of **sdd**.

```
[root@localhost tool]# hioadm updatefw -d sdd
slot version activation
1 1030 current
```

6.2.2 Upgrading the Firmware of an SSD

Function

This command is used to upgrade the firmware of an SSD.

CAUTION

If you run the following command with **activeflag** set to **1** (that is, firmware will be activated immediately), services may be stopped. Before running this command, ensure that stopping services has no adverse impact.

Format

hioadm updatefw -d devicename -f fwimagefile [-s slot] [-a activeflag]

Parameters

Parameter	Description	Value
<i>devicename</i>	Name of an SSD.	Example: sdd
<i>fwimagefile</i>	Path of the target firmware image file.	Example: /home/fw_image.img
<i>slot</i>	Slot of the target firmware.	1 NOTE A SAS SSD has only one slot, namely, slot 1.
<i>activeflag</i>	Firmware activation mode.	<ul style="list-style-type: none"> ● 0: Downloaded firmware is activated after the next reset. ● 1: Firmware is activated immediately after being downloaded. NOTE If this parameter is not set, the downloaded firmware is activated after the next reset.

Usage Guidelines

None

Example

Download the sdd firmware and make it activated after the next reset.

```
[root@localhost tool]# hioadm updatefw -d sdd -f ES3000V5_FW_1035.bin -s 1 -a 0
slot version activation
1 1030 current
```

```
WARNING! You have selected slot <1> to update the firmware image.
WARNING! You have selected the update firmware operation.
Proceed with the update firmware operation? (Y|N): y
Please do not remove driver or SSD device
Loading... OK
Downloading and replacing the firmware image at slot <1> succeeded.
Activating the firmware image at slot <1> succeeded.
```

6.2.3 Activating the Firmware of an SSD

Function

This command is used to activate the firmware of an SSD.

CAUTION

If you run the following command with `activeflag` set to **1** (that is, firmware will be activated immediately), services may be stopped. Before running this command, ensure that stopping services has no adverse impact.

Format

```
hioadm updatefw -d devicename [-s slot] [-a activeflag]
```

Parameters

Parameter	Description	Value
<i>devicename</i>	Name of an SSD.	Example: sdd
<i>slot</i>	Slot of the target firmware image.	1
<i>activeflag</i>	Firmware activation mode.	<ul style="list-style-type: none"> ● 0: Activates firmware after the next reset. ● 1: Activates firmware immediately.

Usage Guidelines

None

Example

Activate the **sdd** firmware after the next reset.

```
[root@localhost tool]# hioadm updatefw -d sdd -s 1 -a 0
slot version activation
1      1A01      current
```

```
WARNING! You have selected the update firmware operation.
Proceed with the update firmware? (Y|N): y
Activating the firmware image at slot <1> succeeded.
```

6.3 Querying and Setting the Capacity

The capacity size affects the write performance. A small capacity results in a high random write IOPS. The ES3000 allows you to set the capacity within a specified range.

6.3.1 Querying the Capacity of an SSD

Function

This command is used to query the current capacity of an SSD.

Format

hioadm capacity -d *devicename*

Parameters

Parameter	Description	Value
<i>devicename</i>	Name of an SSD.	Example: sdd

Usage Guidelines

None

Example

Query the current capacity of **sdd**.

```
[root@localhost tool]# hioadm capacity -d sdd
current capacity : 1600.3GB (1600321314816Byte)
maximum capacity : NA
```

System Response

Parameter	Parameter Description	Value
current capacity	Total available capacity (with one decimal place) of the SSD. Unit: GB. In Linux and ESXi, 1 GB equals 1000 MB. In Windows, 1 GB equals 1024 MB.	Example: 1600.3 GB (1600321314816 bytes)
maximum capacity	Original available capacity	NA

6.3.2 Setting the Capacity of an SSD

Function

This command is used to set the current capacity of an SSD.

Format

```
hioadm capacity -d devicename -s capacitysize
```

Parameters

Parameter	Description	Value
<i>devicename</i>	Name of an SSD.	Example: sdd
<i>capacitysize</i>	Target capacity. In Linux and ESXi, 1 GB equals 1000 MB. In Windows, 1 GB equals 1024 MB.	Integer or decimal with a unit. <ul style="list-style-type: none">● Supported units: G● The minimum capacity is 1 GB.

Usage Guidelines

Before running this command, stop all I/O services of the SSD, and unmount all logical drives of the SSD.

Example

Set the current capacity of **sdd** to 100 GB.

```
[root@localhost tool]# hioadm capacity -d sdd -s 100
current capacity : 1600.3GB (1600321314816Byte)
maximum capacity : NA

WARNING! The set capacity operation will clear all
data.
WARNING! You have selected the set capacity operation.
Proceed with the set capacity? (Y|N):y
Setting...OK
Setting capacity succeeded
```

System Response

Parameter	Parameter Description	Value
current capacity	Total available capacity (with one decimal place) of the SSD. Unit: GB In Linux and ESXi, 1 GB equals 1000 MB. In Windows, 1 GB equals 1024 MB.	Example: 512.0 GB (512000000000 bytes)
maximum capacity	Original available capacity of the SSD.	NA

6.4 Formatting

Formatting is classified into quick formatting and secure formatting.

- Quick formatting (Secure Erase Settings=0): Erase only entries and support namespace formatting.
- Secure formatting (Secure Erase Settings=1): Erase all data and support only entire drive formatting.

CAUTION

Perform formatting with caution. Data cannot be restored after formatting.

If drivers do not support the Data Integrity Field (DIF) function, do not format drives into the DIF format. Otherwise, problems such as operating system resetting will occur.

6.4.1 Formatting a Logical Drive

Function

Perform quick formatting of a logical drive. Logical drives support only quick formatting. Secure formatting is not allowed.

Format

hioadm format -d *diskname*

Parameters

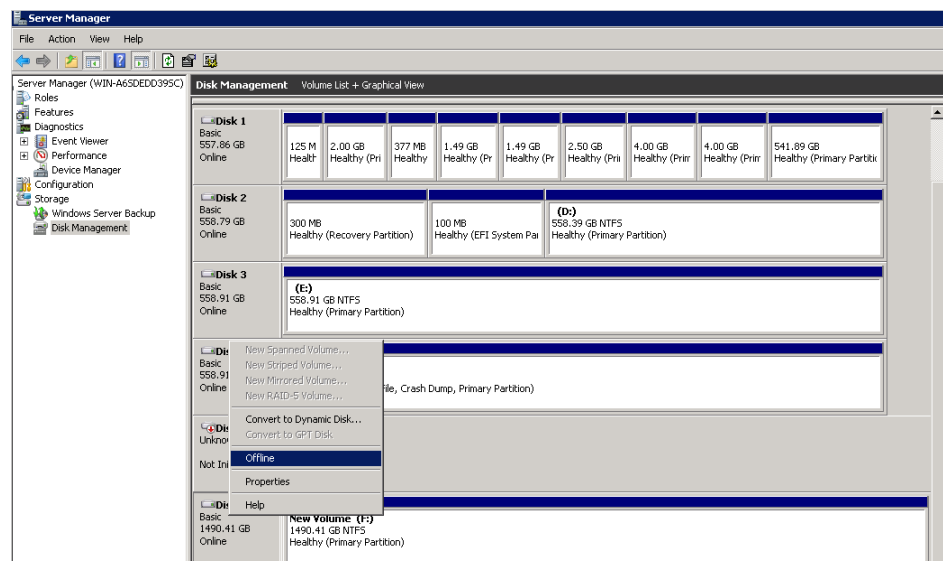
Parameter	Description	Value
<i>diskname</i>	Name of a logical drive.	Example: sdd

Usage Guidelines

- Before running this command, stop all I/O services of the logical drive and perform the following:
 - For Linux, unmount the logical drive. Stop all the processes on the logical drive, and run the **fuser** command to check that these processes are all stopped. The following information indicates that a process is using the logical drive. Stop the process.


```
[root@localhost tool]# fuser /dev/sdd
/dev/sdd:          14789
```
 - For ESXi, delete all partitions of the logical drive.
 - For Windows, make the logical drive offline, as shown in [Figure 6-1](#).

Figure 6-1 Making a logical drive offline



⚠ CAUTION

Do not read or write data when running this command. Otherwise, I/O errors may occur.

Example

Perform quick formatting of the logical drive **sdd**.

```
[root@localhost tool]# hioadm format -d sdd

WARNING! The format operation will clear all data.
WARNING! You have selected the format operation.
Proceed with the format? (Y|N): y
Format Progress.... 100%
The format operate succeeded.
The current LBA Format type : <0> lba=512 metadata=0
```

6.4.2 Formatting an SSD

Function

This command is used to format an SSD. Secure formatting and quick formatting are supported.

Format

hioadm format -d devicename [-m *formatmode*] [-t *lbasize*] [-pt *protectiontype*] [-pil *location*] [-mc *metadatamode*]

Parameters

Parameter	Description	Value
<i>devicename</i>	Name of an SSD.	Example: sdd
<i>formatmode</i>	Formatting mode.	<ul style="list-style-type: none"> ● 0: quick formatting (Secure Erase Settings=0) ● 1: secure formatting (Secure Erase Settings=1) If this parameter is not specified, the default value 0 is used.

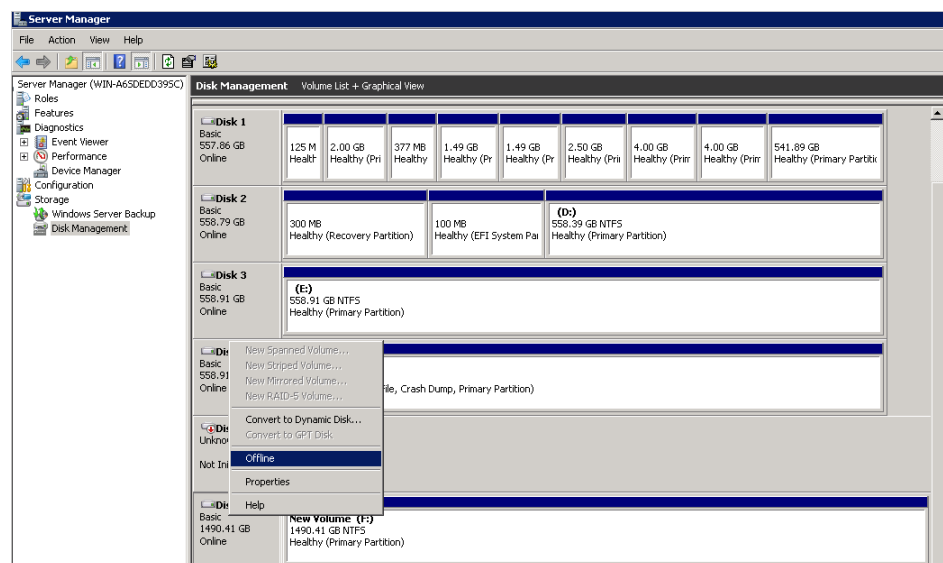
Parameter	Description	Value
<i>lbasize</i>	Sector size and type.	<ul style="list-style-type: none"> ● 0: The sector size is 512 B, and the metadata size is 0 B. ● 1: The sector size is 4 KB, and the metadata size is 0 B. ● 2: The sector size is 512 B, and the metadata size is 8 B. ● 3: The sector size is 4 KB, and the metadata size is 64 B. ● 4: The sector size is 4 KB, and the metadata size is 8 B. ● 5: The sector size is 520 B, and the metadata size is 0 B. ● 6: The sector size is 4160 B, and the metadata size is 0 B. <p>If this parameter is not specified, the sector size and type are not changed.</p> <p>NOTE The Linux operating system supports all the preceding sector types (5 and 6 are applicable only to SAS drives). The Windows operating system supports sector types 0, 1, 5, and 6 (5 and 6 are applicable only to SAS drives). The ESXi system supports only the 512 B sector type. If this parameter is not set, the sector type is not changed.</p>
<i>protectiontype</i>	Protection enabling and type.	<ul style="list-style-type: none"> ● 0: indicates that the protection is not enabled. ● 1: indicates that the protection is enabled and the protection type is 1. ● 2: indicates that the protection is enabled and the protection type is 2. ● 3: indicates that the protection is enabled and the protection type is 3.
<i>location</i>	Protection data location.	<ul style="list-style-type: none"> ● If this value is set to 1 and the protection is enabled, protection data is transmitted as the first eight bytes of the metadata. ● If this value is set to 0 and the protection is enabled, protection data is transmitted as the latter eight bytes of the metadata.
<i>metadatamode</i>	Protection data mode.	<ul style="list-style-type: none"> ● 1: Metadata is transferred as a part of the extended data LBA. ● 0: Metadata is transferred as a part of separate cache. <p>NOTE If Metadata Size is set to 0, this parameter is unavailable.</p>

Usage Guidelines

- Before running this command, stop all I/O services of the SSD and perform the following:
 - For Linux, unmount all logical drives. Stop all the processes on the logical drives that use the SSD, and run the **fuser** command to check that these processes are all stopped. The following information (in this example, the SSD has two logical drives) indicates that a process is using an SSD logical drive. Stop the process.


```
[root@localhost tool]# fuser /dev/sdd /dev/sdd
/dev/sdd:          14789
```
 - For ESXi, delete all partitions of all logical drives.
 - For Windows, make all logical drives offline, as shown in [Figure 6-2](#).

Figure 6-2 Making a logical drive offline



Do not read or write data when running this command. Otherwise, I/O errors may occur.

Example

Perform secure formatting of the **sdd** SSD, and set the sector size to 512 B and metadata size to 0 B.

```
[root@localhost
tool]# hioadm format -d sdd -m 1 -t 0
WARNING! The format operation will clear all data.
WARNING! You have selected the format operation.
Proceed with the format? (Y|N): y
Format Progress.... 100%
The format operate succeeded.
The current LBA Format type : <0> lba=512 metadata=0
```

6.5 Safely Erasing User Data of an SSD

Function

This command is used to safely erase user data of an SSD.

After safely erasing an SSD, the sector type and quantity of logical drives are not changed.

⚠ CAUTION

Exercise caution because this operation erases data.

Format

hioadm secure -d *devicename*

Parameters

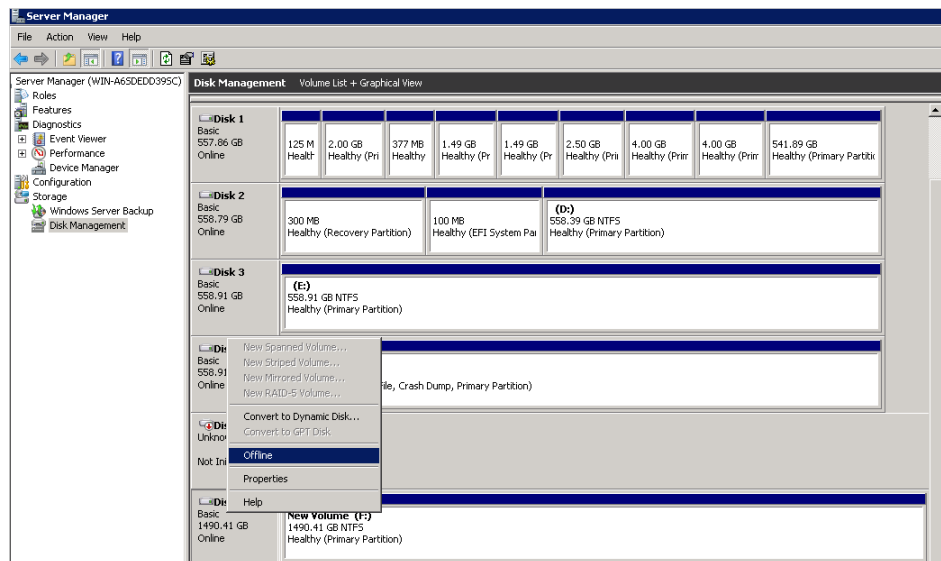
Parameter	Description	Value
<i>devicename</i>	Name of an SSD.	Example: sdd

Usage Guidelines

- Before running this command, stop all I/O services of the SSD and perform the following:
 - For Linux, unmount all logical drives. Stop all the processes on the logical drives that use the SSD, and run the **fuser** command to check that these processes are all stopped. The following information (in this example, the SSD has two logical drives) indicates that a process is using an SSD logical drive. Stop the process.


```
[root@localhost tool]# fuser /dev/sdd
/dev/sdd:      14789
```
 - For ESXi, delete all partitions of all logical drives.
 - For Windows, make the logical drives offline, as shown in [Figure 6-3](#).

Figure 6-3 Making a logical drive offline



Example

Safely erase user data of the **sdd** SSD.

```
[root@localhost tool]# hioadm secure -d sdd
WARNING! The secure operation will clear all data.
WARNING! You have selected the secure operation.
Proceed with the secure? (Y|N): y
Format Progress.... 100%
The secure operate succeeded.
```

6.6 Querying and Setting the Power Consumption Level

6.6.1 Querying the Power Consumption Level of an SSD

Function

This command is used to query the power consumption level of an SSD.

Format

hioadm powerstate -d *devicename*

Parameters

Parameter	Description	Value
<i>devicename</i>	Name of an SSD.	Example: sdd

Usage Guidelines

None

Example

Query the power consumption level of the **sdd** SSD.

```
[root@localhost tool]# hioadm powerstate -d sdd
Power states:
[ ] <0> 10W
[*] <1> 12W
[ ] <2> 14W
```

6.6.2 Setting the Power Consumption Level of an SSD

Function

This command is used to set the power consumption level of an SSD.

Format

hioadm powerstate -d *devicename* **-s** *powerstate*

Parameters

Parameter	Description	Value
<i>devicename</i>	Name of an SSD.	Example: sdd
<i>powerstate</i>	Power consumption level.	<ul style="list-style-type: none"> ● 0: 10 W ● 1: 12 W ● 2: 14 W <p>NOTE If the capacity of an SSD is 16 TB, the level 2 power consumption is 16 W.</p>

NOTE

- The power consumption level affects device performance. The lower the power consumption, the poorer the performance.
- When the power consumption level is 2, the performance is not limited.
- The default power consumption level is level 1. A non-default power consumption level is not recommended.

Usage Guidelines

None

Example

Set the **sdd** SSD power consumption level to **2**.

```
root@ubuntu:~# hioadm powerstate -d sdd -s 2
Set power state succeeded.
Power states:
  [] <0> 10W
  [ ] <1> 12W
  [*] <2> 14W
```

6.7 Obtaining Logs

NOTE

If the 3008 RAID card is used and RAID groups are created, SAS SSDs do not support the function of obtaining logs.

6.7.1 Obtaining Logs of a Device

Function

This command is used to obtain logs of an SSD and generate a log file.

Format

```
hioadm log -d devicename -t logtype
```

Parameters

Parameter	Description	Value
<i>devicename</i>	Name of a device.	Example: sdd
<i>logtype</i>	Log type.	<ul style="list-style-type: none"> ● 0: firmware key log ● 1: firmware log ● 2: core dump log The default value is 0 .

Usage Guidelines

The path and name of the generated log file is as follows. **sdd** is an example device name.

- Linux: The file path is **/opt/hio/**; the key log file name is **sdd_key.log**; the full log file name is **sdd_fw.log**; the core dump file name is **sdd_coredump.log**.
- ESXi: The file path is **/scratch/hio/**; the key log file name is **sdd_key.log**; the full log file name is **sdd_fw.log**; the core dump file name is **sdd_coredump.log**.
- Windows: The file path is the directory storing **hioadm.exe**; the key log file name is **sdd_key**; the full log file name is **sdd_fw**; the core dump file name is **sdd_coredump**.

Example

Obtain the key logs of the **sdd** SSD.

```
[root@localhost tool]# hioadm log -d sdd -t 0
firmware key log saving...OK
```

```
saving firmware key log file succeeded(/opt/hio/sdd_key.log)
logs has been done saved.
```

6.7.2 Obtaining All Logs of a Device At a Time

Function

Obtain and export all logs of a device to a predefined directory. Exported logs include key logs, all logs, core dump logs, SMART information, and advanced information about firmware.

Format

hioadm log -d devicename -a

Parameters

Parameter	Description	Value
<i>devicename</i>	Name of a device.	Example: sdd

Usage Guidelines

- Linux: The log file path is **/opt/hio/**.
- ESXi: The log file path is **/scratch/hio/**.
- Windows: The log file path is the directory storing **hioadm.exe**.

Example

In Linux, obtain all logs of the **sdd** SSD at a time.

```
[root@localhost tool]# hioadm log -d sdd -a
firmware key log saving...OK
saving firmware key log file succeeded(/opt/hio/sdd_key.log)
firmware log saving...OK
saving firmware log file succeeded(/opt/hio/sdd_fw.log)
firmware core dump log saving...OK
saving firmware core dump log file succeeded(/opt/hio/sdd_coredump.log)
other log saving.....OK
saving other logs file succeeded(/opt/hio/sdd_other.log)
logs has been done saved.
```

6.8 Querying and Setting Temperature Thresholds

6.8.1 Querying the Temperature Information About a Device

Function

This command is used to query the temperature and temperature thresholds of an SSD.

Format

hioadm temperature -d *devicename* [-i *index*]

Parameters

Parameter	Description	Value
<i>devicename</i>	Name of a device.	Example: sdd
<i>index</i>	Number of a temperature sensor.	<ul style="list-style-type: none"> ● 0: overall temperature ● 1: controller temperature <p>If this parameter is not specified, all sensor information is queried.</p> <p>SAS drives support only the overall temperature.</p>

Usage Guidelines

None

Example

Query the temperature information about the **sdd** SSD.

```
[root@localhost tool]# hioadm temperature -d sdd
composite highest temperature:          306 degree K (33 degree C)
composite overtemperature threshold count: 0
composite overtemperature threshold time: 0 min

sensors temperature information in degrees Kelvin (degrees Celsius):
      current      overtemperature threshold      undertemperature
threshold
composite      303 (30)                333 (60)                273 (0)
```

System Response

Parameter	Parameter Description	Value
composite highest temperature	Highest SSD temperature recorded. Unit: K and °C	Example: 363 degree K (90 degree C)
composite overtemperature threshold count	Number of SSD overtemperature occurrences.	Example: 5
composite overtemperature threshold time	Period of SSD overtemperature. Unit: minute	Example: 500 min
controller highest temperature	Highest controller temperature recorded. Unit: K and °C	Example: 363 degree K (90 degree C)
controller overtemperature threshold count	Number of controller overtemperature occurrences.	Example: 5

Parameter	Parameter Description	Value
controller overtemperature threshold time	Period of controller overtemperature. Unit: minute	Example: 500 min
current	Current temperature. Unit: K and °C	Example: 303(30)
overtemperature threshold	Overtemperature threshold. Unit: K and °C	Example: 341(68)
undertemperature threshold	Undertemperature threshold. Unit: K and °C	Example: 273(0)

6.8.2 Setting the Temperature Thresholds of a Device

Function

This command is used to set the temperature thresholds of an SSD or controller.

Format

hioadm temperature -d *devicename* [-i *index*] -o *overtemperature_threshold*

Parameters

Parameter	Description	Value
<i>devicename</i>	Name of a device.	Example: sdd
<i>index</i>	Number of a temperature sensor.	<ul style="list-style-type: none"> ● 0: overall temperature ● 1 to 8: controller sensor number <p>NOTE If this parameter is not specified, all sensors are configured. SAS drives can be configured with the high temperature threshold.</p>

Parameter	Description	Value
<i>overthreshold</i>	Overtemperature threshold.	<ul style="list-style-type: none"> ● Unit: K ● Value range: <ul style="list-style-type: none"> - Overall temperature: 273K to 351K (0°C to 78°C) - Controller temperature: 273K to 373K (0°C to 100°C) <p>If this parameter is not specified, this parameter value is not changed. Either the overtemperature or undertemperature threshold must be specified.</p> <p>NOTE ES3000 SDDs have two alarm severities. The second alarm severity restricts drive I/O speed. If an overtemperature alarm occurs, check server heat dissipation and ambient temperature.</p>
<i>undertreshold</i>	Undertemperature threshold.	ES3000 V5 SAS SSD does not support under threshold.

Usage Guidelines

None

Example

Set the overtemperature threshold to **333K** for the **sdd** SSD.

```
[root@localhost tool]# hioadm temperature -d sdd -i 0 -o 333 -u 273
set overtemperature threshold succeeded.
Doesn't support under threshold
[root@localhost tool]# hioadm temperature -d sdd
composite highest temperature:          306 degree K (33 degree C)
composite overtemperature threshold count: 0
composite overtemperature threshold time: 0 min

sensors temperature information in degrees Kelvin (degrees Celsius):
      current      overtemperature threshold      undertemperature
threshold
composite      303 (30)                333 (60)                273 (0)
```

6.9 Querying the Diagnosis Result of a Specified SSD

NOTE

In Windows 2012 R2, Windows 2012, or Windows 2008 R2, when SAS SSDs are used with LSI 3008 RAID cards, the command for querying the SSD diagnosis result may fail. In this case, download and install the latest driver of the LSI 3008 RAID card before running this command in Windows 2012 or Windows 2008 R2; contact the LSI vendor if Windows 2008 R2 is used.

Function

Query the diagnosis result of a specified SSD.

Format

hioadm selftest -d *devicename*

Parameters

Parameter	Description	Value
<i>devicename</i>	Name of a device.	Example: sdd

Usage Guidelines

None

Example

Conduct diagnosis tests for the **sdd** SSD.

```
[root@localhost host]# hioadm selftest -d sdd
self test:
           default: Self-test completed without error.
```

System Response

Parameter	Parameter Description	Value
selftest result	Overall test result. If the test is successful, the value is default: Self-test completed without error. If the test fails, failed items and corresponding repair description are displayed.	Example: default: Self-test completed without error.

6.10 Querying the Electronic Label Information About an SSD

Function

This command is used to query the electronic label information about an SSD.

Format

hioadm label -d *devicename*

Parameters

Parameter	Description	Value
<i>devicename</i>	Name of a device.	Example: sdd

Usage Guidelines

None

Example

Query the electronic label information about the **sdd** SSD.

```
[root@localhost tool]# hioadm label -d sdd
/$(ArchivesInfo Version)
/$(ArchivesInfoVersion=3.0

[Board Properties]
BoardType=STJ2HSSD01
BarCode=031XBK10G1000022
Item=03031XBK
Description=Finished Board,HSSD,STJ2HSSD01,SSD Midrange 900GB 2.5" SAS 12G
Manufactured=XXXX-XX-XX
VendorName=Huawei
IssueNumber=00
CLEICode==
BOM=C
```

6.11 Setting and Querying Time Synchronization

6.11.1 Querying the Time of a Specified SSD

Function

This command is used to query the time of a specified SSD.

Format

hioadm syntime -d *devicename*

Parameters

Parameter	Description	Value
<i>devicename</i>	Indicates the name of an SSD.	Example: sdd

Usage Guidelines

None

Example

Query the time of a specified SSD **sdd**.

```
[root@localhost tool]# hioadm synctime -d sdd
Current device time:Mon Apr 16 17:40:57 EDT 2018.
```

6.11.2 Synchronizing the Time of a Specified SSD

Function

This command is used to synchronize the time of a specified SSD.

Format

hioadm synctime -d *devicename* **-s**

Parameters

Parameter	Description	Value
<i>devicename</i>	Indicates the name of an SSD.	Example: sdd

Usage Guidelines

None

Example

Synchronize the time of the specified SSD **sdd**.

```
[root@localhost tool]# hioadm synctime -d sdd -s
Time synchronization succeeded.
Current device time:Thu Mar 22 10:51:51 EDT 2018.
[root@localhost tool]# hioadm synctime -d sdd
Current device time: Thu Mar 22 10:51:51 EDT 2018.
```

6.12 Erasing a Specified SSD

Function

This command is used to erase a specified SSD.



Before running this command, stop all I/O services of the SSD.

Format

hioadm sanitize -d *devicename* **[-m mode] [-a action] [-r release] [-i invert] [-c count] [-p pattern]**

Parameters

Parameter	Description	Value
<i>devicename</i>	Indicates the name of an SSD.	Example: sdd
<i>mode</i>	Indicates a restriction mode.	<ul style="list-style-type: none"> ● 0: restricted completion mode ● 1: unrestricted completion mode
<i>action</i>	Indicates an operation type.	<ul style="list-style-type: none"> ● 0: reserved ● 1: exit failure mode ● 2: block erase operation ● 3: overwrite operation ● 4: crypto erase operation <p>NOTE Currently, only 1 and 2 1, 2, and 3 are supported.</p>
<i>release</i>	Indicates whether to reassign logical blocks after the sanitize operation is completed successfully.	<ul style="list-style-type: none"> ● 0: reassign logical blocks ● 1: no reassign logical blocks ● The default value is 0. <p>NOTE If action is 1, that is, in the exit failure mode, this parameter is ignored.</p>
<i>invert</i>	Indicates whether the overwrite mode is inverted between two overwrites.	<ul style="list-style-type: none"> ● 0: The overwrite mode is not inverted. ● 1: The overwrite mode is inverted. ● The default value is 0. <p>NOTE This parameter is available only when action is 3 (overwrite operation). In other cases, this parameter is ignored.</p>
<i>count</i>	Indicates the number of overwrite operations.	<ul style="list-style-type: none"> ● Specifies the number of data overwrites. ● The value ranges from 1 to 16. ● The default value is 1. <p>NOTE This parameter is available only when action is 3 (overwrite operation). In other cases, this parameter is ignored.</p>
<i>pattern</i>	Indicates the overwrite pattern.	<ul style="list-style-type: none"> ● A 32-bit value is used for overwriting. ● The default value is 0xFFFFFFFF. <p>NOTE This parameter is available only when action is 3 (overwrite operation). In other cases, this parameter is ignored.</p>

Usage Guidelines

None

Example

```
# Erase a specified SSD sdd.
```

```
linux-mazy:/ # hioadm sanitize -d sdd -m 0 -a 2  
Set sanitize succeeded.
```

6.13 Recovering Data

6.13.1 Recovering Data for an SSD

Function

This command is used to recover data for an SSD.

Format

```
hioadm recovery -d devicename [-t type]
```

Parameters

Parameter	Description	Value
<i>devicename</i>	Name of a device.	Example: sda
<i>type</i>	Data recovery mode.	<ul style="list-style-type: none">● 0: common recovery● 1: forcible recovery NOTE If this parameter is not set, the common recovery mode is used by default.

Usage Guidelines

This command may take up to 20 minutes.

NOTE

- If the device has critical non-hardware issues, data recovery may not be able to recover all data.
- Common recovery will recover original user data as much as possible. To ensure data reliability, SSD disks or cards will work in read-only mode after common recovery. Forcible recovery will erase all user data. If forcible recovery is successful, SSD disks will enter the healthy state.

Example

```
# Recover data for the sda.
```

```
[root@localhost host]# hioadm recovery -d sda  
you have selected normal recovery.
```

```
WARNING! The recovery operation will take tens of minutes.Please wait.  
WARNING! You have selected the recovery operation.  
Proceed with the recovery? (Y|N): y  
Recovering succeeded.  
.
```

6.13.2 Querying the SSD Data Common Recovery Progress

Function

This command is used to query the SSD data common recovery progress.

Format

```
hioadm recovery -d devicename -q
```

Parameter

Parameter	Description	Value
<i>devicename</i>	Name of a device.	Example: sda

Example

Query the data recovery progress of the **sda** SSD.

```
[root@localhost host]# hioadm recovery -d sda -q  
Recovering progress...100%  
The recovery operation completed successfully.
```


A Supported SAS Commands

The ES3000 V5 supports all management and I/O commands required by the SPL3r06, SBC, SPC, and SAM protocols.

A.1 SCSI Commands

Table 1 SCSI commands lists SCSI commands supported by the ES3000 V5.

Table A-1 SCSI commands

Code	Name	Description
00h	TEST UNIT READY	Checks whether the drive is ready, namely, whether the drive can receive the media-access command.
01h	REZEROING UNIT	Returns GOOD.
03h	REQUEST SENSE	Requests sense data from drives.
04h	FORMAT UNIT	Formats the drive.
07h	REASSIGN BLOCKS	Applies for one or more LBAs from drives.
08h	READ(6)	Initiates read operations starting from a specified LBA address and for a specified number of sectors.
0Ah	WRITE(6)	Initiates write operations starting from a specified LBA address and for a specified number of sectors.
0Bh	SEEK(6)	Returns GOOD.
12h	INQUIRY	Queries drive information.
15h	MODE SELECT(6)	Configures drive parameters.
16h	RESERVE(6)	Reserves LUNs for the initiator.
17h	RELEASE(6)	Releases the LUNs previously reserved for the initiator.

Cod e	Name	Description
1Ah	MODE SENSE(6)	Obtain drive parameters.
1Bh	START STOP UNIT	Makes the drive READY or NOT READY and simulates the motor behavior of HDDs.
1Dh	SEND DIAGNOSTIC	Initiates drive self-diagnosis.
25h	READ CAPACITY(10)	Obtains the capacity and medium format information about drives.
28h	READ(10)	Initiates read operations starting from a specified LBA address and for a specified number of sectors.
2Ah	WRITE(10)	Initiates write operations starting from a specified LBA address and for a specified number of sectors.
2Bh	SEEK(10)	Returns GOOD.
2Eh	WRITE AND VERIFY(10)	Initiates write operations starting from a specified LBA address and for a specified number of sectors, and checks whether data is correctly written into the drive.
2Fh	VERIFY(10)	Verifies data correctness.
35h	SYNCHRONIZE CACHE(10)	Stores data starting from a specified LBA address and for a specified number of sectors. As a drive does not have cache, this command is used for parameter and LBA address check only. Cache synchronizing is not executed.
37h	READ DEFECT DATA(10)	Reads the bad block list of drives.
3Bh	WRITE BUFFER	Specifies the operation performed on drive buffer.
3Ch	READ BUFFER(10)	Works with the WRITE BUFFER command to test drive memory and SCSI bus integrity.
41h	WRITE SAME(10)	Initiates write operations to write logical blocks received from the host to the section starting from a specified LBA address and for a specified number of sectors.
42h	UNMAP	Trims drives.
48h	SANITIZE	Clears drives.
4Ch	LOG SELECT	Resets drive Log Page information.
4Dh	LOG SENCE	Queries drive Log Page information.
55h	MODE SELECT(10)	Configures drive parameters.
56h	RESERVE(10)	Reserves LUNs for the initiator.
57h	RELEASE(10)	Releases the LUNs previously reserved for the initiator.

Cod e	Name	Description
5Ah	MODE SENCE(10)	Provides the device server with a method of reporting parameters to the application client.
5Eh	PERSISTENT RESERVE IN	Obtains the key information reserved permanently on the drive. This command is used together with PERSISTENT RESERVE OUT.
5Fh	PERSISTENT RESERVE OUT	Reserves drives for exclusive or shared connections. This command is used together with PERSISTENT RESERVE IN.
88h	READ(16)	Initiates read operations starting from a specified LBA address and for a specified number of sectors.
8Ah	WRITE(16)	Initiates write operations starting from a specified LBA address and for a specified number of sectors.
8Eh	WRITE AND VERIFY (16)	Initiates write operations starting from a specified LBA address and for a specified number of sectors, and checks whether data is correctly written into the drive.
8Fh	VERIFY(16)	Asks the device server to verify whether the data stored in the specific logical block of the storage media is correct.
91h	SYNCHRONIZE CACHE (16)	Stores data starting from a specified LBA address and for a specified number of sectors. As a drive does not have cache, this command is used for parameter and LBA address check only. Cache synchronizing is not executed.
93h	WRITE SAME(16)	Initiates write operations to write logical blocks received from the host to the section starting from a specified LBA address and for a specified number of sectors.
9Ah	WRITE STREAM	Indicates the flow feature, which is equivalent to the WRITE(10) command.
9Bh	READ BUFFER(16)	Works with the WRITE BUFFER command to test drive memory and SCSI bus integrity.
9Eh/ 10h	READ CAPACITY(16)	Obtains the capacity and medium format information about drives.
9Eh/ 14h	STREAM CONTROL	Enables or disables the data stream control function.
9Eh/ 15h	BACKGROUND CONTROL	Asks the device server to start or stop background operations initiated by the host.
9Eh/ 16h	GET STREAM STATIS	Obtains the flow status.
A0h	REPORT LUNS	Asks the device server to report available logical unit information within the connection to the application client.

Cod e	Name	Description
A3h/0Fh	REPORT TIMESTAMP	Obtains drive timestamp.
A4h/0Fh	SET TIMESTAMP	Initiates drive timestamp.
B7h	READ DEFECT DATA(12)	Reads the bad block list of drives.
C0h	Vendor(Get)	Custom command.
C1h	Vendor(Set)	Custom command.

A.2 Task Management Commands

Table1 Task management commands lists task management commands supported by the ES3000 V5.

Table A-2 Task management commands

Task	Supported
Abort task	Yes
Abort task set	Yes
Clear ACA	No
Clear task set	Yes
I_T nexus reset	Yes
Logical unit nexus reset	Yes
Query task	No
Query task set	No
Query asynchronous event	No

A.3 ModePage Support

Table1 Mode Page support lists the mode page support of the ES3500S and ES3600S.

Table A-3 Mode Page support

Mode Page Code	Sub-Page Code	Mode Page
01h	—	Read-Write error recovery
02h	—	Disconnect-reconnect
03h	—	Format Device Parameters
04h	—	Rigid Disk Geometry
07h	—	Verify error recovery
08h	—	Caching
0Ah	—	Control
19h	—	Protocol specific port
1Ah	01h	Power consumption
1Ch	—	Informational exceptions control

A.4 Log Page Support

Table1 Log Page support lists the log page support of the ES3500S and ES3600S.

Table A-4 Log Page support

Log Page Code	Log Page Name
15	Background scan results log page
19	General Statistics
2F	Information exceptions log page
06	Non-medium error page
00	Page support list
1A	Power conditions transitions page
18	Protocol-specific port log page
03	Read error counter page
10	Self-test results page
11	Solid state media log page
0E	Start-stop cycle counter page
0D	Temperature page

Log Page Code	Log Page Name
32	Vendor Specific log page
34	Vendor Specific log page
35	Vendor Specific log page
37	Vendor Specific log page
05	Verify error counter page
02	Write error counter page

A.5 SMART Support

Table1 SMART support (Log Page: 35h) lists the SMART support status of the ES3500S and ES3600S.

Table A-5 SMART support (Log Page: 35h)

Byte	Description	Value
0	PAGE CODE	35h
1	Reserved	00h
2-3	PAGE Length(MSB)	0300h
4	Property ID (accumulative power-on duration)	09h
5-7	Reserved	00h
8-15	Accumulative power-on duration (MSB)	xxh
16	Property ID (accumulative power-on times)	0Ch
17-19	Reserved	00h
20-27	Accumulative power-on times (MSB)	xxh
28	Property ID (number of soft errors)	0Dh
29-31	Reserved	00h
32-39	Number of soft failures (MSB)	xxh
40	Property ID (number of CRC errors of port 0 during the power-on period)	C7h
41-43	Reserved	00h
44-51	Number of CRC errors of port 0 during the power-on period (MSB)	xxh

Byte	Description	Value
52	Property ID (number of CRC errors of port 1 during the power-on period)	C8h
53-55	Reserved	00h
56-63	Number of CRC errors of port 1 during the power-on period (MSB)	xxh
64	Property ID (reconstruction flag of the power-on mapping table)	E1h
65-67	Reserved	00h
68-75	Power-on reconstruction flag (MSB)	xxh
76	Property ID (number of bad blocks before delivery)	E8h
77-79	Reserved	00h
80-87	Number of original bad blocks before delivery (MSB)	xxh
88	Property ID (accumulative erasure times)	E9h
89-91	Reserved	00h
92-99	Accumulative erasure times (MSB)	xxh
100	Property ID (accumulative erasure failure times)	EAh
101-103	Reserved	00h
104-111	Accumulative erasure failure times (MSB)	xxh
112	Property ID (accumulative programming failure times)	EBh
113-115	Reserved	00h
116-123	Accumulative erasure failure times (MSB)	xxh
124	Property ID (number of new bad blocks)	ECh
125-127	Reserved	00h
128-135	Number of new bad blocks (MSB)	xxh
136	Property ID (accumulative UNC times)	EEh
137-139	Reserved	00h
140-147	Accumulative UNC times (MSB)	xxh
148	Property ID (reconstruction times of the mapping table)	F1h

Byte	Description	Value
149-151	Reserved	00h
152-159	Accumulative UNC times (MSB)	xxh
160	Property ID (supercapacitor status)	F2h
161-163	Reserved	00h
164-171	supercapacitor status (MSB)	xxh
172	Property ID (number of accumulative CRC errors of port 0)	F3h
173-175	Reserved	00h
176-183	Number of accumulative CRC errors of port 0 (MSB)	xxh
184	Property ID (number of accumulative CRC errors of port 1)	F4h
185-187	Reserved	00h
188-195	Number of accumulative CRC errors of port 0 (MSB)	xxh
196	Property ID (hard reset times of port 0 during the power-on period)	F5h
197-199	Reserved	00h
200-207	Number of hard reset times of port 0 during the power-on period (MSB)	xxh
208	Property ID (hard reset times of port 1 during the power-on period)	F6h
209-211	Reserved	00h
212-219	Number of hard reset times of port 1 during the power-on period (MSB)	xxh
220	Property ID (highest temperature)	F7h
221-223	Reserved	00h
224-231	Highest temperature (MSB)	xxh
232	Property ID (number of 8b/10b errors of port 0 during the power-on period)	F8h
233-235	Reserved	00h
236-243	Number of 8b/10b errors of port 0 during the power-on period (MSB)	xxh

Byte	Description	Value
244	Property ID (number of 8b/10b errors of port 1 during the power-on period)	F9h
245-247	Reserved	00h
248-255	Number of 8b/10b errors of port 1 during the power-on period (MSB)	xxh
256	Property ID (number of bad blocks in the pending list)	FAh
257-259	Reserved	00h
260-267	Number of bad blocks in the pending list (MSB)	xxh
268	Property ID (logical page size)	FBh
269-271	Reserved	00h
272-279	Logical page size	xxh
280	Property ID (single bit ECC)	FCh
281-283	Reserved	00h
284-291	Number of single-bit ECCs	xxh
292	Property ID (multiple-bit ECC)	FDh
293-295	Reserved	00h
296-303	Number of multiple-bit ECCs	xxh
304	Property ID (flash ECC)	FEh
305-307	Reserved	00h
308-315	Number of flash ECCs	xxh

A.6 VPD Commands

Table1 VPD Page commands lists the VPD commands supported by the ES3500S and ES3600S.

Table A-6 VPD Page commands

VPD Page Code	VPD Page Name
B1	Block Device Characteristics
B0	Block Limits
83	Device Identification

VPD Page Code	VPD Page Name
86	Extended INQUIRY Data
B2	Logical Block Provisioning
87	Mode Page Policy
8A	Power Condition
8D	Power Consumption
90	Protocol Specific Lun Info
91	Protocol Specific PortInfo
88	SCSI Ports
00	Supported VPD Page
80	Unit Serial Number
B7	Block Device Characteristics

B Introduction to Windows GUI

This section describes the Windows GUI tool in the Windows tool package.

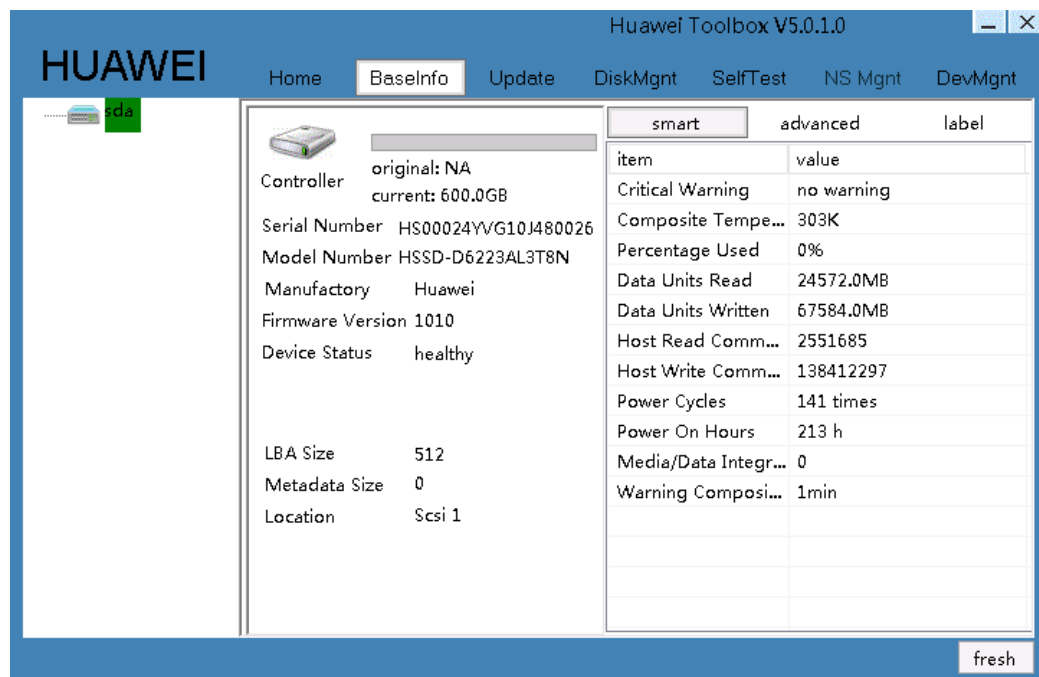
After installing the tool package in Windows, access the Windows GUI tool as follows:

- If the .NET Framework version is 2.0 or 3.5, double-click the **HioadmGUI_DotNet_2.0.exe** file in the tool installation directory.
- If the .NET Framework version is 4.0 or 4.5, double-click the **HioadmGUI_DotNet_4.0.exe** file in the tool installation directory.

BaseInfo Page

This page shows the basic information about controllers and namespaces. Information starting with **sd** indicates a SAS SSD. See [Figure1 SAS SSD BaseInfo page](#).

Figure B-1 SAS SSD BaseInfo page



 **NOTE**

The **eject** button is unavailable for the orderly hot swap. The SAS SSD supports surprise hot swap.

Update Page

This page is used to upgrade the SAS SSD firmware, as shown in [Figure2 Update page with no firmware upgrade image selected](#) and [Figure3 Update page with firmware upgrade image selected](#).

Figure B-2 Update page with no firmware upgrade image selected

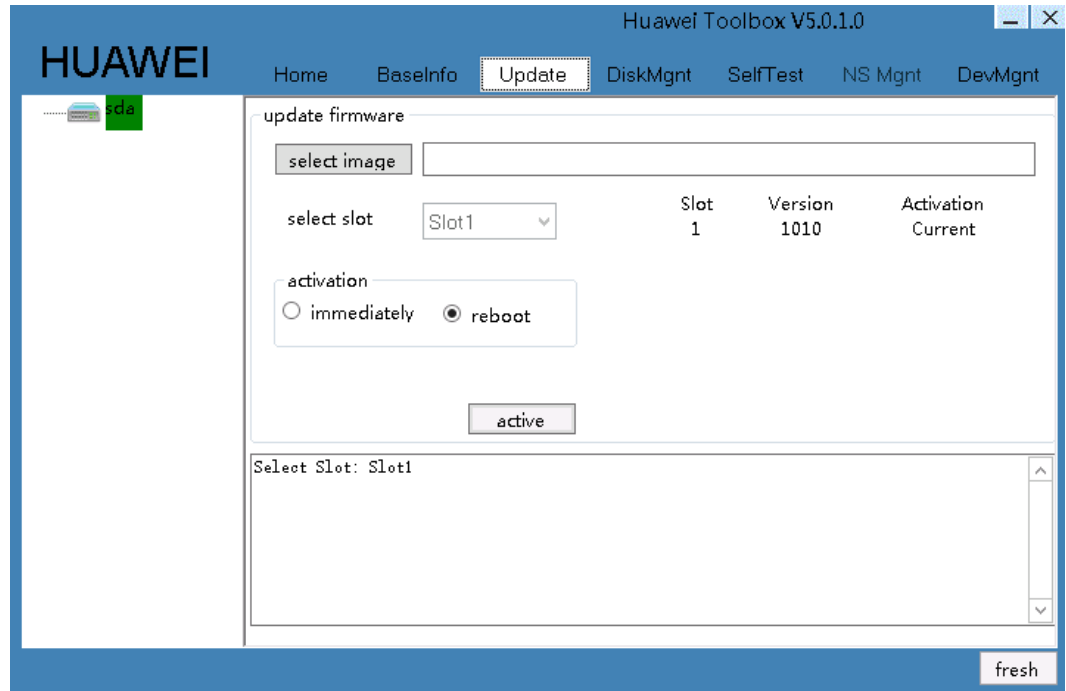
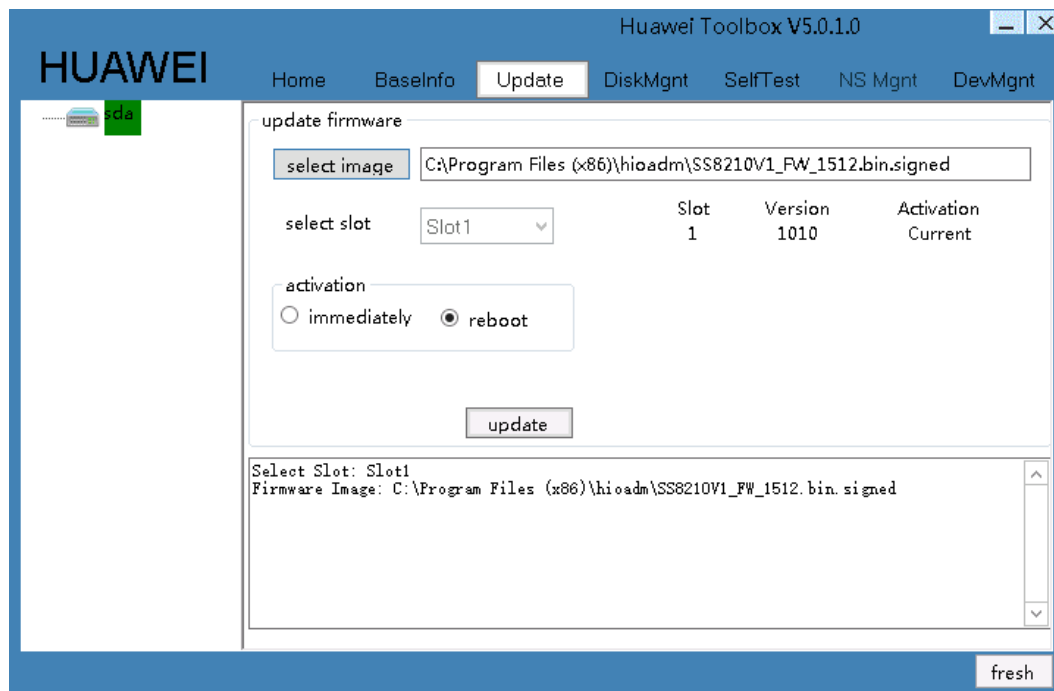


Figure B-3 Update page with firmware upgrade image selected

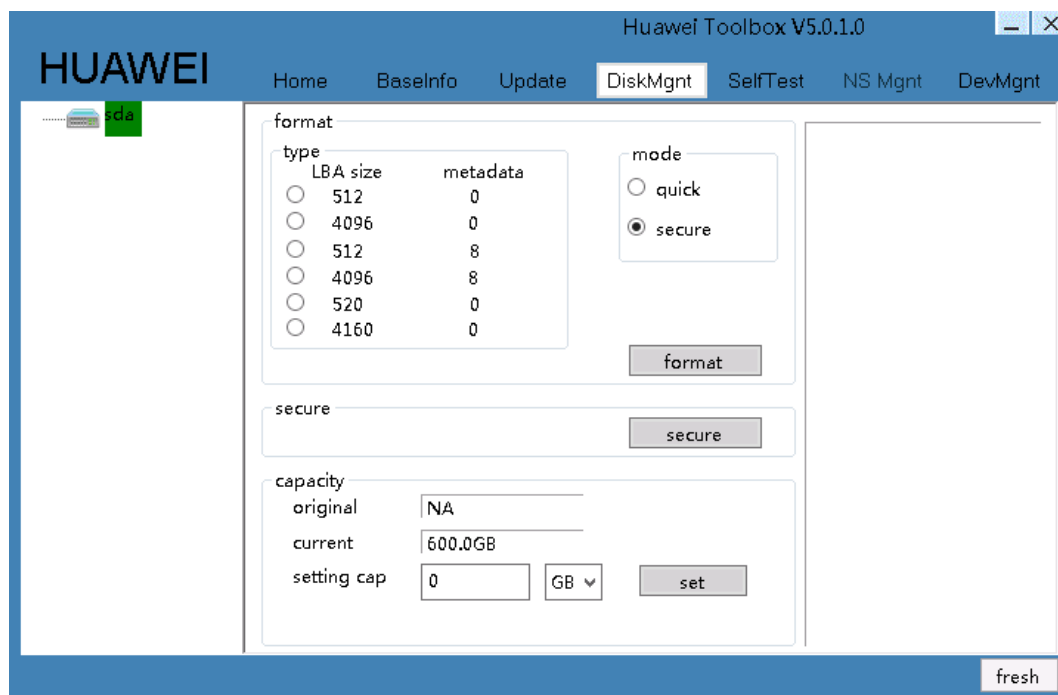


- **select image:** Select Huawei ES3000 and SAS HSSD firmware upgrade images.
- After a firmware image is selected, the active button becomes an update button.
- **activation:** Select an activation mode. For details, see [6.2.3 Activating the Firmware of an SSD](#).

DiskMgmt Page

This page is used to format the SAS SSD, as shown in [Figure4 SAS SSD DiskMgmt page](#).

Figure B-4 SAS SSD DiskMgnt page



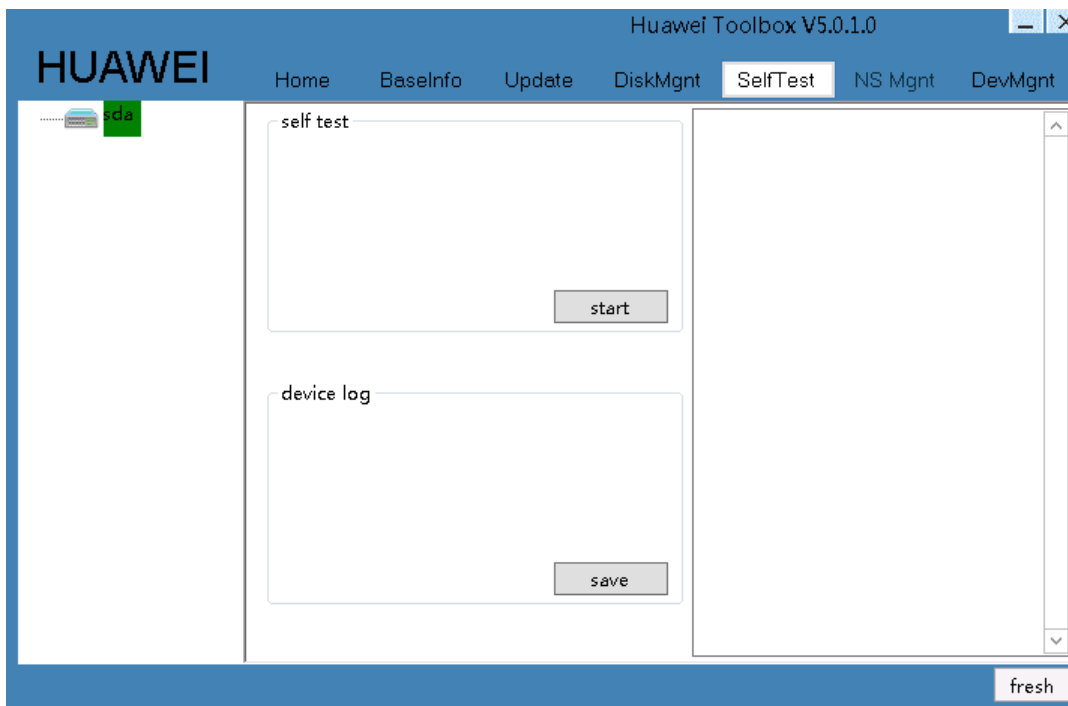
Functions on this page are the same as the operations described in [6.3 Querying and Setting the Capacity](#), [6.4 Formatting](#), and [6.5 Safely Erasing User Data of an SSD](#).

If **setting cap** is set to **0**, the current capacity is set to the original capacity.

SelfTest Page

This page is used to diagnose the SAS SSD, including exporting device log information, as shown in [Figure 5 SelfTest page](#).

Figure B-5 SelfTest page

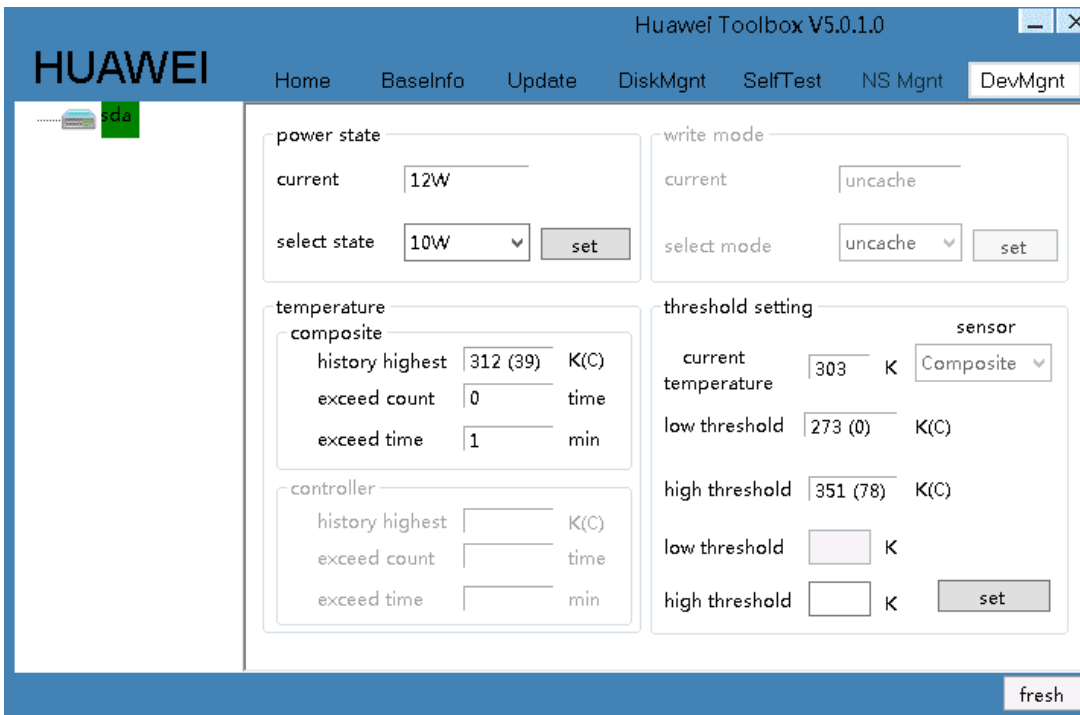


Functions on this page are the same as the operations described in [6.9 Querying the Diagnosis Result of a Specified SSD](#).

DevMgmt Page

This page is used to manage the SAS SSD, as shown in [Figure6 SAS SSD DevMgmt page](#).

Figure B-6 SAS SSD DevMgmt page



This page provides the following functions:

- **power state:** Set the power consumption level.
- **temperature:** View drive temperature information, including the highest historical temperature, number of overtemperature occurrences, and overtemperature duration.
- **threshold setting:** Set temperature thresholds.
- **controller:** View controller temperature information, including the highest historical temperature, number of overtemperature occurrences, and overtemperature duration.

C Getting Help

If you encounter any problems during routine maintenance or troubleshooting, contact Huawei technical support engineers.

C.1 Collecting Fault Information

Before troubleshooting, obtain the following information:

- Customer company and address
- Contact person and telephone number
- Time when the fault occurred
- Detailed fault symptom
- Device type and software version
- Any measures taken and effects
- Fault severity and expected rectification deadline

C.2 Preparing for Debugging

When you seek Huawei technical support, Huawei technical support engineers may assist you in performing some operations to further collect fault information or rectify the fault.

Before contacting technical support engineers, prepare the spare parts for boards and port modules, screwdrivers, screws, serial cables, and network cables.

C.3 Using Product Documentation

Huawei provides the documents delivered with the equipment. This document provides guidance for you to solve common problems that occur during routine maintenance or troubleshooting.

To better rectify the fault, you are advised to use the guide before contacting Huawei technical support engineers.

C.4 Obtaining Technical Support

Huawei's timely and efficient response is available from:

- Local branch offices
- Secondary technical support system
- Telephone support
- Remote support
- Onsite support

Technical Support Website

Obtain technical documents at <http://e.huawei.com>.

Self-Service Platform and Community

Learn more about servers and communicate with experts at:

- [HUAWEI Server Information Self-Service Platform](#) for specific server product documentation.
- [Huawei server intelligent Q&A system](#) for quick learning about products.
- [Huawei Enterprise Support Community \(Server\)](#) for learning and discussion.

News

For notices about product life cycles, warnings, and updates, visit [Product Bulletins](#).

Cases

Learn about server applications at [Knowledge Base](#).

Huawei Technical Support

If a fault persists after taking the above measures, obtain technical support in the following ways:

- Contact Huawei customer service center.
 - Enterprise customers
Send emails to support_e@huawei.com or visit [Global Service Hotline](#).
 - Carriers
Send emails to support@huawei.com or visit [Global TAC Information](#).
- Contact technical support at your local Huawei office.

D Acronym or Abbreviation

Acronym or Abbreviation

C	
CCC	China Compulsory Certification
CRC	Cyclic Redundancy Check
E	
ECC	error checking and correcting
I	
IOPS	I/O operations per second
M	
MLC	multi-level cell
MTBF	mean time between failures
R	
RAID	redundant array of independent disks
S	
SAS	Serial Attached SCSI
SSD	solid-state drive