

# Hitachi Virtual Storage Platform E Series

## Hitachi Virtual Storage Platform G130, G/F350, G/F370, G/F700, G/F900

SVOS RF 9.5.1

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### System Administrator Guide

This document describes the management software for the VSP E series and VSP G130, G/F350, G/F370, G/F700, G/F900 storage systems (for example, Device Manager - Storage Navigator, Maintenance Utility) and provides instructions for setting up and administering the storage systems.

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## Preface

This document describes the management software for the storage systems and provides instructions for performing system administration tasks for these storage systems. This document also provides instructions for configuring and using the Hitachi Device Manager - Storage Navigator (HDvM - SN) software.

Please read this document carefully to understand how to use the software described in this manual, and keep a copy for reference.

### Intended audience

This document is intended for system administrators, Hitachi Vantara representatives, and authorized service providers who install, configure, and operate the storage systems.

Readers of this document should be familiar with the following:

- Data processing and RAID storage systems and their basic functions.
- The *Hardware Guide* for your storage system.
- The operating system and web browser software on the management client.

### Product version

This document revision applies to the following product versions:

- VSP E series: 93-03-2x or later
- VSP G130, F/G350, F/G370, F/G700, F/G900: 88-07-0x or later
- SVOS RF 9.5.1 or later

### Release notes

Read the release notes before installing and using this product. They may contain requirements or restrictions that are not fully described in this document or updates or corrections to this document. Release notes are available on Hitachi Vantara Support Connect: <https://knowledge.hitachivantara.com/Documents>.

## Changes in this revision

- (VSP E590, VSP E790) Added a list of user roles for Hitachi Storage Advisor Embedded ([Roles and permissions \(on page 109\)](#)).
- Updated the information about setting up SSL communications for the management client ([Setting up SSL communications \(on page 45\)](#)).
- Updated the list of system option modes (SOMs) ([System option modes \(on page 275\)](#)):
  - Added SOM 1191.
  - Updated the following SOMs: 144 (default setting), 896 (description), 1053 (description), 1115 (description, default setting), 1169 (description, default setting), 1204 (description), 1205 (description).

## Document conventions

This document uses the following typographic conventions:

Convention	Description
<b>Bold</b>	<ul style="list-style-type: none"> <li>▪ Indicates text in a window, including window titles, menus, menu options, buttons, fields, and labels. Example: Click <b>OK</b>.</li> <li>▪ Indicates emphasized words in list items.</li> </ul>
<i>Italic</i>	<ul style="list-style-type: none"> <li>▪ Indicates a document title or emphasized words in text.</li> <li>▪ Indicates a variable, which is a placeholder for actual text provided by the user or for output by the system. Example: <pre>pairdisplay -g group</pre></li> </ul> <p>(For exceptions to this convention for variables, see the entry for angle brackets.)</p>
Monospace	Indicates text that is displayed on screen or entered by the user. Example: <code>pairdisplay -g oradb</code>
< > angle brackets	<p>Indicates variables in the following scenarios:</p> <ul style="list-style-type: none"> <li>▪ Variables are not clearly separated from the surrounding text or from other variables. Example: <pre>Status-&lt;report-name&gt;&lt;file-version&gt;.csv</pre></li> <li>▪ Variables in headings.</li> </ul>

Convention	Description
[ ] square brackets	Indicates optional values. Example: [ a   b ] indicates that you can choose a, b, or nothing.
{ } braces	Indicates required or expected values. Example: { a   b } indicates that you must choose either a or b.
vertical bar	Indicates that you have a choice between two or more options or arguments. Examples: [ a   b ] indicates that you can choose a, b, or nothing. { a   b } indicates that you must choose either a or b.

This document uses the following icons to draw attention to information:

Icon	Label	Description
	Note	Calls attention to important or additional information.
	Tip	Provides helpful information, guidelines, or suggestions for performing tasks more effectively.
	Caution	Warns the user of adverse conditions and/or consequences (for example, disruptive operations, data loss, or a system crash).
	WARNING	Warns the user of a hazardous situation which, if not avoided, could result in death or serious injury.

## Conventions for storage capacity values

Physical storage capacity values (for example, disk drive capacity) are calculated based on the following values:

Physical capacity unit	Value
1 kilobyte (KB)	1,000 (10 <sup>3</sup> ) bytes
1 megabyte (MB)	1,000 KB or 1,000 <sup>2</sup> bytes
1 gigabyte (GB)	1,000 MB or 1,000 <sup>3</sup> bytes
1 terabyte (TB)	1,000 GB or 1,000 <sup>4</sup> bytes

Physical capacity unit	Value
1 petabyte (PB)	1,000 TB or 1,000 <sup>5</sup> bytes
1 exabyte (EB)	1,000 PB or 1,000 <sup>6</sup> bytes

Logical capacity values (for example, logical device capacity, cache memory capacity) are calculated based on the following values:

Logical capacity unit	Value
1 block	512 bytes
1 cylinder	Mainframe: 870 KB Open-systems: <ul style="list-style-type: none"> <li>▪ OPEN-V: 960 KB</li> <li>▪ Others: 720 KB</li> </ul>
1 KB	1,024 (2 <sup>10</sup> ) bytes
1 MB	1,024 KB or 1,024 <sup>2</sup> bytes
1 GB	1,024 MB or 1,024 <sup>3</sup> bytes
1 TB	1,024 GB or 1,024 <sup>4</sup> bytes
1 PB	1,024 TB or 1,024 <sup>5</sup> bytes
1 EB	1,024 PB or 1,024 <sup>6</sup> bytes

## Accessing product documentation

Product user documentation is available on Hitachi Vantara Support Connect: <https://knowledge.hitachivantara.com/Documents>. Check this site for the most current documentation, including important updates that may have been made after the release of the product.

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## Comments

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**Thank you!**

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# Chapter 1: Overview of system administration

System administration of the Hitachi Virtual Storage Platform E series (VSP E series) and Hitachi Virtual Storage Platform G130, G/F350, G/F370, G/F700, G/F900 (VSP G130, G/F350, G/F370, G/F700, G/F900) storage systems involves initial setup and configuration of the management client and storage system and ongoing tasks such as adding users, managing software licenses, and monitoring storage system events and alerts.

## System administration tasks and workflow

After storage system installation is complete, the first system administration task is to configure the management client for the storage system. The management client is the computer used to log in to and manage the storage system. The management client is LAN-attached to the storage system and communicates with the service processor (SVP) or with the controllers if the storage system does not have an SVP. You can configure the management client and storage system for secure communications (SSL), and you can set up user authentication and authorization for the management software.

When configuration of the management client is complete, you can perform the initial configuration of the storage system. Initial storage system configuration includes tasks such as entering the storage system information (name, location, contact information), setting the date and time, creating a login message, and setting up the syslog server for the audit logs.

After initial setup and configuration of the management client and storage system are complete, the storage system is ready for use. The ongoing system administration activities include the following:

- Adding users and managing users and user groups
- Managing resource groups
- Monitoring storage system events and alerts
- Managing software licenses

## Management tools for system administration

The storage systems support several management tools for system administration, including software that is embedded on the controllers of the storage system, software that is installed on the (optional) service processor (SVP) of the storage system, and software that is installed on a server connected to the storage system. These management tools are accessed from a management (SSH) client on the management LAN for the storage system.

### **Maintenance utility**

The maintenance utility, which is embedded on the controllers, displays storage system information and allows you to perform basic configuration and administration tasks on the storage system, including initial setup (for example, date and time, network settings), user administration, software license management, and audit log settings. You can access and log in to the maintenance utility directly from the management client. In addition, you can access the maintenance utility by launching it from Hitachi Storage Advisor Embedded, Hitachi Device Manager - Storage Navigator, or Hitachi Ops Center Administrator.

### **Hitachi Storage Advisor Embedded (HSAE)**

The HSAE software allows you to easily configure storage system resources such as volumes and pools and perform daily operations such as backing up data and monitoring. You can perform operations by using the HSAE web-based user interface or by using REST API, executed automatically as scripts or incorporated into business applications.

### **Embedded Command Control Interface (CCI)**

The embedded CCI software, also on the controllers, enables you to perform storage system configuration and provisioning operations by issuing commands to the storage system. You can access embedded CCI from an SSH client on the management LAN. When the SSH client connects successfully, the CCI user session is created.

### **Hitachi Device Manager - Storage Navigator (HDvM - SN)**

HDvM - SN runs on the service processor (SVP) for the storage system. HDvM - SN displays detailed information about the storage system and allows you to perform configuration, administration, and data management operations. You can log in to HDvM - SN directly from the management client, or you can access HDvM - SN by launching it from Hitachi Ops Center Administrator.

### **Command Control Interface (CCI)**

CCI enables you to perform data management operations (replication, protection) as well as storage system configuration and provisioning operations by issuing commands directly to the storage system. CCI provides powerful command-line control and advanced functionality for your storage system. CCI commands can be used interactively or in scripts to automate and standardize storage administration functions.

### **Hitachi Ops Center Administrator**

Ops Center Administrator reduces the complexity of managing storage systems by simplifying the setup, management, and maintenance of storage resources. Ops Center Administrator has intuitive graphical user interfaces and recommended configuration practices to streamline system configurations and storage management processes.

### **REST APIs**

REST-based APIs extend operations, enabling integration with existing toolsets and automation templates to further simplify and consolidate management tasks. For details about API integration solutions, contact your Hitachi Vantara representative.

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## Chapter 2: Accessing the storage system

During the initial set up and configuration of the storage system, the management client must be configured to use the management software.

If your storage system includes an SVP, you must configure Device Manager - Storage Navigator, Hitachi Ops Center Administrator or other management software before administering their system.

### Initial setup of the management client

The management client is the computer used to log in to and manage your storage system. The management client is LAN-attached to the storage system and communicates with the service processor (SVP) or with the controller if your storage system does not have an SVP. If your storage system is equipped with an SVP, you can use Hitachi Device Manager - Storage Navigator (HDvM - SN) as well as other management software such as Hitachi Ops Center Administrator to manage your storage system. If your storage system does not have an SVP, you can use the Maintenance Utility and other embedded tools such as Hitachi Storage Advisor Embedded (HSAE) to manage your storage system.

### Workflow for setting up the management client

Before you can start managing the storage system, you must set up a management client to use the management software for your storage system. Perform the following tasks to set up the management client for use of Device Manager - Storage Navigator (HDvM - SN).

1. Confirm that the management client meets the hardware and software requirements for running HDvM - SN ([Requirements for management clients \(on page 19\)](#)).
2. Configure the management client to connect through a firewall ([Connecting through a firewall \(on page 24\)](#)).
3. Set up IPv4/IPv6 communications on the management client ([Setting up IPv4/IPv6 communications \(on page 25\)](#)).
4. Register the primary SVP host name on the management client ([Registering the primary SVP host name \(on page 26\)](#)).
5. Configure the web browser on the management client ([Configuring the web browser on the management client \(on page 27\)](#)).
6. For a management client running Windows, add the SVP to the trusted sites zone ([Adding your SVP to the trusted sites zone for Windows Server computers \(on page 27\)](#)).

7. Enable JavaScript for Windows ([Enabling JavaScript for Windows \(on page 28\)](#)).
8. Install Captive Bundle Application on the SVP ([Installing Captive Bundle Application \(CBA\) on the SVP \(on page 29\)](#)). CBA is required to use HDvM - SN with Adobe® AIR® from HARMAN™.
9. Install Storage Device Launcher on the management client ([Installing Storage Device Launcher on the management client \(on page 29\)](#)). Storage Device Launcher is required to use HDvM - SN with Adobe AIR from HARMAN.
10. Configure the management client for the HDvM - SN secondary window ([Configuring the management client for the HDvM - SN secondary window \(on page 39\)](#)).

## Requirements for management clients

The Device Manager - Storage Navigator administrator is responsible for setting up management clients. Device Manager - Storage Navigator runs on supported versions of the Windows and UNIX/Linux operating systems. If you use a physical or virtual server running on Windows as a management client, you must configure the server to run Device Manager - Storage Navigator.

### General requirements

- The management client must be connected to the network via LAN. Device Manager - Storage Navigator connects to the SVP through a TCP/IP network.
- Use category 5e or 6a LAN cable for LAN connections when the transfer speed is 1 Gbps. Maximum cable length is 328 feet (100 meters). For assistance, contact customer support.
- Several storage systems can be managed by one management client. Device Manager - Storage Navigator must be set up for each storage system.
- A maximum of 32 management clients (Device Manager - Storage Navigator) can access the same storage system at the same time.

### Requirements for Windows-based management clients

The management client must meet hardware and software requirements to run Device Manager - Storage Navigator (HDvM - SN) in a Windows® environment.

#### Hardware requirements for the management client (Windows)

Item	Requirement
Processor (CPU)	Pentium 4 640 3.2 GHz or better  (Not dependent on a specific CPU vendor and processor family. Core2Duo E6540 2.33 GHz or better is recommended.)
Memory (RAM)	2 GB or more Recommended: 3 GB

Item	Requirement
Available storage space	500 MB or more (+ 80 MB for each managed storage system)  When HDvM - SN is using Adobe® AIR® from HARMAN™, an additional 80 MB of free space is required for each storage system managed by HDvM - SN.
Monitor	True Color 32-bit or better Resolution: 1280 x 1024 or better
Keyboard and mouse	You cannot use the mouse wheel feature.
Ethernet LAN card for TCP/IP network	100BASE-TX 1000BASE-T

### Software requirements for the management client (Windows)

On a Windows management client, you can use HDvM - SN with Adobe AIR from HARMAN or with Adobe Flash Player. The following tables specify the requirements for each method. The combinations and versions of operating system, architecture, browser, Java Runtime Environment (JRE), and Flash Player specified below are fixed requirements. Using other combinations or versions might produce unpredictable results such as the inability to use the HDvM - SN windows.



#### Note:

- Adobe will end support of Flash Player by the end of 2020. Make sure you are using HDvM - SN with Adobe AIR from HARMAN before the end of Flash Player support. If desired, you can disable use of HDvM - SN with Flash Player. For details, see [Disabling and enabling use of Flash Player with HDvM - SN \(on page 42\)](#).
- Use software that is supported by the manufacturer. Behavior is not guaranteed for software whose support period has expired.

**Table 1 Requirements for using HDvM with AIR from HARMAN**

Operating system	Architecture	Web browser	TLS
Windows 10	64 bit	Internet Explorer 11.0* Google Chrome 63.0 or later	TLS1.2  TLS1.2 must be enabled. AIR does not support TLS1.3.

Operating system	Architecture	Web browser	TLS
Windows 8.1	64 bit	Internet Explorer 11.0* Google Chrome 48.0 or later	
* Only the latest version of Internet Explorer that runs on each operating system is supported according to Microsoft® Support Policy.			

**Table 2 Requirements for using HDvM - SN with Flash Player**

Operating system <sup>1</sup>	Architecture	Browser	Java Runtime Environment (JRE) <sup>5</sup>	Adobe Flash Player <sup>2, 4</sup>
Windows 8.1	32 bit	Internet Explorer 11.0 <sup>3</sup>	JRE 8.0 Update 131 or earlier	13.0 to 30
	64 bit	Internet Explorer 11.0 <sup>3</sup>	JRE 8.0 Update 131 or earlier	13.0 to 32
	64 bit	Internet Explorer 11.0 <sup>3</sup>	OpenJDK 11	13.0 to 32
	32 bit	Google Chrome 48.0 or later	JRE 8.0 Update 71	20.0
	64 bit	Google Chrome 48.0 or later	JRE 8.0 Update 71	20.0 to 32
	64 bit	Google Chrome 48.0 or later	OpenJDK 11	20.0 to 32
Windows 10 <sup>6</sup>	32 bit	Internet Explorer 11.0 <sup>3</sup>	JRE 8.0 Update 162 or earlier	13.0 to 30
	64 bit	Internet Explorer 11.0 <sup>3</sup>	JRE 8.0 Update 162 or earlier	13.0 to 32
	64 bit	Internet Explorer 11.0 <sup>3</sup>	OpenJDK 11	13.0 to 32
	32 bit	Google Chrome 63.0 or later	JRE 8.0 Update 152 or earlier	13.0 to 28.0
	64 bit	Google Chrome 63.0 or later	JRE 8.0 Update 152 or earlier	13.0 to 32
	64 bit	Google Chrome 63.0 or later	OpenJDK 11	13.0 to 32

Operating system <sup>1</sup>	Architecture	Browser	Java Runtime Environment (JRE) <sup>5</sup>	Adobe Flash Player <sup>2, 4</sup>
Windows Server 2012 Update	64 bit	Internet Explorer 10.0 <sup>3</sup>	JRE 8.0 Update 131 or earlier	13.0 to 30
	64 bit	Internet Explorer 10.0 <sup>3</sup>	OpenJDK 11	13.0 to 30
	64 bit	Google Chrome 63.0 or later	JRE 8.0 Update 152 or earlier	13.0 to 28.0
	64 bit	Google Chrome 63.0 or later	OpenJDK 11	13.0 to 28.0
Windows Server 2012 R2 Update	64 bit	Internet Explorer 11.0 <sup>3</sup>	JRE 8.0 Update 131 or earlier	13.0 to 32
	64 bit	Internet Explorer 11.0 <sup>3</sup>	OpenJDK 11	13.0 to 32
	64 bit	Google Chrome 63.0 or later	JRE 8.0 Update 152 or earlier	13.0 to 32
	64 bit	Google Chrome 63.0 or later	OpenJDK 11	13.0 to 32
Windows Server 2016	64 bit	Internet Explorer 11.0 <sup>3</sup>	JRE 8.0 Update 111	13.0 to 32
	64 bit	Internet Explorer 11.0 <sup>3</sup>	OpenJDK 11	13.0 to 32
	64 bit	Google Chrome 63.0 or later	JRE 8.0 Update 152 or earlier	13.0 to 32
	64 bit	Google Chrome 63.0 or later	OpenJDK 11	13.0 to 32

**Notes:**

1. If the SVP supports Internet Protocol Version 6 (IPv6), you can specify IPv6 addresses.
2. Use Flash Player with the same architecture (32 bit or 64 bit) as the browser.
3. Only the latest version of Internet Explorer active on each OS is supported, according to Microsoft support policy.
4. The management client must be restarted after enabling Flash Player.

Operating system <sup>1</sup>	Architecture	Browser	Java Runtime Environment (JRE) <sup>5</sup>	Adobe Flash Player <sup>2,4</sup>
<p>5. For VSP E990 (all SVP firmware versions), use OpenJDK 11.0.1+13 or later. For VSP G130, G/F350, G/F370, G/F700, G/F900 SVP firmware versions 88-04-01 and later, use either JRE8 update 171 or later or OpenJDK 11.0.1+13 or later. You can use the HDvM - SN secondary window only when these JRE versions are installed. If you want to use other JRE versions, contact customer support.</p> <p>If the SVP firmware is updated from earlier than 88-04-01 to 88-04-01 or later, see <a href="#">Checking Java security settings (on page 41)</a>.</p> <p>6. Do not right-click when executing commands in the Command Prompt window of Windows 10. If you do, the processing might be stopped in the middle of the execution and the prompt does not return.</p>				

**Note:**

- Some Device Manager - Storage Navigator operations are performed through the HDvM - SN secondary window that runs within Java.
- When you display an HTML format report saved in your local file system in a web browser that uses Flash Player version 23 or later, add the folder containing the HTML format report to Trusted Location Settings.

## Requirements for UNIX/Linux-based management clients

The management client must meet hardware and software requirements to run Device Manager - Storage Navigator (HDvM - SN) in a UNIX<sup>®</sup> or Linux<sup>®</sup> environment.

### Hardware requirements for the management clients (UNIX/Linux)

Item	Requirement
Processor (CPU)	Pentium 4 640 3.2 GHz or better (Recommended: Core2Duo E6540 2.33 GHz or better)
Memory (RAM)	2 GB or more Recommended: 3 GB
Available storage space	500 MB or more
Monitor	Resolution: 1280 x 1024 or better
Keyboard and mouse	You cannot use the mouse wheel feature.
Ethernet LAN card for TCP/IP network	100BASE-TX 1000BASE-T

### Software requirements for the management clients (UNIX/Linux)

The following table specifies the software requirements for using HDvM - SN in a UNIX or Linux environment. The combinations of operating system, architecture, browser, Java Runtime Environment, and Adobe Flash Player described below are fixed requirements. Using other combinations or versions might produce unpredictable results such as the inability to use the HDvM - SN windows.



**Caution:** If the SVP microcode version is updated from earlier than 88-04-01-XX/00 to 88-04-01-XX/00 or later, see [Checking Java security settings \(on page 41\)](#).

Operating system	Architecture	Browser	Java Runtime Environment (JRE) <sup>1</sup>	Adobe Flash Player
Red Hat Enterprise Linux 7.4	64 bit	Google Chrome 63.0 or later	JRE 8.0 Update 152	Adobe Flash Player 28
		Google Chrome 63.0 or later	OpenJDK 11.0.1+13	
		Firefox 58.0 or later <sup>2</sup>	JRE 8.0 Update 152	
		Firefox 58.0 or later <sup>2</sup>	OpenJDK 11.0.1+13	
Red Hat Enterprise Linux 7.5	64 bit	Google Chrome 69.0 or later	JRE 8.0 Update 171	
		Google Chrome 69.0 or later	OpenJDK 11.0.1+13	
		Firefox 60.0 or later <sup>2</sup>	JRE 8.0 Update 171	
		Firefox 60.0 or later <sup>2</sup>	OpenJDK 11.0.1+13	
<b>Notes:</b>				
<ol style="list-style-type: none"> <li>1. If the SVP microcode version is updated from earlier than 88-04-01 to 88-04-01 or later, see <a href="#">Checking Java security settings (on page 41)</a>.</li> <li>2. IPv6 HTTPS connection from Firefox is not supported.</li> </ol>				

## Connecting through a firewall

To connect the management client and the SVP through a firewall, configure the firewall so that the TCP/IP port for the protocol you use becomes available.

When attaching Device Manager - Storage Navigator to multiple storage systems, the installer must log in to the SVP of each storage system using separate Device Manager - Storage Navigator sessions and separate web browser instances.

When operating the management GUI directly from the SVP without using the management client, it is not necessary to register ports of protocols other than RMI, SLP, and SMI-S in the table below.

The type of the protocol and the port used is shown in the following table.

Protocol	Port number	Direction of communication
HTTP	80	From the Device Manager - Storage Navigator web client to the SVP
HTTPS	443	
RMI	1099	
RMI (SSL)	5443	
RMI	51099	
RMI	51100-51355	
SLP	427	
SMI-S	5989-6244	



**Note:** If you change the port numbers used by the SVP, the firewall is set with the changed port numbers.

## Setting up IPv4/IPv6 communications

You should assign the SVP the same type of IP addresses (IPv4 or IPv6) as those used on the storage system. You must also configure the client computers with the same IP version that you assign to the SVP. In addition, use the same communication options for the management client and the SVP. If the SVP uses IPv6, you must configure the management clients to use IPv6 for communication.

If you use IPv6 to display the Device Manager - Storage Navigator main window when both IPv4 and IPv6 are available, IPv6 addresses are displayed in the Device Manager - Storage Navigator secondary window but IPv4 communication is actually used.

### Configuring IPv6 communication in Windows 7

If the SVP uses IPv6, you must configure Windows 7 management clients to use IPv6 for communication.

#### Procedure

1. Select **Control Panel > Network and Sharing Center > Manage network connections**.

2. Right-click the network where the SVP resides, and then click **Properties** in the pop-up menu.  
If the User **Account Control** dialog box opens click **Continue**. Otherwise, the **Networking** dialog box opens.
3. In the **Networking** dialog box, clear the **Internet Protocol Version 4 (TCP/IPv4)** check box.
4. Click **OK** to save the changes and close the dialog box.

## Configuring IPv6 communication in Solaris 10

If the SVP uses IPv6 and you plan to use Device Manager - Storage Navigator (HDvM - SN) in a web browser, you must configure Solaris 10 management clients to use IPv6 for communication. If you plan to run HDvM - SN using Adobe AIR, you do not need to perform this task.

### Procedure

1. Start a command window or system console.
2. Execute the following command:

```
ifconfig network-interface-name inet down
```

## Registering the primary SVP host name

You must register the primary SVP host name before completing any of the following tasks.

- Specify a host name instead of an IP address when accessing Device Manager - Storage Navigator.
- Obtain the public key certificate for SSL-encrypted communication from the CA (Certificate Authority). You must register the server name as the host name to the DNS server or the hosts file. The server name is entered in the certificate as a common name.

Enter the SVP host name and IP address in the DNS server or the hosts file of the management client. You can register any host name to the DNS server or the hosts file, but there are restrictions on the letters you can use for the host name.

- **DNS setting:** You must register the IP address and host name of the SVP to the DNS server that manages the network to which the SVP is connected.
- **Hosts file setting:** You must enter the IP address and host name of the SVP to the hosts file of the management client. The general directory of the hosts file is:
  - **Windows:** C:\Windows\System32\drivers\etc\hosts
  - **UNIX:** /etc/hosts



**Caution:** If the host name listed in the hosts file is also listed in the CCI configuration definition file, CCI must be restarted.

## Configuring the web browser on the management client

Configure the web browser on the Hitachi Device Manager - Storage Navigator(HDvM - SN) management client as described below.



**Note:** If you are using HDvM - SN with Adobe® AIR® from HARMAN™:

- You must configure the web browser as described below because these settings are used by AIR.
- You do not need to install Adobe Flash Player.

### Web browser settings

- The browser must allow first-party, third-party, and session cookies.
- The pop-up blocker and plug-ins must be disabled.
- The browser must be configured to use TLS 1.2.
- For Windows 8.1, Windows Server 2012, Windows Server 2012 R2 Update, Windows Server 2012 Update, and Windows Server 2016, JavaScript must be enabled. For details, see [Enabling JavaScript for Windows \(on page 28\)](#).
- For Windows Server and Internet Explorer:
  - Internet Explorer must be configured so it does not save encrypted pages to disk (**Tools > Internet Options > Advanced > Do not save encrypted pages to disk**).
  - The URL of the SVP must be registered in Internet Explorer (**Tools > Internet Options > Security**).
  - For Windows Server 2012, the IE security level for the trusted sites must be set to **Medium-high (Tools > Internet Options > Security > Trusted sites > Security level for this zone)**.
- For Firefox and Chrome, Adobe Flash Player must be enabled in your web browser.
- For the Japanese version of Firefox, the browser must be configured to use the C locale (default system language) by using the X Server Emulator.

In a B Shell, enter the following command:

```
LANG=C
export LANG
```

In a C Shell, enter the following command:

```
setenv LANG C
```

## Adding your SVP to the trusted sites zone for Windows Server computers

If you are using Device Manager - Storage Navigator on a Windows Server computer, the following message may appear during login. If it does, you must add the SVP to the trusted sites zone.

The message below may appear differently depending on the Windows version you are using.



### Procedure

1. Click **Add** in the message dialog box. The **Trusted Sites** dialog box opens.
2. In **Add this web site to the zone**, enter the URL of the SVP that you want to log in to. For example, if the host name is `host01`, the URL is `http://host01`. If the IP address is `127.0.0.1`, the URL is `http://127.0.0.1`.
3. Click **Add** to add the URL of the SVP to the **web sites** list.
4. Click **Close** to close the dialog box.

## Enabling JavaScript for Windows

If you use Windows 8.1, Windows Server 2012 R2 Update, Windows Server 2012 Update, or Windows Server 2016, you must enable JavaScript.



**Note:** This setting is required even if you use Device Manager - Storage Navigator with Adobe AIR because the web browser settings are used by AIR.

### Procedure

1. Launch Internet Explorer.
2. On the Internet Explorer menu bar, click **Tools > Internet Options > Security**.
3. Click the **Security** tab.
4. Click **Custom Level**.
5. On the **Security Settings** window, set **Active scripting** to **Enable**.
6. Click **OK**.
7. When the **Warning** dialog box appears, click **YES**.

8. Click **OK** to close the **Internet Options** window.
9. Exit and then restart Internet Explorer.

## Installing Captive Bundle Application (CBA) on the SVP

Captive Bundle Application (CBA) is the application on the SVP that enables HDvM - SN to run with Adobe AIR from HARMAN. Before you can use HDvM - SN with AIR, you must install CBA on the SVP. If you are using one SVP to manage multiple storage systems, you must install CBA for each storage system.

### Before you begin

- You must have the serial number of the storage system. The serial number is displayed in S/N in the Storage Device List window on the SVP.

### Procedure

1. Close all HDvM - SN sessions connected to the storage system for which you are installing CBA.
2. Log in to the SVP.
3. Open a command prompt on the SVP with administrator permissions.
4. Move the current directory to the folder containing the `MappCbaUpload.bat` batch file (for example, `C:\MAPP\wk\Supervisor\MappIniSet`).
5. Run the batch file specifying the storage system serial number and the CBA file (with absolute path) as arguments as follows:

```
C:\MAPP\wk\Supervisor\MappIniSet> MappCbaUpload.bat serial-number CBA-  
file
```

For example:

```
C:\MAPP\wk\Supervisor\MappIniSet> MappCbaUpload.bat 400102 C:\temp\CBA-  
file-name
```

6. When the completion message is displayed, press any key to exit the processing.
7. Close the command prompt window.

### Next steps

After installing Captive Bundle Application (CBA) on the SVP, you can log in to HDvM - SN using AIR. For instructions, see [Logging in to HDvM - SN by using AIR \(on page 35\)](#).

## Installing Storage Device Launcher on the management client

The Storage Device Launcher application is required to run Hitachi Device Manager - Storage Navigator(HDvM - SN) with Adobe AIR from HARMAN. Storage Device Launcher is included in the Web Console Launcher setup file on the SVP. Use the following procedure to download and install Storage Device Launcher on the management client.



**Caution:** If you use other management software to access HDvM - SN (for example, Hitachi Ops Center Administrator), install Storage Device Launcher as a user with administrator permissions on the management client.



**Note:** If you are using one management client to access multiple storage systems, you only need to install Storage Device Launcher on the management client once.

### Before you begin

- You must have the model identification number of the storage system. The model identification number is the same as the folder name of the SVP firmware installation directory.

Example: C:\Mapp\wk\936000400001

- In this example, the 12-digit character string 936000400001 is the model identification number. The last 6 digits indicate the serial number of the storage system.
- C:\Mapp is the default installation directory for the SVP firmware. The location of the installation directory depends on the conditions specified when the SVP firmware was installed.

If multiple storage systems are registered on the SVP, you can use the model identification number of any storage system whose SVP firmware version supports AIR.

### Procedure

1. Download the Web Console Launcher setup file for Windows from the SVP to the management client.
  - If you can log in to HDvM - SN by using a web browser, click **Tool > Download** in the HDvM - SN menu bar, and then download the Web Console Launcher setup file for Windows (wCLauncher\_win.zip).
  - If you cannot log in to HDvM - SN by using a web browser, open the download the Web Console Launcher setup file as follows:
    - a. Open a web browser on the management client, and enter the following URL:

```
https://IP-address-or-host-name-of-SVP/sanproject/ToolDownload/  
serial-number-of-storage-system
```

If you changed the port number of the protocol HTTPS from the initial value (443 by default), specify the following URL:

```
https://IP-address-or-host-name-of-SVP:port-number-of-protocol-  
HTTPS/sanproject/ToolDownload/serial-number-of-storage-system
```



**Note:** If the SVP firmware version is earlier than 93-02-02 or 88-06-02, enter the following URL instead:

```
https://IP-address-or-host-name-of-SVP(:port-number-of-protocol-HTTPS)/dev/storage/model-identification-number/htdocs/tool/tooldownload.html
```

After the download page opens, go to step (c).

- b. In the authentication window, enter the user name and password.
- c. Download the Web Console Launcher setup file for Windows (WCLauncher\_win.zip).

2. Expand the downloaded Web Console Launcher setup file.

Make sure to expand the setup file in a folder or directory that meets the following requirements:

- Use only 1-byte alphanumeric characters for the expanded folder or directory name.
- Use an expanded folder (excluding directly under C: drive) that can be accessed (Read/Write) by management client users who do not have administrator permissions.
- If you are installing Storage Device Launcher two or more times on the same management client, expand the setup file each time in the same folder or directory (the one used for the initial installation). If you expand the setup file in a different folder or directory from the first installation, other users will not be able to run Storage Device Launcher.



**Note:** If a security warning or a window blocking the operation is displayed, do not expand the setup file. Change the properties of the setup file as follows and then expand the file:

- a. Right-click WCLauncher\_win.zip, and then click **Properties**.
- b. In **Security**, select **Unblock**, and then click **OK**.

3. Install Storage Device Launcher as follows:

- If you are logged in to the management client with administrator permissions, right-click WCLauncher\_win\WCLauncher\Setup\_SDLauncher.bat, and run it by selecting **Run as Administrator**.
- If you are not logged in to the management client with administrator permissions:
  - a. Right-click WCLauncher\_win\WCLauncher\Setup\_SDLauncher.bat, and then click **Create Shortcut**.
  - b. Move the created shortcut onto the desktop.

4. Open WCLauncher\_win\WCLauncher\log\Setup.log with a text editor, and confirm that "completed" is displayed.



**Caution:** Do not move or delete the `WCLauncher_win` folder after Storage Device Launcher installation is complete. This folder contains files required for running Storage Device Launcher.

## Logging in to HDvM - SN in a browser

There are three ways to log in to Device Manager - Storage Navigator (HDvM - SN) running in a web browser:

- If you are an administrator, you can log in to HDvM - SN with a one-time-only initial login.
- If you are a superuser, you can log in first to HDvM - SN to create other user accounts.
- If you are a HDvM - SN user or administrator, you can log in normally.



### Note:

- If you cannot log in three times with the same user ID, HDvM - SN stops responding for one minute. This is for security purposes and is not a system failure.
- The operations (roles) and resource groups that the logged-in user can access are determined when the user logs in. If the roles or resource allocations are changed while the user is logged in, the changes will take effect the next time the user logs back in.

## Initial superuser login

When you log in to the storage system for the first time, you must log in as the superuser (includes all permissions) so you can set up additional user accounts. You must also change the password for the superuser account to prevent unauthorized use of the superuser account.

Use the following procedure to log in for the first time by using Device Manager - Storage Navigator.

### Procedure

1. Contact customer support to obtain the superuser ID and password.
2. Start a web browser on the management client.
3. In the web browser, enter the URL for your SVP:

```
https://IP-address-or-host-name-of-SVP/sanproject/
```

If you changed the port number of the HTTP protocol from the initial value (443), specify the following URL:

```
https://IP-address-or-host-name-of-SVP:port-number-of-the-protocol/
```

4. The following actions might be required to open the login window, depending on your environment:
  - If a message indicates that the enhanced security configuration is enabled on the management client, select **In the future, do not show this message** and then click **OK**.
  - If the SVP is configured to support SSL-encrypted communication and security messages appear, make sure the certificate is correct and follow the instructions in the dialog box.
  - If a message indicates that certain websites are blocked, you need to add the SVP to the trusted sites zone (see [Adding your SVP to the trusted sites zone for Windows Server computers \(on page 27\)](#)).
5. Type the superuser ID and password, and then click **Login**.
6. If the **Security Information** dialog box appears, click **Yes**.  
After you log in, the Device Manager - Storage Navigator main window opens. You can navigate using the menu, tree, or General Tasks.
7. **Important:** Change the superuser password immediately after you log in to prevent unauthorized use of the superuser account. To change the password, click **Settings > User Management > Change Password**.

## User login

Use the following procedure to log in to Device Manager - Storage Navigator.

### Procedure

1. Start a web browser on the management client.
2. In the web browser, specify the following URL:

```
https://IP-address-or-host-name-of-SVP
```

If you changed the port number of the HTTP protocol from the initial value (443), specify the following URL:

```
https://IP-address-or-host-name-of-SVP:port-number-of-the-protocol-HTTPS/
```

If the Device Manager - Storage Navigator loading window is displayed, wait until the service status changes to **Ready (Normal)**. At that time, the login window is displayed automatically. The following is an example of the loading window.

Please wait... Storage Navigator is loading.

<Service>	<Status>
DataSupplierMan	Starting
ModelMan	Starting
ControllerMan	Starting
UserSessionMan	Ready (Normal)
RscMan	Starting

Storage Navigator start-up may take up to 10 minutes.

If services do not become Ready (Normal) after 10 minutes, there may be a problem in the network connection between the SVP and the storage system. Please verify that:

- The environment allows accesses from the SVP to the IP address of the storage system specified at storage system registration.
- The user name or password of the storage system specified at storage system registration is correct, and
- GUM of the storage system specified at system registration is not rebooting.

3. The following actions might be required to open the login window, depending on your environment:
  - If a message indicates that the enhanced security configuration is enabled on the management client, select **In the future, do not show this message** and then click **OK**.
  - If the SVP is set to support SSL-encrypted communication and security messages appear, make sure the certificate is correct and follow the instructions in the dialog box.
  - If a message indicates that certain web sites are blocked, you need to add the SVP to the trusted sites zone (see [Adding your SVP to the trusted sites zone for Windows Server computers \(on page 27\)](#)).
  - If multiple storage systems are connected, a window that allows selection of the storage system is displayed. Select the storage system you want to connect.
4. When the Storage Device List window opens, select the storage system. The Device Manager - Storage Navigator login window appears.
5. Type the user ID and password, and then click **Login**.
6. If the **Security Information** dialog box appears, click **Yes**.
7. If a local storage area pop-up dialog box of Adobe Flash Player Setting appears, click **Allow** to open the Device Manager - Storage Navigator main window. The cache function of Adobe Flash Player optimizes the process of Device Manager - Storage Navigator. Denial of the request might delay the processing speed of Device Manager - Storage Navigator.



## Result

After you log in, the Device Manager - Storage Navigator main window opens. You can navigate using the menu, tree, or General Tasks. For instructions on performing operations on the storage system using Device Manager - Storage Navigator, see the

applicable user guide (for example, *Hitachi Universal Replicator User Guide*). For descriptions of the Device Manager - Storage Navigator GUI windows, see Appendixes D through .

## Logging in to HDvM - SN by using AIR

When you log in to HDvM - SN by using Adobe AIR from HARMAN for the first time, Captive Bundle Application (CBA) is downloaded from the SVP to the management client. CBA is the application that enables HDvM - SN to run with AIR. The downloaded file size is about 30 MB. If the CBA version on the SVP is updated later, the new CBA version will be downloaded automatically to the management client.

Use the following procedure to log in to HDvM - SN by using AIR for the first time.



**Note:** If you are using one management client to access multiple storage systems, CBA is downloaded for each storage system.

### Before you begin

- Storage Device Launcher must be installed on the management client.
- CBA must be installed on the SVP.

### Procedure

1. Open the HDvM - SN login dialog box.

You can open the HDvM - SN login dialog box by running Storage Device Launcher on the management client or by opening a web browser and running Storage Device Launcher on the SVP.

- To open the HDvM - SN login dialog box by running Storage Device Launcher:
  - a. If you are logged in to the management client with administrator permissions, on the desktop or start menu, right-click the **Storage Device Launcher** batch file, and then run it by selecting **Run as Administrator**.

If you are not logged in to the management client with administrator permissions, on the desktop run the shortcut for the Storage Device Launcher batch file.



**Note:** If a security warning or a window blocking the operation is displayed, do not run Storage Device Launcher. Change the properties of the batch file (right-click `SDLauncher.bat`, click **Properties**, and then select **Unblock** in **Security**), and then run the file.

- b. Enter the IP address or host name of the SVP.
- c. Specify 443 for the HTTPS port number, and then click **Connect**.

If a security warning message is displayed, verify that the security certificate is correct, and then follow the instructions in the dialog box.

- To open the HDvM - SN login dialog box by opening a web browser and running Storage Device Launcher on the SVP:
  - a. Start the web browser on the management client with administrator permissions.
  - b. Enter the following URL in the web browser:

```
sdlauncher://IP-address-or-host-name-of-SVP/
```

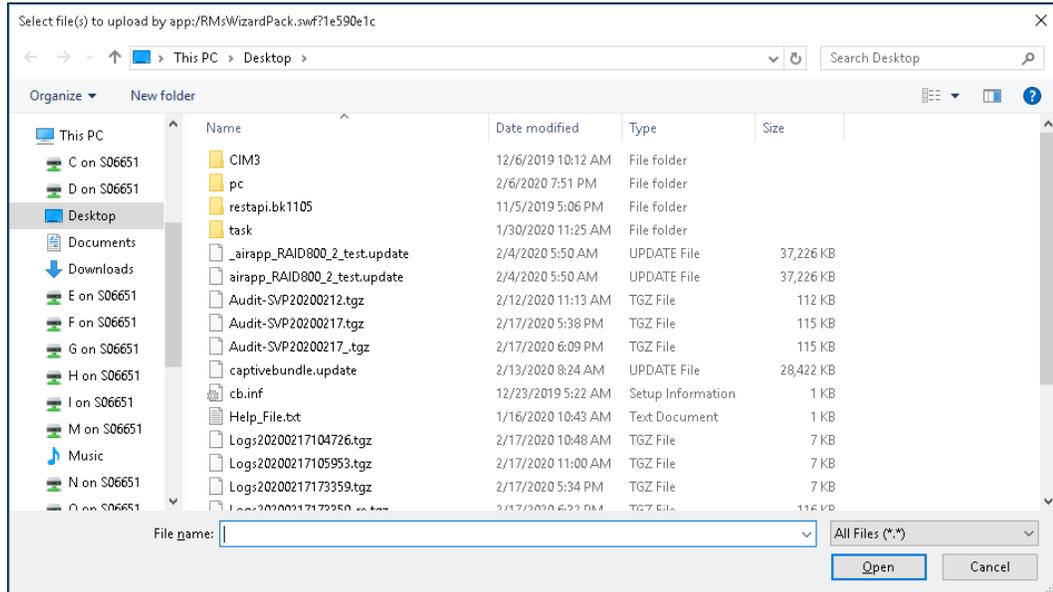
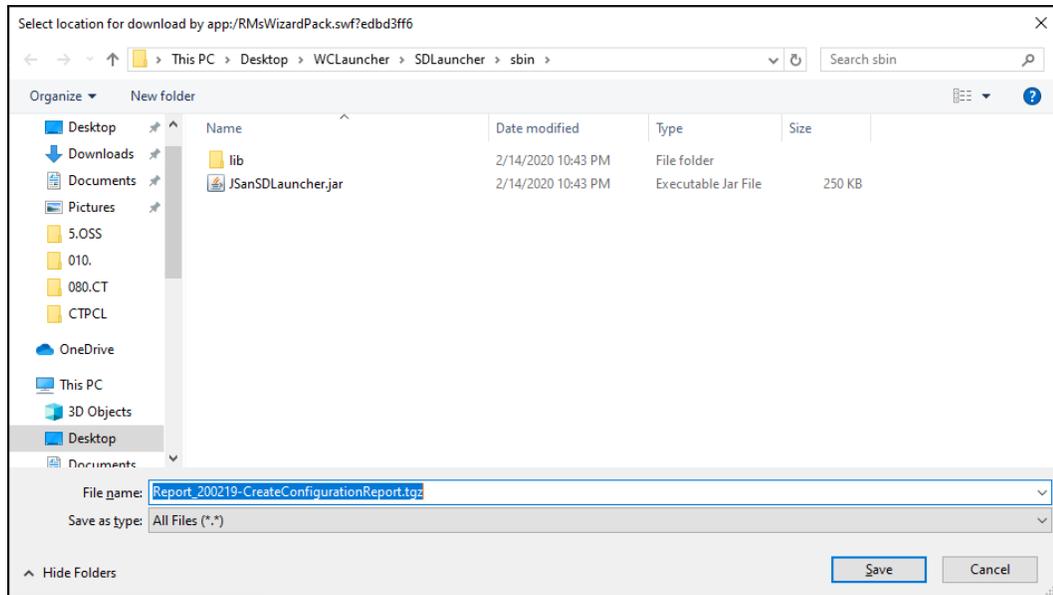


**Note:** If a security warning or a window blocking the operation is displayed, do not run the file. Change the properties of the batch file (right-click `SDLauncher.bat`, click **Properties**, and select **Unblock** in **Security**), and then run the file.

- c. If a security warning message is displayed, verify that the security certificate is correct, and then follow the instructions in the dialog box.
2. Wait about 10 seconds for the CBA file to be downloaded to the management client. When the download is complete, the HDvM - SN login dialog box opens. You can close the web browser.
  3. Enter the user name and password, and then click **Login**.  
If the **Security Information** dialog box is displayed, click **Yes**.  
When the storage system configuration information is finished loading, the HDvM - SN main window opens.

## Download/Upload window for HDvM - SN with AIR

When you use Device Manager - Storage Navigator (HDvM - SN) with Adobe AIR, a character string that depends on the Adobe AIR environment is displayed in the title of the window used for selecting a file to be downloaded or uploaded.



## Launching the maintenance utility

The o configure the storage system and perform maintenance operations, You can access the maintenance utility in several ways depending on whether your storage system has an SVP. The maintenance utility opens on a separate browser tab.

- Log in to Hitachi Device Manager - Storage Navigator, and then select the Maintenance Utility menu.
- Log in to Storage Advisor Embedded, click the Settings icon (top right), and then select Maintenance Utility.

**Note:**

- Click in the window to see the help menu for the description of the Maintenance Utility.
- To display the help, the settings for enlarging and reducing the display might not be reflected in the help window, depending on the type or version of your browser.

The screenshot displays the Hitachi Maintenance Utility interface for a storage system with S/N: 407001. The system is in a 'Ready' state. The 'Set Up System Information' section shows details for the Storage System Name, Contact, Location, Storage System Type (VSP G400/G600), and Serial Number (407001). It also displays IPv4 and IPv6 addresses for CTL1 and CTL2, and a temperature of 25 degrees C. A table below shows drive statistics: Data (75 drives, 18.36 TB), Spare (8 drives, 1.56 TB), Free (9 drives, 3.16 TB), and Total (92 drives, 23.09 TB). The 'Chassis' section shows a graphical layout of the Controller Chassis, DB-00, and DB-01, with options to 'Locate LED' and 'Go to Detail' for each component.

## Changing the administrator password

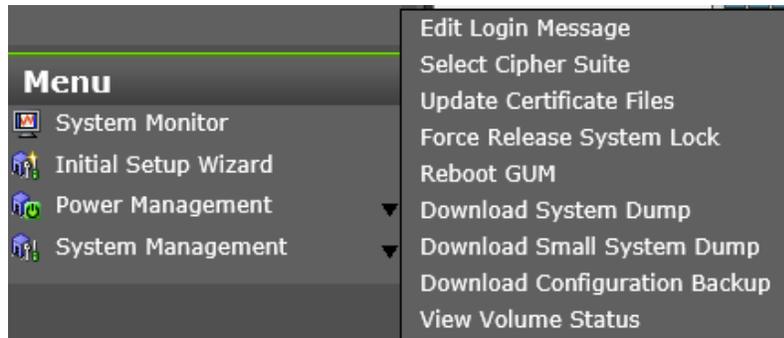
You can change the administrator password using the maintenance utility.

### Before you begin

- Before changing the password of a user account specified by the registered storage system in the **Storage Device List** window, click Stop Service for the registered storage system. After changing the password of the user account, click Edit and set the new password, then click Start Service for the storage system.

### Procedure

1. In the maintenance utility **Menu** navigation tree, click **System Management**.



2. Click **Change Password**.
3. Enter your current password and a new password. Enter the password again in the **Re-enter Password** field.
4. Click **Finish**.

## Configuring the management client for the HDvM - SN secondary window

If you plan to use any of the following functions, you must configure the management client for use of the Device Manager - Storage Navigator (HDvM - SN) secondary window:

- Login Message function
- Data Retention Utility
- Server Priority Manager

The Device Manager - Storage Navigator (HDvM - SN) secondary window runs within the Java Runtime Environment (JRE) on the management client. The secondary window is disabled by default in HDvM - SN and must be enabled by using HDvM - SN or Web Console Launcher (when Java 11 or later is installed on the HDvM - SN management client). If the secondary window is not enabled, the functions listed above are not accessible in HDvM - SN.

### Restrictions for using the HDvM - SN secondary window with Google Chrome

When you open the secondary window, Google Chrome displays the following message: **This type of file can harm your computer. Are you sure you want to download <file name>.jnlp?** . Click Save in the message window and save the object file. Then open the file. You can continue the operation even though a Java security warning is displayed when you open the file.

`SJsvlSNStartServlet (<serial number>).jnlp` is saved in the download folder. This file is duplicated every time you open the secondary window (because it is not overwritten or deleted automatically). Delete extraneous downloaded `SJsvlSNStartServlet (<serial number>).jnlp` files periodically to prevent shortage of capacity. To confirm the download location, follow Chrome Menu > Settings > Show advanced settings > Downloads.

Do not click Discard in the message window. If you do, you will not be able to use HDvM - SN for a while until error (20020-108000) appears. When error (20020-108000) appears, click OK to close the error and continue working in HDvM - SN.

If you don't want to wait for the error to appear, you can close Chrome and then log in to HDvM - SN again.

The error also appears if you do not click Save or if you do not open the saved file for some time.

## Enabling the HDvM - SN secondary window

If you plan to use any of the following functions in Device Manager - Storage Navigator (HDvM - SN), you must enable the HDvM - SN secondary window:

- Login Message function
- Data Retention Utility
- Server Priority Manager

The HDvM - SN secondary window runs within the Java Runtime Environment (JRE) on the management client. The secondary window is disabled by default in HDvM - SN and must be enabled by using HDvM - SN, or by using Web Console Launcher when Java 11 or later is installed on the HDvM - SN management client. If the secondary window is not enabled, the functions listed above are not accessible in HDvM - SN.

### Before you begin

- Required role: Storage Administrator (View Only)

### Procedure

1. From the **Settings** menu, click **Environmental Settings > Edit Information Display Settings**.  
The **Edit Information Display Settings** window opens.
2. In **Secondary window**, click **Enable**.
3. Click **Apply**.

## Using Web Console Launcher to enable the secondary window (Java 11 or later)

When Java 11 or later is installed on the Device Manager - Storage Navigator (HDvM - SN) management client, you must download and execute Web Console Launcher to enable the HDvM - SN secondary window. The setup file that you download contains the following applications:

- Web Console Launcher: This application is required to enable the HDvM - SN secondary window when HDvM - SN is running on a web browser with Java 11 or later installed.
- Storage Device Launcher: This application is required to start HDvM - SN in the Adobe AIR environment. Storage Device Launcher is contained only in the setup file for Windows.

When the HDvM - SN secondary window is opened, you must enable the .jnlp file included in the setup file.



**Note:** You must perform the following procedure each time the SVP firmware is upgraded.

### Procedure

1. From the Menu bar, click **Tool > Download**.
2. Download the Web Console Launcher tool for Windows or UNIX.
3. Expand and execute the download file by the following OS method:

**Windows:** Expand the file, right click `WCLauncher\Setupwin.bat` and execute it by selecting **Run as Administrator**. This associates the downloaded .jnlp file with Web Console Launcher.

**UNIX:** Enter `tar zxvf WCLauncher_unix.tgz` to expand the file, and then enter `sudo shsetupunix.sh` in the expanded directory to execute it.



**Note:** When you execute Web Console Launcher, Java8 is disabled.

### Next steps

Each time you open the HDvM - SN secondary window with Java 11 or later, you must enable the .jnlp file using Web Console Launcher.



**Caution:** Do not delete or move the `WCLauncher_win` folder. This folder contains files required to run Web Console Launcher.

## Checking Java security settings

If the SVP microcode version is updated from earlier than 88-04-01-XX/00 to 88-04-01-XX/00 or later, perform the following procedure to check and, if necessary, change the settings.

If the SVP microcode version is earlier than 88-04-01-XX/00, IP addresses of SVPs might be registered in the exception site list in Java security settings on the management client, for using Device Manager - Storage Navigator secondary windows. If the SVP microcode version is 88-04-01-XX/00 or later, registration of IP addresses to the exception site list is not necessary.

### Procedure

1. Start **Java Control Panel** on the management client by either of the following ways:
  - From Windows **Control Panel**, double-click the Java icon.
  - From the Windows **Start** menu, click **All Programs > Java > Configure Java**.
2. Click the **Security** tab.

3. Check whether the following URLs are registered in **Exception Site List**:

`http://IP-address-of-SVP`

`https://IP-address-of-SVP`

If these URLs are not registered, click **Cancel** to finish the operation.

4. Click **Edit Site List**.
5. In the **Exception Site List** dialog box, select the URLs shown in step 3, and then click **Remove**.
6. Click **OK**
7. In **Exception Site List**, confirm that the corresponding URLs are removed.  
If the corresponding URLs are removed, go to the next step.  
If the corresponding URLs are not removed, see steps 4 and 5 and correct the problems.
8. Click the **Advanced** tab.
9. Under **Perform signed code certificate revocation checks on**, select **All certificates in the chain of trust**, and then click **OK**.



**Caution:** Even when **Perform signed code certificate revocation checks on** is not displayed and **Perform certificate revocation checks on** is displayed instead, select **All certificates in the chain of trust**, and then click **OK**.

10. Close the **Control Panel**.

## Disabling and enabling use of Flash Player with HDvM - SN

Adobe Flash Player is used to run Device Manager - Storage Navigator (HDvM - SN) in a web browser. If desired, you can disable use of Flash Player with HDvM - SN after you start using HDvM - SN with Adobe AIR. Later, if you need to run HDvM - SN in a web browser, you can re-enable use of Flash Player on the management client.

When you use Hitachi Command Suite, however, do not disable use of Flash Player to run HDvM - SN. If you disable this function, you will not be able to access HDvM - SN from HCS.

Make sure that the HCS version supports linkage with HDvM - SN running in the Adobe AIR environment.



**Caution:** If you disable Flash Player, you will not be able to access HDvM - SN.

Use the following procedure to disable or enable use of Flash Player with HDvM - SN. When multiple storage systems are managed by using one SVP, you must disable or enable use of Flash Player for each storage system.

## Procedure

1. Close all HDvM - SN sessions connected to the storage system on which this operation is performed.
2. Log in to the SVP.
3. Open a command prompt on the SVP with administrator permissions.
4. Move the current directory to the folder containing the `MappFlashEnable.bat` and `MappFlashDisable.bat` batch files (for example, `C:\MAPP\wk\Supervisor\MappIniSet`), and then run the desired batch file (enable or disable) specifying the storage system serial number\* as the argument. For example:

```
C:\MAPP\wk\Supervisor\MappIniSet> MappFlashDisable.bat 400102
```

\* The storage system serial number is displayed in **S/N** in the **Storage Device List** window on the SVP.

5. When the completion message appears, press any key to continue the processing.
6. Close the command prompt window.

## Accessing the storage system without management software

You can use the administrator account created during the initial setup to use HDvM - SN temporarily to access the storage system. You can then perform critical storage management operations during a planned maintenance activity or an unexpected downtime on the management server.

### Before you begin

- You must have an administrator login account with permissions equal to or higher than Administrator User Group has. For information about creating user accounts, see [Creating user accounts \(on page 117\)](#) in this manual, and the *Hardware Reference Guide* for your system model.
- For Hitachi Ops Center Administrator users, you must have an administrator login account with the require permissions to access the storage system without management software.
- Adobe Flash Player must be configured on the client to use HDvM - SN.



**Note:** To obtain the administrator login information, contact customer support.

### Procedure

1. Start a web browser.

2. Enter the following URL:

- For the VSP F350 and VSP G350 storage system, enter:

`https://IP-address-or-host-name-of-the-SVP/dev/storage/8820004XXXXX/emergency.do` (where the model number is '8820004' and '4XXXXX' indicates the system serial number)

- For VSP F370, VSP G370, VSP F700, VSP G700, VSP F900, and VSP G900 storage systems, enter:

`https://IP-address-or-host-name-of-the-SVP/dev/storage/8840004XXXXX/emergency.do` (where the model number is '8840004' and '4XXXXX' indicates the system serial number)

3. The following actions might be required to open the login dialog box, depending on your environment:

- If a message indicates that the enhanced security configuration is enabled on the computer, select **In the future, do not show this message** and click **OK**.
- If the SVP is set to support SSL-encrypted communication and security messages appear, make sure the certificate is correct and follow the instructions in the dialog box.
- If a message indicates that certain web sites are blocked, make sure you have added the SVP to the trusted sites zone.

4. Enter a user ID and password for the account.

5. Click **Log In**.

6. If the Security Information dialog box appears, click **Yes**.

7. If an Adobe Flash Player local storage area pop-up dialog box appears, click **Allow** to open the Device Manager - Storage Navigator main window.

The cache function of Adobe Flash Player optimizes the process of Device Manager - Storage Navigator. Denial of the request might reduce processing speed.



**Note:** If the login process fails three times with the same user ID, Device Manager - Storage Navigator will stop responding for one minute. This is for security purposes and is not a system failure. Wait, and then try again.

## Chapter 3: Setting up SSL security for the management client

You can use a Secure Sockets Layer (SSL) certificate to create a secure, encrypted connection between the storage system and the management client.

### Setting up SSL communications

Before you enable SSL encryption, you must create a private key and a public key to establish a secure communication session.

The following figure shows the procedure to set up SSL communication. Unless otherwise noted, all steps are required. Note that creation of private and public keys requires a dedicated program. You can download a program for creating private and public keys from the OpenSSL website (<http://www.openssl.org/>).



### Setting up SSL encryption using Device Manager - Storage Navigator

To improve security of remote operations from a Device Manager - Storage Navigator SVP to a storage system, you can set up Secure Sockets Layer (SSL) encrypted communication. By setting SSL encryption, the Device Manager - Storage Navigator User ID and Password are encrypted.

The SSL communication can be established between the management client and the SVP using the following supported protocols and the port numbers:

Protocol	Port Number
HTTPS	443
RMI	11099
RMI	51100
SMI-S	5989
HTTPS (raidinf)	5443

The SSL communication can be established between the following servers and the SVP:

- Key management server
- Authentication server
- Authorization server
- Hitachi Command Suite server



**Note:** To enable SSL, the private and public key pair and SVP server certificate must be valid. If either the keys or the certificate is expired, the user cannot connect to the SVP.



**Note:** The extended profile fields in the X.509 certificate support the following items as specified in RFC5280:

- BasicConstraints
- KeyUsage
- SubjectKeyIdentifier
- subjectAltName



**Note:** To add the Secure attribute to cookies using Device Manager - Storage Navigator, you must block HTTP communication. For details, see [Blocking HTTP communication to the management client \(on page 59\)](#).



**Note:** Device Manager - Storage Navigator supports HTTP Strict Transport Security (HSTS) with a max range of 31,536,000 seconds (1 year). To enable HSTS, you must use the security certificate issued by a trusted root certificate authority for your Device Manager - Storage Navigator domain. HSTS is valid for one year (31,536,000 seconds), and it is renewed automatically every time the HSTS header is sent to the browser. The security certificate to use is determined by the browser. For details, contact your browser vendor.



**Note:** If HSTS is enabled on a Web application on a server you wish to install Device Manager - Storage Navigator, use a domain that is written to the security certificate specific to each application. If you use the same domain, the HSTS settings are applied to all Web applications that use the domain, and all connections are switched to https. If you have an application that can be accessed only through http, you cannot establish the connection.

## Creating a keypair

To enable SSL, you must create a keypair consisting of a public and a private key on the management client. The instructions use Windows 8.1 as an example.

### Creating a private key using the OpenSSL command

A private key is required to create an SSL keypair. The following procedure for Windows creates a private key file called `server.key` in the `c:\key` folder.

#### Before you begin

Ensure that OpenSSL is stored in `C:\Mapp\OSS\apache\bin\openssl` on the SVP. (You do not need to install OpenSSL.) If not, Download and install `openssl.exe` from <http://www.openssl.org/> to the `C:\openssl` folder.



**Note:** `C:\Mapp` indicates the installation directory for the storage management software and SVP software. Specify `C:\Mapp` for the installation directory if another directory is specified for the installation directory.

#### Procedure

1. When you install OpenSSL, if the read-only attribute is set, release it from the `c:\openssl` folder. (This step is not necessary if you use OpenSSL on the SVP.)
2. Open a command prompt with administrator permissions.
3. Move the current directory to the folder to which the key file is output (such as `c:\key`), and execute the following command.

When OpenSSL is installed:

```
C:\key>c:\openssl\bin\openssl genrsa -out server.key 2048
```

When using OpenSSL on the SVP:

```
C:\key>c:\Mapp\OSS\apache\bin\openssl genrsa -out server.key 2048
```

### Creating a public key using the OpenSSL command

A public key has the file extension `.csr`. It is required to create an SSL keypair. The following procedure is for the Windows operating system.

#### Before you begin

Download `openssl.exe` from the OpenSSL website or determine to use OpenSSL on the SVP.

## Procedure

1. Open a command prompt with administrator permissions.
2. Execute the following command:

When OpenSSL is installed:

```
C:\key>c:\openssl\bin\openssl req -sha256 -new -key server.key -
config c:\openssl\bin\openssl.cnf -out server.csr
```

When using OpenSSL on the SVP:

```
C:\Key>Mapp\OSS\apache\bin\openssl req -sha256 -new -key
server.key -config c:\Mapp\OSS\apache\conf\openssl.cnf -out
server.csr
```



**Note:** C:\Mapp indicates the installation directory for the storage management software and SVP software. Specify C:\Mapp for the installation directory if another directory is specified for the installation directory.



**Note:** This command uses SHA-256 as a hash algorithm.

- Use SHA-256 for the hash algorithm. Do not use MD5 or SHA-1 for the hash algorithm due to its low security level.
- When you use OpenSSL on the SVP, do not change the contents of c:\Mapp\OSS\apache\conf\openssl.cnf.

3. Enter the following information in the prompt:

- Country Name (two-letter code)
- State or Province Name
- Locality Name
- Organization Name
- Organization Unit Name
- Common Name

To create a self-signed certificate, enter the IP address of the SVP or GUM. The name you entered here is used as the server name (host name). To obtain a signed and trusted certificate, ensure that the server name is the same as the host name.

- Email Address
- Challenge password (optional)
- Company name (optional)

## Example

The following example shows the contents of a command window when you create a public key.

```
.....++++++
..++++++
```

```

is 65537 (0x10001)
C:\key>c:\openssl\bin\openssl req -sha256 -new -key server.key -config c
You are about to be asked to enter information that will be incorporated
into your certificate request. What you are about to enter is what is
called a Distinguished Name or a DN.
\openssl\bin\openssl.cfg -out server.csr
For some fields there will be a default value.
If you enter '.', the field will be left blank.
-----
Country Name (2 letter code) [AU]:JP
State or Province Name (full name) [Some-State]:Kanagawa
Locality Name (eg, city) []:Odawara
Organization Name (eg, company) [Internet Widgits Pty Ltd]:Hitachi
Organization Unit Name (eg, section) []:ITPD
Common Name (eg, YOUR name) []:192.168.0.1
Email Address []:
Please enter the following 'extra' attributes
to be sent with your certificate request
A challenge password []:

```

## Obtaining a signed certificate

After creating a private key and public key, obtain a signed public key certificate file. You can use any of these methods to obtain a signed certificate file.

- Create a certificate by self-signing. See [Obtaining a self-signed certificate \(on page 49\)](#).
- Obtain a certificate from the certificate authority that is used by your company.
- Request an official certificate from an SSL certificate authority. See [Obtaining a signed and trusted certificate \(on page 50\)](#).



### Note:

When you send a request to a certificate authority, specify the SVP or GUM as the host name.

Hitachi recommends that self-signed certificates be used only for testing encrypted communication.

## Obtaining a self-signed certificate

To obtain a self-signed certificate, open a command prompt and execute the following command:

When OpenSSL is installed:

```
C:\key>c:\openssl\bin\openssl x509 -req -sha256 -days 10000 -in
server.csr -signkey server.key -out server.crt
```

When using OpenSSL on the SVP:

```
C:\key>c:\Mapp\OSS\apache\bin\openssl x509 -req -sha256 -days 10000  
-in server.csr -signkey server.key -out server.crt
```



**Note:** C:\Mapp indicates the installation directory for the storage management software and SVP software. Specify C:\Mapp for the installation directory if another directory is specified for the installation directory.



**Note:** This command uses SHA-256 as a hash algorithm. MD5 or SHA-1 is not recommended for a hash algorithm due to its low security level.

This command creates a `server.crt` file in the `c:\key` folder, which is valid for 10,000 days. This is the signed private key, which is also referred to as a self-signed certificate.

## Obtaining a signed and trusted certificate

To obtain a signed and trusted certificate, you must obtain a certificate signing request (CSR), send that file to a Certificate Authority (CA), and request that the CA issue a signed and trusted certificate. Each certificate authority has its own procedures and requirements. Use of this certificate results in higher reliability in exchange for greater cost and requirements. The signed and trusted certificate is the signed public key.

## Before uploading the SSL certificate

Before uploading the SSL certificate to the SVP or management client, perform the following tasks:

- If the passphrase is set, an SSL certificate cannot be applied for the SVP. You must release the passphrase for the SSL certificate before applying the SSL certificate to the SVP. For instructions, see [Releasing an SSL certificate passphrase \(on page 50\)](#).
- If you are uploading a created private key and the SSL certificate to the management client, you need to convert the SSL certificate to PKCS#12 format. For instructions, see [Converting the SSL certificates to PKCS#12 format \(on page 51\)](#).

## Releasing an SSL certificate passphrase

An SSL certificate cannot be uploaded to the SVP if the passphrase is set. If the passphrase is set, use the following procedure to release the passphrase for the SSL certificate before applying it to the SVP.

### Before you begin

- The private key (`server.key` file) must have been created.
- OpenSSL must be installed. In this procedure, it is installed in `C:\openssl`.
- All users must be logged out of Device Manager - Storage Navigator.

### Procedure

1. On the SVP, open a command prompt with administrator permissions.

2. Move the current directory to the folder containing the key file (for example, C:\key).
3. Execute the following command.



**Caution:** Executing this command will overwrite the current key file. To prevent loss of the key file, either back up the key file before executing the following command, or specify a different key file input destination and output destination when executing the following command.

When OpenSSL is installed:

```
C:\key>c:\openssl\bin\openssl rsa -in key-file-input-destination
-out key-file-output-destination
```

When using OpenSSL on the SVP:

```
C:\key>c:\Mapp\OSS\apache\bin\openssl rsa -in key-file-input-
destination -out key-file-output-destination
```



**Note:** C:\Mapp indicates the installation directory for the storage management software and SVP software. If you specified a different installation directory, replace C:\Mapp with the specified installation directory.

4. When Enter pass phrase for server.key: is displayed, enter the passphrase. The passphrase in the SSL private key is released, and the SSL certificate can be applied to the SVP.

#### Example (when passphrase is set)

```
C:\key>c:\openssl\bin\openssl rsa -in server.key -out server.key
```

```
Enter pass phrase for server.key: "Enter passphrase"
```

```
Writing RSA key
```

#### Example (when passphrase is not set)

```
C:\key>c:\openssl\bin\openssl rsa -in server.key -out server.key
```

```
Writing RSA key
```

## Converting the SSL certificates to PKCS#12 format

Uploaded SSL certificates need to be in PKCS#12 format.

If you are uploading a created private key and the SSL certificate to the management client, you need to convert the SSL certificate to PKCS#12 format. If you are not uploading the SSL certificate, conversion is not required.

### Before you begin

- You must store a private key and SSL certificate in the same folder.
- In the following procedure:
  - The private key file name is "client.key".
  - The SSL certificate file name is "client.crt".
  - The SSL certificate in PKCS#12 format is output to c:\key.
  - If you update SSL certificates in a batch, conversion is not required.

### Procedure

1. Open a command prompt with administrator permissions.
2. Enter the following command:

When OpenSSL is installed:

```
C:\key>c:\openssl\bin\openssl pkcs12 -export -in client.crt -inkey client.key -out client.p12
```

When using OpenSSL on the SVP:

```
C:\key>c:\Mapp\OSS\apache\bin\openssl pkcs12 -export -in client.crt -inkey client.key -out client.p12
```



**Note:** C:\Mapp indicates the installation directory for the storage management software and SVP software. Specify C:\Mapp for the installation directory if another directory is specified for the installation directory.

3. Enter a password, which is used when uploading the SSL certificate in PKCS#12 format. You can use up to 128 alphanumeric characters and the following symbols: ! # \$ % & ' ( ) \* + , - . / : ; < = > ? @ [ \ ] ^ \_ ` { | } ~
4. The client.p12 file is created in the C:\key folder. This client.p12 file is the SSL certificate in PKCS#12 format.
5. Close the command prompt.

## Uploading the SSL certificate to the SVP or management client

To use SSL-encrypted communication, you must upload the private key and the signed server certificate (public key) to the management client.



### Caution:

When DKCMAIN firmware version 88-03-24 or earlier is updated, the existing SSL certificate file is deleted and replaced with the default certificate file. Therefore, back up the SSL certificate file before DKCMAIN firmware version 88-03-24 or earlier is updated, and then install the backed-up certificate file.

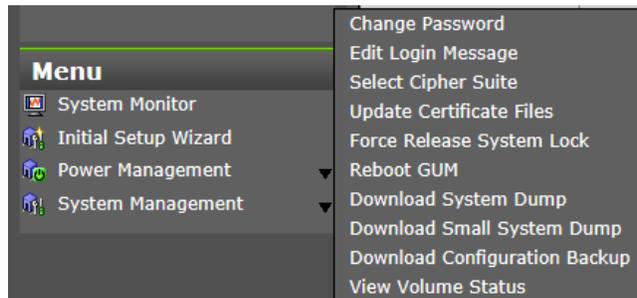
When DKCMAIN firmware version 88-03-25-x0/00 or later is updated, the existing certificate file is inherited.

## Before you begin

- You must have the Storage Administrator (Initial Configuration) role to perform this task.
- You must be logged in to the SVP or management client.
- A private key (.key file) has been created. Make sure that the file name is `server.key`.
- A signed public key certificate (.crt file) has been acquired. Make sure that the file name is `server.crt`.
- The private key (.key file) must be in PEM format. You cannot use DER format.
- The signed public key certificate (.crt file) must be in X509 PEM format. You cannot use X509 DER format.
- The passphrase for the private key (server.key file) must be released.
- If an intermediate certificate exists, you must prepare a signed public key certificate (server.crt file) in a certificate chain that contains the intermediate certificate.
- The number of tiers of the certificate chain for the certificate to be uploaded must be 5 tiers or less including the root CA certificate.
- The public key of the certificate to be uploaded must be RSA.

## Procedure

1. In the maintenance utility **Menu** navigation tree, click **System Management**.



2. Click **Update Certificate Files**.



### Before you begin

- The private key (`server.key` file) must have been created. If the file name is not `server.key`, rename it to `server.key`.
- The signed public key certificate (`server.crt` file) must have been obtained. If the file name is not `server.crt`, rename it to `server.crt`.
- The private key (`server.key` file) and the signed public key certificate (`server.crt` file) must be in X509 PEM format. Do not use a certificate in X509 DER format.
- If an intermediate certificate exists, you must prepare a signed public key certificate (`server.crt` file) in a certificate chain that contains the intermediate certificate.
- The certificate chain for the certificate to be uploaded must have 5 tiers or fewer including the root CA certificate.
- The following GUM firmware version is required to update a certificate file to a certificate file in a certificate chain that contains the intermediate certificate and root CA certificate:
  - 93-02-01-xx/xx or later
  - 88-06-01-xx/xx or later
- The public key encryption method for the certificate to be uploaded must be RSA.
- All users must be logged out of Device Manager - Storage Navigator.

### Procedure

1. On the SVP, start a Windows command prompt as Administrator.
2. Move the current directory to the directory containing the certificate update tool `MappApacheCrtUpdate.bat`.
3. Run the following commands:

```
cd /d C:\Mapp\wk\Supervisor\MappIniSet
MappApacheCrtUpdate.bat absolute-path-of-the-certificate-file absolute-
path-of-the-private-key-file
```

In this command, `C:\MAPP` indicates the installation directory of the storage management software and SVP software. If the installation directory is not `C:\Mapp`, replace `C:\Mapp` with your installation directory.

4. When prompted, press any key to continue.
5. When the processing is complete, you can close the command prompt.

## Uploading the certificates for “Connect to SVP” and “Web server” to the storage system

Before uploading the SSL certificate, you must upload and update the certificate for “Connect to SVP” and the certificate for “Web server” that are used for SSL communications between the management client and the storage system and between the SVP and the storage system.

The extended profile fields in the X.509 certificate support the following items as specified in RFC5280:

- BasicConstraints
- KeyUsage
- SubjectKeyIdentifier



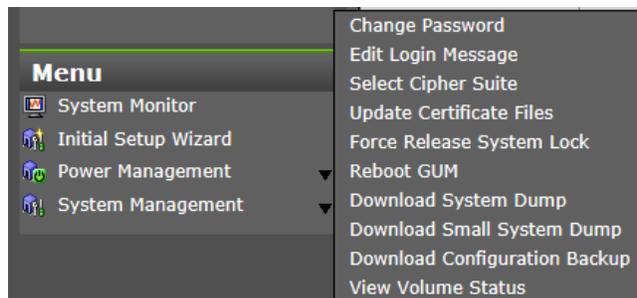
**Note:** When the storage management software is updated, the private key and signed public key certificate might be returned to default. If this happens, you need to upload the private key and signed public key certificate to the SVP again.

### Before you begin

- The certificate files must be in PKCS#12 format.
- If you have a server certificate file and a private key file that are in PEM format, you need to convert the certificates to PKCS#12 format. Also, register the server certificate files before conversion in the SVP.
- If an intermediate certificate exists, you must prepare a signed public key certificate in a certificate chain that contains the intermediate certificate.
- The number of tiers of the certificate chain for the certificate to be uploaded must be 5 tiers or less including the root CA certificate.
- The following GUM firmware version is required to update a certificate file to a certificate file in a certificate chain that contains the intermediate certificate and CA certificate:
  - 93-02-01-xx/xx or later
  - 88-06-01-xx/xx or later
- The public key encryption method for the certificate to be uploaded must be RSA.

### Procedure

1. In the maintenance utility **Menu** navigation tree, click **System Management** > **Update Certificate Files**.



2. Select the check box for the certificate you want to update, and then specify the certificate file.
  - If you are using Hitachi Storage Advisor Embedded, select **Web Server**.



**Note:** If the storage system does not have an SVP, make sure to clear (uncheck) the check box for **Connect to SVP**.

- If you are using Hitachi Device Manager - Storage Navigator, select **Web Server** or **Connect to SVP**.

### Update Certificate Files

To update the server certificate, select the certificate file, and enter the password. When the settings are complete, verify the entries, and then click [Apply].

<input checked="" type="checkbox"/> Web Server:	Browse...	No file selected.
	Password:	<input type="text"/>
		(Max. 128 characters or blank)
	Re-enter Password:	<input type="text"/>
 <input checked="" type="checkbox"/> Connect to SVP:	 Browse...	 No file selected.
	Password:	<input type="text"/>
		(Max. 128 characters or blank)
	Re-enter Password:	<input type="text"/>

3. Confirm the settings, and then click **Apply**.
4. When the completion message appears, close the dialog box.

## Uploading the certificate for “Connect to SVP” to the SVP

Before using a certificate for SSL communications between the SVP and the storage system, you need to upload the signed public key certificate to the SVP.

The extended profile fields in the X.509 certificate support the following items as specified in RFC5280:

- BasicConstraints
- KeyUsage
- SubjectKeyIdentifier

### Before you begin

- The private key for the storage system and the signed public key certificate must be updated in the maintenance utility.
- The signed public key certificate (`server.crt` file) must be in X509 PEM format.
- If an intermediate certificate exists, you must prepare a signed public key certificate (`server.crt` file) in a certificate chain that contains the intermediate certificate.

- The number of tiers of the certificate chain for the certificate to be uploaded must be 5 tiers or less including the root CA certificate.
- The following GUM firmware version is required to update a certificate file to a certificate file in a certificate chain that contains the intermediate certificate and CA certificate:
  - 93-02-01-xx/xx or later
  - 88-06-01-xx/xx or later
- The public key encryption method for the certificate to be uploaded must be RSA.
- All users must be logged out of Device Manager - Storage Navigator.

### Procedure

1. On the SVP, start a Windows command prompt as Administrator.
2. Move the current directory to the directory containing the tool  
`MappL7SwitchGumSslCrtUpdate.bat`.
3. Run the following commands:

```
cd /d C:\Mapp\wk\Supervisor\MappIniSet  
MappL7SwitchGumSslCrtUpdate.bat absolute-path-of-the-certificate-file
```

In this command, `C:\MAPP` indicates the installation directory of the storage management software and SVP software. If the installation directory is not `C:\Mapp`, replace `C:\Mapp` with your installation directory.

4. When prompted, press any key to continue.
5. When the processing is complete, you can close the command prompt.

## Uploading the certificate to the web server

Execute the SSL communication with Device Manager - Storage Navigator installed on the SVP as a client and the controller of the storage system as a server. Upload the private key and the signed server certificate (public key) to the SVP for using the SSL communication. The following describes how to upload the certificate using the certificate update tool.

This procedure assumes that:

- The private key for the web server and the signed public key certificate must be updated in the maintenance utility.
- The private key (`server.key` file) and signed public key certificate (`server.crt` file) must be in X509 PEM format or X509 DER format.
- If an intermediate certificate exists, you must prepare a signed public key certificate (`server.crt` file) in a certificate chain that contains the intermediate certificate.
- The number of tiers of the certificate chain for the certificate to be uploaded must be 5 tiers or less including the root CA certificate.
- The following GUM firmware version is required to update a certificate file to a certificate file in a certificate chain that contains the intermediate certificate and root CA certificate:
  - 93-02-01-xx/xx or later
  - 88-06-01-xx/xx or later
- The public key encryption method for the certificate to be uploaded must be RSA.
- All users must be logged out of Device Manager - Storage Navigator.

### Procedure

1. On the SVP, start a Windows command prompt as Administrator.
2. Move the current directory to the directory containing the certificate update tool (`MappSn2GumSslCrtUpdate.bat`).
3. Run the following commands:

```
C:\MAPP\wk\Supervisor\MappIniSet\  
MappSn2GumSslCrtUpdate.bat r[absolute path of the certificate file]
```

In this command, `C:\MAPP` indicates the installation directory of the storage management software and SVP software. If the installation directory is not `C:\Mapp`, replace `C:\Mapp` with your installation directory.

4. When prompted, press any key to continue.
5. When the processing is complete, you can close the command prompt.

## Importing the SSL certificate to the Web browser

To allow your Web browser to automatically trust SSL certificates, you can import the SSL certificate into your Web browser.

Consult your Web browser's documentation for instructions to import the SSL certificate to the Web browser.

## Blocking HTTP communication to the management client

You can use the HTTP setting tool to block or allow access to the HTTP communication port as needed.

### Before you begin

- You must have the Storage Administrator (Initial Configuration) role to perform this task.
- You must be logged into the SVP or management client.

### Procedure

1. Close all management client sessions on the storage system, including Storage Advisor Embedded, maintenance utility, and Device Manager - Storage Navigator.
2. Open a command prompt window with administrator permissions.
3. In the folder where the HTTP setting tool is located, execute the following command:  

```
C:\MAPP\wk\Supervisor\MappIniSet>MappHttpBlock.bat
```
4. A completion message box displays. Press any key to acknowledge the message and close the message box.
5. Close the command prompt window.

## Releasing HTTP communication blocking

If the web server supports SSL (HTTPS), you can use the HTTP setting tool to release a block to the HTTP communication port as needed.

### Before you begin

- You must have the Storage Administrator (Initial Configuration) role to perform this task.
- You must be logged into the SVP or management client.

### Procedure

1. Close all management client sessions on the storage system, including Storage Advisor Embedded, maintenance utility, and Device Manager - Storage Navigator.
2. Open a command prompt window with administrator permissions.
3. In the folder where the HTTP setting tool is located, execute the following command:  

```
C:\MAPP\wk\Supervisor\MappIniSet>MappHttpRelease.bat
```
4. A completion message box displays. Press any key to acknowledge the message and close the message box.
5. Close the command prompt window.

## Managing SSL certificates

When you use encrypted SSL communications to manage your storage system, you can select the desired cipher suite, update a signed certificate, and return an updated certificate to default.

SSL connection protects the User IDs and passwords that are exchanged when users log in to the management client.

## Selecting a cipher suite

Cipher suites are part of SSL Version 3 and OSI Transport Layer Security Version 1 Cipher Specifications.



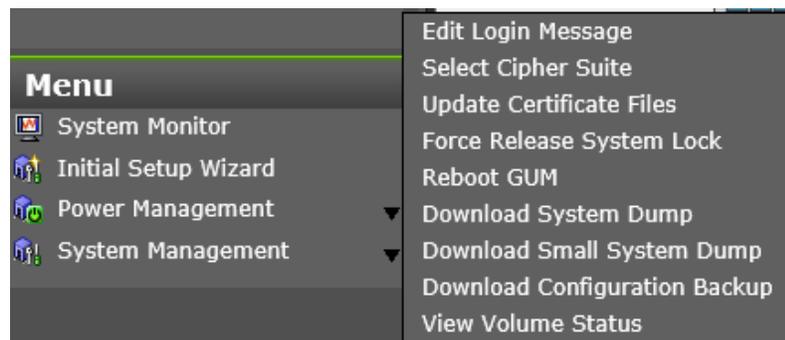
**Note:** The cipher suites for RSA key exchange used by SSL communication are set to enabled by default.

### Before you begin

You must have the Storage Administrator (View & Modify) role to complete this procedure.

### Procedure

1. In the maintenance utility **Menu** navigation tree, click **System Management**.



2. Click **Select Cipher Suite**.
3. Select the type of communication to use between the management client and the storage system. The selections change the encryption level. Higher encryption provides better security but the communication speed is slower.
  - TLS\_RSA\_WITH\_AES\_128\_CBC\_SHA (Prioritize Transmission Speed). This selection provides higher communication speed and lower security.
  - TLS\_RSA\_WITH\_AES\_128\_CBC\_SHA256 (Prioritize Security). This selection provides higher security and lower communication speed.
4. Click **Apply** to save the setting and close the dialog box.

## Updating a signed certificate

To use SSL-encrypted communication, you must update and upload the private key and the signed server certificate (public key) to the management client.



**Note:** The extended profile fields in the X.509 certificate support the following items as specified in RFC5280:

- BasicConstraints
- KeyUsage
- SubjectKeyIdentifier
- subjectAltName

### Before you begin

- You must have the Storage Administrator (Initial Configuration) role to perform this task.
- You must be logged in to the SVP or management client.
- A private key (.key file) has been created. Make sure that the file name is `server.key`.
- The passphrase for the private key (server.key file) is released.
- A signed public key certificate (.crt file) has been acquired. Make sure that the file name is `server.crt`.
- The private key (.key file) must be in PEM format. You cannot use DER format.
- The signed public key certificate (.crt file) must be in X509 PEM format. You cannot use X509 DER format.
- The passphrase for the private key (server.key file) must be released.

### Procedure

1. Close all management client sessions on the storage system, including Storage Advisor Embedded, maintenance utility, and Device Manager - Storage Navigator.
2. Open a command prompt window with administrator permissions.
3. In the folder where the .bat file is located, execute the following command:

```
C:\MAPP\wk\Supervisor\MappIniSet>MappApacheCrtUpdate.bat
absolute-path-of-signed-public-key-certification-file absolute-
path-of-private-key-file
```



**Note:**

A space is required between MappApacheCrtUpdate.bat and the signed public key certification file path.

A space is required between the signed public key certification file path and the private key file path.

4. A completion message box displays. Press any key to acknowledge the message and close the message box.
5. Close the command prompt window.

## Notes on updating a signed certificate for the service processor

The following notes provide additional information about updating a signed certificate.

- While the service processor certificate is being updated, tasks that are being run or scheduled to run on Device Manager - Storage Navigator are not executed.
- Certificates for RMI communication are updated asynchronously. The process takes about two minutes.
- If the service processor certificate is updated while Ops Center Administrator or Hitachi Command Suite is being set up, the setup operation will fail.
- Updating the SSL certificate might change the system drastically and may lead to service processor failure. Therefore take sufficient care to consider the content of the certificate and private key to be set.
- After the certificate update is complete, depending on the environment, the service processor can take 30 to 60 minutes to restart.

## Returning the certificate to default

You can return the certificate that was updated by the procedure in [Updating a signed certificate \(on page 61\)](#) back to default.

### Before you begin

- You must have the Storage Administrator (Initial Configuration) role to perform this task.
- You must be logged into the management client.
- A private key (.key file) has been created. Make sure that the file name is `server.key`. See [Creating a private key using the OpenSSL command \(on page 47\)](#).
- The passphrase for the private key (server.key file) is released.
- A signed public key certificate (.crt file) has been acquired. Make sure that the file name is `server.crt`. See [Creating a public key using the OpenSSL command \(on page 47\)](#).
- The private key (.key file) must be in PEM format. You cannot use DER format.
- The signed public key certificate (.crt file) must be in X509 PEM format. You cannot use X509 DER format. See [Obtaining a self-signed certificate \(on page 49\)](#).
- The extended profile fields in the X.509 certificate support the following items as specified in RFC5280:
  - BasicConstraints
  - KeyUsage
  - SubjectKeyIdentifier
  - subjectAltName
- The passphrase for the private key (server.key file) must be released.

## Procedure

1. Close all management client sessions on the storage system, including Storage Advisor Embedded, maintenance utility, and Device Manager - Storage Navigator.
2. Open a command prompt window with administrator permissions.
3. In the folder where the .bat file is located, execute the following command:  

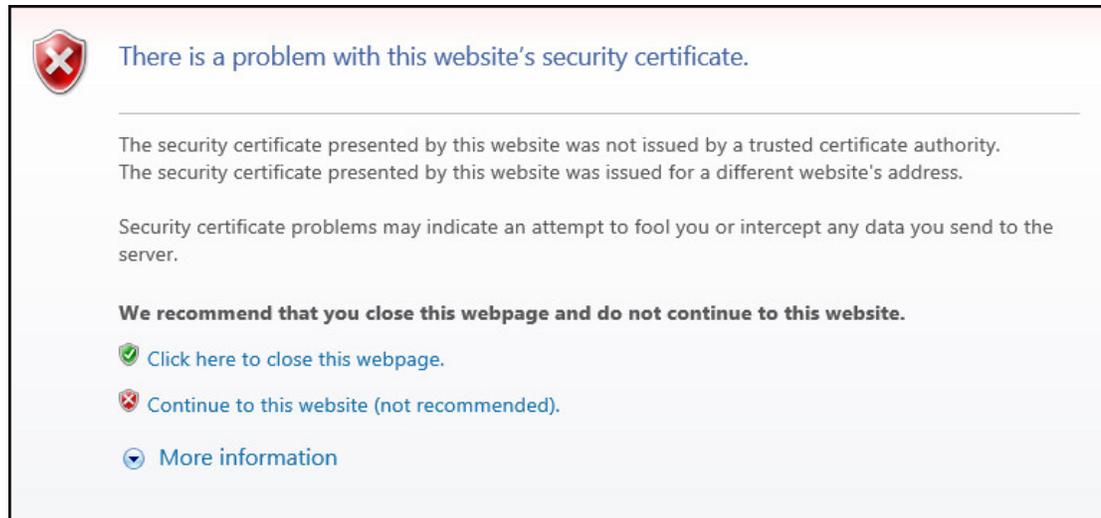
```
C:\MAPP\wk\Supervisor\MappIniSet>MappApacheCrtInit.bat
```
4. A completion message box displays. Press any key to acknowledge the message and close the message box.
5. Close the command prompt window.

## Messages about website security certificates

When the message "There is a problem with this website's security certificate." is displayed, click **Continue to this website (not recommended)**.

When you are using encrypted SSL communications to connect to the storage system, the browser displays a warning message if the security certificate is not issued by a trusted certificate authority. This warning message also appears when the IP address or host name specified in the URL does not match the CN listed in the security certificate.

If this warning message starts to appear after an update of the storage management software, check to see if the SSL certificate returned to the default. If the SSL certificate has returned to the default, install the certificate file that was backed up when the storage management software was updated.



## Updating the certificate files

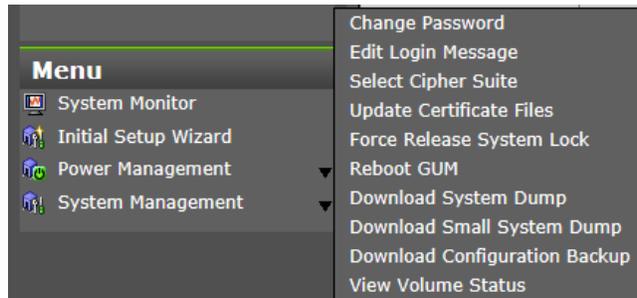
The **Update Certificate Files** window is used to update the certificates that are used for communication between the management client and the storage system.

## Before you begin

- You must have the Storage Administrator (View & Modify) role to complete this procedure.

## Procedure

- In the maintenance utility **Menu** navigation tree, click **System Management**.



- Click **Update Certificate Files**.

 A screenshot of the 'Update Certificate Files' dialog box. The title bar reads 'Update Certificate Files'. Below the title bar, there is a grey instruction box: 'To update the server certificate, select the certificate file, and enter the password. When the settings are complete, verify the entries, and then click [Apply].'. The main area contains two sections. The first section is for the 'Web Server' and is checked with a checkbox. It includes a 'Browse...' button (with 'No file selected.' text), a 'Password:' field, and a 'Re-enter Password:' field. A note '(Max. 128 characters or blank)' is shown below the password fields. The second section is for 'Connect to SVP' and is also checked. It includes a 'Browse...' button (with 'No file selected.' text), a 'Password:' field, and a 'Re-enter Password:' field. A note '(Max. 128 characters or blank)' is shown below the password fields. At the bottom right, there are 'Apply' and 'Cancel' buttons.


**Note:** For storage systems without an SVP, unselect the **Connect to SVP** box.

- To update the certificate file on the management client:
  - Select the **Web Server** checkbox, then click **Browse**.
  - Browse to the certificate file and click **Open**. The **File Upload** window closes and returns you to the **Update Certificate Files** dialog box.
  - In the Web Server **Password:** field, enter the certificate password.
  - Enter the password again in the Web Server **Re-enter Password:** field.



**Note:** For storage systems without an SVP, continue to step 5.

4. To update the certificate file on the SVP:
  - a. Select the **Connect to SVP** checkbox, then click **Browse**.
  - b. Browse to the certificate file and click **Open**. The **File Upload** window closes and returns you to the **Update Certificate Files** dialog box.
  - c. In the Connect to SVP **Password:** field, enter the certificate password.
  - d. Enter the password again in the Connect to SVP **Re-enter Password:** field.
5. Click **Apply** to update the certificates.

## Updating SSL certificates for the SVP and storage system in a batch

If only one storage system is registered in the SVP, you can update the following SSL certificates in a batch:

- Signed certificate for SSL communication between the SVP and the management client
- Certificate for connecting to the SVP
- Certificate for connecting to the web server on the storage system



**Note:** The extended profile fields in the X.509 certificate support the following items as specified in RFC5280:

- BasicConstraints
- KeyUsage
- SubjectKeyIdentifier
- subjectAltName

### Before you begin

- Ensure that only one storage system is registered in the SVP.
- A private key for external communication between the SVP and the management client has been created.
- A signed public key certificate for external communication between the SVP and the management client has been acquired.
- A private key for internal communication for connecting to the SVP or web server and a signed public key certificate must be X509 PEM or X509 DER format.
- All users must be logged out of Hitachi Device Manager - Storage Navigator.
- You must have the Security Administrator (View & Modify) role and Support Personnel (User) role to perform this task.

Create the following parameter file (in JSON format) beforehand. Allowed characters when you specify the path to the certificate in the parameter file are alphanumeric characters, spaces, and symbols: - \_ . \ / :.

- "user": "user-name-of-the-account-registered-in-the-storage-system"
- "password": "password-of-the-account-registered-in-the-storage-system"

- "innerConnectionCertPath": "absolute-path-to-the-public-key-certificate-for-internal-communication"
- "innerPrivateKeyPath": "absolute-path-to-the-private-key-for-internal-communication"
- "outerConnectionCertPath": "absolute-path-to-the-public-key-certificate-for-external-communication"
- "outerPrivateKeyPath": "absolute-path-to-the-private-key-for-external-communication"

```
{
"user": "someuser",
"password": "password123",
"innerConnectionCertPath": "c:\\sslcert\\innercert.crt",
"innerPrivateKeyPath": "c:\\sslcert\\innercert.key",
"outerConnectionCertPath": "c:\\sslcert\\outercert.crt",
"outerPrivateKeyPath": "c:\\sslcert\\outercert.key"
}
```

### Procedure

1. On the SVP, start Windows command prompt as an Administrator.
2. Move the current directory to the directory where the tool exists

```
cd /d C:\Mapp\wk\Supervisor\MappIniSet
```



#### Note:

- C:\Mapp indicates the installation directory of the storage management software and the SVP software. When the installation directory other than C:\Mapp was specified, replace C:\Mapp with the specified installation directory.
- If you specify `--ignore-cert-verification`, the signed certificate for SSL communication between the SVP and the management client is not verified when the certificate is updated. Specify this option immediately after you install HDvM - SN on the SVP or when the certificate has not been normally updated. (You must check the IP address of the GUM on the storage system beforehand.)
- If you specify `--delete`, the parameter file is automatically deleted after the SSL certificate is updated.

3. Run the following command:

```
mapsslcertupdate.bat
--file=name-of-the-parameter-file-created-beforehand
```

4. A message appears indicating that the command finished, and then the GUM restarts automatically.
5. Restart the SVP manually.

## Administering management software certificates

You can set or delete certificates for management software including Hitachi Command Suite and Hitachi Ops Center Administrator that are used to check the server's reliability when SSL communication external authentication is performed.

You cannot register the certificate for both of the HCS and Ops Center Administrator at the same time. Register one of the certificate for the server you are using to manage the storage system.

## Registering management software certificates

To check the server reliability during SSL communication for management software external authentication, upload an public key certificate of the management software to the web server to register the certificate.

### Before you begin

- You must be logged into the SVP.
- The private key file on the management software server must be current. Update it if necessary.
- The certificate file must have a .crt extension. Rename the file if necessary.
- The certificate must be in X509 PEM format or X509 DER format.

### Procedure

1. Close all Device Manager - Storage Navigator sessions on the SVP.
2. Open a command prompt window with administrator permissions.
3. In the folder where the certificate update tool is located, execute the following command:

```
C:\MAPP\wk\Supervisor\MappIniSet>MappHcsCrtEntry.bat absolute-path-of-signed-public-key-certificate-file
```



**Note:** A space is required between MappHcsCrtEntry.bat and the signed public key certification file path.



**Note:** If using Hitachi Ops Center Administrator, execute the same command.

4. A completion message box displays. Press any key to acknowledge the message and close the message box.
5. Close the command prompt window.

## Deleting HCS certificates

You can delete the certificates you registered for the management software. After you delete a certificate, server reliability for that certificate is not checked by SSL communication for management software external authentication.

### Before you begin

- You must be logged into the SVP.
- The private key file on the management software server must be current. Update it if necessary.
- The certificate file must have a .crt extension. Rename the file if necessary.
- The certificate must be in X509 PEM format or X509 DER format.

### Procedure

1. Close all Device Manager - Storage Navigator sessions on the SVP.
2. Open a command prompt window with administrator permissions.
3. In the folder where the certificate update tool is located, execute the following command:

```
C:\MAPP\wk\Supervisor\MappIniSet>MappHcsCrtDelete.bat
```



**Note:** If using Hitachi Ops Center Administrator, execute the same command.

4. A completion message box opens. Press any key to acknowledge the message and close the message box.
5. Close the command prompt window.

## Using HSTS

HSTS (HTTP Strict Transport Security) is a security mechanism used when the Web server communicates with the Web browser using HTTPS.



**Note:** If you enable HSTS, you might not connect to Device Manager - Storage Navigator by using HTTP. If the connection does not work by using HTTP, use HTTPS.

## Enabling HSTS

HTTP Strict Transport Security (HSTS) is a security mechanism that informs web browsers they can communicate with web servers only through secured HTTPS connections. Use the following procedure to enable HSTS.



**Caution:** If you enable HSTS, you might not be able to use HTTP for connection to Device Manager - Storage Navigator. In this case, use HTTPS for connection to Device Manager - Storage Navigator.

### Procedure

1. On the SVP, open a command prompt with administrator permissions.
2. Move the current directory to the folder containing the setting tool.

- Execute the following command:

```
cd /d C:\Mapp\wk\Supervisor\MappIniSet
MappHstsEnable.bat
```



**Note:** C:\Mapp: indicates the installation directory of the storage management software and SVP software. If you specified a different installation directory, replace C:\Mapp with the specified installation directory.

- When prompted, press any key to continue.
- To verify that HSTS is enabled, execute the following command:

```
MappHstsState.bat
```

- If "hsts=on" appears, HSTS is enabled. Press the Enter key, and then go to the next step.
  - If "hsts=off" appears, HSTS is not enabled. Press the Enter key, and then go back to step 3.
  - If a message indicating that the specified file could not be found appears, the HSTS settings failed. Press the Enter key, and then go back to step 3.
- Close the command prompt window.

## Disabling HSTS

To disable HSTS, use the following procedure:

### Procedure

- Open a command prompt with administrator permissions on the SVP.
- Move the current directory to the folder in which the setting tool is located, and then execute the following command:

```
cd /d C:\Mapp\wk\Supervisor\MappIniSet
MappHstsDisable.bat
```



**Note:** C:\Mapp: indicates the installation directory of storage management software and SVP software. If you specified an installation directory other than C:\Mapp, replace C:\Mapp with the specified installation directory.

- When "Press any key to continue ..." appears in the window, press the Enter key.
- To verify that HSTS is disabled, execute the following command:

```
MappHstsState.bat
```



**Note:**

If "hsts=off" appears, HSTS is disabled. Press the Enter key. If "hsts=on" appears, HSTS is not disabled. Press the Enter key, and then go back to step 2.

If the message indicating that the specified file could not be found appears, the HSTS settings failed. Press the Enter key, and then go back to step 2.

5. Close the command prompt window.

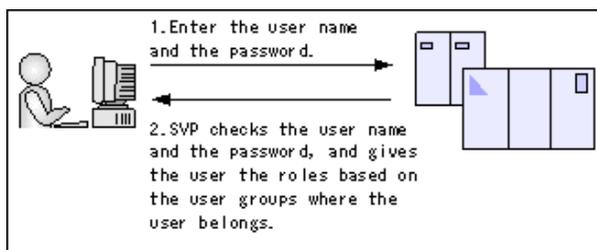
## Chapter 4: User authentication and authorization with Device Manager - Storage Navigator

An authentication server enables users to log in to Device Manager - Storage Navigator with the same password as the password they use for other applications. In addition, an authentication server can be configured to work with an authorization server so that user groups registered in the authorization server can be assigned to Device Manager - Storage Navigator users.

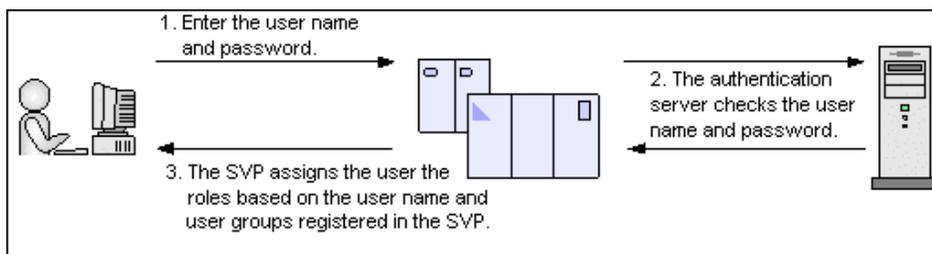
### Setting up authentication and authorization with Device Manager - Storage Navigator

The following figures show the Device Manager - Storage Navigator login workflow without and with an authentication server. The authentication server must be configured for each user.

**Note:** If you use the SVP, enable authentication by the SVP and disable external authentication by the maintenance utility. For instructions, see [Disabling external authentication by the maintenance utility \(on page 90\)](#).



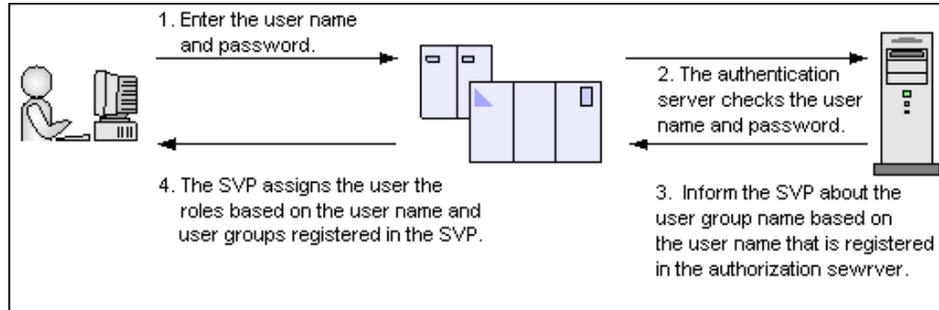
**Figure 1 Logging in without an authentication server**



**Figure 2 Logging in with an authentication server**

The following figure shows the login workflow when an authentication server and an authorization server are used in combination. In this case, the user groups that are registered in the authorization server can be assigned to Device Manager - Storage Navigator users.

**Figure 3 Logging in with an authentication server and an authorization server**



If you register the information of the authentication server as an SRV record in the DNS server, you can use the authentication server without knowing the host names and port numbers. If you register multiple numbers of authentication servers to the SRV record, you can determine the authentication server to be used based on the priority that has been set in advance.

If the affiliated user group registered in the external authentication server and the user group registered locally in the storage system are different, the user group in the storage system has higher priority.

## External authentication requirements using authentication server

Authentication servers support the following protocols:

- LDAPv3 simple bind authentication
- RFC 2865-compliant RADIUS with PAP and CHAP authentication
- Kerberos v5



**Note:** The authentication server needs to support TLS1.2 as a transfer protocol.

The following root certificate file formats to be set on Device Manager - Storage Navigator are available for LDAP server settings:

- X509 DER format
- X509 PEM format



**Note:**

The root certificate to be set on Storage Navigator must satisfy the following requirements:

- The extended profile fields in the X.509 certificate support the following items as specified in RFC5280:
  - BasicConstraints
  - KeyUsage
  - SubjectKeyIdentifier

The certificate to be set on the connected server must satisfy the following requirements:

- The extended profile fields in the X.509 certificate support the following items as specified in RFC5280:
  - BasicConstraints
  - KeyUsage
  - SubjectKeyIdentifier
- The public key of the server certificate must be RSA.

One of the following encryption types must be used for the Kerberos server:

**Windows**

- AES128-CTS-HMAC-SHA1-96
- RC4-HMAC
- DES3-CBC-SHA1
- DES-CBC-CRC
- DES-CBC-MD5

**Solaris or Linux**

- DES-CBC-MD5

## External authorization requirements using authorization server

The authorization server must satisfy the following requirements to work together with the authentication server:



**Note:** Use an operating system that continues to be supported by a vendor. Operations performed using firmware for which vendor support has expired cannot be guaranteed.

### Prerequisite OS

- Windows Server 2008<sup>1, 2</sup>
- Windows Server 2008 R2<sup>1, 2</sup>
- Windows Server 2012 R2



### Note:

1. Microsoft support for this operating system has expired. Use an operating system for which Microsoft continues to provide the support.
2. VSP E series does not support this operating system.

### Prerequisite software

- Active Directory

### Authentication protocol for user for searching

- LDAP v3 simple bind

### Root certificate file format for Device Manager - Storage Navigator

- X509 DER format
- X509 PEM format

### Requirements for root certificate to be set on Storage Navigator

The extended profile fields in the X.509 certificate support the following items as specified in RFC5280:

- BasicConstraints
- KeyUsage
- SubjectKeyIdentifier

### Requirements for certificate to be set on the connected server

The extended profile fields in the X.509 certificate support the following items as specified in RFC5280:

- BasicConstraints
- KeyUsage

- SubjectKeyIdentifier

The public key of the server certificate must be RSA.



**Note:**

- Acquire the root certificate for the authentication server from the authentication server administrator.
- The certificates has an expiration date. If the certificate expires, you will not be able to connect to the authentication server. Make sure to set the expiration date carefully to prepare the certificate.
- For more information about the certificate management, consult with the authentication server administrator and manage it appropriately.



**Note:** When using an LDAP server or a Kerberos server as an authentication server, and combining it with an authorization server, use the same host for the authentication and authorization servers.

When a RADIUS server is used as an authentication server, two authentication servers (one primary and one secondary) can be specified, but only one authorization server can be specified.

## Creating configuration files

Authentication servers and authorization servers must be configured using configuration files.

Configuration files can be created for LDAP, RADIUS, and Kerberos authentication protocols.

### Creating an LDAP configuration file

You can use an LDAP server for authentication on your storage system.

To use an LDAP server for authentication, create a configuration file in UTF-8 encoding. Include information about the authentication server as shown in the following example. Any file name and extension is allowed.



**Caution:** If you save the configuration file when using the Windows standard Notepad application, specify ANSI for the letter code. If you use an editor other than the memo pad and have the YTF-8 BOM setting, specify No BOM then save.

```
auth.server.type=ldap
auth.server.name=<server_name>
auth.group.mapping=<value>
auth.ldap.<server_name>.<attribute>=<value>
```

A full example is shown here:

```
auth.server.type=ldap
auth.server.name=PrimaryServer
auth.group.mapping=true
auth.ldap.PrimaryServer.protocol=ldaps
auth.ldap.PrimaryServer.host=ldaphost.domain.local
auth.ldap.PrimaryServer.port=636
auth.ldap.PrimaryServer.timeout=3
auth.ldap.PrimaryServer.attr=sAMAccountName
auth.ldap.PrimaryServer.searchdn=CN=sample1,CN=Users,DC=domain,DC=local
auth.ldap.PrimaryServer.searchpw=password
auth.ldap.PrimaryServer.basedn=CN=Users,DC=domain,DC=local
auth.ldap.PrimaryServer.retry.interval=1
auth.ldap.PrimaryServer.retry.times=3
auth.ldap.PrimaryServer.domain.name=EXAMPLE.COM
```

The LDAP attributes are defined in the following table.

Attribute	Description	Required / Optional	Default value
auth.server.type	Type of an authentication server. Specify ldap.	Required	None
auth.server.name	<p>The name of an authentication server.</p> <p>When registering a primary and a secondary server, use a comma to separate the names. The name of the server, including the primary name, secondary name, and the comma (1 byte) must be 64 bytes or less.</p> <p>The names can use all ASCII code characters except for the following: \ / : , ; * ? " &lt; &gt;   \$ % &amp; ' ~</p> <p>In this manual, the value specified here is called &lt;server_name&gt; hereafter.</p>	Required	None

Attribute	Description	Required / Optional	Default value
auth.group.mapping	Information about whether to work together with an authorization server: <ul style="list-style-type: none"> <li>▪ true: Works together</li> <li>▪ false: Does not work together</li> </ul>	Optional	False
auth.ldap.<server_name>.protocol	LDAP protocol to use. Specify "ldaps" (Uses LDAP over SSL/TLS). Do not specify "starttls" (Uses StartTLS)	Required	None
auth.ldap.<server_name>.host	A host name, an IPv4 address or an IPv6 address of the LDAP server. An IPv6 address must be enclosed in square brackets. To use StartTLS as a protocol, specify a host name. If this value is specified, auth.ldap.<server_name>.dns_lookup will be ignored	Optional <sup>1</sup>	None
auth.ldap.<server_name>.port	A port number of the LDAP server. Must be between 1 and 65,535. <sup>2</sup>	Optional	389
auth.ldap.<server_name>.timeout	The number of seconds before the connection to the LDAP server times out. It must be between 1 and 30. <sup>2</sup>	Required	10
auth.ldap.<server_name>.attr	Attribute name to identify a user (such as a user ID). <ul style="list-style-type: none"> <li>▪ Hierarchical model: An attribute name where the value that can identify a user is stored</li> <li>▪ Flat model: An attribute name for a user entry's RDN</li> </ul>	Required	None

Attribute	Description	Required / Optional	Default value
	sAMAccountName is used for Active Directory.		
auth.ldap.<server_name>.searchdn	DN of the user for searching. If omitted, [value_of_attr]=[Login_ID], [value_of_basedn] is used for bind authentication. <sup>3</sup>	Optional	None
auth.ldap.<server_name>.searchpw	User password that is used for searching. Specify the same password that is registered in the LDAP server.	Required	None
auth.ldap.<server_name>.basedn	BaseDN for searching for users to authenticate. <sup>3</sup> <ul style="list-style-type: none"> <li>▪ Hierarchical model: DN of hierarchy that includes all the targeted users for searching</li> <li>▪ Flat model: DN of hierarchy that is one level up from the targeted user for searching</li> </ul>	Required	None
auth.ldap.<server_name>.retry.interval	Retry interval in seconds when the connection to the LDAP server fails. Must be between 1 and 5. <sup>2</sup>	Optional	1
auth.ldap.<server_name>.retry.times	Retry times when the connection to the LDAP server fails. Must be between 0 and 3. Zero means no retry. <sup>2</sup>	Optional	3
auth.ldap.<server_name>.domain.name	A domain name that the LDAP server manages.	Required	None
auth.ldap.<server_name>.dns_lookup	Information about whether to search the LDAP server with the information registered in the SRV records in the DNS server.	Optional	False

Attribute	Description	Required / Optional	Default value
	<p>Specify "false" (Searches with the host name and port number).</p> <p>Do not specify "true" (Searches with the information registered in the SRV records in the DNS server).</p>		
<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. The item can be omitted if true is specified for "auth.ldap.&lt;server_name&gt;.dns_lookup".</li> <li>2. If the specified value is not valid, the default value will be used.</li> <li>3. To use symbols such as + ; , &lt; = and &gt; , enter a backslash (\) before each symbol. When using multiple symbols, each symbol must have a backslash before it. For example, to enter abc++ in the searchdn field, use \+ instead of + as shown here: abc\+</li> </ol> <p>To enter \ , / , or " , enter a backslash and then enter the ASCII code in hex for the following symbols:</p> <ul style="list-style-type: none"> <li>▪ Enter \5c for \</li> <li>▪ Enter \2f for /</li> <li>▪ Enter \22 for "</li> </ul> <p>For example, to enter abc\ in the searchdn field, enter abc\5c.</p>			

## Creating a RADIUS configuration file

You can use a RADIUS server for authentication on your storage system.

To use a RADIUS server for authentication, create a configuration file in UTF-8 encoding. Include information about the authentication server as shown in the following example. Any file name and extension is allowed. If an authorization server is not used, you do not need to define the items for it.



**Caution:** If you save the configuration file when using the Windows standard Notepad application, specify ANSI for the letter code. If you use an editor other than the memo pad and have the YTF-8 BOM setting, specify No BOM then save.

```
auth.server.type=radius
auth.server.name=server-name
auth.group.mapping=value
auth.radius.server-name.attribute=value
auth.group.domain-name.attribute=value
```

A full example is shown below:

```

auth.server.type=radius
auth.server.name=PrimaryServer
auth.group.mapping=true
auth.radius.PrimaryServer.protocol=PAP
auth.radius.PrimaryServer.host=example.com
auth.radius.PrimaryServer.port=1812
auth.radius.PrimaryServer.timeout=3
auth.radius.PrimaryServer.secret=secretword
auth.radius.PrimaryServer.retry.times=3
auth.radius.PrimaryServer.domain.name=radius.example.com
auth.group.radius.example.com.protocol=ldaps
auth.group.radius.example.com.host=xxx.xxx.xxx.xxx
auth.group.radius.example.com.port=636
auth.group.radius.example.com.searchdn=CN=sample1,CN=Users,DC=domain,
DC=local
auth.group.radius.example.com.searchpw=password
auth.group.radius.example.com.basedn=CN=Users,DC=domain,DC=local
    
```

The attributes are defined in the following tables.

**Table 3 RADIUS definition (for authentication server)**

Attribute	Description	Required / Optional	Default value
auth.server.type	Type of an authentication server. Specify <i>radius</i> .	Required	None
auth.server.name	<p>The name of a server.</p> <p>When registering a primary and secondary server, use a comma to separate the names. The name of the server, including the primary name, secondary name, and the comma (1 byte) must be 64 bytes or less.</p> <p>The names can use all ASCII code characters except for the following:                      \ / : , ; * ? " &lt; &gt;   \$ % &amp; ' ~</p> <p>In this manual, the value specified here is called <i>server-name</i> hereafter.</p>	Required	None

Attribute	Description	Required / Optional	Default value
auth.group.mapping	Information about whether to work together with an authorization server <ul style="list-style-type: none"> <li>▪ true: Works together</li> <li>▪ false: Does not work together</li> </ul>	Optional	False
auth.radius.server-name.protocol	RADIUS protocol to use. <ul style="list-style-type: none"> <li>▪ PAP: Password authentication protocol that transmits plaintext user ID and password</li> <li>▪ CHAP: Challenge-handshake authentication protocol that transmits encrypted password</li> </ul>	Required	None
auth.radius.server-name.host	A host name, an IPv4 address or an IPv6 address of the RADIUS server. An IPv6 address must be enclosed in square brackets.	Required <sup>1</sup>	None
auth.radius.server-name.port	A port number of the RADIUS server. Must be between 1 and 65,535.	Optional <sup>2</sup>	1,812
auth.radius.server-name.timeout	The number of seconds before the connection to the RADIUS server times out. Must be between 1 and 30.	Optional <sup>2</sup>	10
auth.radius.server-name.secret	RADIUS secret key used for PAP or CHAP authentication	Required	None
auth.radius.server-name.retry.times	Retry times when the connection to the RADIUS server fails. Must be between 0 and 3. 0 means no retry.	Optional <sup>2</sup>	3
auth.radius.server-name.attr.NASIdentifier	Identifier for the RADIUS server to find SVP. Specify this value if the attr.NAS-Identifier attribute is used in your RADIUS environment. ASCII codes up to 253 bytes long are accepted.	Optional	None

Attribute	Description	Required / Optional	Default value
auth.radius.server-name.attr.NAS-IPv4-Address	IPv4 address of the SVP. Specify the value of the NAS-IP-Address attribute. This value is transmitted to the RADIUS server when the authentication is requested.	Optional	None
auth.radius.server-name.attr.NAS-IPv6-Address	IPv6 address of the SVP. Specify the value of the NAS-IPv6-Address attribute. This value is transmitted to the RADIUS server when the authentication is requested.	Optional	None
<b>Notes:</b> <ol style="list-style-type: none"> <li>1. If you query DNS with external authorization, the settings are not required.</li> <li>2. If the specified value is not applicable, the default value will be used.</li> </ol>			

**Table 4 RADIUS definition (for authorization server)**

Attribute	Description	Required / Optional	Default value
auth.radius.server-name.domain.name	A domain name that the LDAP server manages. In this manual, the value specified here is called <i>domain-name</i> hereafter.	Required	None
auth.radius.server-name.dns_lookup	Information about whether to search the LDAP server with the information registered in the SRV records in the DNS server.  Specify "false" (Searches with the host name and port number).  Do not specify "true" (Searches with the information registered in the SRV records in the DNS server).	Optional	false
auth.radius.domain-name.protocol	LDAP protocol to use.  Specify "ldaps" (Uses LDAP over SSL/TLS).  Do not specify "starttls" (Uses StartTLS).	Required	None

Attribute	Description	Required / Optional	Default value
<i>auth.radius.domain-name</i> .host	A host name, an IPv4 address or an IPv6 address of the LDAP server. An IPv6 address must be enclosed in square brackets ([ ]).	Optional <sup>1</sup>	None
<i>auth.radius.domain-name</i> .port	A port number of the LDAP server. Must be between 1 and 65535.	Optional <sup>2</sup>	389
<i>auth.radius.domain-name</i> .searchdn	DN of the user for searching.	Required	None
<i>auth.radius.domain-name</i> .searchpw	User password for searching. Specify the same password that is registered in the LDAP server.	Required	None
<i>auth.radius.domain-name</i> .basedn	Base DN for searching for users to authenticate. Specify DN of the hierarchy, including all the users for searching because the targeted users for searching are in lower hierarchy than the specified DN.	Optional <sup>3</sup>	abbr
<i>auth.radius.domain-name</i> .timeout	The number of seconds before the connection to the LDAP server times out. Must be between 1 and 30.	Optional <sup>2</sup>	10
<i>auth.radius.domain-name</i> .retry.interval	Retry interval in seconds when the connection to the LDAP server fails. Must be between 1 and 5.	Optional	1
<i>auth.radius.domain-name</i> .retry.times	Retry times when the connection to the LDAP server fails. Must be between 0 and 3. 0 means no retry.	Optional <sup>2</sup>	3
<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. The item can be omitted if true is specified for "<i>auth.radius.server-name.dns_lookup</i>".</li> <li>2. If the specified value is not valid, the default value will be used.</li> <li>3. To use symbols such as + ; , &lt; = and &gt; , enter a backslash (\) before each symbol. When using multiple symbols, each symbol must have a backslash before it. For example, to enter abc++ in the searchdn field, use \+ instead of + as shown here: abc\+\+</li> </ol>			

Attribute	Description	Required / Optional	Default value
	<p>To enter \, /, or ", enter a backslash and then the ASCII code in hex for these symbols.</p> <ul style="list-style-type: none"> <li>▪ Enter \5c for \.</li> <li>▪ Enter \2f for /.</li> <li>▪ Enter \22 for "</li> </ul> <p>For example, to enter abc\ in the searchdn field, enter abc\5c.</p>		

## Creating a Kerberos configuration file

You can use a Kerberos server for authentication on your storage system.

To use a Kerberos server for authentication, create a configuration file in UTF-8 encoding. Include information about the authentication server as shown in the following example. Any file name and extension are allowed. If an authorization server is not used, you do not need to define the items for it.



**Caution:** If you save the configuration file when using the Windows standard Notepad application, specify ANSI for the letter code. If you use an editor other than the memo pad and have the YTF-8 BOM setting, specify No BOM then save.

```
auth.server.type=kerberos
auth.group.mapping=<value>
auth.kerberos.<attribute>=<value>
auth.group.<realm name>.<attribute>=<value>
```

A full example is shown below:

```
auth.server.type=kerberos
auth.group.mapping=true
auth.kerberos.default_realm=example.com
auth.kerberos.dns_lookup_kdc=true
auth.kerberos.clockskew=300
auth.kerberos.timeout=10
auth.group.example.com.protocol=ldaps
auth.group.example.com.port=636
auth.group.example.com.searchdn=CN=sample1,CN=Users,DC=domain,DC=local
auth.group.example.com.searchpw=password
auth.group.example.com.basedn=CN=Users,DC=domain,DC=local
```

The Kerberos attributes are defined in the following table.

**Table 5 Kerberos definition (for authentication server)**

Attribute	Description	Required / Optional	Default value
auth.server.type	Type of an authentication server. Specify <code>kerberos</code> .	Required	None
auth.group.mapping	Information about whether to work together with an authorization server <ul style="list-style-type: none"> <li>▪ true: Works together</li> <li>▪ false: Does not work together</li> </ul>	Optional	false
auth.kerberos.default_realm	Default realm name	Required	None
auth.kerberos.dns_lookup.kdc	This is a switch that determines which information registered in the SRV records in the DNS server to use when searching the Kerberos server.  Specify "false" (Searches with the host name and port number).  Do not specify "true" (Searches with the information registered in the SRV records in the DNS server).	Optional	false
auth.kerberos.clock_skew	The acceptable range of the difference in time between the SVP and the Kerberos server where the SVP is operating.  Must be between 0 and 300 seconds.	Optional <sup>1</sup>	300
auth.kerberos.time_out	The number of seconds before the connection to the RADIUS server times out. Must be between 1 and 30. When 0 is specified, the connection does not time out until a communication error occurs.	Optional <sup>1</sup>	10

Attribute	Description	Required / Optional	Default value
auth.kerberos.realm_name	Realm identifier name Any name to distinguish the information of Kerberos server in each realm. Duplicate names cannot be used. If you register multiple names, use a comma to separate the names. The value specified here is called <realm_name> hereafter.	Optional <sup>2</sup>	None
auth.kerberos.<realm_name>.realm	The realm name set to the Kerberos server.	Optional <sup>2</sup>	None
auth.kerberos.<realm_name>.kdc	The host name, the IPv4 address, and the port number of the Kerberos server. Specify these in the format of "<Host name or IP address>[:Port number]".	Optional <sup>2</sup>	None
<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. If the specified value is not valid, the default value will be used.</li> <li>2. The item can be omitted if true is specified for auth.kerberos.dns_lookup_kdc.</li> </ol>			

**Table 6 Kerberos definition (for authorization server)**

Attribute	Description	Required / Optional	Default value
auth.group.<realm_name>.protocol	LDAP protocol to use. Specify "ldaps" (Uses LDAP over SSL/TLS). Do not specify "starttls" (Uses StartTLS).	Required	None
auth.group.<realm_name>.port	A port number of the LDAP server. Must be between 1 and 65535.	Optional <sup>1</sup>	389
auth.group.<realm_name>.searchdn	DN of the user for searching.	Required <sup>2</sup>	None

Attribute	Description	Required / Optional	Default value
auth.group.<realm_name>.searchpw	Password of the user for searching. Specify the same password that is registered in the LDAP server.	Required	None
auth.group.<realm_name>.basedn	BaseDN when the search for users begins. When searching, specify the hierarchy DN, including all the users, because the targeted user for the search is in a lower hierarchy than the specified DN.	Optional <sup>2</sup>	abbr
auth.group.<realm_name>.timeout	Number of seconds before the connection to the LDAP server times out. Must be between 1 and 30 seconds. When 0 is specified, the connection does not time out until a communication error occurs.	Optional <sup>1</sup>	10
auth.group.<realm_name>.retry.interval	Retry interval in seconds when the connection to the LDAP server fails. Must be between 1 and 5.	Optional <sup>1</sup>	1
auth.group.<realm_name>.retry.times	Retry times when the connection to the LDAP server fails. Must be between 0 and 3. 0 means no retry.	Optional <sup>1</sup>	3

Attribute	Description	Required / Optional	Default value
<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. If the specified value is not valid, the default value will be used.</li> <li>2. To use symbols such as + ; , &lt; = and &gt; , enter a backslash (\) before each symbol. When using multiple symbols, each symbol must have a backslash before it. For example, to enter abc++ in the searchdn field, use \+ instead of + as shown here: abc\+\+</li> </ol> <p>To enter \ , / , or " , enter a backslash and then the ASCII code in hex for these symbols.</p> <ul style="list-style-type: none"> <li>▪ Enter \5c for \</li> <li>▪ Enter \2f for /</li> <li>▪ Enter \22 for "</li> </ul> <p>For example, to enter abc\ in the searchdn field, enter abc\5c.</p>			

## Connecting two authentication servers

Two authentication servers can be connected to a storage system. When the servers are connected, the server configurations must be the same, except for the IP address and the port.

If you search for a server using information registered in the SRV records in the DNS server, confirm that the following conditions are satisfied:



**Note:** For RADIUS servers, you cannot use the SRV records.

### LDAP server conditions:

- The environmental setting for the DNS server is completed at the LDAP server.
- The host name, the port number, and the domain name of the LDAP server are registered in the DNS server.

### Kerberos server conditions:

- The host name, the port number, and the domain name of the Kerberos server are registered in the DNS server.

Because UDP/IP is used to access the RADIUS server, no encrypted communications are available, such as negotiations between processes. To access the RADIUS server in a secure environment, encryption in the packet level is required, such as IPsec.

## Connecting authentication and authorization servers

To use an authentication server and an authorization server, you must create configuration files and configure your network. Detailed setting information is required for the authentication server and the authorization server, especially for creating a configuration file.

### Before you begin

- Contact your server administrator for information about the values to be written in the LDAP, RADIUS, or Kerberos configuration file. If you use LDAP servers, obtain certification for the LDAP server files.
- Contact your network administrator for information about the network settings.

### Procedure

1. Create a configuration file. The items to specify depend on the protocol you use.
2. Log in to the SVP and store the following files in an easily accessible location.
  - Certificate (for secure communication)
  - Configuration file
3. Open the Windows command prompt on the SVP.
4. In the folder where the .bat file is located, execute the following command specifying the configuration file path and the certificate file path:

```
C:\MAPP\wk\Supervisor\MappIniSet>MappSetExAuthConf "C:\auth\auth.properties" "C:\auth\auth.cer"
```

After you complete the settings and verify that you can use the authentication and authorization servers, back up the connection settings for the authentication server.

If the authentication server and the authorization server are unusable even after you make the settings, the network or the configuration file settings might have a problem. Contact the server administrator or the network administrator.

5. When a message appears asking if you want to delete the specified configuration file and certificate file, press **y** to delete the files.

If you do not delete these files now when prompted, delete them manually.

## Disabling external authentication by the maintenance utility

If you use the SVP, enable authentication by the SVP, and also disable external authentication by the maintenance utility.

Use the following procedure to disable external authentication server by the maintenance utility.

### **Procedure**

1. Log in to the maintenance utility.
2. Click **Administration > External Authentication > Set Up Server > Disable**.
3. When the confirmation window appears, click **Apply**.
4. When the completion message appears, click **Close**.

---

## Chapter 5: Configuring the storage system

When configuring the storage system, you must set storage system information, set up the network connection, and register the SVP if using one.

### Setting storage system information

You can set the name, contact information, and location of the storage system.



**Caution:** When changing a setting more than once, ensure that the current setting is complete before changing it again. Otherwise, only the new change will be applied, and the result might be different from what you expected.

#### Before you begin

- You must have the Storage Administrator (Initial Configuration) role to complete this procedure.

#### Procedure

1. In the Device Manager - Storage Navigator **Storage Systems** tree, select the storage system.
2. From **Settings**, click **Environmental Settings** > **Edit Storage System**.
3. Enter the items that you want to set.  
You can enter up to 180 alphanumeric characters (ASCII codes) excluding several symbols (\, / ; : \* ? " < > | & % ^). Do not use a space at the beginning or the end.
4. Click **Finish**.
5. In the **Confirm** window, check the settings and enter a task name in **Task Name**.
6. Click **Apply**. The task is now registered. If the **Go to tasks window for status** check box is checked, the **Tasks** window opens to show the status of the task.

### Changing the date and time

You can change the date and time for the controller clock and the SVP clock.

#### Changing the controller clock settings

Complete the following steps to change the date and time on the storage system controller.



**Caution:** If you change the system date and time when the currently set system date and time is after the real time, the configuration information might not be backed up. To prevent this from happening, move the existing backup file to another folder.

### Before you begin

- You must have the Storage Administrator (View & Modify) role to perform this task.

### Procedure

1. In the maintenance utility **Administration** tree, select **Date & Time**.  
The current settings are displayed.
2. Click **Set Up**.
3. Change the settings as needed, and either click **Apply** to save them, or click **Cancel** to close the window without saving the changes.

## Changing the SVP clock and time zone settings

If your configuration includes SVP for the external management server, you need to ensure that the clock and the time zone settings on the SVP matches those of the controller clock.

### Before you begin

Complete the following steps to change the Windows 8.1 date and time on the SVP

- The management console is connected to the LAN 2 port on the SVP.
- The console has established a remote desktop connection with the SVP. Note that the connection cannot be established when you use Remote Desktop Session Host.
- The management utility window is displayed on the console.
- Storage systems are not registered in the Storage Device List.
- If storage systems are registered in the Storage Device List, before changing the SVP clock settings, click Stop Service for all registered storage systems in the Storage Device List window.

### Procedure

1. Log in to the management console that is connected to the SVP.
2. On the Windows 8.1 desktop, click **Start > Control Panel**.
3. Click **Clock, Language, and Region**.
4. Click **Date and Time**.
5. Click **Change date and time**. The Date and Time Settings window opens.
6. Set the date and time, then click **OK** to save the settings.
7. Click **Change time zone**. The Time Zone Settings windows opens.
8. Select the time zone, then click **OK**.



**Note:** If you do not restart the background service, time zone changing is not reflected. So time zone remain the different settings between SVP and storage system and this state cause any fails.

## Changing network communication settings

This procedure explains how to configure a management client to use IPv6 for communication with an SVP.

### Procedure

1. In the maintenance utility, click **Administration** to expand the **Administration** navigation pane.
2. Click **Network Settings**.  
The **Network Settings** window displays the current network settings and permissions.
3. In the **Network Settings** window, click **Set Up Network Settings**.  
The **Network Settings** dialog box displays the current settings for the Mac address, IPv4 and IPv6 settings, and the network connection mode for both controllers 1 and 2. It also displays the current settings for the maintenance port and the storage system internal network.
4. Change the settings as needed and click **Apply**.

The dialog box closes and returns you to the **Network Settings** window.



**Note:** If you set items for DNS server, register the following items to the DNS server:

- host name: localhost
- IP address: 127.0.0.1

## Changing network permissions

This procedure explains how to block or allow HTTP blocking.

### Procedure

1. In the maintenance utility, click **Administration** to expand the **Administration** navigation pane.
2. Click **Network Settings**. The **Network Settings** window displays the current network settings and permissions.
3. In the **Network Settings** window, click **Set Up Network Permissions**.
4. To enable HTTP blocking, click **Enable**. To disable HTTP blocking, click **Disable**.
5. Click **Apply**. The dialog box closes and returns you to the **Network Settings** window.

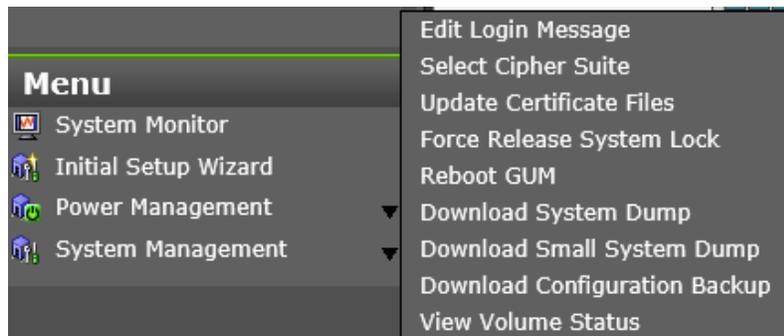
## Creating a login message

### Before you begin

You must have the Storage Administrator (View & Modify) role to complete this procedure.

### Procedure

1. In the maintenance utility **Menu** navigation tree, click **System Management**.



2. Click **Edit Login Message**.
3. Enter a message to be displayed at the time of login. The message can contain up to 2,048 characters. A line break is counted as one character.
4. Click **Apply** to save the message and close the dialog box.

## Using the SMI-S function on the HDvM - SN management client

The VSP E990 (SVP firmware version 93-02-00 or later), VSP Gx00 models, and VSP Fx00 models support the SMI-S function developed by SNIA. Administrators can use the SMI-S function by using SMI-S compliant management software on the HDvM - SN management client. (The SMI-S function applies only to storage systems with an SVP.)

For VSP E990 (SVP version 93-02-00 or later) and VSP Gx00 models and VSP Fx00 models (SVP version 88-03-01 or later), use TLS 1.2.



**Note:** If the SMI-S certificate is expired, upload a new signed certificate to the SMI-S provider.

## Using the SMI-S function

To use the SMI-S function, create a Device Manager - Storage Navigator user account and specify a storage system as the access destination from the management software.

## Procedure

1. Create a Device Manager - Storage Navigator user account in the management software. The user account must belong to one of the following built-in user groups:
  - Storage Administrator (Initial Configuration)
  - Storage Administrator (System Resource Management)
  - Storage Administrator (Provisioning)
  - Storage Administrator (Performance Management)
  - Storage Administrator (Local Copy)

When the user accesses the SMI-S function with the read-only access authority, the user account must belong to one of the following built-in user groups:

- Storage Administrator (Remote Copy)
2. In the management software program, enter the following storage system information:
    - **IP Address** of the SVP
    - **Protocol**: specify **HTTPS**
    - **Port**: **5989**



**Note:** The allocation method of the port numbers to be used varies depending on the SVP software versions.

- **Namespace**: **root/hitachi/smis** or **interop**

## Uploading an SMI-S provider configuration file

You can control the SMI-S function using the SMI-S provider configuration file that you create.

### Before you begin

- Ensure that the SMI-S provider configuration file has already been created. If the configuration is not already named array-setting-01.properties, rename it to that name.
- You must have the Storage Administrator (View & Modify) role to perform this task.
- A private key (.key file) has been created. Make sure that the file name is server.key.
- A signed public key certificate (.crt file) has been acquired. Make sure that the file name is server.crt.
- The signed public key certificate (.crt file) must be in X509 PEM format. You cannot use X509 DER format.

- The extended profile fields in the X.509 certificate support the following items as specified in RFC5280:
  - BasicConstraints
  - KeyUsage
  - SubjectKeyIdentifier
  - subjectAltName
- If an intermediate certificate exists, prepare a signed public key certificate (server.crt file) that has a certificate chain that includes the intermediate certificate.
- The number of tiers of the certificate chain for the certificate to be uploaded must be 5 tiers or less including the root CA certificate.
- The public key encryption method for the certificate to be uploaded must be RSA.
- The passphrase for the private key (server.key file) is released.
- SMI-S provider service has been stopped.



**Note:** If the ResourceGroup parameter is set, theVVolForSnapshot parameter and the PoolIDForSnapshot parameter are not valid.

### Procedure

1. On the SVP, start Windows command prompt as an Administrator.
2. Move the current directory to the directory where the tool MappSmisConfUpload.bat exists. Execute the following command:

```
cd /d C:\Mapp\wk\Supervisor\MappIniSet
MappSmisConfUpload.bat serial-number-of-storage-system absolute-path-
of-SMI-S-provider-configuration-file
```



**Note:** C:\MAPP indicates the installation directory of the storage management software and the SVP software. When the installation directory other than C:\Mapp was specified, replace C:\Mapp with the specified installation directory.

3. The completion message appears. Press any key to continue.
4. Close the command prompt.



**Note:** To reflect the update of the certificate, you need to start the SMI-S provider service.

## Returning an SMI-S provider configuration file to default

You can return a configuration file uploaded to the SMI-S provider to default.

### Before you begin

- You must have the Storage Administrator (View & Modify) role to perform this task.
- SMI-S provider service has been stopped.

## Procedure

1. On the SVP, start Windows command prompt as an Administrator.
2. Move the current directory to the directory where the tool `MappSmisConfInit.bat` exists. Execute the following command:

```
cd /d C:\Mapp\wk\Supervisor\MappIniSet
MappSmisConfInit.bat serial-number-of-storage-system
```



**Note:** `C:\MAPP` indicates the installation directory of the storage management software and the SVP software. When the installation directory other than `C:\Mapp` was specified, replace `C:\Mapp` with the specified installation directory.

3. The completion message appears. Press any key to continue.
4. Close the command prompt.



**Note:** To reflect the update of the certificate, you need to start the SMI-S provider service.

## Sending SMI-S artificial indication

You can send an SMI-S artificial indication to determine whether the communication between the listeners and the SMI-S provider succeeds or fails.

### Before you begin

- SMI-S Provider software application must be installed.
- The network environment is configured so that the computer on which the listener application operates is connected to the SVP.
- The listeners are subscribed to the SMI-S provider.
- The user specified for the parameter must have the following roles:
  - Storage Administrator (Initial Configuration)
  - Storage Administrator (System Resource Management)
  - Storage Administrator (Provisioning)
  - Storage Administrator (Performance Management)
  - Storage Administrator (Local Copy)
  - Storage Administrator (Remote Copy)
- The services of the SMI-S provider should be running.

### Procedure

1. On the SVP, start Windows command prompt as an Administrator.

2. Move the current directory to the directory where the tool `MappSmisArtificialIndicate.bat` exists. Execute the following command:

```
cd /d C:\Mapp\wk\Supervisor\MappIniSet
MappSmisArtificialIndicate.bat serial-number-of-storage-system
username password
```



**Note:** `C:\MAPP` indicates the installation directory of the storage management software and the SVP software. When the installation directory other than `C:\Mapp` was specified, replace `C:\Mapp` with the specified installation directory.

3. The SMI-S artificial indication result message appears. Press any key to continue.
4. Close the command prompt.

## SMI-S provider startup setting

You can enable or disable the service by performing the SMI-S provider startup setting.



**Note:** If the service is set to disable by the startup setting, the SMI-S function cannot be used because the service does not start.

### Before you begin

- The SVP software version is 88-03-01-xx/00 or later.
- SMI-S provider service has been stopped.

### Procedure

1. On the SVP, start Windows command prompt as an Administrator.
2. Execute the following command:

```
C:\Mapp\wk\Supervisor\SMI\SetServiceStartupType.bat Serial-number-of-storage-system Startup-type
```

Specify **enable** or **disable** for *Startup-type*.



**Note:** `C:\MAPP` indicates the installation directory of the storage management software and the SVP software. When the installation directory other than `C:\Mapp` was specified, replace `C:\Mapp` with the specified installation directory.

3. The completion message appears. Press any key to continue.
4. Close the command prompt.



**Note:** The startup setting is reflected after starting the service in each storage system next time.

## Configuring audit logs

The audit log files contain records of the operations performed on the storage system, including the user who performed the operation and the date and time, as well as the storage system behaviors resulting from the operations. For storage systems with an SVP, the audit log files are stored in the SVP or in the storage system depending on the type of log. For storage systems without an SVP, the audit log files are stored in the storage system. To access the collected log files, you must configure the storage system to transfer the log files to the syslog server and export an audit log file before you can view an audit log for the storage system.

### Setting up a syslog server

Use the following procedure to set up a syslog server for your storage system.

#### Before you begin

- You must have the Audit Log Administrator (View & Modify) role to perform this task.

#### Procedure

1. In the maintenance utility, expand the **Administration** tree, and then select **Audit Log Settings**.
2. Click **Set Up Syslog Server**.
3. In the **Set Up Syslog Server for Audit Logs** window:
  - a. Select the desired **Transfer Protocol**.
  - b. Enable or disable the **Primary Server**.
  - c. Enable or disable the **Secondary Server**.
  - d. Enter the **Location Identification Name**.
  - e. Enable or disable the **Retry**. If enabled, enter the desired retry interval.
  - f. Enable or disable the **Output Detailed Information**.
4. When are finished specifying the syslog server settings, click **Apply** to save the settings and close the window.

### Exporting audit log files overview

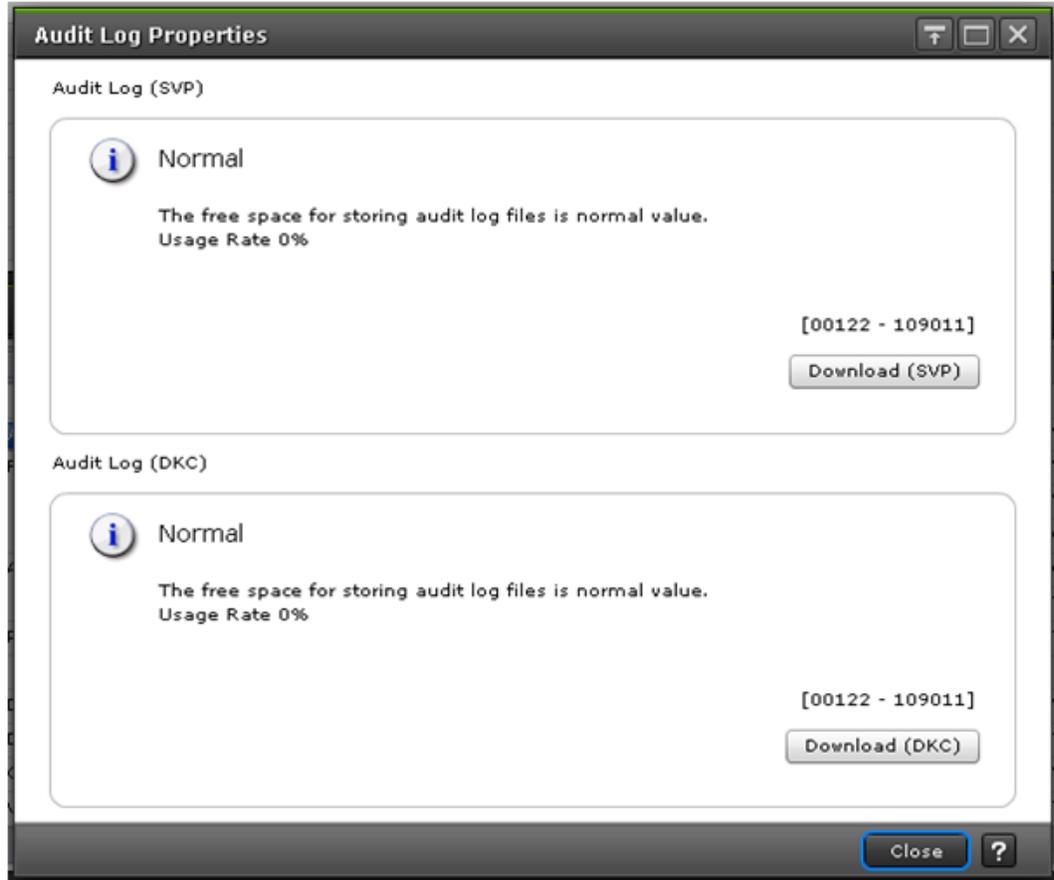
You can export audit log files stored in the management client using Hitachi Device Manager - Storage Navigator or files stored in the storage system using the maintenance utility.

#### Exporting audit log files stored in the management client

##### Procedure

1. In the main window, click **Audit Log** on the menu bar.  
The icons on the menu bar show the accumulated status of the audit log files.

- From the **Audit Log Properties** window, click **Download (SVP)** to export logs operated by the Device Manager - Storage Navigator client computer (SVP window). Click **Download (DKC)** to export commands sent from a host or computers using CCI or logs of events on encryption keys. The preparation message appears.



Item	Description
Usage Rate	Indicates how much of storage capacity of the non-transfer audit logs is used in comparison to the maximum storage capacity.
Download (SVP)	Audit logs of the following contents or type are exported: <ul style="list-style-type: none"> <li>Operation set by the client PC</li> <li>Operation logs of encryption keys for encrypting stored data</li> <li>Execution logs of Remote Maintenance API</li> </ul>

- Click **OK**.  
A window opens where you can specify the export destination.

4. Specify the export destination and file name, and then click **Save**.
5. Click **Close**.

## Exporting audit log files stored in the storage system

You can export audit logs from either the controller or the GUM located on the controller.

The storage system has two controllers, so to get audit logs for the complete system, you must log-in to the maintenance utility on each controller to export the audit log individually.

### Before you begin

You must have the Audit Log Administrator (View Only) role to perform this task.

### Procedure

1. In the maintenance utility under Administration menu, select **Audit Log Settings**.
2. Click **Export Audit Log** in the **Audit Log Settings** window to select **GUM** or **DKC**.
3. Click **OK**.



**Note:** The security confirmation window is displayed. If the certificate is invalid at the time of the connection, the security confirmation window is displayed. If the security confirmation window is displayed, select **Continue to this website (not recommended)**.

4. Save the file to the folder containing audit logs.



**Note:** If you change the location identification name of a syslog server, the location identification name on new audit logs could be changed retroactively.



**Note:** If you change the UTC time zone setting of the storage system, the times recorded on new audit logs could be changed retroactively.

## Send test message to syslog server

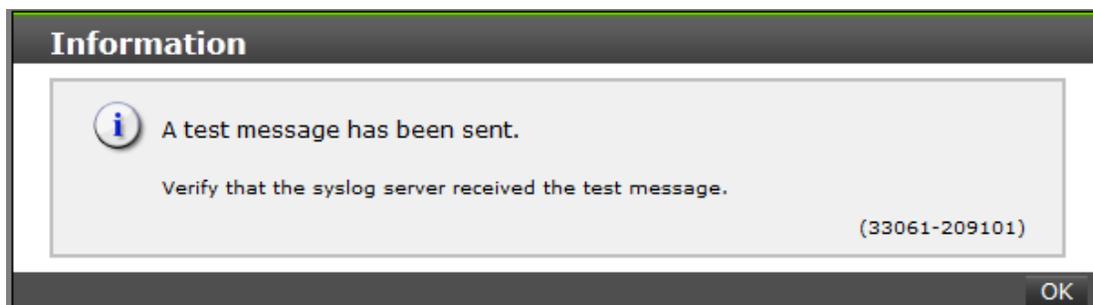
Use the following procedure to send a test audit log message to the syslog server.

### Before you begin

You must have the Audit Log Administrator (View Only) role to perform this task.

### Procedure

1. In the maintenance usage **Administration** tree, select **Audit Log Settings**.
2. Click **Send Test Message to Syslog Server**. The following message box opens:



3. Click **OK** to close the message box. Check the syslog server messages and verify that the test message was received and is on the server.

## Backing up and restoring the HDvM - SN configuration files

The HDvM - SN configuration files for your storage system are stored on the SVP. You can maintain a current backup of your HDvM - SN configuration files, and then if the SVP needs to be replaced, you can restore the backed up HDvM - SN configuration files onto the new SVP.

### Backing up HDvM - SN configuration files

Before replacing an SVP, you must make a backup copy of the Device Manager - Storage Navigator configuration files on the SVP. You can then use the backup copy to restore the configuration file if it becomes necessary, or to configure a replacement SVP if one fails.

The following configuration items can be backed up and restored. Before you create the backup, ensure that the settings are correct.

- Device Manager - Storage Navigator environment parameters
- Authentication server connection settings
- Key management server connection settings
- Display settings (table width) for each Device Manager - Storage Navigator user
- Device Manager - Storage Navigator login warning messages
- Device Manager - Storage Navigator task information
- SMI-S application settings
- SSL certification for HTTPS/SMI-S/RMI

#### Before you begin

- You must have the Storage Administrator (Initial Configuration) role to perform this task.
- You must be logged into the SVP.

#### Procedure

1. Stop all services running on the storage system.

2. Open a command prompt window with administrator permissions.
3. In the folder where the .bat file is located, execute the following command:  

```
C:\MAPP\wk\Supervisor\MappIniSet>MappBackup.bat absolute-path-of-backup-file
```

**Note:**

- The backup file must be in .tgz format.
- A space is required between .bat file and the path to the backup file.

4. A completion message displays. Click any key to continue.
5. Close the command prompt window.

**Tip:**

- If you do not specify a folder in which to save the file, the system automatically creates a default file in the following location:

```
SVP-root\wk\Supervisor\MappIniset  

\LogsyymmddHHmms.tgz
```

where *yyyyMMddHHmms* is the year, month, date, and time that the file was created.

- The backup file is compressed and uses the .tgz format. Use a tool that supports tar and gzip to extract the data from the .tgz file.

6. Save the backup file to another computer or external memory device such as a USB flash memory or hard drive.

## Restoring HDvM - SN configuration files

You can use a saved copy of a configuration file to restore the active configuration file if it becomes necessary, or to configure a replacement SVP if one fails.

### Before you begin

- The storage systems registered in the SVP you backed up are registered in a new SVP.
- The services on the storage system are stopped.
- The SVP is configured so that the service does not start automatically when starting the system.

### Procedure

1. Copy the backup file to any folder in the SVP.
2. Open a command prompt window with administrator permissions.
3. In the folder where the .bat file is located, enter

```
C:\MAPP\wk\Supervisor\MappIniSet>MappRestore.bat absolute-path-of-backup-file
```

**Note:**

- The backup file must be in .tgz format.
- A space is required between `MappRestore.bat` and the path to the backup file.

4. A completion message displays.
5. Type a key to close the message, and then close the command prompt.
6. Reassign a port number for each storage system registered in the Storage Device List.
7. Reboot the SVP. It takes about 10 minutes to complete the startup process.

**Caution:**

If you restore the configuration files from a backup that was created on the SVP with a different firmware version as listed in the following table, the services on the storage system will not work correctly after the restore operation is complete:

SVP firmware version on which a backup is created	SVP firmware version on the backup is restored
93-02-03-xx/00 or later	Earlier than 93-02-02-xx/00
88-06-03-xx/00 or later	Earlier than 88-06-02-xx/00

You must perform either of the following operations after the restore operation is complete:

- Update the signed certificate for the SSL communication between the SVP and the management client.
- Return the certificate for the SSL communication between the SVP and the management client to default.

## Preventing errors while using virus detection programs on the SVP

Running virus detecting programs on an SVP\* that has Device Manager - Storage Navigator installed might cause operation errors while using Device Manager - Storage Navigator.

To prevent errors caused by virus detection programs, exclude the Device Manager - Storage Navigator installation directory from the real-time virus scan target in your virus detection program.

**Note:** C:\MAPP indicates the installation directory of the storage management software and the SVP software. When the installation directory other than C:\Mapp was specified, replace C:\Mapp with the specified installation directory.

Perform virus scans regularly on the excluded directory during periods when Device Manager - Storage Navigator is not in use or when the service stops.

**Note:** \*Including standard virus detection programs installed on the operating system such as Windows Defender.

## Forcing the system lock to release

When performing configuration and maintenance operations, the storage system might automatically lock itself and release the system when the operations are completed. If the storage system does not unlock itself, you can unlock the system using Force Release System Lock in the maintenance utility.

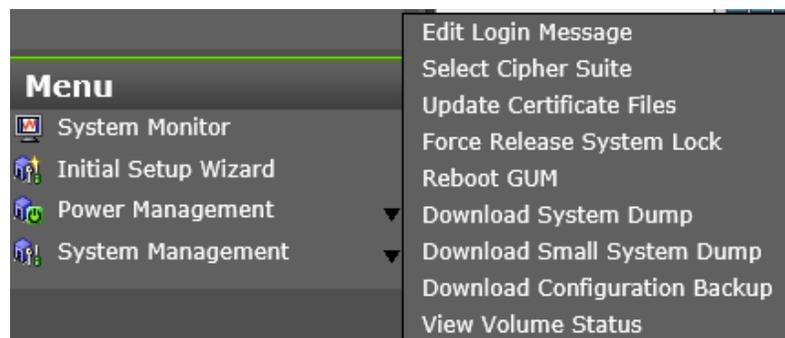
**Caution:** Before using this feature, ensure that releasing the system lock will not cause system problems due to processes that are currently running. Releasing the system lock can terminate a process before it completes and possibly leave the system in an unknown state. Check with any users that are logged on. Wait until their processes are complete before releasing the system lock.

### Before you begin

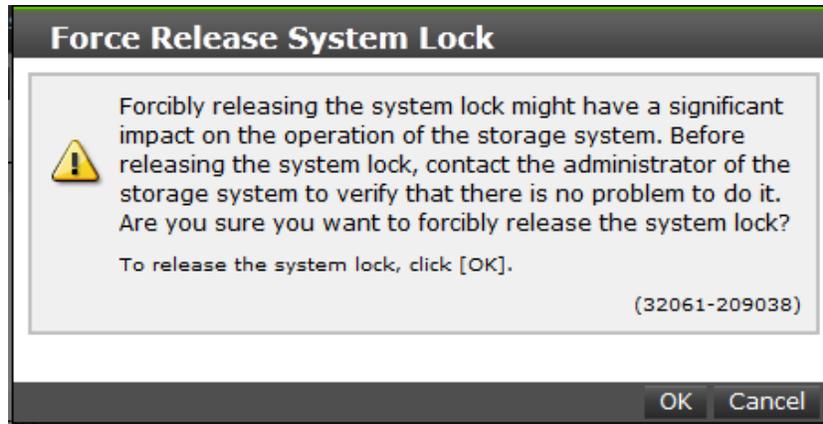
You must have the Storage Administrator (View & Modify) role to complete this procedure.

### Procedure

1. In the maintenance utility **Menu** navigation tree, click **System Management**.



2. Click **Force Release System Lock**.
3. A warning message is displayed. Verify that releasing the lock will not cause data loss or other problems. To release the system lock, click **OK**. Click **Cancel** to close the dialog box without releasing the system lock.



---

## Chapter 6: Managing users and user groups

You can create and modify users by assigning them roles, permissions, and groups using Storage Navigator or the maintenance utility.

### User administration overview

Device Manager - Storage Navigator provides a rich set of user administration, roles and permissions, and access control features. Administrators can manage users by groups and set up access control by defining who can access what storage resources .

The storage system also provides some basic user management capabilities, such as create, modify, and delete users without using SVP or Device Manager - Storage Navigator. For more information, see [Managing users using the maintenance utility \(on page 123\)](#) .

You can create and manage users locally or configure Device Manager - Storage Navigator to authenticate storage users with an existing authentication server, such as LDAP. For more information, see [Setting up authentication and authorization with Device Manager - Storage Navigator \(on page 72\)](#) .



**Note:** If you don't create user accounts in the maintenance utility, use the authentication server to allocate user groups to users by configuring the same user group name between the storage system and the authentication server. If you create user accounts in the maintenance utility, users can be authenticated by the authentication server, but user groups are allocated to users based on the configuration in the maintenance utility.

### User groups

Hitachi Storage Navigator provides several built-in user groups with predefined permissions based on the available roles. You can use these groups to begin managing user permissions and access control immediately. Or you can create your own user groups tailored to meet your unique requirements.

Consider the following when setting up user groups:

- When a user is assigned to multiple user groups, the user has the permissions of all the roles in each user group that are enabled on the resource groups assigned to each user group.
- You can create two user accounts that are used by the same user playing two roles. For example, you can create user\_1 and user\_2 that are used by the same person, but user\_1 is a security administrator that has access to all resource groups and user\_2 is a storage administrator that has access to only one of the resource groups.

- All user groups, except for the Storage Administrator groups, have access to all resources in the storage systems (All Resource Groups Assigned is automatically set to Yes).
- If you deleted all the roles except the Storage Administrator, you will need to add all required resource groups to the user group because the Storage Administrator role does not have access to all resources by default. See [Changing assigned resource groups \(on page 116\)](#).
- All user groups must have resource groups assigned in order to perform operations on the storage system.

## Roles and permissions

The following table lists all of the available user roles and shows the permissions that each role provides to the users. Custom user roles are not supported.

The roles for Hitachi Storage Advisor Embedded users are:

- Storage Administrator (Initial Configuration)
- Storage Administrator (Provisioning)
- Storage Administrator (Local Backup Management)
- Security Administrator (View and Modify)
- (VSP E series) Maintenance (User)



**Note:** The Support Personnel group and the Support Personnel (Vendor Only) role contain permissions to perform maintenance. Assign this role only to the accounts used by support personnel from vendors responsible for maintenance.

Role	Permissions
Security Administrator (View Only)	<ul style="list-style-type: none"> <li>▪ Viewing information about user accounts and encryption settings</li> <li>▪ Viewing information about the encryption key in the key SVP</li> <li>▪ Viewing information about the external authentication by the maintenance utility</li> </ul>
Security Administrator (View & Modify)	<ul style="list-style-type: none"> <li>▪ Configuring user accounts</li> <li>▪ Creating encryption keys and configuring encryption settings</li> <li>▪ Viewing and switching where encryption keys are generated</li> <li>▪ Backing up and restoring encryption keys</li> <li>▪ Deleting encryption keys backed up in the key SVP</li> <li>▪ Viewing and changing the password policy for backing up encryption keys on the management client</li> <li>▪ Connection to the external server</li> </ul>

Role	Permissions
	<ul style="list-style-type: none"> <li>▪ Backing up and restoring connection configuration to the external server</li> <li>▪ Configuring the certificate used for the SSL communication</li> <li>▪ Configuring the fibre channel authentication (FC-SP)</li> <li>▪ Configuring resource groups</li> <li>▪ Editing virtual management settings</li> <li>▪ Setting reserved attributes for global-active device</li> <li>▪ Configuring external authentication by the maintenance utility</li> </ul>
Audit Log Administrator (View Only)	<ul style="list-style-type: none"> <li>▪ Viewing audit log information and downloading audit logs</li> </ul>
Audit Log Administrator (View & Modify)	<ul style="list-style-type: none"> <li>▪ Configuring audit log settings and downloading audit logs</li> </ul>
Storage Administrator (View Only)	<ul style="list-style-type: none"> <li>▪ Viewing storage system information</li> </ul>
Storage Administrator (Initial Configuration)	<ul style="list-style-type: none"> <li>▪ Configuring settings for storage systems</li> <li>▪ Configuring settings for SNMP</li> <li>▪ Configuring settings for e-mail notification</li> <li>▪ Configuring settings for license keys</li> <li>▪ Viewing, deleting, and downloading storage configuration reports</li> <li>▪ Acquiring all the information about the storage system and updating Device Manager - Storage Navigator window by clicking Refresh All</li> </ul>
Storage Administrator (System Resource Management)	<ul style="list-style-type: none"> <li>▪ Configuring settings for CLPR</li> <li>▪ Configuring settings for MP unit</li> <li>▪ Deleting tasks and releasing exclusive locks of resources</li> <li>▪ Configuring LUN security</li> <li>▪ Configuring Server Priority Manager</li> <li>▪ Configuring tiering policies</li> </ul>
Storage Administrator (Provisioning)	<ul style="list-style-type: none"> <li>▪ Configuring caches</li> <li>▪ Configuring volumes, pools, and virtual volumes</li> <li>▪ Formatting and shredding volumes</li> <li>▪ Configuring external volumes</li> <li>▪ Configuring Dynamic Provisioning</li> </ul>

Role	Permissions
	<ul style="list-style-type: none"> <li>▪ Configuring host groups, paths, and WWN</li> <li>▪ Configuring Volume Migration except splitting Volume Migration pairs when using CCI</li> <li>▪ Configuring access attributes for volumes</li> <li>▪ Configuring LUN security</li> <li>▪ Creating and deleting quorum disk used with global-active device</li> <li>▪ Creating and deleting global-active device pairs</li> <li>▪ Editing virtual management settings</li> <li>▪ Setting reserved attributes for global-active device.</li> </ul>
Storage Administrator (Performance Management)	<ul style="list-style-type: none"> <li>▪ Configuring monitoring</li> <li>▪ Starting and stopping monitoring</li> </ul>
Storage Administrator (Local Copy)	<ul style="list-style-type: none"> <li>▪ Performing pair operations for local copy</li> <li>▪ Configuring environmental settings for local copy</li> <li>▪ Splitting Volume Migration pairs when using CCI</li> </ul>
Storage Administrator (Remote Copy)	<ul style="list-style-type: none"> <li>▪ Remote copy operations in general</li> <li>▪ Operating global-active device pairs (except for creation and deletion)</li> </ul>
Support Personnel (Vendor Only)	<p>Configuring the SVP</p> <ul style="list-style-type: none"> <li>▪ Normally, this role is for service representatives.</li> </ul>
Support Personnel (User)	<ul style="list-style-type: none"> <li>▪ Viewing storage system status</li> <li>▪ Installing OS security patches</li> <li>▪ Updating operating systems</li> <li>▪ Performing basic maintenance</li> </ul>
<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Completing SIMs is permitted for users who are assigned to both the Storage Administrator (System Resource Management) role and Storage Administrator (Provisioning) role.</li> <li>2. Normally, the Support Personnel role is reserved for service representatives. However, if the role is assigned to a user account, dump files can be downloaded using the Dump tool.</li> </ol>	

## Built-in user groups

You can assign users to one or more built-in user groups and custom user groups. You cannot change roles or resource groups set to the built-in groups, but you can create custom user groups according to the needs of your storage environment.

The following table shows all the built-in groups, and their built-in roles and resource groups.

Built-in group	Role	Resource group
Administrator	<ul style="list-style-type: none"> <li>▪ Security Administrator (View &amp; Modify)</li> <li>▪ Audit Log Administrator (View &amp; Modify)</li> <li>▪ Storage administrator (Initial Configuration)</li> <li>▪ Storage Administrator (System Resource Management)</li> <li>▪ Storage Administrator (Provisioning)</li> <li>▪ Storage Administrator (Performance Management)</li> <li>▪ Storage Administrator (Local Copy)</li> <li>▪ Storage Administrator (Remote Copy)</li> </ul>	All Resource Groups Assigned
System	<ul style="list-style-type: none"> <li>▪ Security Administrator (View &amp; Modify)</li> <li>▪ Audit Log Administrator (View &amp; Modify)</li> <li>▪ Storage Administrator (Initial Configuration)</li> <li>▪ Storage Administrator (System Resource Management)</li> <li>▪ Storage Administrator (Provisioning)</li> <li>▪ Storage Administrator (Performance Management)</li> <li>▪ Storage Administrator (Local Copy)</li> <li>▪ Storage Administrator (Remote Copy)</li> </ul>	All Resource Groups Assigned
Security Administrator (View Only)	<ul style="list-style-type: none"> <li>▪ Security Administrator (View Only)</li> <li>▪ Audit Log Administrator (View Only)</li> <li>▪ Storage Administrator (View Only)</li> </ul>	All Resource Groups Assigned

Built-in group	Role	Resource group
Security Administrator (View & Modify)	<ul style="list-style-type: none"> <li>▪ Security Administrator (View &amp; Modify)</li> <li>▪ Audit Log Administrator (View &amp; Modify)</li> <li>▪ Storage Administrator (View Only)</li> </ul>	All Resource Groups Assigned
Audit Log Administrator (View Only)	<ul style="list-style-type: none"> <li>▪ Audit Log Administrator (View Only)</li> <li>▪ Storage Administrator (View Only)</li> </ul>	All Resource Groups Assigned
Audit Log Administrator (View & Modify)	<ul style="list-style-type: none"> <li>▪ Audit Log Administrator (View &amp; Modify)</li> <li>▪ Storage Administrator (View Only)</li> </ul>	All Resource Groups Assigned
Storage Administrator (View Only)	<ul style="list-style-type: none"> <li>▪ Storage Administrator (View Only)</li> </ul>	meta_resource
Storage Administrator (View & Modify)	<ul style="list-style-type: none"> <li>▪ Storage Administrator (Initial Configuration)</li> <li>▪ Storage Administrator (System Resource Management)</li> <li>▪ Storage Administrator (Provisioning)</li> <li>▪ Storage Administrator (Performance Management)</li> <li>▪ Storage Administrator (Local Copy)</li> <li>▪ Storage Administrator (Remote Copy)</li> </ul>	meta_resource
Support Personnel	<ul style="list-style-type: none"> <li>▪ Storage Administrator (Initial Configuration)</li> <li>▪ Storage Administrator (System Resource Management)</li> <li>▪ Storage Administrator (Provisioning)</li> <li>▪ Storage Administrator (Performance Management)</li> <li>▪ Storage Administrator (Local Copy)</li> <li>▪ Storage Administrator (Remote Copy)</li> <li>▪ Support Personnel</li> </ul>	All Resource Groups Assigned

## Creating a new user group

You can customize a user group, as long as it supports your storage system.

This section explains how administrators can create a user group.

A user group name consists of 1 to 64 characters including alphanumeric characters, spaces, and the following symbols:

! # \$ % & ' ( ) + - . = @ [ ] ^ \_ ` { } ~

The system can support a maximum of 32 user groups, including the nine built-in user groups.

### Before you begin

- You must have the Security Administrator (View & Modify) role to perform this task.

### Procedure

1. In the **Administration** tree, select **User Groups**.
2. In the **User Groups** tab, click **Create User Groups** to open the **Create User Group** window.
3. Enter a user group name.
4. If you use an authorization server, click **Check** and verify that the entered user group name is registered in the authorization server.
5. Click **Next** to open the **Assign Roles** window.
6. Select the roles to assign to the user group, and click **Add**.
7. Click **Next** to open the **Assign Resource Groups** window.
8. Select the resource groups to assign to the user group, and click **Add**. If you select a role other than the storage administrator in the **Assign Roles** window, you do not need to select resource groups because all the resource groups are assigned automatically.
9. Click **Finish** to finish and confirm settings.  
Click **Next** to add another user.
10. Check the settings and enter a task name in **Task Name**.
11. Click **Apply**. The task is now registered. If the **Go to tasks window for status** check box is checked, the **Tasks** window opens to show the status of the task.

## Changing a user group name

You can change the name of a user group by using Hitachi Device Manager - Storage Navigator.

**Before you begin**

- You must have the Security Administrator (View & Modify) role to perform this task.
- The names of built-in groups cannot be changed.
- A user group name consists of 1 to 64 characters including alphanumeric characters (ASCII), spaces and the following symbols:

# \$ % & ' ( ) + - . = @ [ ] ^ \_ ` { } ~

**Procedure**

1. In the **Administration** tree, select **User Groups**.
2. In the **User Groups** tab, select the user group.
3. Click **More Actions > Edit User Group**.
4. In the **Edit User Group** window, enter a new user group name.
5. If you use an authorization server, click **Check** and verify that the entered user group name is registered in the authorization server.
6. Click **Finish**.
7. In the **Confirm** window, check the settings and enter a task name in **Task Name**.
8. Click **Apply**. The task is now registered. If the **Go to tasks window for status** check box is checked, the **Tasks** window opens to display the status of the task.

**Changing user group permissions**

You can change the permissions that are assigned to user groups by using Hitachi Device Manager - Storage Navigator.

**Before you begin**

- You must have the Security Administrator (View & Modify) role to perform this task.
- The permissions of a built-in group cannot be changed.

**Procedure**

1. In the Device Manager - Storage Navigator **Administration** tree, select **User Groups**.
2. In the **User Groups** tab, select the user group whose permission you want to change.
3. Click the **Roles** tab.
4. Click **Edit Role Assignment**.
5. In the **Edit Role Assignment** window, change roles to be assigned to the user group.
  - Select roles to add, and then click **Add**.
  - Select a role to remove, and then click **Remove**.
6. Click **Finish**.
7. In the **Confirm** window, check the settings and enter a task name in **Task Name**.

8. Click **Apply**. The task is now registered. If the **Go to tasks window for status** check box is checked, the **Tasks** window opens.

## Changing assigned resource groups

You can change the resource groups that are assigned to user groups by using Hitachi Device Manager - Storage Navigator.

### Before you begin

- You must have the Security Administrator (View & Modify) role to perform this task.
- Create a resource group to be assigned to the user group in advance.
- You cannot change the resource groups of a user group that has All Resource Groups Assigned set to Yes
- You cannot change resource groups of a built-in group.

### Procedure

1. In the Device Manager - Storage Navigator **Administration** tree, select **User Groups**.
2. On the **User Groups** tab, select a user group to change the resource group.
3. Select the **Resource Groups** tab.
4. Click **Edit Resource Group Assignment** to open the **Edit Resource Group Assignment** window.
5. In the **Edit Resource Group Assignment** window, change resource groups to be assigned to the user group.
  - Select the resource group to add, and click **Add**.
  - Select the resource group to remove, and click **Remove**.
6. Click **Finish**.
7. In the **Confirm** window, check the settings and enter a task name in **Task Name**.
8. Click **Apply**. The task is now registered. If the **Go to tasks window for status** check box is checked, the **Tasks** window opens to display the status of the task.

## Deleting a user group

You do not have to retain a user group for the life of the project. You can delete it at any time by using Hitachi Device Manager - Storage Navigator.

### Before you begin

- You must have the Security Administrator (View & Modify) role to perform this task.
- You cannot delete a built-in user group.
- You cannot delete a user group if the users in it belong to only the user group to be deleted.

## Procedure

1. In the Device Manager - Storage Navigator **Administration** tree, select **User Groups**.
2. In the **User Groups** tab, select the user-created user groups that you want to delete.
3. Click **More Actions > Delete User Groups**.
4. Check the settings, then click **Apply**.

## User accounts

When adding a new user, you need to add it to a user group with desired permissions. You can use one of the built-in user group or a custom user group.

For more information about roles, permissions, and user groups, see [Roles and permissions \(on page 109\)](#).

You will need to use the local administrator account created during the initial setup step, or create administrator accounts using the procedures described in this chapter as needed to access the storage system temporarily when the management software is not available.

It is prudent to create more than one user account in case the system administrator is not available when the management software becomes unavailable, or when someone else needs to access the system. This is also helpful if multiple users need to access Device Manager - Storage Navigator to use storage features that are not available in the management software.

## Creating user accounts

When you create user accounts, you must register each user to the applicable user groups with appropriate permissions. The storage system supports a maximum of 20 user accounts, including the built-in user accounts.

 **Important:** To prevent unauthorized access to the storage system, users must change their password immediately after logging in for the first time.

### Before you begin

- You must have the Security Administrator (View & Modify) role to perform this task.
- You or an authorized technical support representative can log in to Device Manager - Storage Navigator and CCI with user accounts that are created in Device Manager - Storage Navigator.

**Table 7 User name and password for Device Manager - Storage Navigator**

Item	Length in characters	Characters that can be used
User name	1-256	<ul style="list-style-type: none"> <li>▪ Alphanumeric characters</li> <li>▪ The following symbols: # \$ % &amp; ' * + - . / = ? @ ^ _ ` {   } ~</li> </ul>
Password	6-256	<ul style="list-style-type: none"> <li>▪ Alphanumeric characters</li> <li>▪ All symbols</li> </ul>

**Table 8 User name and password for logging in to CCI**

Item	Length in characters	Characters that can be used
User name	1-63	<ul style="list-style-type: none"> <li>▪ Alphanumeric characters</li> <li>▪ The following symbols:<sup>1</sup> - . @ _</li> </ul>
Password	6-63	<ul style="list-style-type: none"> <li>▪ Alphanumeric characters</li> <li>▪ The following symbols:<sup>2</sup> , - . @ _ :</li> </ul>
<p><b>Note:</b></p> <ol style="list-style-type: none"> <li>1. When CCI is installed on a UNIX computer, you can also specify a slash (/).</li> <li>2. When CCI is installed on a Windows computer, back slashes (\) can also be specified. When CCI is installed on a UNIX computer, forward slashes (/) can also be used.</li> </ol>		

### Procedure

1. In the Device Manager - Storage Navigator **Administration** tree, select **User Groups**.
2. On the **User Groups** tab, select a user group to which to add a user. This is dependent on which permissions you want to give to the user.  
Support representatives must have the Support Personnel (Vendor Only) role to log in.
3. On the **Roles** tab, confirm that the displayed permissions are appropriate for the user.  
The roles for Hitachi Storage Advisor Embedded users are:
  - Storage Administrator (Initial Configuration)
  - Storage Administrator (Provisioning)

- Storage Administrator (Local Backup Management)
  - Security Administrator (View and Modify)
  - (VSP E series) Maintenance (User)
4. On the **Users** tab, click **Create**.
  5. Enter the user name.
  6. Select **Enable** or **Disable** for the account.  
If you select **Disable**, the user of this account is disabled and cannot log in to Device Manager - Storage Navigator.
  7. To use an authentication server, select **External**. To authenticate users with only Device Manager - Storage Navigator, select **Local**.
  8. If you select **Local**, enter the password for this user account in two places.  
You can use all alphanumeric characters and symbols for the password. The password must be between 6 and 256 characters.
  9. Click **Finish**.
  10. In the **Confirm** window, check the settings.
  11. Click **Apply**. The task is now registered. If **Go to tasks window for status** is checked, the **Tasks** window opens to display the status of the task.

## Changing your initial HDvM - SN password

When the system administrator adds users to HDvM - SN, each user is assigned a user ID and an initial password. When you log in to HDvM - SN for the first time using your initial password, you must change your password to prevent unauthorized access to the storage system.

### Procedure

1. Log in to Device Manager - Storage Navigator with the user ID and password given to you by the administrator.
2. Click **Settings > User Management > Change Password**.
3. Enter your initial password and your new password on the **Change Password** window, and then click **Finish**.
4. In the confirmation window:
  - a. Enter a task name or accept the default task name.
  - b. If you want the **Tasks** window to open after you click **Apply**, select **Go to tasks window for status**.
  - c. Click **Apply**.

## Changing user passwords

You can change or reissue passwords for other users by using Device Manager - Storage Navigator.



**Caution:** When using Hitachi Command Suite, you need to change information, such as passwords, registered in Hitachi Command Suite. For details, see the section describing how to change storage system settings in the Hitachi Command Suite User Guide.



**Caution:** Before changing the password of a user account specified by the registered storage system in the **Storage Device List** window, click Stop Service for the registered storage system. After changing the password of the user account, click Edit and set the new password, then click Start Service for the storage system.

### Before you begin

- Security administrators with View & Modify roles can change user passwords on Device Manager - Storage Navigator.
- If the target user has a local user account for Device Manager - Storage Navigator, the security administrator can use Device Manager - Storage Navigator to change the target user's password.
- If the target user has a local user account for the authentication server, the security administrator can use the authentication server to change the target user's password. After the password is changed, the target user can use the new password on both the authentication server and Device Manager - Storage Navigator.

### Procedure

1. In the Device Manager - Storage Navigator **Administration** tree, select **User Groups**.
2. On the **User Groups** tab, select the user group to which the user belongs.
3. On the **User** tab, select the user whose password you want to change.
4. In the **User** tab, click **Change Password**.
5. In the **Change Password** dialog box, specify a new password for the user in the two password fields.
6. Click **Finish**.
7. In the **Confirm** window, check the settings and enter a task name in **Task Name**.
8. Click **Apply**. The task is now registered. If the **Go to tasks window for status** check box is checked, the **Tasks** window opens to show the status of the task.

## Changing user permissions

You can change user permissions by changing membership in the user group. A user can belong to multiple user groups.

For example, if you want to change the role of the user who manages security to the performance management role, add this user to the Storage Administrator (Performance Management) role group and then remove the user from the Security Administrator (View & Modify) role group.

**Before you begin**

- You must have the Security Administrator (View & Modify) role to perform this task.
- The user whose permissions you want to change must belong to at least one user group.
- A user account can belong to up to 8 user groups.
- A user group can contain a maximum of 20 user accounts, including the built-in user accounts.

**Adding a user****Procedure**

1. In the Device Manager - Storage Navigator **Administration** tree, select **User Groups**.
2. On the **User Groups** tab, select the user group that has the role you want the user to have, and then add or remove users.  
To add users to the selected groups:
  - a. Click **Add Users**.
  - b. In the **Add Users** window, select a user and click **Add**.
 To remove users from the selected groups:
  - a. In the **Remove Users** window, select one or more users.
  - b. Click **More Actions > Remove Users**.
3. Click **Finish**.
4. In the **Confirm** window, check the settings. If the **Task Name** field is empty, enter a task name.
5. Click **Apply**. The task is now registered. If you selected the **Go to tasks window for status** check box, the **Tasks** window opens to show the status of the task.

**Enabling and disabling user accounts**

To allow or prevent a user from logging in to Device Manager - Storage Navigator, follow the steps below.



**Caution:** Do not select any user account used to connect to a storage system that is registered in the Storage Device List window. For details, see the Hardware Reference Guide for your storage system.

**Before you begin**

- Log into an account that is different from the user whose account that you want to disable.
- You must have the Security Administrator (View & Modify) role to perform this task.

**Procedure**

1. In the Device Manager - Storage Navigator **Administration** tree, click **User Groups**.
2. On the **User Group** tab, select the user group.

3. On the **Users** tab, select a user.
4. Click **Edit User**.
5. Click the **Account Status** check box.
6. Click **Finish**.
7. In the **Confirm** window, check the settings.
8. Click **Apply**. The task is now registered. If the **Go to tasks window for status** check box is checked, the **Tasks** window opens to show the status of the task.

## Deleting user accounts

Security Administrators can delete a user account when the account is no longer in use. Built-in user accounts cannot be deleted.



**Caution:** Do not select any user account used to connect to a storage system that is registered in the **Storage Device List** window. For details, see the Hardware Reference Guide for your storage system.

### Before you begin

You must have the Security Administrator (View & Modify) role to perform this task.

### Procedure

1. In the Device Manager - Storage Navigator **Administration** tree, select **User Groups**.
2. On the **User Groups** tab, click a user group to which a user belongs.
3. On the **Users** tab, select the user whose account you want to delete.
4. Click **More Actions > Delete Users**.
5. In the **Delete Users** window, select the user to be deleted, then click **Finish**.
6. In the Confirm window, check the settings.
7. Click **Apply**. The task is now registered. If the **Go to tasks window for status** check box is checked, the **Tasks** window opens to show the status of the task.

## Unlock a user account

If a user attempting to log in to Device Manager - Storage Navigator or Command Control Interface enters an incorrect username or password three times, the system sets the login status to locked, preventing further login attempts for 60 seconds. If necessary, you can release the locked status before the lock times out.

### Before you begin

You must have the Security Administrator (View & Modify) role to perform this task.

### Procedure

1. In the **Administration** tree, select **User Groups**.
2. On the **User Groups** tab, click a user group to which the locked-out user belongs.
3. On the **User** tab, select the user you want to unlock.

4. On the **User** tab, click **More Actions > Release Lockout**.  
The **Release Lockout** window opens.
5. Specify a task name, and then click **Apply**.

## Managing users using the maintenance utility

You can create, modify, and delete users in the storage systems without an SVP or Device Manager-Storage Navigator using the maintenance utility.

The storage system allows minimum user administration - create, modify, and delete user accounts - using the maintenance utility (embedded maintenance console).

To access the full user administration feature set, you need Device Manager-Storage Navigator running on SVP.

### Required roles

Administrators can control what maintenance utility operation windows are available for a user by registering the user with the appropriate roles.

The following table lists the required roles for using specific maintenance utility operation windows.

Maintenance utility operation window	Required role name
Initial Setting Wizard	Storage Administrator (Initial Configuration)
Set Up System Information	Storage Administrator (Initial Configuration)
Firmware	Support Personnel or User Maintenance <sup>1</sup>
User Administration	Security Administrator (View & Modify)
External authentication setting	Security Administrator (View & Modify)
System Monitor	For 93-03-2x or later: Not needed For 93-03-1x or earlier: Support Personnel or User Maintenance <sup>1</sup> For 88-xx-xx: Support Personnel or User Maintenance <sup>1</sup>
Alert Notifications	Storage Administrator (Initial Configuration)
Set Up Date & Time	Storage Administrator (Initial Configuration)
Set Up Network Settings	Storage Administrator (Initial Configuration)
Licenses	Storage Administrator (Initial Configuration)
Audit Log Settings	Audit Log Administrator (View & Modify)
Turn on/off Locate LEDs	Support Personnel or User Maintenance <sup>1</sup>
Power on Storage System	Support Personnel or User Maintenance <sup>1</sup>
Power off Storage System	Support Personnel or User Maintenance <sup>1</sup>
Edit UPS Mode	Support Personnel or User Maintenance <sup>1</sup>
Edit Login Message	Storage Administrator (Initial Configuration)
Select Cipher Suite	Security Administrator (View & Modify)
Update Certificate Files	Security Administrator (View & Modify)
Force Release System Lock	Storage Administrator (Initial Configuration)
Reboot GUM	Support Personnel or User Maintenance
View Volume Status	Support Personnel or User Maintenance <sup>1</sup>
Change Password	No role is required.
Boot System Safe Mode	Support Personnel <sup>1</sup>
Alert Display	Support Personnel or User Maintenance <sup>1</sup>
Alert Display Related to FRU	Support Personnel or User Maintenance <sup>1</sup>

Maintenance utility operation window	Required role name
Administration Menu	N/A
Power Management	N/A
System Management	N/A
Resetting GUM	N/A

**Notes:**

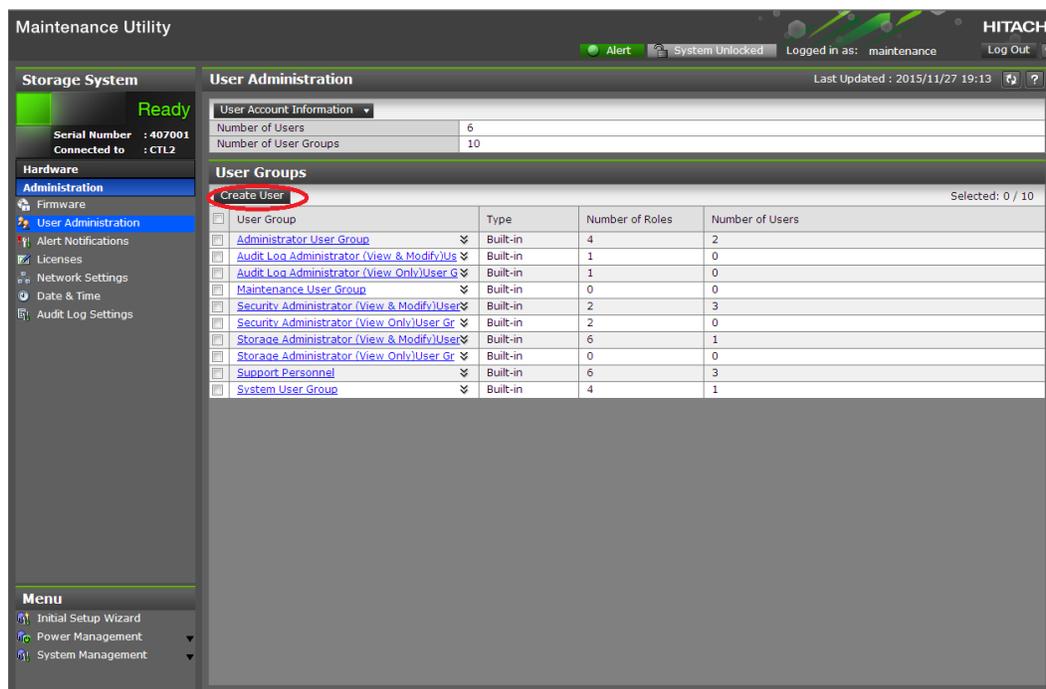
1. *Support Personnel* means operations performed by the service personnel. *User Maintenance* means operations performed by the user

## Setting up user accounts

You can create up to 20 users, including the built-in user.

### Procedure

1. In the Maintenance Utility window, click **Administration > User Administration**.
2. In the **User Groups** tab, click **Create User**.



3. Create a new user account. Specify the **User Name**, **Account Status**, **Authentication**, and **User Group**. Click **Finish**.

**Create User**

To create a new user account, specify the User Name, Account Status, Authentication, and User Group. When the settings are complete, click [Finish].

User Name:   
(Max. 256 characters)

Account Status:  Enable  Disable

Authentication:  Local: Password:   
(6 - 256 characters)

Re-enter Password:

External

User Groups			
<input type="checkbox"/>	User Group Name	Type	Number of Roles
<input type="checkbox"/>	Administrator User Group	Built-in	8
<input type="checkbox"/>	Audit Log Administrator (View ...	Built-in	2
<input type="checkbox"/>	Audit Log Administrator (View ...	Built-in	2
<input type="checkbox"/>	Maintenance User Group	Built-in	2
<input type="checkbox"/>	Security Administrator (View &...	Built-in	3
<input type="checkbox"/>	Security Administrator (View O...	Built-in	2

Selected: 0 of 10

Finish Cancel ?

Item	Description
User Name	Create a user name. You can enter up to 256 one-byte alphanumeric characters and some symbols (! # \$ % & ' * + - . / = ? @ ^ _ ` {   } ~).
Account Status	The following statuses are available: Enable: User can use the account. Disable: User cannot use the account or log in to the storage management software.
Authentication	The following methods are available: Local: Does not use authentication server. Uses a dedicated password for storage management software. External: Uses an authentication server.

4. Confirm the settings, and then click **Apply**.

**Create User**

Verify the settings, and then click [Apply].

Added User	
User Name	maintenance
Account Status	Enable
Authentication	Local
Password	*****
Number of User Groups	1

Selected User Groups		
User Group Name	Type	Number of Roles
Administrator User Group	Built-in	8
		Total: 1

< Back   Apply   Cancel   ?

- When the completion message appears, click **Close**.

## Disabling user accounts

You can disable user accounts by changing the **Account Status** to Disable.

Observe the following guidelines:

- Log into an account that is different from the user account that you want to disable (you cannot disable the current login user account).
- To disable the user account specified by the registered storage system in the **Storage Device List** window, click Stop Service for the registered storage system. After disabling the user account, click Edit to enable the user account.

### Procedure

- In the Maintenance Utility window, click **Administration > User Administration**.
- In the **User Groups** tab, click the user group belonging to the user.

The screenshot shows the 'User Administration' section of the Hitachi Maintenance Utility. The 'User Account Information' summary shows 6 users and 10 user groups. The 'User Groups' table is displayed below, listing various built-in groups and their associated roles and user counts.

User Group	Type	Number of Roles	Number of Users
Administrator User Group	Built-in	4	2
Audit Log Administrator (View & Modify) User Group	Built-in	1	0
Audit Log Administrator (View Only) User Group	Built-in	1	0
Maintenance User Group	Built-in	0	0
Security Administrator (View & Modify) User Group	Built-in	2	3
Security Administrator (View Only) User Group	Built-in	2	0
Storage Administrator (View & Modify) User Group	Built-in	6	1
Storage Administrator (View Only) User Group	Built-in	0	0
Support Personnel	Built-in	6	3
System User Group	Built-in	4	1

- Click the **Users** tab, and then select the user account to disable.

The screenshot shows the 'User Administration' section with the 'Users' tab selected. The 'Administrator User Group' is expanded, showing 2 users and 4 roles. The 'Users' table lists the 'maintenance' and 'user00' accounts, both currently in an 'Enable' status.

User	Account Status	Authentication	Type	Number of User Groups
maintenance	Enable	Local	Built-In	3
user00	Enable	Local	User-Created	3

- Click **Edit**.
- For **Account Status**, click **Disable**, and then click **Finish**.

### Create User

To create a new user account, specify the User Name, Account Status, Authentication, and User Group. When the settings are complete, click [Finish].

User Name:   
(Max. 256 characters)

Account Status:  Enable  **Disable**

Authentication:  Local: Password:   
(6 - 256 characters)

Re-enter Password:

External

User Groups			
<input type="checkbox"/>	User Group Name	Type	Number of Roles
<input checked="" type="checkbox"/>	Administrator User Group	Built-in	8
<input type="checkbox"/>	Audit Log Administrator (View ...)	Built-in	2
<input type="checkbox"/>	Audit Log Administrator (View ...)	Built-in	2
<input type="checkbox"/>	Maintenance User Group	Built-in	2
<input type="checkbox"/>	Security Administrator (View &...)	Built-in	3
<input type="checkbox"/>	Security Administrator (View &...)	Built-in	2

Selected: 1 of 10

**Finish** Cancel ?

6. Confirm the settings, and then click **Apply**.

### Edit User

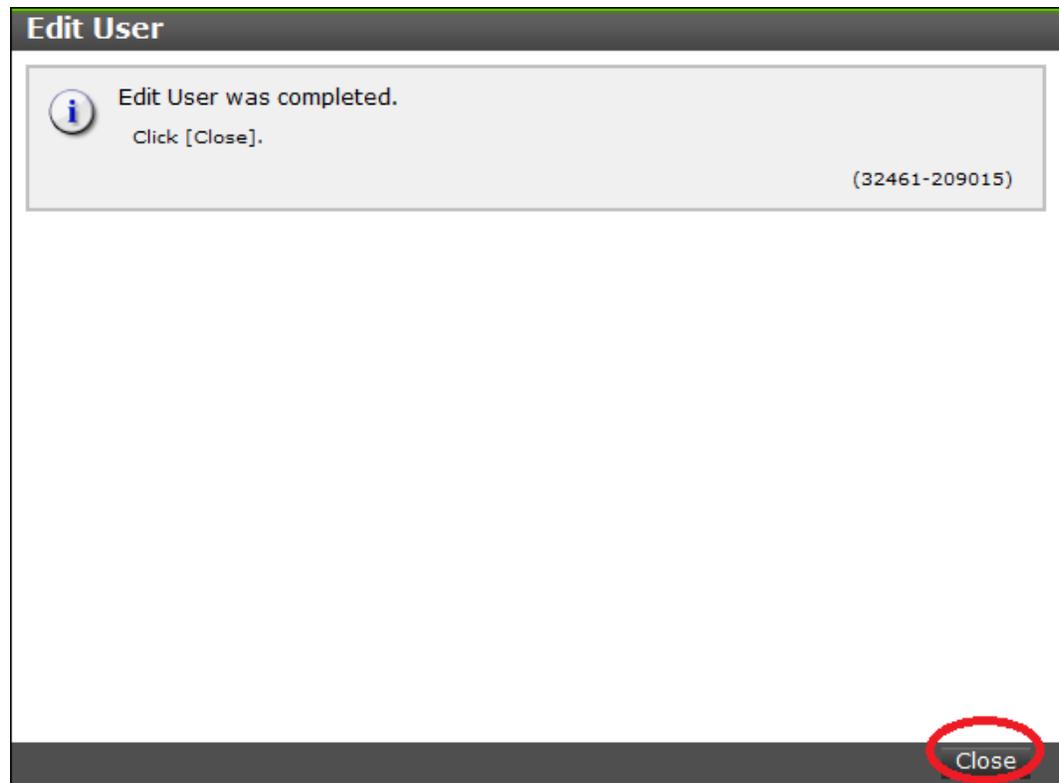
Verify the edited settings, and then click [Apply].

Edited User	
User Name	maintenance
Account Status	Disable
Authentication	Local
Password	
Number of User Groups	4

Selected User Groups		
User Group Name	Type	Number of Roles
Administrator User Group	Built-in	16
Support Personnel	Built-in	16
		Total: 4

< Back **Apply** Cancel ?

7. When a completion message appears, click **Close**.



## Deleting user accounts

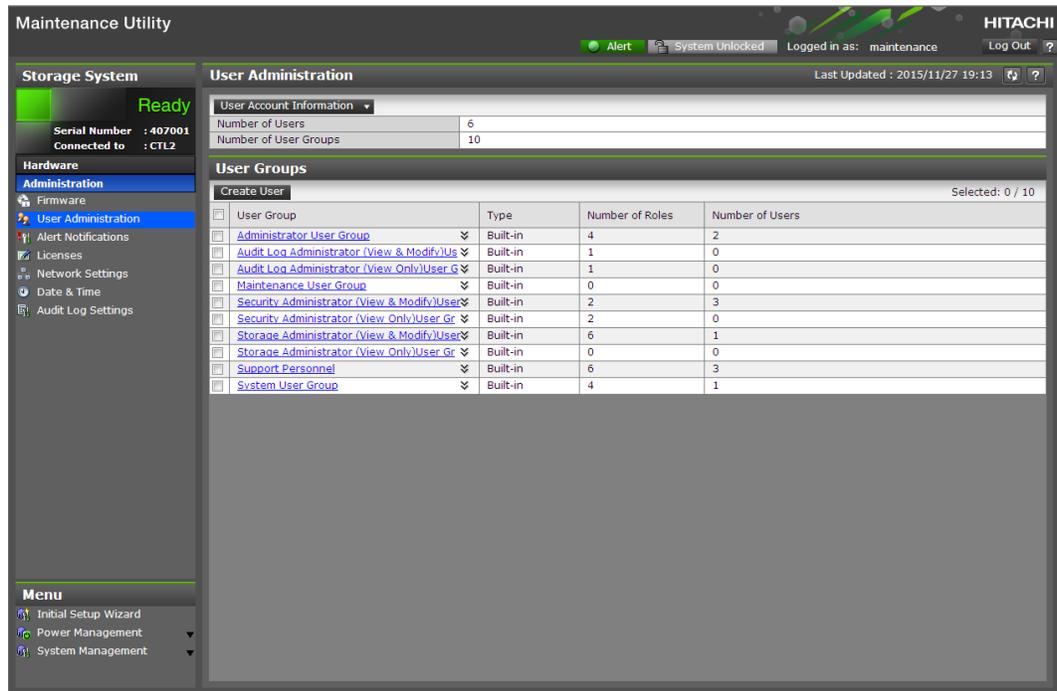
Security administrators can remove a user account when the account is no longer in use. Built-in user accounts cannot be deleted. If deleting the current login user account, you can continue the storage management software operation until you log out.



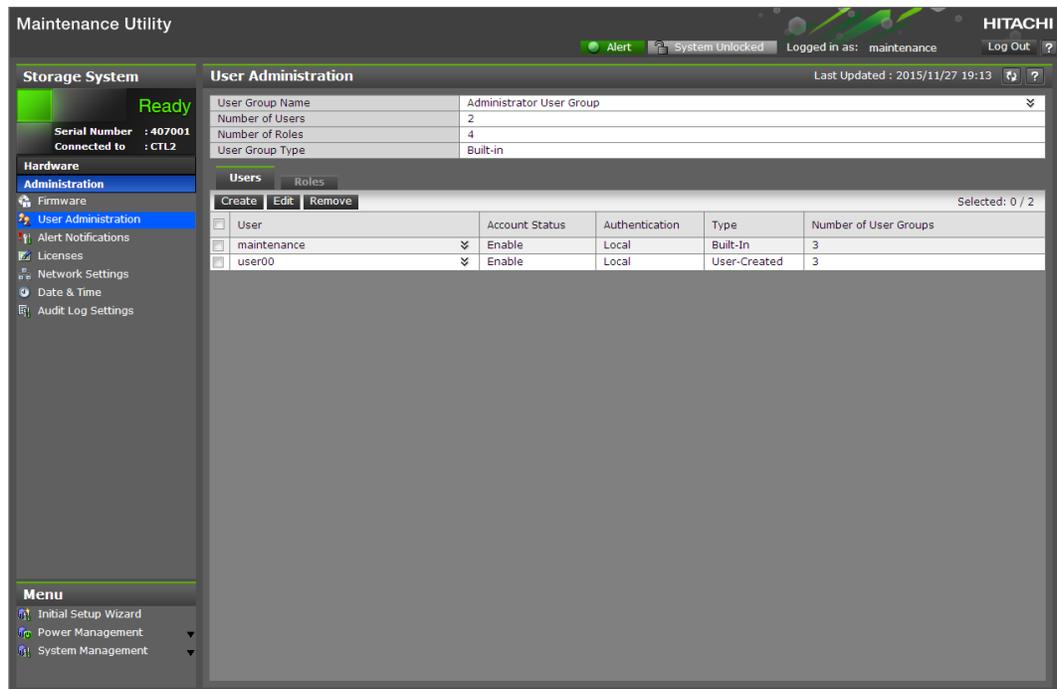
**Note:** To delete the user account specified by the registered storage system in the **Storage Device List** window, click **Stop Service** of the registered storage system. After deletion, click Edit to enable the user account.

### Procedure

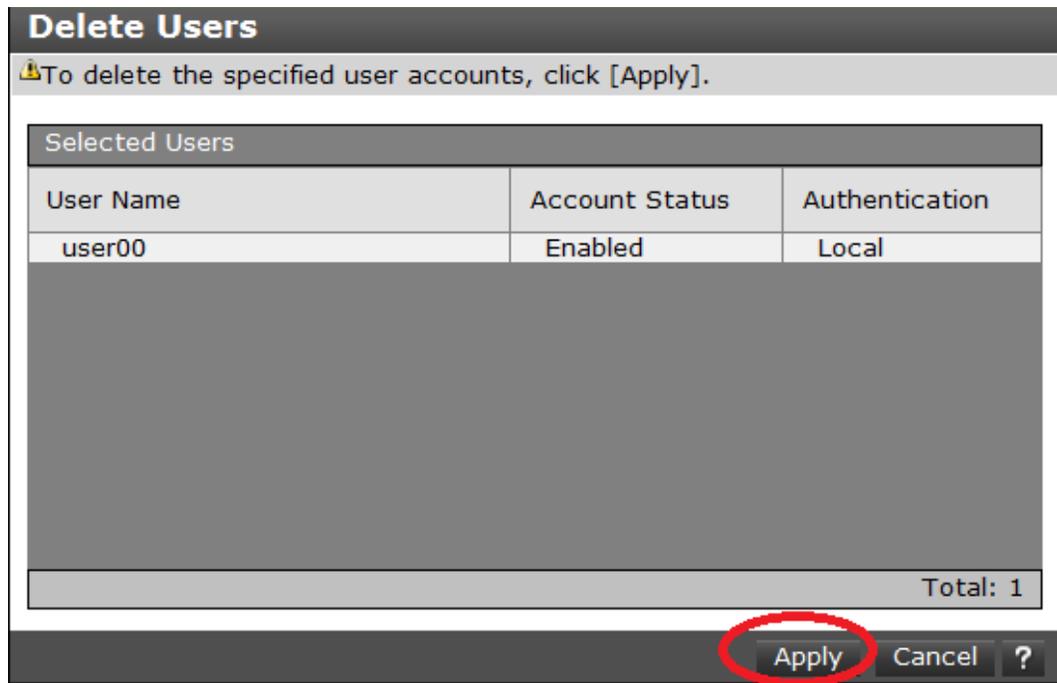
1. In the **Maintenance Utility** window, click **Administration > User Administration**.
2. In the **User Groups** tab, select the user group belonging to the user.



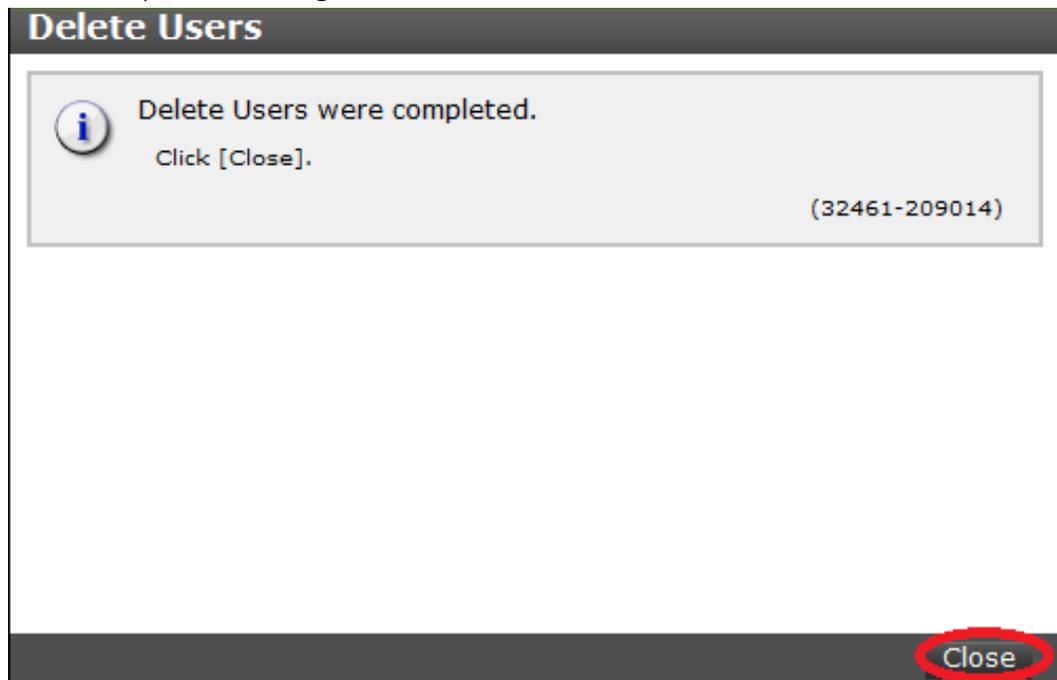
3. Click the **Users** tab, and then select the user to remove.



4. Click **Remove**.  
The **Confirm** window opens.
5. In the **Confirm** window, confirm the settings, and then click **Apply**.



6. At the completion message, click **Close**.

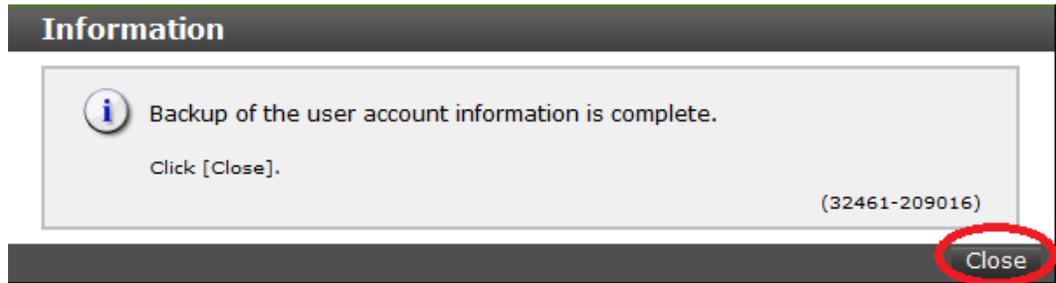


## Backing up user accounts

### Procedure

1. Click **User Account Information > Backup**.

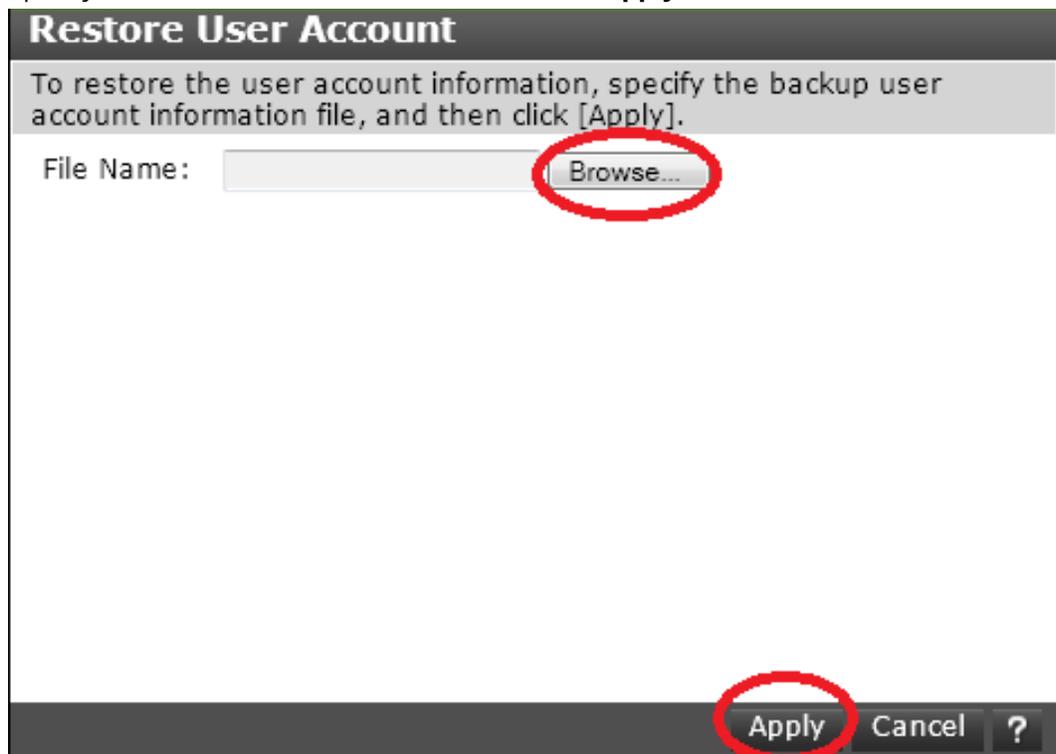
2. Specify a storage destination and a file name in the displayed window and download the file.
3. When the following message appears, click **Close**.



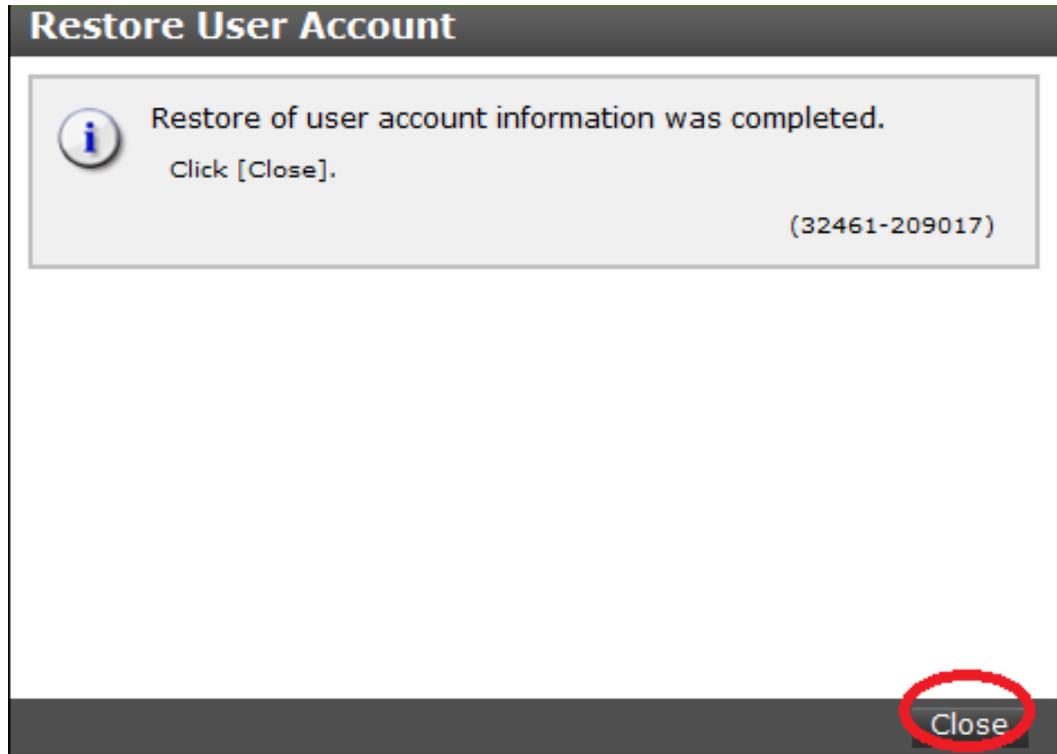
## Restoring user account information

### Procedure

1. Click **User Account Information > Restore**  
The **Restore User Account** window opens.
2. Specify file names to be restored, and then click **Apply**.



3. When a completion message appears, click **Close**.



## Changing the administrator password

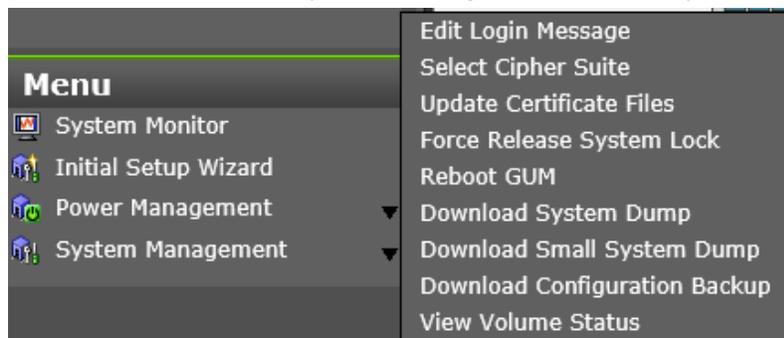
You can change the administrator password using the maintenance utility.

### Before you begin

- Before changing the password of a user account specified by the registered storage system in the **Storage Device List** window, click Stop Service for the registered storage system. After changing the password of the user account, click Edit and set the new password, then click Start Service for the storage system.

### Procedure

- In the maintenance utility **Menu** navigation tree, click **System Management**.



- Click **Change Password**.
- Enter your current password and a new password. Enter the password again in the **Re-enter Password** field.

4. Click **Finish**.

## Managing resource groups

You can divide a provisioned storage system into resource groups that allow you to manage the storage system as multiple virtual private storage systems. Configuring resource groups involves creating resource groups, moving storage system resources into the resource groups, and assigning resource groups to user groups.

### About resource groups

A storage system can connect to multiple hosts and be shared by multiple divisions in a company or by multiple companies. Many storage administrators from different organizations can access the storage system. Managing the entire storage system can become complex and difficult. Potential problems are that private data might be accessed by other users, or a volume in one organization might be accidentally destroyed by a storage administrator in another organization.

To avoid such problems, use Hitachi Resource Partition Manager software to set up resource groups that allow you to manage one storage system as multiple virtual private storage systems. The storage administrator in each resource group can access only their assigned resources. Resource groups prevent the risk of data leakage or data destruction by another storage administrator in another resource group.

The following resources can be assigned to resource groups.

- LDEV IDs
- Parity groups
- External volumes
- Ports
- Host group IDs
- iSCSI target IDs

**Note:**

Before you create LDEVs, you can reserve the desired number of LDEV IDs and assign them to a resource group for future use. You can also reserve and assign host group IDs and iSCSI target IDs in advance because the number of host groups or iSCSI targets per port is limited.

#### **meta\_resource**

The meta\_resource group is the resource group consisting of the resources that exist on the storage system (other than external volumes) before Resource Partition Manager is installed. By default, all existing resources initially belong to the meta\_resource group to ensure compatibility with older software when a system is upgraded to include Resource Partition Manager.

### Resource lock

When a task is being processed on a resource, all of the resource groups assigned to the logged-on user are locked for exclusive access. When a resource is locked, a status indicator appears on the Device Manager - Storage Navigator status bar. To view information about the locked resource, click Resource Locked.



**Note:** Opening a Device Manager - Storage Navigator secondary window (such as **Basic Information Display**) or performing an operation from the service processor (SVP) locks all of the resource groups in the storage system.

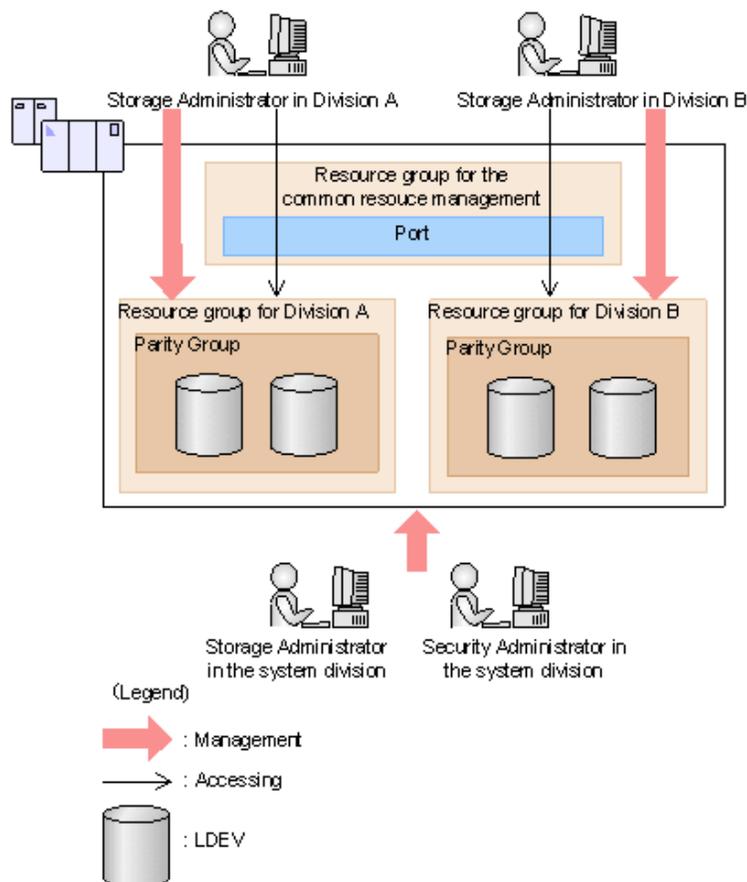
## Examples

The following examples illustrate how you can configure resource groups on your storage system.

### Resource groups sharing a port

If you have a limited number of ports, you can still operate a storage system effectively by sharing ports using resource groups.

The following example shows the system configuration of an in-house division providing virtual private storage system for two divisions. Divisions A and B each use their own assigned parity group, but share a port between the two divisions. The shared port is managed by the system division.



The Security Administrator in the system division creates resource groups for each division in the storage system and assigns them to the respective divisions. The Storage Administrator in Division A can manage the resource groups for Division A but cannot access the resource groups for Division B. In the same manner, the Storage Administrator in Division B can manage the resource groups for Division B but cannot access the resource groups for Division A.

The Security Administrator creates a resource group for managing the common resources, and the Storage Administrator in the system division manages the port that is shared between Divisions A and B. The Storage Administrators in Divisions A and B cannot manage the shared port belonging to the resource group for common resources management.

### Configuration workflow for resource groups sharing a port

1. The system division forms a plan about the resource group creation and assignment of the resources.
2. The Security Administrator creates the resource groups.
3. The Security Administrator creates the user groups.
4. The Security Administrator assigns the resource groups to the user groups.

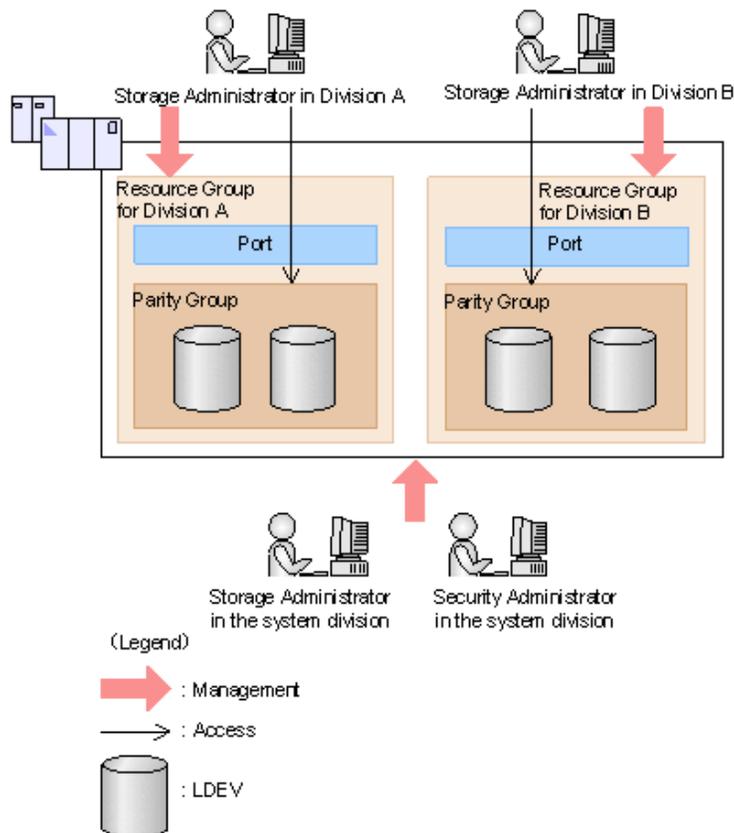
5. The Storage Administrator in the system division sets a port.
6. The Security Administrator assigns resources to the resource groups.
7. The Security Administrator assigns the Storage Administrators to the appropriate user groups.

After the above procedures, the Storage Administrators in Divisions A and B can manage the resource groups assigned to their own division.

## Resource groups not sharing ports

If you assign ports to each resource group without sharing, performance can be maintained on a different port even if the bulk of I/O is issued from one side port.

The following shows a system configuration example of an in-house system division providing the virtual private storage system for two divisions. Divisions A and B each use individual assigned ports and parity groups. In this example, they do not share a port.



The Security Administrator in the system division creates resource groups for each division in the storage system and assigns them to the respective divisions. The Storage Administrator in Division A can manage the resource groups for Division A but cannot access the resource groups for Division B. In the same manner, the Storage Administrator in Division B can manage the resource groups for Division B but cannot access the resource groups for Division A.

### **Configuration workflow for resource groups not sharing a port**

1. The system division forms a plan about creating resource groups and the assigning resources to the groups.
2. The Security Administrator creates the resource groups.
3. The Security Administrator creates the user groups.
4. The Security Administrator assigns the resource groups to user groups.
5. The Storage Administrator in the system division sets ports.
6. The Security Administrator assigns resources to the resource groups.
7. The Security Administrator assigns each Storage Administrator to each user group.

After the above procedures, the Storage Administrators in Divisions A and B can access the resource groups allocated to their own division.

## **Resource group assignments**

All resource groups are normally assigned to the Security Administrator and the Audit Log Administrator.

Each resource group has a designated Storage Administrator who can access only their assigned resources and cannot access other resources.

All resource groups to which all resources in the storage system belong can be assigned to a user group. Configure this in Device Manager - Storage Navigator by setting All Resource Groups Assigned to Yes.

A user who has All Resource Groups Assigned set to Yes can access all resources in the storage system. For example, if a user is a Security Administrator (with View & Modify privileges) and a Storage Administrator (with View and Modify privileges) and All Resource Groups Assigned is Yes on that user account, the user can edit the storage for all the resources.

If allowing this access becomes a problem with security on the storage system, then register the following two user accounts and use these different accounts for different purposes.

- A user account for a Security Administrator where All Resource Groups Assigned is set to Yes.
- A user account for a Storage Administrator who does not have all resource groups assigned and has only some of the resource groups assigned.

## **Resource group rules, restrictions, and guidelines**

### **Rules**

- The maximum number of resource groups that can be created on a storage system is 1023.

If you are providing a virtual private storage system to different companies, you should not share parity groups, external volumes, or pools if you want to limit the capacity that can be used by each user. When parity groups, external volumes, or pools are shared between multiple users, and if one user uses too much capacity of the shared resource, the other users might not be able to create an LDEV.

## Creating resource groups

When you create a resource group, you enter a name and assign the desired resources (parity groups, LDEVs, ports, host groups, and iSCSI targets) to the new group. You can create more than one resource group at a time.

### Before you begin

You must have Security Administrator (View & Modify) role to perform this task.

### Procedure

1. In the **Explorer** pane, expand the **Storage Systems** tree, click the **Administration** tab, and then select **Resource Groups**.
2. Click **Create Resource Groups**.
3. In the **Create Resource Groups** window, enter the name for the new group, select the desired resources for the new group, and click **Add** to add the new group to list of resource groups to be added.

Naming guidelines:

- A resource group name can use alphanumeric characters, spaces, and the following symbols: ! # \$ % & ' ( ) + - . = @ [ ] ^ \_ ` { } ~
  - The characters in a resource group name are case-sensitive.
  - Duplicate occurrences of the same name are not allowed.
  - You cannot use the following names: `meta_resource`
4. Repeat the previous step for each new resource group to be added. If you need to remove a group from the list of resource groups to be added, select the group, and click **Remove**.



**Note:** The maximum number of resource groups that can be created on a storage system is 1023.

5. When you are finished configuring new resource groups in the **Create Resource Groups** window, click **Next**.
6. Enter a task name or accept the default, and then click **Submit**.  
If you select **View task status**, the **Tasks & Alerts** tab opens.

## Adding resources to a resource group

You can add resources to, remove resources from, and rename existing resource groups.

Note the following restrictions for editing resource groups:

- Only resources allocated to `meta_resource` can be added to resource groups.
- Resources removed from a resource group are returned to `meta_resource`.
- No resource can be added to or removed from `meta_resource`.

- The name of the meta\_resource group cannot be changed or used for any resource group other than the meta\_resource group.
- The system does not allow duplicate names.
- LDEVs with the same pool ID or journal ID cannot be added to multiple resource groups or partially removed from a resource group. For example, if two LDEVs belong to the same pool, you must allocate both to the same resource group. You cannot allocate them separately.

You cannot partially remove LDEVs with the same pool ID or journal ID from a resource group. If LDEV1 and LDEV2 belong to the same pool, you cannot remove LDEV1 leave only LDEV2 in the resource group.

Use the sort function to sort the LDEVs by pool ID or journal ID. Then select the IDs and add or remove them all at once.

- Host groups that belong to the initiator port cannot be added to a resource group.
- To add or delete DP pool volumes, you must first add or delete DP pools.

### Before you begin

You must have Security Administrator (View & Modify) role to perform this task.

### Procedure

1. In the **Explorer** pane, click the **Administration** tab, and then select **Resource Groups**.
2. Select the desired resource group (check the box next to the name of the resource group) to display the resource information for the resource group.
  - To change the name of the selected resource group, click **Edit Resource Group**, and enter the new name.
  - To add resources to the selected resource group, select the **Parity Groups, LDEVs, Ports, or Host Groups / iSCSI Targets** tab, click **Add Resources**, and follow the instructions on the **Add Resources** window.
  - To remove resources from the selected resource group, select the **Parity Groups, LDEVs, Ports, or Host Groups / iSCSI Targets** tab, select the resources to be removed, and then click **Remove Resources**.
3. Enter a task name or accept the default, and then click **Submit**.  
If you select **View task status**, the **Tasks & Alerts** tab opens.

## Deleting resource groups

You can delete a resource group only when the resource group does not contain any resources and is not assigned to any user groups.

The following resource groups cannot be deleted:

- meta\_resource
- A resource group that is assigned to a user group

- A resource group that has resources assigned to it
- Resource groups included in different resource groups cannot be removed at the same time.

### Before you begin

The Security Administrator (View & Modify) role is required to perform this task.

### Procedure

1. In the **Explorer** pane, expand the **Storage Systems** tree, click the **Administration** tab, select **Resource Groups**.
2. Click the check box of a **Resource Group Name**.
3. Click **Delete Resource Groups**.
4. Enter a task name or accept the default, and then click **Submit**.  
If you select **View task status**, the **Tasks & Alerts** tab opens.

---

## Chapter 7: Monitoring alerts and events

Use alert notifications to monitor the storage system for changes in configuration or status.

### Alert notifications overview

You can view alert email messages, alert Syslog messages, and alert SNMP trap messages using Device Manager - Storage Navigator or using the maintenance utility.

#### Before you begin

You must have the Storage Administrator (View Only) or Storage Administrator (Initial Configuration) role to perform this task.

- **Email:** Check your email to view alerts sent by email. Alerts that are reported through email are the same as the SIM information that is displayed in the Alert window or reported through an SNMP trap.
- **Syslog:** Check the messages on the Syslog server to view alert information sent there.
- **SNMP traps:** To view SNMP trap information, use the SNMP Manager in Device Manager - Storage Navigator. See the *Hitachi Alert Notification Guide* for information about using SNMP traps.

### Configuring email notifications

#### Procedure

1. In the maintenance utility **Administration** pane, select **Alert Notifications**.
2. To send email notices, click **Enable**, next to **Email Notice**. Click **Disable** to not send email notices.

3. Click **Add** to add an email address to the list of registered addresses.

4. Enter the email address and then use the pull-down menu to select the type of address: **To**, **Cc**, or **Bcc**.
5. Click **OK** to save the email address and close the dialog box.
6. Enter an email address in **Email Address (From)**.
7. Enter an email address in **Email Address (Reply To)**.
8. In **Mail Server Settings**, select the mail server type: **Identifier**, **IPv4**, or **IPv6**.
9. To use SMTP authentication, click **Enable**.
10. In **Account**, enter an SMTP account name.
11. In **Password**, enter the SMTP account password.
12. Click **Apply** to save the changes and close the **Set Up Alert Notifications** window.



**Note:** If SIMs are not transferred through email, verify the settings in the procedure. If all settings are correct, verify the settings and operating conditions of the mail server itself, and the operating conditions of the Management LAN.

## Syslog settings

### Procedure

1. Click the **Syslog** tab.

**Set Up Alert Notifications**

To edit the alert notification settings of Email, Syslog, and SNMP, set the required information for alert notification settings for the information types. When the settings are complete, verify the settings, and then click [Apply].

Notification Alert:  Host Report  All

Email

Syslog

SNMP

Transfer Protocol:  TLS1.2/RFC5424  UDP/RFC3164

Primary Server:  Enable  Disable

Syslog Server:  IPv4  IPv6 Port Number

(1-65535)

Client Certificate File Name:

Password:

Root Certificate File Name:

Secondary Server:  Enable  Disable

Syslog Server:  IPv4  IPv6 Port Number

(1-65535)

Client Certificate File Name:

Password:

Root Certificate File Name:

Location Identification Name:  (Max. 32 characters)

Retry:  Enable  Disable

Retry Interval:  sec. (1-60)

2. Select the type of transfer protocol to use.
3. In **Primary Server**:
  - a. Click **Enable** to use the server or **Disable** not to use it.
  - b. Select the type of IP address to use for the server: **IPv4** or **IPv6**.
  - c. In **Client Certificate File Name**, click **Browse** to select a client certificate file.
4. In **Secondary Server**:
  - a. Click **Enable** to use the server or **Disable** not to use it.
  - b. Select the type of IP address to use for the server: **IPv4** or **IPv6**.

- c. In **Client Certificate File Name**, click **Browse** to select a client certificate file.
5. In **Location Identification Name**, enter a name to use to identify the server.
6. To set up an automatic attempt to reconnect to the server in case of communication failure, in **Retry**, click **Enable**. Click **Disable** to not use this feature.
7. If you enabled retry, in **Retry Interval**, enter the number of seconds that the system will wait between retry attempts.



**Note:** If SIMs are not transferred to the Syslog server, verify the settings in the procedure. If all settings are correct, verify the settings and operating conditions of the Syslog server itself, and the operating conditions of the Management LAN.

## SNMP settings

### Procedure

1. Click the **SNMP** tab.
2. In **SNMP Agent**, click **Enable** to use the agent or **Disable** not to use it.
3. In **Trap Destination**, click the type of address to send the SNMP trap information: **Community** or **Public**.
4. Click **Add** to add an SNMP trap address.

5. In **Community**, create a new community name or select an existing one.
6. In **Send Trap to**, enter a new IP address or select an existing one.
7. Click **OK** to save the information and close the dialog box.

## Sending a test email message

### Procedure

1. Click the **Email** tab.  
The **Email** tab displays the current settings for the mail server, SMTP authentications, and email addresses.
2. Click **Send Test Email**.  
A completion notice is displayed.
3. Click **OK** to acknowledge the notice and close the message. Verify that the log (*Detailed data: "RefCode: 7FFFFF, This is Test Report."*) has been transferred to the Syslog server.

## Example of a test email message

```
Subject: VSP Gx00 Report
DATE : 24/10/2014
TIME : 10:09:30
Machine : Hitachi Virtual Storage Platform Gx00 (Serial# 64019)
RefCode : 7ffffff
Detail: This is Test Report.
```

The field definitions in the test email message are listed in the following table.

Item	Description
Subject	Email title (name of the storage system) + (report)
DATE	Date when a system failure occurred.
TIME	Time when a system failure occurred.
Machine	Name and serial number of the storage system.
RefCode	Reference code. The same code as the one reported by SNMP traps.
Detail	Failure details. The same information as the one reported by SNMP traps.

See the *SIM Reference Guide* for reference codes and failure details.

## Sending a test Syslog message

### Procedure

1. Click the **Syslog** tab.  
The **Syslog** tab displays the current settings for the primary and secondary servers.

2. Click **Send Test message to the Syslog Server**.  
A completion notice appears.
3. Click **OK** to acknowledge the notice and close the message. Verify that the log (*Detailed data: "RefCode: 7FFFFF, This is Test Report."*) has been transferred to the Syslog server.

## Sending a test SNMP trap

### Procedure

1. Click the **SNMP** tab.  
The **SNMP** tab displays the current settings for the storage system name, contact, location, SNMP trap, and SNMP manager.
2. Click **Send Test SNMP Trap**.  
A completion notice displays.
3. Click **OK** to acknowledge the notice and close the message.

## Monitoring SIMs alerts in Device Manager - Storage Navigator

The Device Manager - Storage Navigator main window opens an icon indicating whether service information messages (SIMs) occurred in the storage system.

### Procedure

1. In the Device Manager - Storage Navigator main window, click **Alert**. The **Alerts** window opens.



2. To check the details of each alert, select and right-click one row, and then click **Detail** in the pop-up menu. The detail dialog box opens.
3. If the following SIM reference codes appear, you must resolve the error (xxx indicates the pool ID):
  - 601xxx, 602xxx, 602ffff, and 624000 (for Thin Image)
  - 620xxx, 621xxx, 622xxx, 624000, 625000, and 626xxx (for Dynamic Provisioning).

For details on how to resolve the error, see the *Hitachi Thin Image User Guide* or the *Provisioning Guide*.

## Checking storage system alerts by using the maintenance utility

When a notification consisting of information about the detection of a failure in the storage system is sent via Health Status, an email message, or an SNMP trap message, you can check the alert information by using the maintenance utility, and then take appropriate action.

### Before you begin

The logged-in user must be registered in the Maintenance user group (a built-in user group).

### Procedure

1. In the navigation bar, click **Settings** and then select **Maintenance Utility** to open the maintenance utility.
2. Click the **Alerts** tab to display the list of alerts.
3. Check the alerts and then take appropriate action based on the notification information.



**Tip:** For details about alerts, see the Provisioning Guide.

4. In the maintenance utility, click **Log Out**.

## Using the Windows event log

Some failure information is output to the Windows event log.

## Monitoring the system log using the Windows event log

You can manage the Windows error information by outputting failure information to the event log.

### Before you begin

- The storage system status in the storage device list must be READY.

### Procedure

1. Open a Windows command prompt with administrator permissions in SVP.

- Execute the following command to move the current directory:

```
cd /d C:\Mapp\wk\model-identification-number\DKC200\mp\pc
```

- The default installation directory is C:\Mapp:<installation-directory-of-SVP>



**Note:**

- C:\Mapp indicates the installation directory of Device Manager - Storage Navigator. If you specified another directory, replace C:\Mapp: with the specified installation directory.
  - Without moving the current directory, failure information is not output to the Windows event log if you execute the batch file in step 3.
- model-identification-number*: Use the format <First 2 digits of firmware version><model-name><serial-number>, where <model-name> is one of the following:
    - VSP E990: 6000
    - VSP F350 and VSP G350: 2000
    - VSP F370, VSP F700, VSP F900, VSP G370, VSP G700, VSP G900: 6000
 For example, for a VSP G700 that has the serial number 400102, the value is 886000400102.

- Execute the following batch file:

```
eventlog.bat action monitoring-period
```

- action*: Specify one of the following:
  - 0: Stop outputting failure information
  - 1: Start outputting failure information
 when this parameter is omitted, 0 is set.
- monitoring-period*: If you specified 1 for *action*, specify the monitoring period, from 5 to 720 minutes.
- A space is required between `eventlog.bat` and *action*.
- A space is required between *action* and *monitoring-period*.
- The command prompt is displayed if the command finishes without any errors.

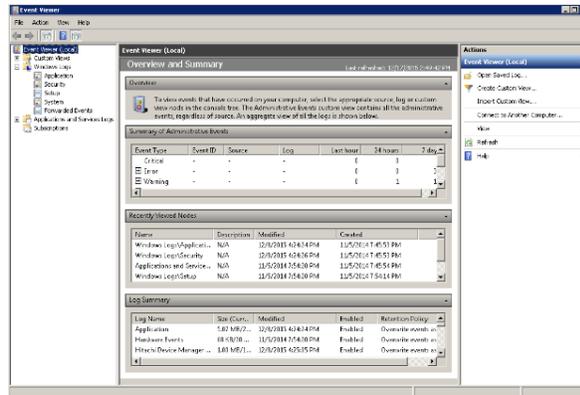
- Close the command prompt.

## Viewing the system log in the Event Viewer

You can view the Windows event log which is output to the SVP.

## Procedure

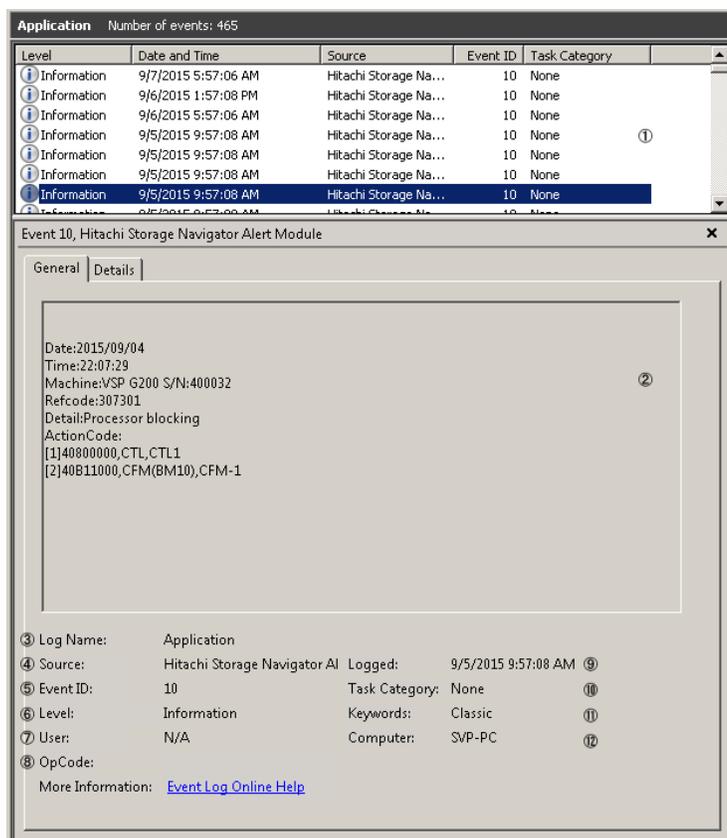
1. From the Windows start menu, click **Control Panel > System and Security > Administrative Tools > Event Viewer**.
2. Click **Windows Logs > Application** in the left pane.



## Output example

The storage system delivers a report after you send failure information to the event log. The storage system failure information will look similar to the following example:





#	Item	Description
1	Overview of the event info	Displays the overview of the event information
2	Detail of the event info	Displays the selected information Date: Date of the event occurrence Time: Time of the event occurrence Machine: Model name and serial number of the storage system Refcode: Reference code* Detail: Detailed failure information* ActionCode: Includes action code, expected failure parts, and location. A maximum of 8 failure information can be shown.
3	Log name	Displays the log type This is always displayed as "Application"
4	Source	Displays the name of the application which issued the event

#	Item	Description
		This is always displayed as "Hitachi Storage Navigator Alert Module"
5	Event ID	Displays the event ID This is always displayed as "10"
6	Level	Displays the event alert level <ul style="list-style-type: none"> <li>▪ Error: Acute or Serious</li> <li>▪ Warning: Moderate</li> <li>▪ Information: Service</li> </ul>
7	User	This is always displayed as "N/A"
8	OpCode	This is always displayed as blank
9	Logged	Displays the date and time when the event log was registered
10	Task category	This is always displayed as "None"
11	Keywords	This is always displayed as "Classic"
12	Computer	Displays the computer name on which the event occurred
*For reference code, failure details, and alert level, see the <i>SIM Reference Guide</i> .		

## Events that do not affect the operation of the storage system

Occurrence of the following events does not affect the operation of the storage system:



**Note:** These events can be ignored.

Event	Timing of occurrence of event
Log type: Application Source: Application Error Event ID: 1000 Level: Error Application on which an error occurs: DkcMan.exe	This event might occur at the following timing: <ul style="list-style-type: none"> <li>▪ When the storage management software is updated</li> <li>▪ When the SVP is shut down or rebooted</li> </ul>

Event	Timing of occurrence of event
<p>Module in which an error occurs: ntdll.dll or jvm.dll Exception code: 0xc0000005</p>	
<p>Log type: Application Source: Application Error Event ID: 1000 Level: Error Application on which an error occurs: KickJava.exe Module in which an error occurs: SVPCMN32.dll Exception code: 0xc0000005</p>	<p>This event might occur when the service of the storage system is stopped.</p>
<p>Log type: Application Source: Application Error Event ID: 1000 Level: Error Application on which an error occurs: MpcL7Comm.exe Module in which an error occurs: MpcL7Mem.dll Exception code: 0xc0000005</p>	<p>This event might occur at the following timing:</p> <ul style="list-style-type: none"> <li>▪ When the services on the storage system stop</li> <li>▪ When the storage management software is updated</li> <li>▪ When the SVP is shut down or rebooted</li> </ul>
<p>Log type: Application Source: Application Error Event ID: 1000 Level: Error Application on which an error occurs: RestPush_Base.exe Module in which an error occurs: jvm.dll Exception code: 0xc0000005 or 0xc000041d</p>	<p>This event might occur when the service of the storage system is stopped.</p>

---

## Chapter 8: Managing license keys

Accessing software functionality for your storage system requires a license key.

### Overview

When you install a license key, it is automatically enabled and the timer on the license starts at that time. To preserve time on a term key license, you can disable it without uninstalling it. When you need the software, enable the license again.

If you do not install the software before you install the license key software, the software will install correctly but will be disabled. To enable a license key, install the prerequisite software, and then enable the key.

### License key types

To use software, you must install the license key provided when you purchase that software.

You can use software with licensed capacity for a term key by installing a term key and overwriting a permanent key as long as the term key is valid. If the term key expires when the system is being used, and the capacity needed for the operation is insufficient, operations that you can perform are limited. In this case, a SIM that indicates the term key expiration (reference code 7ff7xx) is output on the Alerts tab in the Storage Systems window.

The following table describes the four types of license keys.

Type	Description	Effective term <sup>1</sup>	Estimating licensed capacity
Permanent	For purchase	No limit	Required
Term	For purchase	365 days	Required
Temporary	For trial use before purchase (try and buy)	120 days	Not required
Emergency	For emergency use	30 days	Not required
<b>Notes:</b>			

Type	Description	Effective term <sup>1</sup>	Estimating licensed capacity
	1. When you log in to Device Manager - Storage Navigator, a warning message appears if 45 days or less remain before the expiration.		

## Using the permanent key

You can purchase the permanent key to use a software application indefinitely. You must estimate a licensed capacity required for using the software application and purchase a license key for the amount of the required capacity.

- If insufficient license capacity is installed, Not Enough License displays in the status field of the **License Keys** window, and the software application is not enabled.
- If the capacity of the usable volume exceeds the licensed capacity while the storage system is running (for example, when an LDEV is additionally installed), Grace Period displays in the status field of the **License Keys** window. You can continue to perform the same operations, but the deficient amount of license capacity must be purchased within 30 days.

## Using the term key

You can purchase the term key to use the software application for a specific number of days. You must estimate a licensed capacity required for using the software application and purchase a license key for the amount of the required capacity.

- If insufficient license capacity is installed, Not Enough License or Grace Period displays in the status field of the **License Keys** window.
- You can enable or disable the term key for each software application. Unlike the temporary key and the emergency key, the number of days the term key is enabled is counted as the number of effective days of the term key rather than the number of elapsed days from the installation date.
- The number of effective days is decremented by one day when the date changes.

For example, if the term key is set to be enabled for 150 days during installation and the term key is disabled for 100 days and a total of 250 days have elapsed since the installation, the number of remaining effective days of the term key is 215 days. This is determined by subtracting 150 days from 365 days. By disabling the term key on the days when the software application is not used, you can prevent the unnecessary shortening of the period in which the term key can be used.

- If the term key is expired, Not Installed displays in the status field of the **License Keys** window, and the software application is disabled.

## Using the temporary key

You can use the temporary key for trial purposes. The effective term is 120 days from the time of installation of the temporary key. The effective term is not increased even if the temporary key is reinstalled during the effective term.

If you uninstall the temporary key, even though the effective term remains, Temporary is displayed in the status field, Not Installed is displayed in the Key Type field, and the remaining days of the effective term are displayed in the Term (Days) field of the **License Keys** window.

If the temporary key expires, you cannot reinstall the temporary key for 180 days. Expired displays in the status field of the **License Keys** window, and the software application is disabled.

## Using the emergency key

You can use the emergency key if the license key cannot be purchased, or if an emergency occurs, such as a system failure or a communication error.

You can also use the emergency key if the configuration of the software application that is installed by the temporary key remains in the changed status and cannot be restored to the original status. For example, if you do not plan to purchase the software application after using the temporary key for trial purposes, you can restore the changed configuration to the original status by temporarily enabling the software application with the emergency key.



### Caution:

- If an emergency key is installed for a software application for which a permanent or term key is installed, the effective term of the license key is 30 days. However, because the emergency key can be reinstalled during the effective term, the effective term can be restored to 30 days.
- In other scenarios, the emergency key can be installed only once.

Software bundle	VSP F350, VSP F370, VSP F700, VSP F900	VSP G350, VSP G370	VSP G700, VSP G900
Hitachi Foundation Suite	Unlimited	Unlimited	Used capacity or mounted capacity
Hitachi Remote Data Protection	Unlimited	Unlimited	Used capacity or mounted capacity
global-active device	Unlimited	Unlimited	Used capacity or mounted capacity
Hitachi Encryption License Key	Unlimited	Unlimited	Unlimited

## Cautions on license capacities in license-related windows

License capacities are displayed not only in license-related windows but also in the **Pools** window and the **Replication** window.

When you install or overwrite a temporary key or an emergency key for an installed software application, the license capacity before the overwrite installation is displayed as Permitted (TB) in license-related windows. However, Unlimited (license capacity for the temporary key or emergency key) is displayed as Licensed Capacity in the **Pools** window and the **Replication** window.

For example: You install a term key that has a license capacity of 5 TB for Compatible FlashCopy<sup>®</sup>, and when the term expires, you use an emergency key. In license-related windows, 5 TB is displayed in the Permitted (TB) field. However, in the **Licensed Capacity** field in a **Replication** window, Unlimited (capacity of the emergency key) is displayed.

## Estimating licensed capacity

The licensed capacity is volume capacity that you are licensed to use with the software application. You must estimate the amount of capacity that you want to use with the software application before you purchase the permanent key or the term key.

## Software and licensed capacity

The following table describes the three types of licensed capacity: used capacity, mounted capacity, and unlimited capacity. The type you select depends on the software application.



**Caution:** If you use Dynamic Provisioning, the licensed capacity might become insufficient because the used capacity of Dynamic Provisioning pools could increase, even if you do not add any volumes. If this happens, you must purchase an additional license within 30 days to increase the capacity to match the new volume size. For instructions to calculate pool capacity, see the *Provisioning Guide*.

**Table 9 Licensed capacity types**

Type	Description
Used capacity	<p>The licensed capacity is calculated by using one of the following capacities:</p> <ul style="list-style-type: none"> <li>▪ Normal volumes (volumes)</li> <li>▪ External volumes mapped to the storage system</li> <li>▪ Pools</li> </ul>

Type	Description
	If the pool contains pool volumes that belong in accelerated compression-enabled parity groups, you must purchase physical capacity of the pool for the license capacity.
Mounted capacity / usable capacity	The licensed capacity is estimated by using the capacity of all the volumes in the storage system.  When you estimate for the capacity of the accelerated compression-enabled parity groups, the physical capacity of the parity group is the maximum of the estimated capacity, even if you created an internal volume which exceeds the physical capacity of the accelerated compression-enabled parity group. See the Provisioning Guide for an explanation of accelerated compression.
Unlimited capacity	You can use the software regardless of the volume capacity.

The following tables list the software bundles and specify the licensed capacity type(s) for each bundle.

**Table 10 Software bundle licensed capacity for VSP E series**

Software bundle	Licensed capacity
Base Package	Used capacity or mounted capacity
Advanced Package	Used capacity or mounted capacity
Remote Data Protection	Used capacity or mounted capacity
Global-active device	Used capacity or mounted capacity

**Table 11 Software bundle licensed capacity for VSP G/F350, G/F370, G/F700, G/F900**

Software bundle	VSP G350, G370	VSP G700, G900	VSP F350, F370, F700, F900
Hitachi Foundation Suite	Unlimited	Used capacity or mounted capacity	Unlimited
Hitachi Remote Data Protection	Unlimited	Used capacity or mounted capacity	Unlimited
Global-active device	Unlimited	Used capacity or mounted capacity	Unlimited
Hitachi Encryption License Key	Unlimited	Unlimited	Unlimited

## Calculating licensed capacity for a normal volume

A normal volume is a volume that is not blocked or protected. For OPEN-V volumes, the licensed capacity of a volume is the same as the capacity specified when creating the volume.

## Calculating licensed capacity for an external volume

Use the following equation to calculate the licensed capacity for an external volume:

$$\text{External Volume Capacity (KB)} = \text{Volume Capacity (number of blocks)} \times \frac{512 \text{ (bytes)}}{1,024}$$

## Calculating pool capacity

The license capacity of Dynamic Provisioning is calculated using the total capacity of the Dynamic Provisioning pool. If you use Dynamic Provisioning V-VOLs as P-VOLs or S-VOLs of ShadowImage, TrueCopy, Universal Replicator, or global-active device, the license capacity of ShadowImage, TrueCopy, Universal Replicator, or global-active device is calculated by using the page capacity allocated to the Dynamic Provisioning V-VOLs (that is, used pool capacity).

For more information on calculating pool capacity, see the *Provisioning Guide*.

## Accelerated compression-enabled parity group capacity

For the actual capacity of accelerated compression-enabled parity groups, the total capacity of LDEVs created in the parity group and the physical capacity are compared. The one with the least capacity is added as the actual capacity. See the following table for an example.

Total LDEV capacity in the parity group	Physical capacity	Actual capacity which is added
12 TB	20 TB	12 TB
24 TB	20 TB	20 TB

## Installing license keys using maintenance utility

When installing a software product that enables you to use additional features, you first need to register the license key provided when you purchased that software product.

### Before you begin

Prepare the license key code or the license key file for the software product to be installed.

## Procedure

1. In the navigation bar, click  (**Settings**), and then select **Licenses**.
2. In the maintenance utility, click **Install**.
3. Specify the license key code or the license key file, and register the license key.

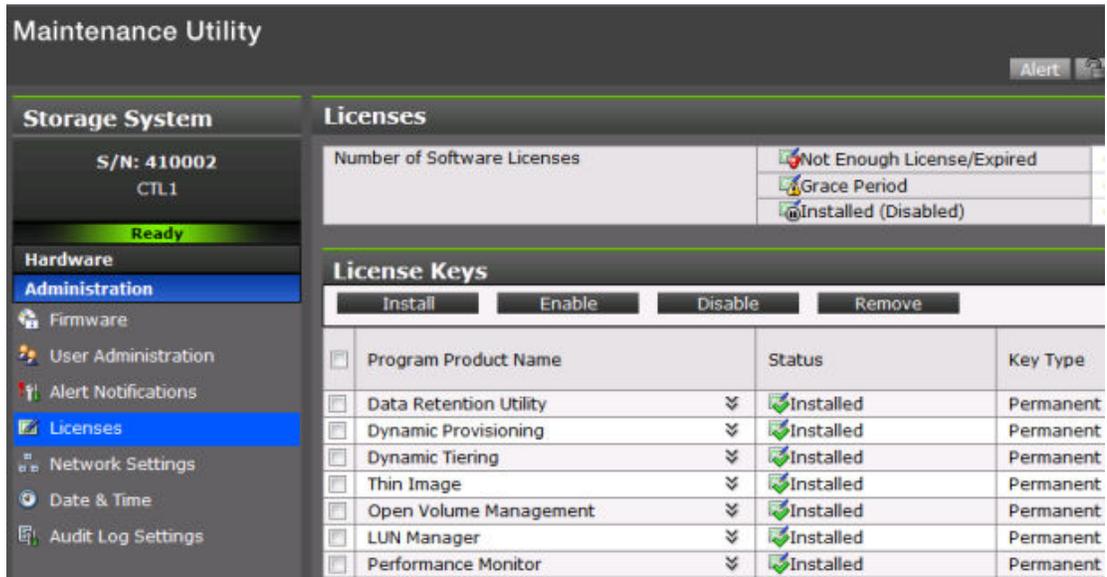


**Tip:** For more information, refer to Help in the maintenance utility.

4. In the list of license keys, confirm that the status of the software product has changed to **Installed**.
5. In the maintenance utility, click **Log Out**.

## Managing licenses

Use the Licenses window in the maintenance utility to install and uninstall block license keys.



Licenses		
Number of Software Licenses		Not Enough License/Expired
		Grace Period
		Installed (Disabled)

License Keys				
	Install	Enable	Disable	Remove
<input type="checkbox"/>	Program Product Name	Status	Key Type	
<input type="checkbox"/>	Data Retention Utility	Installed	Permanent	
<input type="checkbox"/>	Dynamic Provisioning	Installed	Permanent	
<input type="checkbox"/>	Dynamic Tiering	Installed	Permanent	
<input type="checkbox"/>	Thin Image	Installed	Permanent	
<input type="checkbox"/>	Open Volume Management	Installed	Permanent	
<input type="checkbox"/>	LUN Manager	Installed	Permanent	
<input type="checkbox"/>	Performance Monitor	Installed	Permanent	



**Caution:** If you use Dynamic Provisioning, the licensed capacity might become insufficient because the used capacity of Dynamic Provisioning pools could increase even if you do not add any volumes. If this occurs, you must purchase an additional license within 30 days to cover the capacity shortage. For details on how to calculate pool capacity, see the *Provisioning Guide*.



**Caution:** When you remove Data Retention Utility an error might occur even if the Permitted Volumes column of the **License Keys** window indicates that the licensed capacity is 0 TB.

## Enabling a license

You can enable a license that is in disabled status.

### Before you begin

You must have the Storage Administrator (Initial Configuration) role to perform this task.

### Procedure

1. From the **Maintenance Utility** menu, click **License Keys** to open the **License Keys** window.
2. Select the license to enable. You can select from one to all of the licenses listed in the window at the same time.
3. Click **Enable** to display the **License Keys** window.
4. Check the settings and click **Apply**.

## Disabling a license

You can disable a license that is in enabled status.

### Before you begin

You must have the Storage Administrator (Initial Configuration) role to perform this task.

### Procedure

1. From the **Maintenance Utility** menu, click **License Keys** to open the **License Keys** window.
2. Select the license to disable. You can select from one to all of the licenses listed in window the at the same time.
3. Click **Disable** to display the **License Keys** window.
4. Click **Finish**.
5. Check the settings and click **Apply**.

## Removing a software license

You can remove a software license that is in disabled status.

### Before you begin

You must have the Storage Administrator (Initial Configuration) role to perform this task.

### Procedure

1. In the maintenance utility **Administration** tree, click **License Keys**.
2. In the **License Keys** window, select the license to uninstall. You can select from one to all of the licenses listed in the window at the same time.
3. In the **License Keys** window, click **Uninstall Licenses**.
4. Check the settings and click **Apply**.

On rare occasions, a software option that is listed as Not Installed but still has available licensed capacity (shown as XX TB) might remain in the list. In this case, select that option and uninstall the software.

 **Note:** To reinstall a license key after uninstalling it, contact customer support to reissue the license key file.

## Removing a Data Retention Utility license

 **Caution:** When you remove a Data Retention Utility license, an error might occur, even if the Permitted Volumes column of the **License Keys** window indicates that the licensed capacity is 0 TB.

### Procedure

1. Click **Actions > Other Function > Data Retention** to open the **Data Retention** window.
2. In the **Data Retention** window, find logical volumes that are unusable as S-VOLs.
3. Change the settings so that the logical volumes are usable as S-VOLs.
4. Uninstall the Data Retention Utility.

## Examples of license information

The following table provides examples of license information displayed in the **License Keys** table of the maintenance utility.

 **Note:** When using Volume Migration, you do not need to install the license key. The function of Volume Migration is available regardless of the license key status displayed in the maintenance utility.

License key status (example)	Status	Key type	Licensed capacity	Term (Days)
Not installed	Not installed	blank	Blank	Blank
Installed with the permanent key	Installed	permanent	Permitted	-
Installed with the term key and set to Enabled	Installed	term	Permitted	Number of remaining days before expiration
Installed with the term key and set to Disabled	Installed (Disabled)	term	Permitted	-
Installed with the temporary key.	Installed	temporary	-	Number of remaining days before expiration

<b>License key status (example)</b>	<b>Status</b>	<b>Key type</b>	<b>Licensed capacity</b>	<b>Term (Days)</b>
Installed with the emergency key.	Installed	emergency	-	Number of remaining days before expiration
A temporary key was installed, but has expired.	Expired	temporary	-	Number of remaining days before expiration
A term key or an emergency key was installed, but has expired.	Not installed	blank	Blank	Blank
Installed with the permanent key or the term key, but the licensed capacity was insufficient.	Not Enough License	permanent or term	Permitted and Used	-
Installed with the permanent or term key, and then LDEVs are added, but the license capacity was insufficient.	Grace Period	permanent or term	Permitted and Used	Number of remaining days before expiration
Installed with the temporary key, and then reinstalled with the permanent key, but the license capacity was insufficient.	Installed	temporary	Permitted and Used	Number of remaining days before expiration
Installed with the permanent or term key, then reinstalled with the emergency key.	Installed	emergency	Permitted and Used	Number of remaining days before expiration

## License key expiration

If the license key for software-A expires, the license key for software-B is also disabled if software-B requires an enabled software-A. In this scenario, Installed (Disabled) is shown for software-B in the Status column of the **License Keys** table. After that, when you re-enable software-A, software-B is also re-enabled. If the Status column for software-B continues to display Installed (Disabled), go to the **License Keys** table and manually change the status of software-B back to Installed.

After your license key expires, no new configuration settings can be made, and no monitoring functions can be used with Performance Monitor. Configuration settings made before the expiration of the license key remain in effect. You can cancel configuration changes for some software.

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## Chapter 9: Managing Device Manager - Storage Navigator storage system reports

Device Manager - Storage Navigator can generate a standard set of reports that provide views of various aspects of the storage system. In addition to these views, you can generate custom reports for specific areas of the system. These include a summary of the system data and configuration, ports, channel adapters, and disk adapters. You can save reports in CSV files or HTML files. Tables in the HTML version of the configuration reports are sortable.

Before making changes to a storage system, create reports of your storage system's physical configurations and logical settings. Make a similar report after the changes, and then compare the reports to verify that new settings were made as intended.

### About storage system reports

Device Manager - Storage Navigator can generate a standard set of reports that provide views of various aspects of the storage system. In addition to these views, you can generate custom reports for specific areas of the system. These include a summary of the system data and configuration, ports, channel adapters, and disk adapters. You can save reports in CSV files or HTML files. Tables in the HTML version of the configuration reports are sortable.

Before making changes to a storage system, create reports of your storage system's physical configurations and logical settings. Make a similar report after the changes, and then compare the reports to verify that new settings were made as intended.

### Viewing configuration reports

The configuration report created on Device Manager - Storage Navigator (HDvM - SN) can be archived by downloading it to the management client.

**Note:**

- Adobe Flash Player is required to display configuration reports created with SVP firmware version 88-06-01 or earlier.
- Configuration reports created with SVP firmware version 88-06-0x or later or later might not be displayed depending on the web browser version on the management client. You must use the latest version of the web browser. (Use the management client running an OS that supports the latest version of the web browser.)
- If you use Google Chrome, specify the Start Option `-allow-file-access-from-files`.
- If you use Google Chrome, the window used to specify the location where the folder will be saved might not appear when downloading the report. In this case, click Chrome Menu > Settings > Show advanced settings, and under Privacy clear the checkbox for Protect you and your device from dangerous sites.

**Before you begin**

- Adobe Flash Player must be installed.
- Users can view the reports that they created.
- Users who have the Storage Administrator (Initial Configuration) role can view all reports.



**Note:** The window used to specify the location where the folder will be saved might not appear when downloading the report in Google Chrome. In this case, follow Chrome Menu > Settings > Show advanced settings and uncheck the Protect you and your device from dangerous sites checkbox under Privacy.

**Procedure**

1. Expand the **Storage Systems** tree, and then click **Reports**.
2. Specify the report to download.
3. Click **Download Reports**.



**Note:** If you are running HDvM - SN with Adobe AIR, a character string that depends on the AIR environment is displayed in the title of the download window.

4. Specify a folder in which to save a `.tgz` file.
5. Extract the downloaded `.tgz` file.

6. Display the report.

For HTML reports, open the file `extracted-folder\html\index.html`.

The following warning message might appear when opening an HTML file: An ActiveX control on this page might be unsafe to interact with other parts of the page. Do you want to allow this interaction? This message appears when the program embedded in the report accesses a local file. Click **Yes** to continue the operation.

For CSV reports, open a CSV file in the folder `extracted-folder\csv`.

## Viewing configuration reports in the Reports window

You can view only HTML format reports in the **Reports** window.



**Note:**

- Adobe Flash Player is required to display configuration reports created with SVP firmware version 88-06-01 or earlier.
- If you use Google Chrome, specify the Start Option `-allow-file-access-from-files`.

### Procedure

1. Expand the **Storage Systems** tree, and then click **Reports**.
2. Click the name of the report to display.  
The report is displayed in the **Reports** window.
3. In the **Reports** window, click the name of the report in the list at the left, and then view the report at the right.

## Creating configuration reports

You can create up to 20 configuration reports for each storage system. If you already created 20 reports, delete unnecessary reports first, and then create a new report.

### Before you begin

You must have Storage View permission to perform this task.

### Procedure

1. Open the **Create Configuration Report** window. From **General Tasks**, click **Create Configuration Report**.
2. Specify a task name and click **Apply**. This task name is used as the report name in the **Reports** window. This process takes approximately 10 minutes to complete.
3. Click **Refresh** to update the **Reports** window. The created report appears in the list.

## Deleting configuration reports

You can delete a configuration report when you no longer need it, or to make room in the **Reports** window when the number of reports is near the limit.

### Before you begin

Users that create the report or users with the Storage Administrator (Initial Configuration) role can delete a configuration report.

### Procedure

1. Expand the **Storage Systems** tree, and then click **Reports**.
2. Select the report to delete.
3. Click **Delete Reports**.
4. Click **Apply**.

## Downloading dump files

Use the Dump tool to download dump files onto a management client. The downloaded dump files can be used to:

- Troubleshoot the system. Use the Dump tool to download dump files from the SVP and give it to the support personnel.
- Check system configuration. First, click File > Refresh All to update the configuration information, and then use the Dump tool to download the dump files.
- Before deleting the storage management software and the SVP software. Collect the dump files of the SVP system information.

There are two types of dump files:

- Normal Dump includes all information about the SVP and the minimum information about the storage system. Select this when you have a less serious problem such as incorrect display.
- Detail Dump includes all information about the SVP and the storage system. Select this when Device Manager - Storage Navigator has a serious problem (for example, HDvM - SN does not start) or when you need to determine if the storage system has a problem.

### Before you begin

- You must be logged into the SVP.
- HDvM - SN must be running.
- The configuration information must be refreshed by selecting File > Refresh All in HDvM - SN.
- All other users (including the SVP user) must stop using the Dump tool.
- Stop all maintenance operations.
- Dump tools from other storage systems must not be used during the process.
- The installation directory of Storage Navigator must be excluded from the real time virus scan targets by the virus detection program.

**Note:**

If the error is in regards to HDvM - SN starting up, collect information about the SVP using the Dump tool, without HDvM - SN running.

**Procedure**

1. Close all HDvM - SN sessions on the SVP.
2. Open a Windows command prompt with administrator permissions.
3. Move the current directory to the folder where the tool is available. (For example: `<SVP-root-directory>\DKC200\mp\pc`).
4. Specify the output destination of the dump file and execute `Dump_Detail.bat` or `Dump_Normal.bat`.

For example, if you are storing the result of `Dump_Detail.bat` to `C:\Result_832000400001`, enter the following:

```
C:\MAPP\wk\832000400001\DKC200\mp\pc>Dump_Detail.bat
C:\Result_832000400001
```

**Note:**

- A space is required between `Dump_Detail.bat` and `C:\Result`.
- The dump file name is `hdcp.tgz`. To manage dump files by storage systems, we recommend adding a serial number to the output folder name. For example, if the serial number is 832000400001, the folder name should be `C:\Result_832000400001`.
- A folder under the network drive cannot be specified as the output destination.
- When the tool is being executed, `Executing` is displayed in the command prompt. When the execution is completed, the following is displayed:

```
zSv_AutoDump.exe is completed.
```

"zSv\_AutoDump.exe is completed." might not be displayed even after the completion of the tool execution due to the heavy load on the SVP or other cause. If it is not displayed even after 20 minutes, check whether a dump file is output in the output folder for the dump file. When a dump file is output, see the date and time of the file update to confirm that the file is created after 20 minutes have passed since the start time of execution of the dump tool. When no dump file is output, close the command prompt and execute the dump tool again.



**Note:** If the execution fails, `zSv_AutoDump.exe is failed` is displayed.

- You cannot specify the folders under the network drive as the output folder.
- The dump file capacity might become approximately 3 GB depending on the usage of the storage system.
- If "zSv\_AutoDump.exe is failed." is displayed when you run the dump tool, the installation directory of HDvM - SN might not be excluded from the real-time virus scan target in the virus detection program. Exclude the installation directory from the virus scan target.

5. A completion message box displays. Press any key to acknowledge the message and close the message box.

`hdcp.tgz`: This is the dump file. Give this file to the maintenance personnel. If you save too many dump files in the SVP storage, space might not be available. Therefore, move the dump file outside of SVP storage.

`zSv_AutoDump.log`: This is the log file of the dump tool. If the dump file is not output, give this log file to the maintenance personnel. If the dump file is output, delete the log file.

`DumpResult.txt`: This is the collection results file. The results are displayed in the following categories:

**DKC dump**

Collection result of the DKC dump data

**Dump of GUM of CTRL1**

Collection result of the GUM (CTL1) dump data

**Dump of GUM of CTRL2**

Collection result of the GUM (CTL2) dump data

*exist* is displayed if the collection was successful. *not exist* is displayed if the collection has failed.

6. Close the Windows command prompt.

## Collecting dump files manually

You can collect dump files manually if the dump tool is unavailable or is causing an error in the dump files.

**Note:**

- `installDir` indicates the installation directory of the storage management software and the SVP software (for example, `C:\Mapp`).
- `%USERPROFILE%` indicates the installation login user of the SVP (for example, `C:\Users\`).
- `%WINDIR%` indicates the Windows folder in the system drive (for example, `C:\Windows`).
- [Storage system number] (Example) When the storage system number is 832000400001, the folder name is as follows: `<installDir>\wk\832000400001\DKC200\mp\pc\*.trc`
- Note that some files do not exist depending on the operating environment.

Files to collect manually:

- <installDir>%wk%supervisor%dkcman%log%\*.\*
- installDir>%wk%supervisor%dkcman%cnf%\*.\*
- <installDir>%wk%supervisor%rmiserver%log%\*.\*
- <installDir>%wk%supervisor%rmiserver%cnf%\*.\*
- <installDir>%wk%supervisor%sdlist%log%\*.\*
- <installDir>%wk%supervisor%mappingiset%logs%MappIniSet%\*.\*
- <installDir>%wk%supervisor%mappingiset%mpprt%cnf
- <installDir>%wk%supervisor%assist%log%\*.\*
- <installDir>%wk%supervisor%assist%cfg%\*.\*
- <installDir>%wk%supervisor%assist%dat%\*.\*
- <installDir>%wk%supervisor%assist%history%\*.\*
- <installDir>%wk%supervisor%comweb%logs%\*.\*
- <installDir>%wk%supervisor%microsetup%log%\*.\*
- <installDir>%wk%supervisor%portmanager%cnf%\*.\*
- <installDir>%wk%supervisor%portmanager%logs%PortManager%\*.\*
- <installDir>%wk%supervisor%restapi%data
- <installDir>%wk%supervisor%restapi%logs
- <installDir>%wk%supervisor%restapi%build.json
- <installDir>%wk%supervisor%restapi%version.json
- <installDir>%wk%supervisor%system%log%\*.log
- <installDir>%wk%[Storage system number]%DKC200%mp%pc%\*.trc
- <installDir>%wk%[Storage system number]%DKC200%mp%pc%\*.dmp
- <installDir>%wk%[Storage system number]%DKC200%mp%pc%\*.dbg
- <installDir>%wk%[Storage system number]%DKC200%mp%pc%\*.dmb
- <installDir>%wk%[Storage system number]%DKC200%mp%pc%\*.ini
- <installDir>%wk%[Storage system number]%DKC200%mp%pc%\*.inf
- <installDir>%wk%[Storage system number]%DKC200%san%SN2%SN2Files%logs%\*.\*
- <installDir>%wk%[Storage system number]%DKC200%san%SN2%SN2%logs%\*.\*
- <installDir>%wk%[Storage system number]%DKC200%san%cgi-bin%utility%log%\*.\*
- <installDir>%wk%[Storage system number]%DKC200%others%commdata%\*.\*
- <installDir>%wk%[Storage system number]%DKC200%config%\*.cfg
- %wk%[Storage system number]%SMI\logs\\*.\*
- <installDir>%OSS%apache%logs%\*.log

- <installDir>%OSS%apache%logs%ssl%\*.log
- <installDir>%OSS%jetty%logs%\*.log
- %USERPROFILE%\AppData\LocalLow\Sun\Java\Deployment\log
- %WINDIR%\system32\config\SysEvent.Evt
- %WINDIR%\system32\config\SecEvent.Evt
- %WINDIR%\system32\config\AppEvent.Evt
- %WINDIR%\minidump%\*.dmp
- %WINDIR%\System32\Winevt\Logs\Application.evtx
- %WINDIR%\System32\Winevt\Logs\Security.evtx
- %WINDIR%\System32\Winevt\Logs\System.evtx
- %WINDIR%\system32\drivers\etc\HOSTS\*
- %WINDIR%\system32\drivers\etc\services\*
- %WINDIR%\minidump%\*.

## Handling performance problems of the SVP

If the following performance problems occur in the SVP, collect the performance information of the SVP and dumps, and then send them to the maintenance personnel.

- Slow operation of the SVP
- High CPU usage rate of the SVP
- Slow operation of the Storage Device List or the Device Manager - Storage Navigator



### Caution:

The tool used in this procedure collects the performance information of the SVP. This tool is installed in the directories corresponding to the serial numbers of all storage systems registered in the Storage Device List. Although this tool does not collect performance information of individual storage systems, it can collect dump files for the storage system corresponding to the directory used to run the tool. Therefore, for the storage systems other than that storage system, see [Downloading dump files \(on page 169\)](#) and [Collecting dump files manually \(on page 172\)](#) to collect the dump files, and then pass them to maintenance personnel.

You can collect performance information of the SVP by using the tool in the following procedure. Collection of performance information takes about 30 minutes, and then the dump files are automatically collected.

### Before you begin

- Any performance problem of the SVP must be occurring.
- You must be logged into the SVP.
- Device Manager - Storage Navigator must be running.

- All other users (including the SVP user) must stop using the Dump tool.
- All maintenance operations must be stopped.
- Dump tools from other storage systems must not be used during the process.
- The installation directory of the Device Manager - Storage Navigator must be excluded from the real time virus scan targets by the virus detection program.

For the virus detection program settings, see [Preventing errors while using virus detection programs on the SVP \(on page 105\)](#).



**Note:** If the error is in regards to Device Manager - Storage Navigator starting up, collect information about the SVP using the Dump tool, without Device Manager - Storage Navigator running. If some tools are running, performance of the SVP might be further degraded.

### Procedure

1. On the SVP, open a command prompt window with administrator permissions.
2. Move the current directory to the directory where the tools are installed.

For example, if the serial number of the storage system is 882000400001, the directory where the tool is installed is `C:\Mapp\wk\882000400001\DKC200\mp\pc`. In this case, enter the following:

```
cd /d C:\Mapp\wk\882000400001\DKC200\mp\pc
```



**Note:** `C:\MAPP` indicates the installation directory of the storage management software and the SVP software. When the installation directory other than `C:\Mapp` was specified, replace `C:\Mapp` with the specified installation directory.

3. Run the performance information collection tool `GetSVPPerfInfo.bat` by specifying the output folder of the performance information and dump files. In the command prompt, enter the following:

```
GetSVPInfo.bat output-directory
```

For example, when you want to output the performance information and dump files of the SVP to `C:\Result_882000400001`, enter the following command:

```
GetSVPPerfInfo.bat C:\Result_882000400001
```

If you do not specify output directory, the performance information and dump files are output to the following folders:

```
C:\Mapp\wk\882000400001\DKC200\tmp\PerfLog
C:\Mapp\wk\882000400001\DKC200\tmp\PerfLog
```

In this example, 882000400001 is the serial number of the registered storage system.

**Note:**

- When you enter the command, a space is required between the bat file of the dump tool and the output directory.
- A directory under the network drive cannot be specified as the output destination.
- Do not click or close the command prompt window while running the tool.
- When the tool is being executed, "Executing..." is displayed in the command prompt.
- The dump tool automatically starts collecting dumps after collection of the performance information finishes.
- Both performance information and system information of the SVP are collected. Do not click the cancel button on the dialog box that opens while system information is collected. The dialog box automatically closes after collection of system information finishes.
- When all processes are complete, "SVP Performance Information tool is completed." is displayed in the command prompt.

**4.** Check the dump files that were output.

The following files are output:

- CounterResult\_YYYYMMDDhhmmss.blg : Windows performance monitor log
- ProcessList\_YYYYMMDDhhmmss.csv : Information of the processes running on the SVP
- Sysinfo\_YYYYMMDDhhmmss.txt : System information of the SVP
- hdcp.tgz
- zSv\_AutoDump.log
- DumpResult.txt

**5.** Close the command prompt.**6.** An OS failure might cause a failure of collecting dumps by the dump tool. If the output result of the dump tool in step 4 is not output, collect the dump files manually.**7.** Send all the files that were output in step 4 to the maintenance personnel.

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## Appendix A: Troubleshooting

Troubleshooting for Device Manager - Storage Navigator involves identifying the cause of the error and resolving the problem.

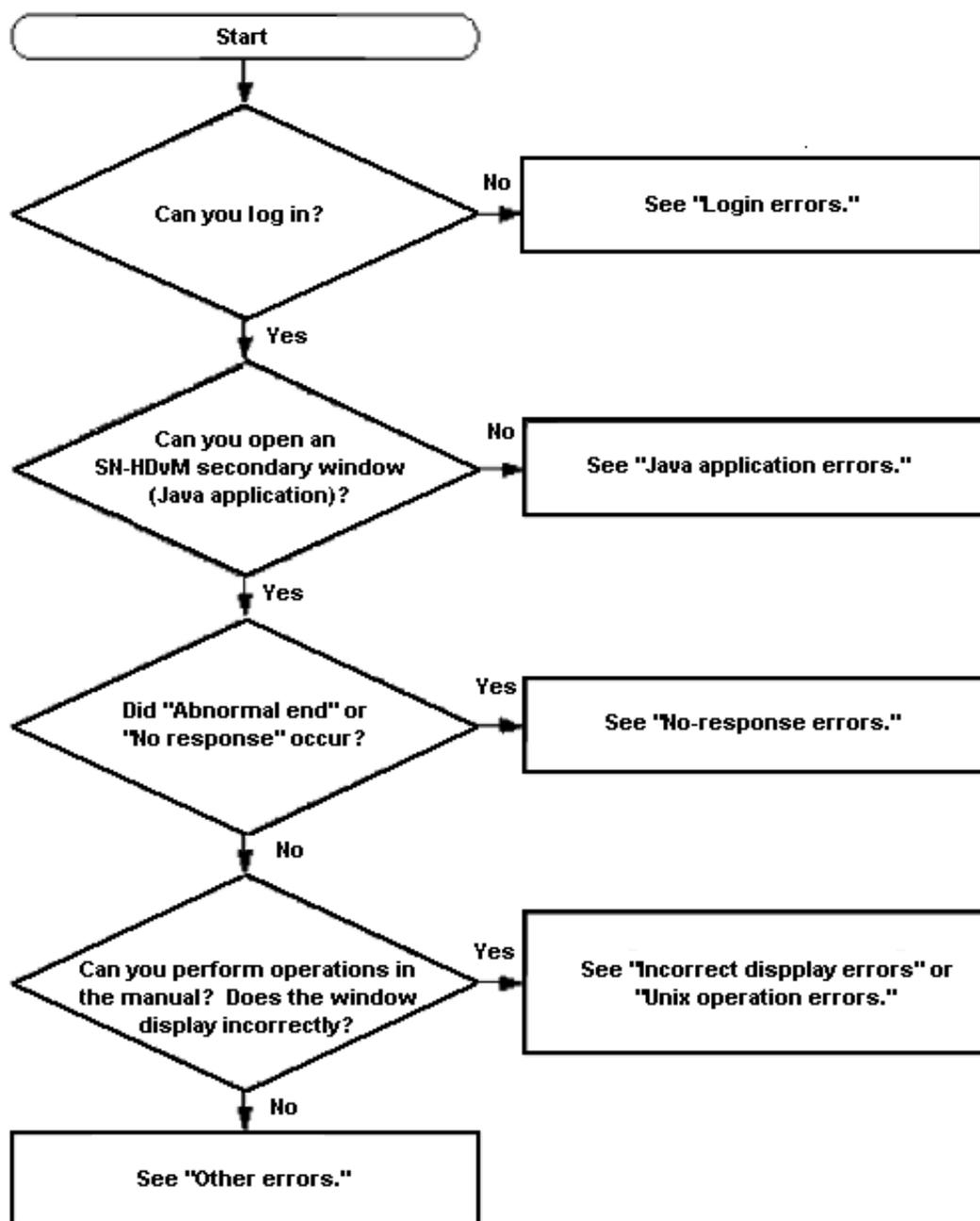
This section provides information for identifying and correcting problems with Device Manager - Storage Navigator for your storage system.

### General troubleshooting

If you have a problem with Device Manager - Storage Navigator, check the following items. If you cannot resolve an error condition, contact customer support.

- Check the cabling and the LAN. Verify that both the management client and LAN cabling are firmly attached, and that the LAN is operating properly.
- Close any programs on the management client that are not responding. If necessary, reboot the management client and restart a Device Manager - Storage Navigator web client session.
- Clear the Java and web browser caches to solve the problem. To clear the Java cache, click Delete the temporary files in the **General** dialog box of the Java Control Panel.
- Check for other general error conditions. For a complete list of Device Manager - Storage Navigator error codes, see the *Hitachi Device Manager - Storage Navigator Messages*.
- Check the alert icon. Confirm the severity level of the storage system alert by clicking Alert in the Device Manager - Storage Navigator main window.

#### Troubleshooting workflow



## Displaying alerts

You can check if the failure (SIM) is reported or not in the storage system by checking the alert in the Device Manager - Storage Navigator main window.

### Procedure

1. In the Device Manager - Storage Navigator main window, click **Alert**. The **Alerts** window opens.

2. On the **Alerts** tab, click **DKC** or **GUM (CTL1)**, or **GUM (CTL2)** to check alert information.
3. Click the alert ID link to check the detailed information for each alert.  
The error information displays in the **Alert Detail** window.

## Login errors

The following table lists login errors and provides recommended actions for each error condition.

Error condition	Probable cause / Recommended action
Failed to login is displayed.	<p>Check that the user name and password are correct. If you forget your password, log in with the Security Administrator (View &amp; Modify) and set a new password.</p> <p>To confirm that the SVP and the storage system can communicate normally, check the following:</p> <ul style="list-style-type: none"> <li>▪ LAN cabling is correct and connections are in place.</li> <li>▪ IP address of SVP and IP address of GUM are in the same network.</li> <li>▪ There is no duplicate IP address in the network to which SVP and GUM belong.</li> <li>▪ GUM is pingable from SVP.</li> </ul> <p>When you are using an external authentication server such as LDAP, check the following:</p> <ul style="list-style-type: none"> <li>▪ The authentication server has been started.</li> <li>▪ The authentication server can be accessed from the SVP via the network</li> <li>▪ The user account has been established on the authentication server</li> <li>▪ The connection information for the authentication server that has set on the SVP is correct.</li> </ul>

Error condition	Probable cause / Recommended action
	<p>(VSP G130, G/F350, G/F370, G/F700, G/F900) When RSA key exchange is disabled on the SVP, the SVP communicates with the external authentication server by using the following four cipher suites. Check whether the external authentication server supports the following cipher suites:</p> <ul style="list-style-type: none"> <li>▪ TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384</li> <li>▪ TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256</li> <li>▪ TLS_DHE_RSA_WITH_AES_256_GCM_SHA384</li> <li>▪ TLS_DHE_RSA_WITH_AES_128_GCM_SHA256</li> </ul> <p><b>Note:</b> If the OS on the external authentication server is Windows Server 2008, the SVP cannot communicate with the authentication server because the OS does not support these cipher suites.</p> <p>Check whether the user account is registered. If the user account is not registered, perform one of the following operations:</p> <ul style="list-style-type: none"> <li>▪ Reboot the GUM of CTL2.</li> <li>▪ Restore the user account.</li> <li>▪ Register the user account again.</li> </ul> <p>If the symptom recurs even after you correct the above settings, use the dump tool to collect HDvM - SN normal dump files to some recording media and then contact customer support.</p>
The HDvM - SN window is not displayed.	<ul style="list-style-type: none"> <li>▪ Make sure the URL of the desired SVP is registered to the Trusted sites section of the Internet Options dialog box</li> <li>▪ Make sure that the browser uses TLS 1.2.</li> </ul>
HDvM - SN does not start even with repeated attempts.	<p>Close all the web browser windows and then clear the web browser cache.</p> <p>Use the Task Manager to check for "hung" or duplicate processes.</p>
A network error occurred when you logged in to HDvM - SN.	<p>Close all dialog boxes and log in to the HDvM - SN again. If the same error occurs, check the network environment.</p>

Error condition	Probable cause / Recommended action
Internet Explorer cannot display the webpage is displayed.	<ul style="list-style-type: none"> <li>▪ Ensure that the network device is enabled.</li> <li>▪ Ensure that the proxy server settings are correct if you use proxy for the network connection.</li> </ul>
An error occurred during SVP processing is displayed.	<ul style="list-style-type: none"> <li>▪ If the web browser is set up to use a proxy server, disable the proxy server.</li> <li>▪ If a proxy server is not used in the web browser, wait a few minutes, update the screen, and log in again.</li> </ul>
The login to a storage system from the Hitachi Command Suite server fails.	<p>If you change your password for a storage system, you need to change the information registered in Hitachi Command Suite. For details, see the section describing how to change storage system settings in the Hitachi Command Suite User Guide.</p> <p>(VSP G130, G/F350, G/F370, G/F700, G/F900) When RSA key exchange is disabled on the SVP, the SVP communicates with Hitachi Command Suite by using the following four cipher suites. Check whether Hitachi Command Suite supports the following cipher suites:</p> <ul style="list-style-type: none"> <li>▪ TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384</li> <li>▪ TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256</li> <li>▪ TLS_DHE_RSA_WITH_AES_256_GCM_SHA384</li> <li>▪ TLS_DHE_RSA_WITH_AES_128_GCM_SHA256</li> </ul> <p>If Hitachi Command Suite does not support these four cipher suites, enable RSA key exchange on the SVP.</p>
The window in gray appears and the login dialog box is not displayed during startup of HDvM - SN that can run in the Adobe AIR environment.	Enable the TLS settings of Internet Options for the web browser.

## No-response errors

The following table lists no-response errors:

Error condition	Probable cause / Recommended action
The error 20121-107022 occurs when using Device Manager - Storage Navigator.	An unsupported locale might be set for the SVP. Make sure that the correct locale is set for the SVP.  To set the locale, see the Hardware Reference Guide for your storage system.
The following error occurs when using Device Manager - Storage Navigator: <ul style="list-style-type: none"><li>▪ 20121-107024</li></ul>	The SVP web server might have been restarted. Close Device Manager - Storage Navigator, wait 10 minutes, and then restart Device Manager - Storage Navigator.
Error (20121-107096) occurs repeatedly while you are using Device Manager - Storage Navigator.	A timeout error may have occurred in Adobe Flash Player or Adobe AIR.  Close the Device Manager - Storage Navigator window. Click X in the corner of the browser window or click the window and press <b>Alt+F4</b> .
The following errors occur when using Device Manager - Storage Navigator: <ul style="list-style-type: none"><li>▪ 20121-107024</li><li>▪ 20121-107025</li><li>▪ 20121-107096</li><li>▪ 20121-107097</li></ul>	This error may occur if the load to the management client is high, or if you start multiple instances of Device Manager - Storage Navigator by using multiple tabs in a tab browser or multiple browsers.  Close the other applications which cause the high load, or make sure to start only one Device Manager - Storage Navigator
The following application error occurs when using Device Manager - Storage Navigator: <ul style="list-style-type: none"><li>▪ 20020-108000</li></ul>	<ul style="list-style-type: none"><li>▪ The version of Device Manager - Storage Navigator recognized by the management client might not match the version installed on the SVP. Close all the browser windows and then clear the browser cache.</li><li>▪ The management client might have entered standby or hibernate mode. Restart Device Manager - Storage Navigator.</li><li>▪ If a proxy server is used for network connections, the proxy server cache may be storing the older version of the program. If the problem continues after you clear the browser cache, contact your network administrator.</li></ul>

Error condition	Probable cause / Recommended action
	<ul style="list-style-type: none"> <li>▪ Java content might be disabled in the web browser using the JRE 7.0 Update 10 or later. To enable Java content in the web browser:               <ol style="list-style-type: none"> <li>1. From Windows, open the Java Control Panel.</li> <li>2. In the Java Control Panel, click the Security tab.</li> <li>3. If Enable Java content in the browser is checked, uncheck it and click Apply.</li> <li>4. The <b>User Account Control</b> dialog box opens. Click Yes. The confirmation window opens. Click OK.</li> <li>5. Restart the browser.</li> </ol> </li> <li>▪ The JRE used by the secondary window might not support the protocols or cipher suites used in TLS communications. Check whether your JRE supports the protocols and cipher suites used in TLS communications. If not, install a new JRE that supports these protocols and cipher suites.</li> </ul> <p>If none of the above actions solves the problem, save the Device Manager - Storage Navigator dump file and send it to customer support. Then restart the web browser.</p>
<p>Device Manager - Storage Navigator does not respond.</p> <p>Device Manager - Storage Navigator may hang in the following cases:</p> <ul style="list-style-type: none"> <li>▪ The Device Manager - Storage Navigator main window is grayed out and does not display the percentage of progress, and you cannot perform any operation for a long period of time.</li> <li>▪ You cannot perform any operation for a long period of time and the dialog box that says <b>Loading...</b> is not displayed.</li> <li>▪ The dialog box that says <b>Loading...</b> opens when the window switches. However, you cannot move the dialog box or perform any operation for a long period of time.</li> </ul>	<p>Close the web browser and reopen it. When using the Device Manager - Storage Navigator secondary window, exit Device Manager - Storage Navigator by pressing <b>Ctrl+Alt+Shift+D</b> all at once.</p>

Error condition	Probable cause / Recommended action
<ul style="list-style-type: none"> <li>▪ The login window does not appear and the white screen continues.</li> <li>▪ You clicked the cross mark  or Close, however the window cannot be closed.</li> </ul>	<p>If you close the web browser but you cannot exit Device Manager - Storage Navigator, reboot the management client or restart Device Manager - Storage Navigator after forcibly closing Device Manager - Storage Navigator as follows:</p> <ul style="list-style-type: none"> <li>▪ In Windows: <ul style="list-style-type: none"> <li>Exit the web browser and then use the Task Manager to terminate iexplorer.exe (if you are using Internet Explorer) or chrome.exe (if you are using Google Chrome).</li> </ul> </li> <li>▪ In UNIX: <ul style="list-style-type: none"> <li>Exit the web browser, and then terminate firefox-bin with the kill command.</li> </ul> </li> <li>▪ If the problem continues, restart the SVP.</li> </ul>
<p>A network error occurred. There is no response to any operation even after 30 minutes.</p>	<p>Restart the management client. An operation can take over 30 minutes depending on the use condition. For example, when several Device Manager - Storage Navigator web clients are running, an operation might take a long time.</p>
<p>An internal error occurs, or a web browser ended abnormally.</p>	<p>Close all dialog boxes, and then log in to Device Manager - Storage Navigator again. If the same error occurs, restart the management client.</p>
<p>During a Device Manager - Storage Navigator operation, the web browser suddenly disappears.</p>	<p>Restart the management client.</p>
<p>An error (1-4011) occurs while you are using Device Manager - Storage Navigator.</p>	<p>The clock time of the management client may have been changed. Log in to Device Manager - Storage Navigator again.</p>
<p>The management client reboots on its own.</p>	<p>Restart the management client.</p>
<p>A Device Manager - Storage Navigator window is forcibly closed during a time-consuming process, such as LDEV formatting.</p>	<p>Close all windows, wait until processing finishes, and then restart Device Manager - Storage Navigator.</p>

Error condition	Probable cause / Recommended action
<p>A Device Manager - Storage Navigator window is incorrectly closed when you do one of the following:</p> <ul style="list-style-type: none"> <li>▪ Click </li> <li>▪ Use commands such as File &gt; Close on the web browser</li> <li>▪ Press the <b>Alt</b> and <b>F4</b> keys</li> </ul>	<p>Restart Device Manager - Storage Navigator. If you cannot log in, wait for one minute and try again.</p>
<p>During a Device Manager - Storage Navigator operation, an add-on (Flash10e.ocx) error occurs.</p>	<p>Restart the management client. If this error occurs repeatedly, reinstall Adobe Flash Player on the management client.</p>
<p>When you log out from the Device Manager - Storage Navigator, an Internet Explorer error occurs.</p>	<p>The probable causes are as follows:</p> <ul style="list-style-type: none"> <li>▪ Internet Explorer has not been updated. Install the latest updates</li> <li>▪ Internet Explorer may be configured incorrectly. Re-install Internet Explorer.</li> </ul>
<p>When you click File &gt; Refresh All or Refresh in the Device Manager - Storage Navigator main window, the percentage of progress remains 99%.</p>	<p>The probable causes are as follows:</p> <ul style="list-style-type: none"> <li>▪ Another application such as Command Control Interface may be changing configuration. The window will be updated shortly after the configuration change ends.</li> <li>▪ Volume Migration operations, Quick Restore operations or Thin Image operations may be in progress. The window will be updated shortly after the operations end.</li> </ul>
<p>One of the following errors occurred during a Device Manager - Storage Navigator operation in the main window</p> <ul style="list-style-type: none"> <li>▪ 20123-107027</li> <li>▪ 20123-108004</li> <li>▪ 00002-058578</li> <li>▪ 00003-002003</li> <li>▪ xxxxx-065740</li> <li>▪ xxxxx-068800</li> </ul> <p>where xxxxx indicates any code.</p>	<ul style="list-style-type: none"> <li>▪ Another application such as Command Control Interface may be changing configuration.</li> <li>▪ Volume Migration operations, Quick Restore operations, or Thin Image operations may be in progress.</li> <li>▪ The configuration data may not be matched if a communication error occurs between the storage system and SVP.</li> </ul> <p>Wait a few minutes and then click File &gt; Refresh All to reload the configuration information. Then run Device Manager - Storage Navigator again. If a configuration change operation was performed, check that all the configuration changes that caused the error were applied, and then set the settings that were not applied again.</p>

Error condition	Probable cause / Recommended action
	<p>When using Encryption License Key, do the following:</p> <ul style="list-style-type: none"> <li>▪ If a failure (00002-058578) occurs when you set the Encryption Environment for the first time from the <b>Edit Encryption Environmental Settings</b> window, do the following: <ol style="list-style-type: none"> <li>1. Wait a few minutes and then click File &gt; Refresh All to reload the configuration information.</li> <li>2. Initialize the Encryption Environment Settings.</li> <li>3. Set the Encryption Environment again.</li> </ol> </li> <li>▪ If a failure (00002-058578) occurs when you set the Encryption Environment again from the <b>Edit Encryption Environmental Settings</b> window, do the following: <ol style="list-style-type: none"> <li>1. Wait a few minutes and then click File &gt; Refresh All to reload the configuration information.</li> <li>2. Set the Encryption Environment again.</li> </ol> </li> </ul>
<p>The Device Manager - Storage Navigator window turns white and the icon shown below displays in the center of the web browser when you use Device Manager - Storage Navigator.</p> <p>If you are using Internet Explorer: </p> <p>If you are using Google Chrome: </p>	<p>Restart the management client.</p>
<p>Operations cannot be performed due to a problem with the Device Manager - Storage Navigator main window. For example, tables are not displayed correctly or some buttons are not displayed. Logging out and back in does not solve the problem.</p>	<p>The Device Manager - Storage Navigator window setting information may have been saved with an incorrect value. Click Settings &gt; Environmental Settings &gt; Reset View to Settings in the Device Manager - Storage Navigator main window to clear the window setting information. Then click any button in the Device Manager - Storage Navigator window and check that it operates correctly. You do not need to log out and back in.</p>

Error condition	Probable cause / Recommended action
Device Manager - Storage Navigator closes automatically when operating the IPv6 address setting from Device Manager - Storage Navigator.	<p>When the symptom occurs, the resource group status remains locked.</p> <p>Open the <b>Resource Lock Properties</b> window and release the locked resource group caused by the symptom. Suspend other operations when releasing the resource group, as other resource groups are also released the lock.</p> <p>If you use HDvM - SN in a web browser, update Adobe Flash Player to version 13 or later.</p>
The error 20122-208003 occurred when using Device Manager - Storage Navigator.	<p>A problem might have occurred with the storage system connection, or user account information which is used for the storage system connection might have changed.</p> <p>Configure the user account information specified for the registered system of the <b>Storage Device List</b> window. For details, see the Hardware Reference Guide for your storage system.</p>

## Incorrect display errors

The following table lists incorrect display errors:

Error condition	Probable cause / Recommended action
A question mark or icon displays in a table or other area of the window.	<ul style="list-style-type: none"> <li>▪ When the question mark appears in the <b>View Tier Properties</b> window, see the topic describing this window in the <i>Provisioning Guide</i>. If the problem still persists, contact customer support.</li> <li>▪ When the question mark appears in the <b>Add External Volumes</b> window, see the topic describing this window in the <i>Hitachi Universal Volume Manager User Guide</i>. If the problem still persists, contact customer support.</li> <li>▪ If the question mark or icon appears in another window, update the window. Contact customer support if the question mark remains after you update the window.</li> </ul>

Error condition	Probable cause / Recommended action
The product name, vendor name, and function name displayed in HDvM - SN are incorrect.	Contact customer support.
A part of the HDvM - SN window is not displayed.	You may be using the zoom in and zoom out function of the web browser. Do not use this function of the web browser when using HDvM - SN.
The display on HDvM - SN's main window is not updated to the latest information. "Last Updated" on HDvM - SN's main window is not updated.	Volume Migration operations, Quick Restore operations, or Thin Image operations may be in progress. The window will be updated shortly after the operations end.
<p>The following message is displayed when connected to HDvM - SN on Internet Explorer or Google Chrome.</p> <p>This content requires Adobe Flash Player.</p> <ul style="list-style-type: none"> <li>▪ Get and install Adobe Flash Player from the Adobe web site.</li> <li>▪ Enable Adobe Flash Player.</li> <li>▪ Adjust the browser security settings.</li> </ul>	<p>This message displays when Adobe Flash Player is not installed. Do the following:</p> <ul style="list-style-type: none"> <li>▪ Install Adobe Flash Player</li> <li>▪ Disable ActiveX Filtering</li> </ul> <p>If you are using Internet Explorer 9 or later, click  Tools &gt; Safety and uncheck ActiveX Filtering.</p> <ul style="list-style-type: none"> <li>▪ When a message appears indicating that the specific site was blocked, perform the procedure described in <a href="#">Adding your SVP to the trusted sites zone for Windows Server computers (on page 27)</a>.</li> <li>▪ When using HDvM - SN with Flash Player, do not change the local storage area value in Adobe Flash Player.</li> <li>▪ When using HDvM - SN with Flash Player, do not disable Adobe Flash Player.</li> <li>▪ If you use Internet Explorer, do not change the settings in Tools &gt; Manage add-ons.</li> </ul>
The Maintenance Utility window is not displayed.	<ul style="list-style-type: none"> <li>▪ Make sure that the browser uses TLS 1.2.</li> <li>▪ If the storage system is registered by using the host name, you need Windows setting on the SVP. Add, to the DNS suffix, the domain names of the hosts that are set for CTL1 and CTL2.</li> </ul>

Error condition	Probable cause / Recommended action
<p>When many items are set, some items might not be displayed even if you scroll through the table.</p>	<p>Depending on the size of a window, some items in a table might not be displayed. Do the following:</p> <ul style="list-style-type: none"> <li>▪ Increase the resolution so that more areas of the table can be shown.</li> <li>▪ Use the zoom in or zoom out function of your browser to adjust the viewing area.</li> </ul> <p><b>Note:</b> Text might become too small.</p> <p>If you still cannot solve the problem, contact customer support.</p>
<p>The Maintenance Utility window is displayed incorrectly.</p> <ul style="list-style-type: none"> <li>▪ A specific window is not displayed.</li> <li>▪ No response if you click the button.</li> </ul>	<p>Set the <b>Maintenance Utility</b> window out of Compatibility View by first confirming "Compatibility View" in the Address bar of Internet Explorer, and then setting Compatibility View to OFF.</p> <p>If "Compatibility View" is not displayed (prior to IE11):</p> <ol style="list-style-type: none"> <li>1. Select Tool &gt; Compatible View Settings in Internet Explorer.</li> <li>2. Uncheck the Display intranet sites in Compatibility View and Display all websites in Compatibility View checkboxes.</li> <li>3. Click Close.</li> </ol>
<p>The message "Unable to launch the application" appears on the secondary window, then operation ends abnormally.</p>	<p>Perform the following:</p> <ol style="list-style-type: none"> <li>1. If the current JRE (Client) version is JRE 7, update to JRE 8 or later.</li> <li>2. Confirm that Use TLS 1.2 for Java is enabled. If Use TLS 1.2 is disabled, change the TLS settings for Java to enabled.</li> </ol>

## UNIX operation errors

The following table lists UNIX operation errors:

Error condition	Probable cause / Recommended action
<p>The web browser is incorrectly displayed because GUI items, such as labels and icons, cannot be loaded properly.</p> <p>Part of a button is outside the window.</p>	<p>If you use Device Manager - Storage Navigator on the Japanese version of Firefox, log out of Device Manager - Storage Navigator, and then log in to Device Manager - Storage Navigator again. Enter the following commands using the X Server Emulator.</p> <ul style="list-style-type: none"> <li>▪ B Shell: LANG=C export LANG</li> <li>▪ C Shell: setenv LANG C</li> </ul>
<p>The web browser closes abnormally.</p>	<p>This problem can occur if a Mozilla process keeps running after Mozilla stops responding. Delete the "java_vm" and "mozilla" processes and continue with Device Manager - Storage Navigator operations.</p>

## Storage Device Launcher errors

Error condition	Probable cause / Recommended action
<ul style="list-style-type: none"> <li>▪ Storage Device Launcher cannot start. Or a message appears asking if you have entered the name correctly because <code>..\..\bundle\jre_win\bin\javaw</code> cannot be found.</li> <li>▪ HDvM - SN that can run in the Adobe AIR environment cannot start from a web browser.</li> </ul>	<p>After installing Storage Device Launcher, the <code>WCLauncher_win</code> folder used for the installation might have been deleted or moved. If the <code>WCLauncher_win</code> folder remains, restore it to the location where it was installed. Or, reinstall Storage Device Launcher in the new location to which it has been moved.</p> <p>If you cannot find the <code>WCLauncher_win</code> folder, download the setup file and reinstall Storage Device Launcher. For details, see <a href="#">Installing Storage Device Launcher on the management client (on page 29)</a>.</p>

## HDvM - SN secondary window blocked

If Java 7 Update 55 or later or Java 8 Update 5 or later is installed on the management client, execution of the Device Manager - Storage Navigator secondary window application might be blocked. In this case, use the following procedure to change the Java security settings.

### Procedure

1. Check the version and update information of Java installed in your management client. Click **Start > Control Panel > Java**.
2. On the **General** tab, click **About**.
3. Check the version and update information of Java, and then close the **About Java** dialog box. If your PC uses either Java 7 update 55 or later, or Java 8 Update 5 or later, you need to change Java security settings referring to Step 4 and after.
4. Select the **Security** tab.
5. Click **Edit Site List**.
6. In **Exception Site List**, specify the URL of the SVP as follows, and then click **Add**.  
`http://IP-address-of-SVP` OR `https://IP-address-of-SVP`
7. Click **OK**.
8. Select the **Advanced** tab.
9. For **Perform signed code certificate revocation checks on**, select **Do not check (not recommended)**, and then click **OK**.
10. Close the **Control Panel**.

## Clearing the browser cache and Java memory

If an error occurs in Device Manager - Storage Navigator, try clearing the web browser cache to solve the problem. For instructions, see the documentation for the browser.

Reboot Jetty periodically to ensure that Device Manager - Storage Navigator starts up and runs well. When Jetty is rebooted at regular intervals, memory is released from Java programs, and the necessary memory capacity is secured for startup of Device Manager - Storage Navigator.

## Firefox web browser problems on UNIX

Note the following when using Firefox web browser on UNIX:

- If a Mozilla process or a Firefox web browser process becomes unavailable, Device Manager - Storage Navigator performance is affected. Delete the abnormal process and continue with Device Manager - Storage Navigator operations.
- When using Device Manager - Storage Navigator on the Japanese version of the Firefox web browser, you must use the X Server Emulator to properly configure the browser, as follows:

In a B Shell, enter the following command:

```
LANG=C
export LANG
```

In a C Shell, enter the following command:

```
setenv LANG C
```

When you use Device Manager - Storage Navigator with Firefox, movements of the focus may differ from movements of the focus in Internet Explorer. For example:

- When the Device Manager - Storage Navigator login window appears, the focus is not on the User Name box. Even if the User Name box is emphasized, you cannot enter any characters in it.
- When you move the focus by using the Tab key, the destination browser window does not become active.

In Firefox, when you click Logout at the upper right corner of the Device Manager - Storage Navigator main window, the Device Manager - Storage Navigator login window appears after you logout. With Internet Explorer, the window closes after the logout.

## Troubleshooting the SMI-S function

If you cannot access the SMI-S function, check the network environment and access destination. If access cannot be made even though there is no problem with the network environment and access destination, contact customer support.

The SMI-S certificate might have expired when you receive a storage system. If so, you must upload a new signed certificate to the SMI-S provider.

### SMI-S artificial indication errors

The following table lists SMI-S artificial indication errors:

Error condition	Probable cause / Recommended action
The user ID or the password is not valid. (00190 77302)	User ID or password is invalid. Enter the correct user ID or password, and then retry the operation.
An error occurred during the listener information acquisition. (00190 77303)	An error occurred during the listener information acquisition. Collect Device Manager - Storage Navigator normal dump file to the media using the dump tool.
No listeners are subscribed to the provider. (00190 77304)	The listeners are not subscribed to the SMI-S provider. Have the listeners subscribe to the provider, and retry.
The artificial indication cannot be sent to some listeners. (00190 77305)	The artificial indication cannot be sent to some listeners. Use the dump tool to collect and save Device Manager - Storage Navigator normal dump files. Then contact the customer support.
A time-out error occurred. (00190 77306)	Send the artificial indication again. If this problem persists, use the dump tool to collect Device Manager - Storage Navigator normal dump files to some recording media and then contact the customer support.
An internal error occurred. (00190 77307)	Use the dump tool to collect Device Manager - Storage Navigator normal dump files to some recording media and then contact the customer support.

## Other errors

The following table lists other errors that might occur in Device Manager - Storage Navigator (HDvM - SN) and Tool Panel utilities.

Error condition	Probable cause / Recommended action
<ul style="list-style-type: none"> <li>▪ Error about insufficient capacity when creating an LDEV with sufficient capacity.</li> <li>▪ Operation error about an LDEV that does not exist when creating a pair for an LDEV that does exist.</li> </ul>	<p>Configuration information displayed in HDvM - SN and controller configuration information might not match.</p> <p>Click File &gt; Refresh All in the Device Manager - Storage Navigator main window to reload configuration information.</p> <p>If the problem persists, contact customer support.</p>

Error condition	Probable cause / Recommended action
The software on the SVP is upgraded or downgraded.	Close all HDvM - SN windows, and then clear the browser cache. Even when you are not sure that the software on the SVP is upgraded or downgraded, clear the browser cache.
HDvM - SN processing is temporarily delayed.	Internal processing (such as, configuration change, P.P. check, or operational information acquisition) might be running on the SVP.
HDvM - SN processing is delayed.	<p>If you use HDvM - SN in a browser, the local storage value for Adobe Flash Player might have decreased. Follow these steps:</p> <ol style="list-style-type: none"> <li>1. Right-click on the HDvM - SN main window and click Settings to open the <b>Adobe Flash Player Settings</b> window.</li> <li>2. In the local storage settings, move the slider until Unlimited appears and then click Close.</li> <li>3. Close HDvM - SN.</li> <li>4. Restart HDvM - SN.</li> <li>5. If the local storage confirmation dialog box appears, click Allow.</li> <li>6. If this problem persists, there might be a problem with the SVP performances. Contact customer support.</li> </ol>
Installing of signed SSL certificate fails.	The passphrase for the SSL certificate might be set. Release the passphrase. If needed, see <a href="#">Releasing an SSL certificate passphrase (on page 50)</a> .
An error (0002-009000) occurs while you are using HDvM - SN.	<p>Another management client might be changing the HDvM - SN settings. Close all windows, check that maintenance personnel are not using the storage system, and then log in to HDvM - SN again.</p> <p>If other than above, restart the SVP, and then log in to HDvM - SN again.</p>
In the <b>Operation Lock Properties</b> window, Locked is displayed for system lock status and Unlocked is displayed for resource group status.	Restart the SVP then log in to HDvM - SN again.
<i>Failed in the certification of the user.</i> appears when you create a configuration report of a storage system and try to view it in a browser.	Close the tab of the configuration report or the window, and then open it again.

Error condition	Probable cause / Recommended action
	<p>If the problem cannot be solved, address mismatch of SSL certificates between the SVP and the management client might have occurred. To reconfigure SSL communication, see <a href="#">Setting up SSL communications (on page 45)</a>.</p> <p>Otherwise, you can display the configuration report by logging in to HDvM - SN using HTTP.</p> <p>Note that you cannot connect HDvM - SN that operates on Adobe AIR by using HTTP (Only HTTPS connection is available).</p>
<p>HDvM - SN operation is slow, although the requirements for the SVP are satisfied.</p>	<p>Verify that no anti-virus software runs on the SVP.</p>
<p>You cannot resolve an error condition.</p>	<p>Do the following, and then contact the customer support.</p> <ol style="list-style-type: none"> <li>1. Log in to the SVP. In the SVP, use the dump tool to copy the HDvM - SN detailed dump files onto recording media.</li> <li>2. Obtain the Java log and trace files (only when using the HDvM - SN secondary window).</li> <li>3. Obtain the Java log and trace files (only when using the HDvM - SN secondary window).</li> </ol> <p>When using Web Console Launcher, collect the log in <code>&lt;installation-directory-for-Web-Console-Launcher&gt;\WCLauncher\log</code>.</p>
<p>When you open the window for updating the firmware, a window for one of the following messages appears, and the firmware cannot be updated:</p> <ul style="list-style-type: none"> <li>▪ 32061 208061, 33361 203116</li> <li>▪ 30162 205057, 33361 203116</li> </ul> <p>"The firmware is being updated."</p>	<p>Forcibly release the system lock, and then update the firmware again. Note that the system lock can be forcibly released even if System Unlocked is displayed as the status at the upper right of the Maintenance Utility window.</p>

Error condition	Probable cause / Recommended action
Edit is clicked, but error "21041-007018" occurs and the storage system information cannot be changed.	<p>The Storage Device List might not have been started with administrator permissions.</p> <ul style="list-style-type: none"> <li>▪ End the Storage Device List, and then start it with administrator permissions.</li> <li>▪ If an error still occurs after starting the Storage Device List with administrator permissions, restart the SVP and restart the Storage Device List with administrator permissions.</li> </ul>
Start Service or Stop Service is clicked, but error "21041-007019" occurs. Otherwise, storage systems cannot be deleted from the Storage Device List.	<p>The Storage Device List might not have been started with administrator permissions.</p> <ul style="list-style-type: none"> <li>▪ End the Storage Device List, and then start it with administrator permissions.</li> <li>▪ If an error still occurs after starting the Storage Device List with administrator permissions, restart the SVP and restart the Storage Device List with administrator permissions.</li> </ul>
A storage system is clicked in a Storage Device List window, the login window for Storage Navigator is not opened.	<p>The Storage Device List might not have been started with administrator permissions.</p> <ul style="list-style-type: none"> <li>▪ End the Storage Device List, and then start it with administrator permissions.</li> <li>▪ If an error still occurs after starting the Storage Device List with administrator permissions, restart the SVP and restart the Storage Device List with administrator permissions.</li> </ul>
An error (21443-200026) occurs while installing the storage management software or the SVP software.	<p>The port number of the port number key name "RestAPIServerStop" might be the same as the port number of other software.</p> <p>Use the following procedure to install the software again:</p> <ol style="list-style-type: none"> <li>1. Check whether the port number of "RestAPIServerStop" is the same as the port number of another application.</li> <li>2. If the port numbers are the same, change the port number of "RestAPIServerStop" or the port number of the other software.</li> <li>3. Install the software again.</li> </ol>

Error condition	Probable cause / Recommended action
An error (21041-007006) or (21041-007008) occurs when you click Apply on the <b>Add System</b> window.	<p>The connection between the SVP and the storage system has failed. Make sure that the following conditions are satisfied:</p> <ul style="list-style-type: none"><li>▪ The storage system is running.</li><li>▪ The Management LAN is working properly.</li><li>▪ The IP address or the host name of the storage system is correct.</li></ul> <p>If you want to create a device icon when the running storage system is not connected to the Management LAN, select Manual and then enter the values for the required fields.</p>

# Appendix B: Examples of Device Manager - Storage Navigator storage configuration reports

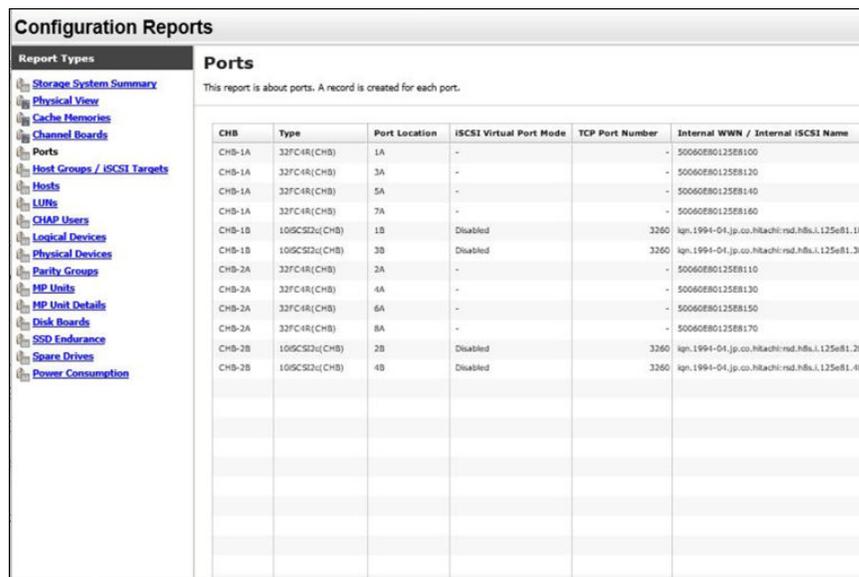
The Device Manager - Storage Navigator can show configuration reports for your storage system in table, graph, and CSV formats.

The following examples show various storage configuration reports in table, graph, and CSV formats.

## Report examples: table view

Some Device Manager - Storage Navigator reports appear in table format.

The following figure provides examples of reports in table format. The  icons are displayed before the names of the reports in table view. If the icons are not displayed correctly, update the window. To sort data in table reports, click any column header.



**Configuration Reports**

**Report Types**

- Storage System Summary
- Physical View
- Cache Memories
- Channel Boards
- Ports
- Host Groups / iSCSI Targets
- Hosts
- LUNs
- CHAP Users
- Logical Devices
- Physical Devices
- Parity Groups
- MP Units
- MP Unit Details
- Disk Boards
- SSD Endurance
- Spare Drives
- Power Consumption

**Ports**

This report is about ports. A record is created for each port.

CHB	Type	Port Location	iSCSI Virtual Port Mode	TCP Port Number	Internal WWN / Internal iSCSI Name
CHB-1A	32FC4R(CHB)	1A	-	-	50060E80125E8100
CHB-1A	32FC4R(CHB)	3A	-	-	50060E80125E8120
CHB-1A	32FC4R(CHB)	5A	-	-	50060E80125E8140
CHB-1A	32FC4R(CHB)	7A	-	-	50060E80125E8160
CHB-1B	10SCS2j(CHB)	1B	Disabled	3260	iqn.1994-04.jp.co.hitachi.rnd.hbs.l.125e81.1b
CHB-1B	10SCS2j(CHB)	3B	Disabled	3260	iqn.1994-04.jp.co.hitachi.rnd.hbs.l.125e81.3b
CHB-2A	32FC4R(CHB)	2A	-	-	50060E80125E8110
CHB-2A	32FC4R(CHB)	4A	-	-	50060E80125E8130
CHB-2A	32FC4R(CHB)	6A	-	-	50060E80125E8150
CHB-2A	32FC4R(CHB)	8A	-	-	50060E80125E8170
CHB-2B	10SCS2j(CHB)	2B	Disabled	3260	iqn.1994-04.jp.co.hitachi.rnd.hbs.l.125e81.2b
CHB-2B	10SCS2j(CHB)	4B	Disabled	3260	iqn.1994-04.jp.co.hitachi.rnd.hbs.l.125e81.4b

## CHAP Users report

The following figure shows an example of a CHAP Users report. The table following the figure describes the items in the report.

CHAP Users			
This report is about chap users. A record is created for each chap user.			
Port Location	User Name	iSCSI Target Alias	iSCSI Target Name
1B	iqn.1994-04.jp.co.hitachi:rsd.h8m.t.00001.1b000	iqn.1994.04.jp.co.hitachi:rsd.r50.t.62510.2a.02	iqn.1994.04.jp.co.hitachi:rs
3B	iqn.1994-04.jp.co.hitachi:rsd.h8m.t.00001.3b000	iqn.1994.04.jp.co.hitachi:rsd.r50.t.62510.2a.02	iqn.1994.04.jp.co.hitachi:rs
2B	iqn.1994-04.jp.co.hitachi:rsd.h8m.t.00001.2b000	iqn.1994.04.jp.co.hitachi:rsd.r50.t.62510.2a.02	iqn.1994.04.jp.co.hitachi:rs
4B	iqn.1994-04.jp.co.hitachi:rsd.h8m.t.00001.4b000	iqn.1994.04.jp.co.hitachi:rsd.r50.t.62510.2a.02	iqn.1994.04.jp.co.hitachi:rs
Total:4			

Item	Description
Port Location	Name of the port
User Name	Name of the CHAP user for authentication
iSCSI Target Alias	Alias of the iSCSI target
iSCSI Target Name	Name of the iSCSI target

## Disk Boards report

The following figure shows an example of a Disk Boards report. The table following the figure describes the items in the report.

Disk Boards					
This report is about disk boards. A record is created for each disk boards.					
DKB	Number of PGs	Number of LDEVs(Total)	Number of LDEVs(Unallocated)	Total LDEV Capacity(MB)	Unallocated LDEV Capacity(MB)
DKB-1C	1	32	27	327680.00	276480.00
DKB-2C	1	32	27	327680.00	276480.00
Total:2					

Item	Description
DKB	Location of the disk board. <ul style="list-style-type: none"> <li>"External" is displayed when the storage system has an external storage system.</li> <li>"External (FICON DM)" is displayed when the storage system has volumes for FICON DM.</li> </ul>
Number of PGs	The number of the parity groups that the disk board controls. <ul style="list-style-type: none"> <li>If "DKB" is "External", this item indicates the number of parity groups mapped to external volumes.</li> <li>If "DKB" is "External (FICON DM)", this item indicates the number of parity groups mapped to volumes for FICON DM.</li> </ul>

Item	Description
Number of LDEVs (Total)	The number of the logical volumes belonging to the parity groups that the disk board controls.
Number of LDEVs (Unallocated)	The number of the logical volumes that are inaccessible from the host and belong to the parity groups controlled by the disk board.
Total LDEV Capacity (MB)	Total capacity of the logical volumes belonging to the parity groups that the disk board controls.
Unallocated LDEV Capacity (MB)	Total capacity of the logical volumes that are inaccessible from the host and belong to the parity groups controlled by the disk board.

## Host Groups / iSCSI Targets report

The following figure shows an example of a Host Groups / iSCSI Targets report. The table following the figure describes the items in the report.

Host Groups / iSCSI Targets				
This report is about host groups and iSCSI Targets. A record is created for each host group or iSCSI Target.				
Port Location	Type	Host Group Name / iSCSI Target Alias	Host Group ID / iSCSI Target ID	iSCSI Target Name
1A	4FC16(CHB)	1A-G00		-
3A	4FC16(CHB)	3A-G00		-
1B	ISCSI(OPT)	1B-G00	00	iqn.1994-04.jp.co.hitachi:rsd.h8m.t.00001.1b000
3B	ISCSI(OPT)	3B-G00	00	iqn.1994-04.jp.co.hitachi:rsd.h8m.t.00001.1b000
2A	4FC16(CHB)	2A-G00		-
4A	4FC16(CHB)	4A-G00		-
2B	ISCSI(OPT)	2B-G00	00	iqn.1994-04.jp.co.hitachi:rsd.h8m.t.00001.1b000
4B	ISCSI(OPT)	4B-G00	00	iqn.1994-04.jp.co.hitachi:rsd.h8m.t.00001.1b000

Total:8

Item	Description
Port Location	Name of the port
Type	Type of the host group
Host Group Name / iSCSI Target Alias	Name of the host group / alias of the iSCSI target
Host Group ID / iSCSI Target ID	Number of the host group / ID of the iSCSI target
iSCSI Target Name	Name of the iSCSI target
Resource Group Name	Resource Group Name where the host group belongs
Resource Group ID	Resource Group ID where the host group belongs
Number of LUNs	The number of LU paths defined to the host group

Item	Description
Number of LDEVs	The number of logical volumes that are accessible from the hosts in the host group
Number of PGs	The number of parity groups with logical volumes that are accessible from the hosts in the host group
Number of DKBs	The number of disk boards controlling the parity groups where the logical volumes that are accessible from the hosts in the host group belong
Total LDEV Capacity (MB)	Total capacity of the logical volumes accessible from the hosts in the host group. This is the total capacity of LDEVs referred to in "Number of LDEVs".
Port Security	Security of the port
Authentication : Method	iSCSI target method authentication settings <ul style="list-style-type: none"> <li>▪ CHAP</li> <li>▪ None</li> <li>▪ Comply with Host Setting</li> </ul>
Authentication : Mutual CHAP	Enable or disable the iSCSI target mutual CHAP <ul style="list-style-type: none"> <li>▪ Enabled</li> <li>▪ Disabled</li> </ul>
Authentication : User Name	Authenticated iSCSI target user name
Authentication : Number of Users	The number of authenticated users registered in the iSCSI target
Host Mode	Host mode of the host group
Host Mode Option	Host mode option of the host group. Host mode options are separated by semicolons (;) when more than one option is specified.
Number of Hosts	The number of the hosts in the host group.

## Hosts report

The following figure shows an example of a hosts report. The table following the figure describes the items in the report. When a host is registered to more than one port, more than one record shows information about the same host.

**Hosts**

This report is about hosts. A record is created for each host. When a host is registered to more than one port, more than one record shows information about the same host.

Port Location	Type	Port Internal WWN	Port Security	Host Group Name / iSCSI Target Alias	iSCSI Target Name
1B	ISCSI(OPT)		Disabled	1B-G00	iqn.1994-04.jp.co.hitachi:rsd.h8m.t.00001.1b000
2B	ISCSI(OPT)		Disabled	2B-G00	iqn.1994-04.jp.co.hitachi:rsd.h8m.t.00001.1b000
3B	ISCSI(OPT)		Disabled	3B-G00	iqn.1994-04.jp.co.hitachi:rsd.h8m.t.00001.1b000
4B	ISCSI(OPT)		Disabled	4B-G00	iqn.1994-04.jp.co.hitachi:rsd.h8m.t.00001.1b000

Total:4

Item	Description
Port Location	Name of the port
Type	Port type
Port Internal WWN	Port WWN
Port Security	Port security setting
Host Group Name / iSCSI Target Alias	Name of the host group / alias of the iSCSI target
iSCSI Target Name	Name of the iSCSI target
Host Mode	Host mode of the host group
Host Mode Option	Host group host mode option. When more than one host mode option is specified, they are separated by semicolons (;)
Host Name	Name of the host that can access the LU path through the port
HBA WWN / iSCSI Name	Host WWN / host iSCSI name. The name is in 16-digit hex format.

## Logical Devices report

The following figure shows an example of a logical volumes report. The table following the figure describes the items in the report.

**Logical Devices**

This report is about logical volumes. A record is created for each logical volume.

LDEV ID	LDEV Name	Capacity(MB)	Emulation Type	Resource Group Name	Resource Group ID	PG	RAID Level	Drive
00:00:00		10240.00	OPEN-V	meta_resource	0	1-1	RAID5(3D+1P)	SAS/7
00:00:01		10240.00	OPEN-V	meta_resource	0	1-1	RAID5(3D+1P)	SAS/7
00:00:02		10240.00	OPEN-V	meta_resource	0	1-1	RAID5(3D+1P)	SAS/7
00:00:03		10240.00	OPEN-V	meta_resource	0	1-1	RAID5(3D+1P)	SAS/7
00:00:04		10240.00	OPEN-V	meta_resource	0	1-1	RAID5(3D+1P)	SAS/7
00:00:05		10240.00	OPEN-V	meta_resource	0	1-1	RAID5(3D+1P)	SAS/7
00:00:06		10240.00	OPEN-V	meta_resource	0	1-1	RAID5(3D+1P)	SAS/7

Total:32

Item	Description
LDEV ID	The logical volume number
LDEV Name	The logical volume name
Capacity (MB)	Capacity of the logical volume
Emulation Type	Emulation type of the logical volume
Resource Group Name	Resource group name where LDEV belongs
Resource Group ID	Resource group ID where LDEV belongs
PG	<p>The parity group number.</p> <ul style="list-style-type: none"> <li>▪ If the number starts with "E" (for example, E1-1), the parity group contains external volumes.</li> <li>▪ If the number starts with "M" (for example, M1-1), the parity group contains FICON DM volumes.</li> </ul> <p>A hyphen displays for Dynamic Provisioning or Thin Image V-VOLs.</p>
RAID Level	RAID level of the parity group where the logical volume belongs <sup>1</sup>
Drive Type/RPM	<p>Drive type, drive control name, and revolutions-per-minute (RPM) of the drive of the parity group where the logical volume belongs.</p> <p>A hyphen (-) is displayed as RPM when the drive is SSD.<sup>1</sup></p> <p>For VSP E990, this item is displayed as Drive Type/Interface.</p>
Drive Type-Code	Type code of the drive of the parity group where the logical volume belongs <sup>1</sup>
Drive Capacity	Capacity of the drive of the parity group where the logical volume belongs. <sup>1</sup>
PG Members	List of the drive locations of the parity group where the logical volume belongs <sup>1</sup>
Allocated	<p>Information about whether the host can access the logical volume.</p> <p>For mainframe volumes and multi-platform volumes, "Y" is displayed unless the volumes are in the reserved status.</p>
SSID	SSID of the logical volume
CVS	Information about whether the logical volume is a customized volume
OCS	Oracle checksum
Attribute	The attribute of the logical volume
Provisioning Type	Provisioning type of the logical volume

Item	Description
Pool Name	<ul style="list-style-type: none"> <li>▪ For V-VOLs of Dynamic Provisioning, the name of the pool related to the logical volume is displayed<sup>1</sup></li> <li>▪ If the logical volume attribute is Pool, the name of the pool where the logical volume belongs is displayed</li> <li>▪ When neither of the above are displayed, the pool name is blank</li> </ul>
Pool ID	The ID of the pool indicated by "Pool Name" A hyphen (-) displays for volumes other than pool-VOLs or V-VOLs
Current MPU	The number of the MP unit that currently controls the logical volume
Setting MPU	The number of the MP unit that you specified to control the logical volume
Command Device: Security	Indicates whether Security is specified as the attribute for the command device. A hyphen (-) displays when "Attribute" is not "CMDDEV".
Command Device: User Authentication	Indicates whether User Authentication is specified as the attribute for the command device. A hyphen (-) displays when "Attribute" is not "CMDDEV".
Command Device: Device Group Definition	Indicates whether Device Group Definition is specified as the attribute for the command device. A hyphen (-) displays when "Attribute" is not "CMDDEV".
Encryption	<p>Indicates whether the parity group to which the LDEV belongs is encrypted.</p> <ul style="list-style-type: none"> <li>▪ For internal volumes: Enabled (encrypted) or Disabled (not encrypted)</li> <li>▪ For external volumes: blank</li> </ul>
T10 PI	<p>Indicates the T10 PI attribute set for the LDEV.</p> <ul style="list-style-type: none"> <li>▪ Enabled</li> <li>▪ Disabled</li> <li>▪ Blank if the emulation type is not OPEN-V</li> </ul>
ALUA Mode	<p>Indicates whether the ALUA mode is enabled:</p> <ul style="list-style-type: none"> <li>▪ Enabled: ALUA mode is enabled.</li> <li>▪ Disabled: ALUA mode is disabled.</li> </ul>
<p><b>Notes:</b></p> <p>1. A hyphen (-) displays if the LDEV is an external volume.</p>	



## MP Units report

The following figure shows an example of an MP units report. The table following the figure describes the items in the report.

<b>MP Units</b>			
This report is about MP units. A record is created for each MP unit.			
<b>MP Unit ID</b>	<b>Auto Assignment</b>	<b>Number of Resources(LDEV)</b>	<b>Number of Resources</b>
MPU-10	Enabled	334	
MPU-11	Enabled	315	
MPU-20	Enabled	312	
MPU-21	Enabled	313	
Total:4			

<b>Item</b>	<b>Description</b>
MP Unit ID	MP unit ID
Auto Assignment	Auto assignment attribute for the MP unit
Number of Resources (LDEV)	Number of LDEVs that the MP unit controls
Number of Resources (Journal)	Number of journals that the MP unit controls
Number of Resources (External Volume)	Number of external volumes that the MP unit controls (includes volumes for FICON DM)
Number of Resources (Total)	The total number of resources that the MP unit controls. It is the total of Number of Resources (LDEV), Number of Resources (Journal), and Number of Resources (External Volume).

## MP Unit Details report

The following figure shows an example of an MP unit details report. The table following the figure describes the items in the report.

<b>MP Unit Details</b>				
This report is about MP unit details. A record is created for each resource controlled by an MP unit.				
MP Unit ID	Auto Assignment	Resource ID	Resource Name	Type
MPU-10	Enabled	00:00:00	Basic	LDEV
MPU-10	Enabled	00:00:01	Basic	LDEV
MPU-10	Enabled	00:00:02	Basic	LDEV
Total:1274				

Item	Description
MP Unit ID	MP unit ID
Auto Assignment	Auto assignment attribute for the MP unit
Resource ID	ID of this resource that the MP unit controls
Resource Name	The name of the resource that the MP unit controls. If "Type" is LDEV, the LDEV name that is set is displayed. A hyphen (-) displays for journal volumes or external volumes.
Type	The type of the resource that the MP unit controls

## Parity Groups report

The following figure shows an example of a parity groups report. The table following the figure describes the items in the report.

<b>Parity Groups</b>				
This report is about parity groups. A record is created for each parity group.				
PG	DKB	RAID Level	Resource Group Name	Resource
1-1	DKB-1H;DKB-2H	RAID5(3D+1P)	meta_resource	0
1-2	DKB-1H;DKB-2H	RAID5(3D+1P)	meta_resource	0
1-3	DKB-1H;DKB-2H	RAID5(3D+1P)	meta_resource	0
Total:6				

Item	Description
PG	Parity group number <ul style="list-style-type: none"> <li>▪ If the number starts with "E" (for example, E1-1), the parity group contains external volumes (Hitachi Universal Volume Manager User Guide).</li> <li>▪ If the number starts with "M" (for example, M1-1), the parity group contains volumes for FICON DM.</li> </ul>
DKB	Name of the disk board that controls the parity group <sup>1</sup>
RAID Level	RAID level of the parity group <sup>1</sup>
Resource Group Name	Name of the resource group in which the parity group belongs
Resource Group ID	ID for the resource group in which the parity group belongs
Emulation Type	Emulation type of the parity group
Number of LDEVs (Total)	The number of the logical volumes in the parity group
Number of LDEVs (Unallocated)	The number of the logical volumes in the parity group that the host cannot access
Total LDEV Capacity (MB)	Capacity of the logical volumes in the parity group
Unallocated LDEV Capacity (MB)	Capacity of the logical volumes <sup>1</sup> in the parity group that the host cannot access
Drive Type-Code	The type code of the drive in the parity group. <ul style="list-style-type: none"> <li>▪ The type code of the first drive in the parity group.</li> <li>▪ If the parity group contains external volumes, the drive type code displays the vendor, the model, and the serial number of the storage system.</li> <li>▪ Separated by semicolons (;) if multiple drive types are set.</li> </ul>
Drive Type/Interface/RPM	Drive type, drive control name, and revolutions-per-minute (RPM) of the drive in the parity group where the LDEV belongs <sup>1</sup>  A hyphen (-) is displayed instead of the RPM when the drive is an SSD or FMD.  For VSP E990, this item is displayed as Drive Type/Interface.
Drive Capacity	Capacity of the drive in the parity group <sup>1</sup>
RAID Concatenation #0	The number indicating a parity group #0 connected to this parity group <sup>1,2</sup>

Item	Description
RAID Concatenation #1	The number indicating a parity group #1 connected to this parity group <sup>1,2</sup>
RAID Concatenation #2	The number indicating a parity group #1,2 connected to this parity group <sup>1,2</sup>
Encryption	Indicates whether the parity group is encrypted. <ul style="list-style-type: none"> <li>For internal volumes: Enabled (encrypted) or Disabled (not encrypted)</li> <li>For external volumes: A hyphen (-) is displayed</li> </ul>
Accelerated Compression	Accelerated compression of the parity group <ul style="list-style-type: none"> <li>If accelerated compression is supported, Enabled or Disabled is displayed.</li> <li>If accelerated compression is not supported, a hyphen (-) is displayed.</li> </ul>
<b>Notes:</b>	
<ol style="list-style-type: none"> <li>A hyphen is displayed if the parity group contains external volumes.</li> <li>A hyphen is displayed if the parity group is not connected with another parity group or if the parity group contains external volumes including volumes for FICON DM.</li> </ol>	

## Physical Devices report

The following figure shows an example of part of a Physical Devices report. The actual report includes more columns of information. A record is created for each physical device. The table following the figure describes the items in the report.

<b>Physical Devices</b>					
This report is about pdevs. A record is created for each pdev.					
Location	CR#	PG	Emulation Type	Drive Type	RPM
HDD00-00	00/00	1-1	OPEN-V	SAS	720
HDD00-01	00/01	1-2	OPEN-V	SAS	720
HDD00-02	00/02	1-3	OPEN-V	SAS	720
HDD00-03	00/03	1-4	OPEN-V	SAS	720
HDD00-04	00/04	2-1	OPEN-V	SAS	720

Total: 12

Item	Description
Location	Name of physical devices
CR#	C# and R# to define physical devices Output as "XX/YY"
PG	Parity group of physical devices
Emulation Type	Parity group of physical devices
Drive type	Drive type of physical devices <ul style="list-style-type: none"> <li>▪ SAS</li> <li>▪ SSD</li> </ul>
RPM	Revolutions-per-minute (RPM) in the parity group <ul style="list-style-type: none"> <li>▪ 8000</li> <li>▪ 15000</li> </ul> <p>A hyphen (-) is displayed instead of the RPM when the drive type is an SSD.</p> <p>For VSP E990, this item is displayed as Interface.</p>
Drive Type-Code	Type code of the drive in the parity group. Output example: SLR5B- M200SS;SFB5A-M200SS; (if multiple drive types are set)
Drive Size	Drive size (inches) <ul style="list-style-type: none"> <li>▪ 2.5</li> <li>▪ 3.5</li> </ul>
Drive Capacity	Physical drive capacity (GB or TB)
Drive Version	Firmware version of the drive
DKB1	Name of the DKB1 which controls the physical devices
DKB2	Name of the DKB2 which controls the physical devices
Serial Number#	Serial product number of the physical devices <ul style="list-style-type: none"> <li>▪ yy: year (last 2 digits)</li> <li>▪ mm: month (2 digits)</li> <li>▪ xxxxxxxx: product number of the physical devices</li> </ul>
RAID Level	RAID level of the physical devices <ul style="list-style-type: none"> <li>▪ RAID1(2D+2D)</li> <li>▪ RAID5(7D+1P)</li> </ul>

Item	Description
	<ul style="list-style-type: none"> <li>▪ RAID6(6D+2P)</li> <li>▪ RAID6(14D+2P)</li> </ul>
RAID Concatenation#0	Number indicating a parity group #0 connected to this parity group Output example: 2-1, 3-1, 4-1
RAID Concatenation#1	Number indicating a parity group #1 connected to this parity group Output example: 2-1, 3-1, 4-1
RAID Concatenation#2	Number indicating a parity group #2 connected to this parity group Output example: 2-1, 3-1, 4-1
Resource Group Name	Name of resource group to which the parity group of physical devices belong
Resource Group ID	ID (0 to 1023 binary)
Encryption	Enable or disable status of the parity group to which the physical devices belong <ul style="list-style-type: none"> <li>▪ Enabled: Encryption is enabled.</li> <li>▪ Disabled: Encryption is disabled.</li> </ul>

## Ports report

The following figure shows an example of part of a ports report. The actual report includes several more columns of information. The table following the figure describes the items in the report.

**Ports**

This report is about ports. A record is created for each port.

CHB	Type	Port Location	TCP Port Number	Internal WWN / Internal iSCSI Name	Fabric
CHB-1A/1B/1C/1D	NAS Module(CHB)	1A	-	-	-
CHB-1A/1B/1C/1D	NAS Module(CHB)	1C	-	-	-
CHB-1E	8FC4 (CHB)	1E	-	50060E8012000104	OFF
CHB-1E	8FC4 (CHB)	3E	-	50060E8012000124	OFF

Item	Description
CHB	Name of the channel board
Type	Package type of the channel board
Port Location	Name of the port on the channel board

Item	Description
iSCSI Virtual Port Mode	Mode of the iSCSI virtual port
TCP Port Number	Port number to use for a socket (decimal)
Internal WWN / Internal iSCSI Name	WWN / iSCSI name of the port
Fabric	One of the Fibre topology settings indicating the setting status of the Fabric switch
Connection Type	One of the Fibre topology settings <ul style="list-style-type: none"> <li>▪ Point to Point</li> <li>▪ FC-AL</li> </ul>
IPv4 : IP Address	IPv4 address of the port Output example: 192.168.0.100
IPv4 : Subnet Mask	IPv4 subnet mask of the port Output example: 255.255.255.0
IPv4 : Default Gateway	IPv4 default gateway of the port Output example: 255.255.255.0
IPv6 : Mode	IPv6 settings of the port <ul style="list-style-type: none"> <li>▪ Enabled</li> <li>▪ Disabled</li> </ul>
IPv6 : Link Local Address	IPv6 link local address of the port (16-digit hexadecimal)
IPv6 : Global Address	IPv6 global address of the port. Output example: xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx (hexadecimal)
IPv6 : Global Address 2	IPv6 global address 2 of the port. Output example: xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx (hexadecimal)
IPv6 : Assigned Default Gateway	Assigned IPv6 default gateway
Selective ACK	Selective ACK mode <ul style="list-style-type: none"> <li>▪ Enabled</li> <li>▪ Disabled</li> </ul>
Ethernet MTU Size (Byte)	MTU settings (binary) <ul style="list-style-type: none"> <li>▪ 1,500</li> </ul>

Item	Description
Keep Alive Timer	iSCSI keep alive timer (0 to 64,800) (sec)
VLAN : Tagging Mode	Tagging mode of VLAN <ul style="list-style-type: none"> <li>▪ Enabled</li> <li>▪ Disabled</li> </ul>
VLAN : ID	Number of VLAN set to the port (1 to 4,094)
CHAP User Name	User name for the CHAP authentication
iSNS Server : Mode	iSNS mode settings <ul style="list-style-type: none"> <li>▪ ON</li> <li>▪ OFF</li> </ul>
iSNS Server : IP Address	IP address of the iSNS server (30 to 65,535)
iSNS Server : TCP Port Number	Number of the TCP port used in iSNS (binary)
Address (Loop ID)	Fibre port address and Loop ID of the port
Port Security	Security of the port <ul style="list-style-type: none"> <li>▪ Enabled</li> <li>▪ Disabled</li> </ul>
Speed	Data transfer speed of the port
SFP Data Transfer Rate	Maximum transfer rate of SFP which the mounted package supports. <ul style="list-style-type: none"> <li>▪ 10G</li> <li>▪ 16G</li> <li>▪ 32G</li> <li>▪ A hyphen (-) is displayed if Type is 10iSCSI2c (CHB)).</li> </ul>
T10 PI Mode	Indicates whether the T10 PI mode can be applied to the port. <ul style="list-style-type: none"> <li>▪ Enabled</li> <li>▪ Disabled</li> <li>▪ Blank if the port type is a Fibre port other than 16FC2(CHB). For iSCSI ports, a hyphen (-) is displayed.</li> </ul>
Resource Group Name	Name of the resource group to which the port belongs
Resource Group ID	ID for the resource group to which the port belongs (0 to 1023)
Number of Hosts	The number of the hosts registered to the port

Item	Description
Number of LUNs	The number of the LU paths defined to the port
Number of LDEVs	The number of the logical volumes that can be accessed through the port
Number of PGs	The number of the parity groups having the logical volumes that can be accessed through the port
Number of DKBs	The number of the disk boards controlling the parity group that contains the logical volumes that can be accessed through the port

## Power Consumption report

The following figure shows an example of a power consumption report. A record is created every two hours for each power consumption and temperature monitoring data. The table following the figure describes the items in the report.

No records are created if the DKC is turned off. If the system is in maintenance mode or the SVP is rebooted, up to two hours of records could be lost.

If a failure occurs in the storage system, the correct information might not be output.

A hyphen(-) is displayed if the power and temperature information cannot be acquired due to a unit or network failure.

<b>Power Consumption</b>				
This report is about power consumption and temperature. A record is created for each power consumption and temperature monitoring data.				
Date and Time	Power Consumption Average (W)	Power Consumption Maximum (W)	Power Consumption Minimum (W)	TEMP:DKCO
2014/07/24 12:00:00	4500	4600	4400	
2014/07/24 10:00:00	4600	4700	4500	
2014/07/24 08:00:00	4500	4600	4400	
2014/07/24 06:00:00	4400	4500	4300	
2014/07/24 04:00:00	4300	4400	4200	
2014/07/24 02:00:00	4400	4500	4300	
2014/07/24 00:00:00	4500	4600	4400	
2014/07/23 22:00:00	4500	4600	4400	
2014/07/23 20:00:00	4400	4500	4300	
2014/07/23 18:00:00	4400	4500	4300	
2014/07/23 16:00:00	4500	4600	4400	

Total:11

Item	Description
Power Consumption Average (W)	Average of the power consumption
Power Consumption Maximum (W)	Maximum of the power consumption
Power Consumption Minimum (W)	Minimum of the power consumption

Item	Description
TEMP:HSNBX0-HSNPANEL0 Average (degrees C)	Average temperature of HSNBX0:HSNPANEL0
TEMP:HSNBX0-HSNPANEL0 Maximum (degrees C)	Maximum temperature of HSNBX0:HSNPANEL0
TEMP:HSNBX0-HSNPANEL0 Minimum (degrees C)	Minimum temperature of HSNBX0:HSNPANEL0
TEMP:HSNBX1-HSNPANEL1 Average (degrees C)	Average temperature of HSNBX1:HSNPANEL1
TEMP:HSNBX1-HSNPANEL1 Maximum (degrees C)	Maximum temperature of HSNBX1:HSNPANEL1
TEMP:HSNBX1-HSNPANEL1 Minimum (degrees C)	Minimum temperature of HSNBX1:HSNPANEL1
TEMP:DKC0-Cluster1 Average (degrees C)	Average temperature of DKC0:CL1
TEMP:DKC0-Cluster1 Maximum (degrees C)	Maximum temperature of DKC0:CL1
TEMP:DKC0-Cluster1 Minimum (degrees C)	Minimum temperature of DKC0:CL1
TEMP:DKC0-Cluster2 Average (degrees C)	Average temperature of DKC0:CL2
TEMP:DKC0-Cluster2 Maximum (degrees C)	Maximum temperature of DKC0:CL2
TEMP:DKC0-Cluster2 Minimum (degrees C)	Minimum temperature of DKC0:CL2

Table 12 Power Consumption report

Item	Description
TEMP:DB00-DBPS00-1 Average (Temperature in degrees C)	Average temperature, maximum temperature, and minimum temperature of the DB for the two-hour period. Outputs in the following format: TEMP:DB XX -DBPS XX -CL Average, Maximum, or Minimum (Temperature in degrees Celsius) <ul style="list-style-type: none"> <li>▪ XX: DB number</li> </ul> 00 to 07 (VSP F350, VSP G350) 00 to 11 (VSP F370, VSP G370)
TEMP:DB00-DBPS00-1 Maximum (Temperature in degrees C),	
TEMP:DB00-DBPS00-1 Minimum (Temperature in degrees C),	
TEMP:DB00-DBPS00-2 Average (Temperature in degrees C),	
TEMP:DB00-DBPS00-2 Maximum (Temperature in degrees C),	

TEMP:DB00-DBPS00-2 Minimum (Temperature in degrees C)	00 to 47 (VSP F700, VSP F900, VSP G700, VSP G900)  00 to 03 (VSP E990) ▪ CL: Cluster number (1 or 2)
--	--

## Spare Drives report

The following figure shows an example of a spare drives report. The table following the figure describes the items in the report.

<b>Spare Drives</b>		
This report is about spare drives. A record is created for each spare drive.		
Drive Type-Code	Drive Capacity	Location
DKS5C-K300SS	300GB	HDD010-23
DKS5C-K300SS	300GB	HDD012-23
DKS5C-K300SS	300GB	HDD014-23
DKS5C-K300SS	300GB	HDD016-23
DKR5D-J900SS	900GB	HDD011-23
DKR5D-J900SS	900GB	HDD013-23
DKR5D-J900SS	900GB	HDD015-23
DKR5D-J900SS	900GB	HDD017-23
Total:8		

Item	Description
Drive Capacity	Capacity of the spare drive
Drive Type-Code	Type code of the spare drive
Location	Location of the spare drive

## SSD Endurance report

The following figure shows an example of an SSD endurance report. The table following the figure describes the items in the report.

## SSD Endurance

This report is about endurance information of SSD. A record is created for each SSD.

Drive Type-Code	Drive Capacity	Location	Used Endurance Indicator (%)
SLB5A-M800SS	800GB	HDD100-00	0
SLB5A-M800SS	800GB	HDD100-01	0
SLB5A-M800SS	800GB	HDD100-02	0
SLB5A-M800SS	800GB	HDD102-00	0
SLB5A-M800SS	800GB	HDD102-01	0
SLB5A-M800SS	800GB	HDD102-02	0
SLB5A-M800SS	800GB	HDD104-00	0
SLB5A-M800SS	800GB	HDD104-01	0
SLB5A-M800SS	800GB	HDD104-02	0
SLB5A-M800SS	800GB	HDD106-00	0
SLB5A-M800SS	800GB	HDD106-01	0
SLB5A-M800SS	800GB	HDD106-02	0
SLB5A-M400SS	400GB	HDD101-00	0
SLB5A-M400SS	400GB	HDD101-01	0
SLB5A-M400SS	400GB	HDD101-02	0
SLB5A-M400SS	400GB	HDD103-00	0
SLB5A-M400SS	400GB	HDD103-01	0
SLB5A-M400SS	400GB	HDD103-02	0
SLB5A-M400SS	400GB	HDD105-00	0
SLB5A-M400SS	400GB	HDD105-01	0
SLB5A-M400SS	400GB	HDD105-02	0
SLB5A-M400SS	400GB	HDD107-00	0
SLB5A-M400SS	400GB	HDD107-01	0
SLB5A-M400SS	400GB	HDD107-02	0

Total:24

Item	Description
Drive Type-Code	Type code of the drive
Drive Capacity	Capacity of the drive
Location	Location of the drive
Used Endurance Indicator (%)	The used endurance of SSD life (0 to 100) The value of this indicator increases due to drive operation associated with internal processing of the storage system, and the host I/O. Even when no data is copied due to a drive failure, the value of this indicator increases because the spare drive also performs internal processing.

## Storage System Summary report

Item	Description
Storage System Type	Type of the storage system
Serial Number	Serial number of the storage system
IP Address	IP address of the SVP
Software Versions	<p>Version of the following programs.</p> <p>For VSP G130, G/F350, G/F370, G/F700, G/F900</p> <ul style="list-style-type: none"> <li>▪ Main</li> <li>▪ DKB</li> <li>▪ ROM BOOT</li> <li>▪ RAM BOOT</li> <li>▪ Expander</li> <li>▪ Config</li> <li>▪ CFM</li> <li>▪ HDD</li> <li>▪ Printout Tool</li> <li>▪ CHB (iSCSI)</li> <li>▪ CHB (FC32G)</li> <li>▪ GUM</li> </ul> <p>For VSP E990</p> <ul style="list-style-type: none"> <li>▪ Main</li> <li>▪ DKBN</li> <li>▪ NSW</li> <li>▪ ROM BOOT</li> <li>▪ RAM BOOT</li> <li>▪ Config</li> <li>▪ CFM</li> <li>▪ HDD</li> <li>▪ Printout Tool</li> <li>▪ CHB (iSCSI)</li> <li>▪ CHB (FC32G)</li> </ul>

Item	Description
	<ul style="list-style-type: none"> <li>▪ GUM</li> <li>▪ EDKBN</li> </ul>
Number of CUs	The number of control units in the storage system
Shared Memory Size (GB)	Capacity of shared memory Includes the cache management information (directory)
Cache Size (GB)	Capacity of the cache
Number of DKBs	The number of disk boards on the module
System Options	List of the system options specified for the storage system
Drive Capacity (TB)	Total capacity of drives in the storage system except for external volumes
Spare Drive Capacity (TB)	Total capacity of the spare drives in the storage system
Free Drive Capacity (GB)	Total capacity of the free drives in the storage system
Volume Capacity (GB) <sup>1</sup>	List of the capacity of the open volumes
Number of LDEVs <sup>1</sup>	List of the numbers of the volumes in the following status. <ul style="list-style-type: none"> <li>▪ Allocated</li> <li>▪ Unallocated</li> <li>▪ Reserved</li> <li>▪ V-VOL</li> </ul>
<b>Notes:</b>	
1. You cannot sort the list.	

## Report examples: graphical view

Some Device Manager - Storage Navigator reports appear in graphical format.

The reports described in this topic display as graphics.  icons are displayed before the names of reports in graphical view. If the icons or graphics are not displayed properly, update the window.

## Cache Memories report

This report shows cache memory data, including shared memory, main board, and DIMM capacity. The total cache memory is displayed for each module.

# Cache Memories

This report shows cache memory data, including MAIN boards and DIMMs.

Shared Memory Size: 21450.00MB

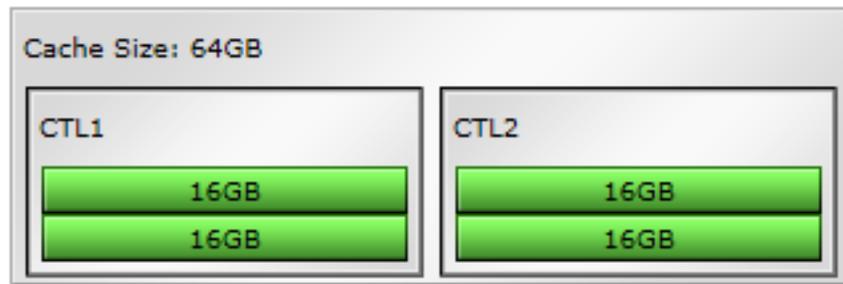


Figure 4 Cache Memories report (VSP F350, VSP F370, VSP G350, VSP G370)

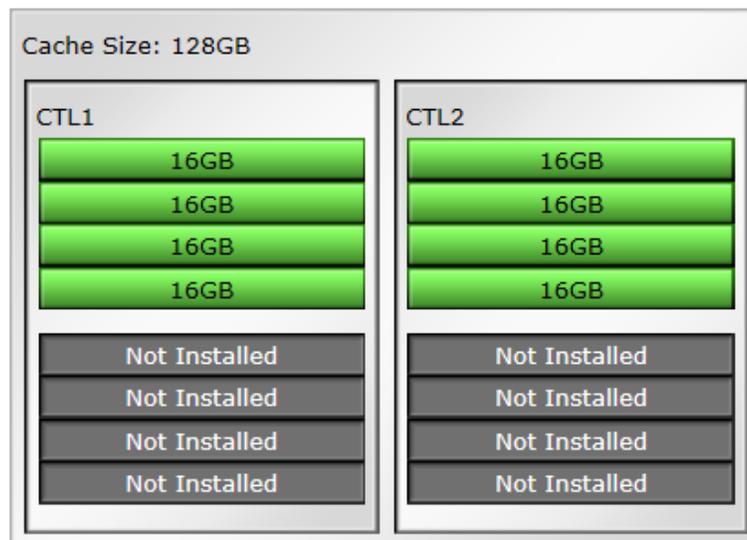


Figure 5 Cache Memories report (VSP F700, VSP G700)

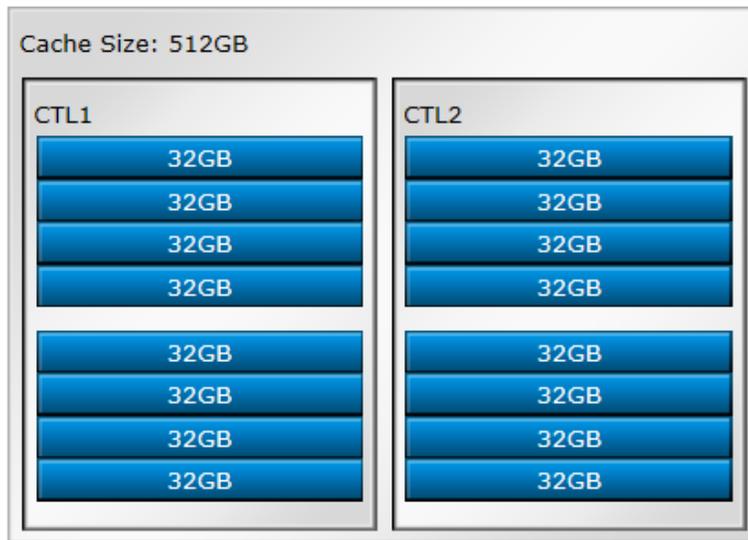


Figure 6 Cache Memories report (VSP F900, VSP G900)

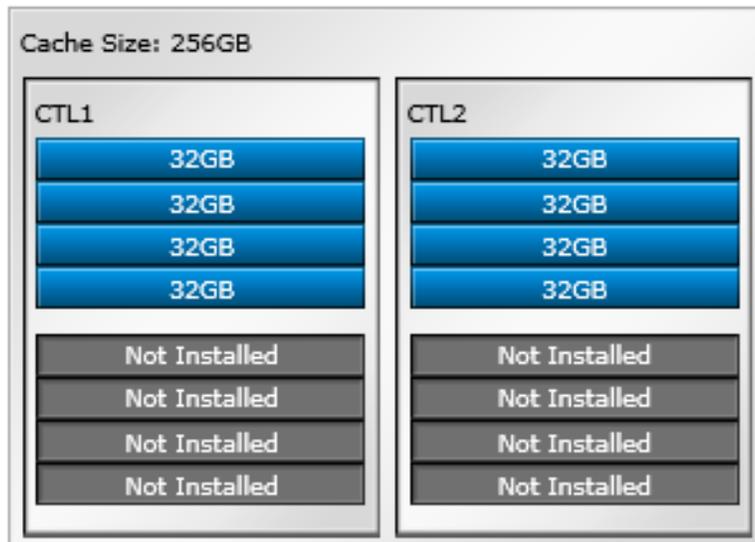
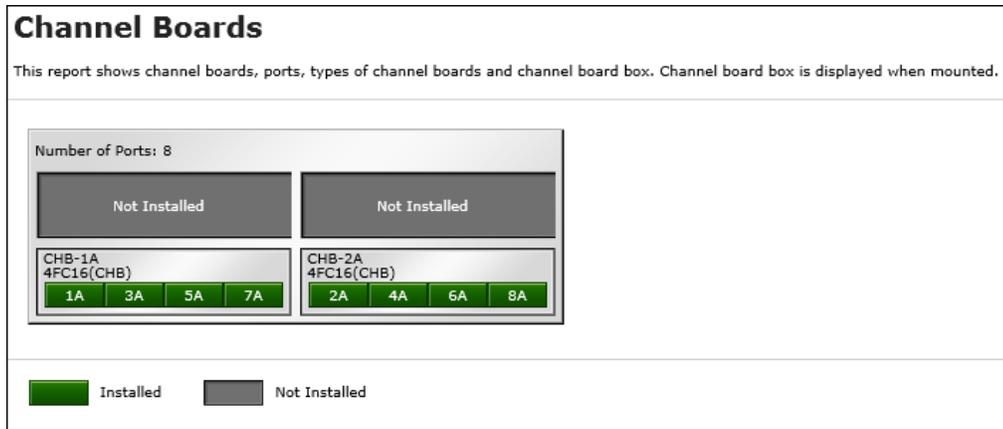


Figure 7 Cache Memories report (VSP E990)

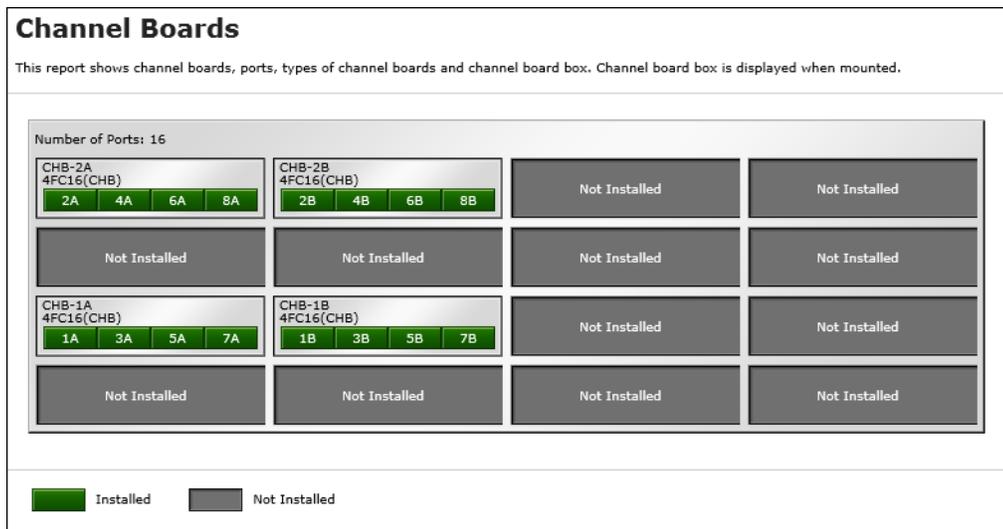
## Channel Boards report

This report shows the channel boards and the ports and types of channel boards for each channel board. The keys show which channel boards are installed (green keys) and which channel boards are not installed (gray keys).

If a PCIe channel board installed in the DKC is connected to a channel board box, the status of the channel board box is displayed.



**Figure 8 Channel Boards (VSP F350, VSP F370, VSP G350, VSP G370)**



**Figure 9 Channel Boards report (VSP F900, VSP G900)**

## Channel Boards

This report shows channel boards, ports, types of channel boards and channel board box. Channel board box is displayed when mounted.

Number of Ports: 12			
CHB-2A 32FC4R(CHB) 2A 4A 6A 8A	CHB-2B 10iSCSI2o(CHB) 2B 4B 6B 8B	Not Installed	Not Installed
Not Installed	Not Installed	Not Installed	Not Installed
CHB-1A 32FC4R(CHB) 1A 3A 5A 7A	CHB-1B 10iSCSI2o(CHB) 1B 3B 5B 7B	Not Installed	Not Installed
Not Installed	Not Installed	Not Installed	Not Installed

Installed
  Not Installed

Figure 10 Channel Boards report (VSP E990)

Channel Boards			
This report shows channel boards, ports, types of channel boards and channel board box. Channel board box is displayed when mounted.			
Total number of Ports: 24			
Number of Ports on Controller Chassis: 16			
CHB-2A 4FC16(CHB) 2A 4A 6A 8A	CHB-2B 4FC16(CHB) 2B 4B 6B 8B	Not Installed	Not Installed
Not Installed	Not Installed	Not Installed	Not Installed
CHB-1A 4FC16(CHB) 1A 3A 5A 7A	CHB-1B 4FC16(CHB) 1B 3B 5B 7B	Not Installed	Not Installed
Not Installed	Not Installed	Not Installed	Not Installed
Number of Ports on Channel Board Box: 8			
Not Installed	Not Installed	Not Installed	CHB-2M 4FC16(CHB) 2M 4M 6M 8M
Not Installed	Not Installed	Not Installed	CHB-1M 4FC16(CHB) 1M 3M 5M 7M

Installed
  Not Installed

Figure 11 Channel Boards report (when a channel board box is connected)

## Physical View report

This report shows disk controller chassis and drive boxes, and includes channel boards, disk boards, data drives, spare drives, and free drives.

It also shows the storage system type, serial number, and software version. You can check the legend for disk units, such as SAS, SSD, Spare, Free, or Not Installed.

If a PCIe channel board installed in the DKC is connected to a channel board box, the status of the channel board box is displayed.









Item	Content
Location	Name of the cache controller board on which the memory is installed.
CMG#0 Size (GB) CMG#1 Size (GB)	<p>Cache memory capacity in the controller board per CMG (32/64/128/256/blank). The number of CMG differs by model and the displayed items are different.</p> <ul style="list-style-type: none"> <li>▪ VSP E990: CMG#0 Size and CMG#1 Size are displayed.</li> <li>▪ VSP F350, VSP F370, VSP G350, VSP G370: Only CMG#0 Size is displayed.</li> <li>▪ VSP F700, VSP F900, VSP G700, VSP G900: CMG#0 Size and CMG#1 Size are displayed.</li> </ul> <p>Depending on the installed number of the cache memory (DIMM), one of the CMG capacities might be blank for VSP E990, VSP F700, VSP F900, VSP G700, VSP G900.</p>
Cache Size (GB)	Total cache memory capacity on the controller board (0 to 512)
SM Size (MB)	<p>The capacity that cannot be used as data cache memory in the total cache memory capacity inside of the controller board.</p> <p>The capacity per cluster is displayed.</p> <p>Includes the shared memory capacity, cache directory capacity, and the fixed capacity.</p> <p>Fixed capacity is the cache memory capacity that is used for controlling the storage system with the controller board.</p> <ul style="list-style-type: none"> <li>▪ VSP E990: 0 to 86400</li> <li>▪ VSP F350, VSP G350: 0 to 29568</li> <li>▪ VSP F370, VSP G370: 0 to 58624</li> <li>▪ VSP F700, VSP G700: 0 to 69632</li> <li>▪ VSP F900, VSP G900: 0 to 86400</li> </ul>
CFM#0 Type CFM#1 Type	<p>Type of CFM in the cluster (BM15/BM35/BM45/BM55/BM65/blank). The number of CFM differs by model and the number of the displayed items are different.</p> <ul style="list-style-type: none"> <li>▪ VSP E990: CFM#0 Type and CFM#1 Type</li> <li>▪ VSP F350, VSP F370, VSP G350, VSP G370: CFM#0 Type only</li> <li>▪ VSP F700, VSP F900, VSP G700, VSP G900: CFM #0 Type and CFM#1 Type</li> </ul> <p>Depending on the installed CFM number, one of the CFM types might be displayed as blank.</p>

## ChapUserInfo.csv

This CSV file contains information about the iSCSI CHAP authenticated user registered to the port in the channel board. A record is created for each target related to the CHAP authenticated user.

Item	Content
Port	Port name
User Name	Name of the CHAP authenticated user <sup>1</sup>
iSCSI Target ID <sup>2</sup>	The iSCSI number of the target (00 to fe, hexadecimal)
Notes:	
<ol style="list-style-type: none"> <li>1. If the character string contains a comma, the comma is converted to a tab.</li> <li>2. For the target information, see the record information with the same iSCSI target ID in lscsiTargetInfo.csv.</li> </ol>	

## ChaStatus.csv

This CSV file contains information about the status of each channel board (CHB). A record is created for each CHB.

**Table 13 ChaStatus.csv file (Title: <<CHB Status>>)**

Item	Content
CHB Location	CHB name
PCB Status	Status of this CHB*
Port#00, #01, ..., #03	Status of ports on this CHB*
*1: Normal, 0: Abnormal	

## DeviceEquipInfo.csv

This CSV file contains information about equipment and devices that are part of the storage system, including power supplies and batteries for DKC, DB, and CHBB. A record is created for each device.

Item	Content
Device Location	Device location name. For example: <ul style="list-style-type: none"> <li>▪ For DKCPS: DKCPS-00</li> <li>▪ For DKUPS: DKUPS000-1</li> <li>▪ For Battery: BATTERY-1BA</li> <li>▪ For SVP: SVP-BASIC</li> </ul>
Equip Status	Equipment status of the device: <ul style="list-style-type: none"> <li>▪ Equipped</li> <li>▪ Not Equipped</li> </ul>
Status	Status of the device: <ul style="list-style-type: none"> <li>▪ Normal</li> <li>▪ Abnormal</li> <li>▪ Blank if "Equip Status" is Not Equipped</li> </ul>

### DkaInfo.csv

This CSV file contains information about disk boards (DKBs). A record is created for each DKB.

Item	Content
DKB Location	DKB name
Package Type	DKB type Output example: <ul style="list-style-type: none"> <li>▪ Unencryption DKB (2Port)</li> <li>▪ Unencryption DKBN (2Port)</li> <li>▪ Encryption EDKB (2Port)</li> </ul>

### DkaStatus.csv

This CSV file contains information about the status of disk boards (DKBs). A record is created for each DKB.

Item	Content
DKB Location	DKB name

Item	Content
PCB Status	Status of this DKB <sup>1</sup>
BECON#00	Status of BECON <sup>1</sup>
BEPOR#0000 to #0001	Status of BEPOR on this DKB <sup>1</sup> Items are output in the format BEPOR#XXYY, where: <ul style="list-style-type: none"> <li>▪ XX: BE controller number (2-digit hexadecimal)</li> <li>▪ YY: BE port number (2-digit hexadecimal)</li> </ul>
Notes:	
1. 1: Normal, 0: Abnormal	

## DkcInfo.csv

This CSV file contains information about the DKC. A record is created for each module.

When Module #1 is not installed, the record for Module #1 is not created.

**Table 14 DkcInfo.csv file (Title: <<DKC Information>>)**

Item	Content
Storage System Type	Storage system type. Output example: <ul style="list-style-type: none"> <li>▪ VSP E990</li> <li>▪ VSP F350, VSP G350*</li> <li>▪ VSP F370, VSP G370*</li> <li>▪ VSP F700, VSP G700*</li> <li>▪ VSP F900, VSP G900*</li> </ul>
Serial Number #	Serial product number (decimal, from 400001 to 499999)
IP Address	IP address Output example: xxx.xxx.xxx.xxx (decimal, 0 to 255)
Subnet Mask	Subnet mask Output example: xxx.xxx.xxx.xxx (decimal, 0 to 255)
Number of CUs	Number of CUs (decimal, 0 to 255)
Number of DKBs	Number of DKBs (decimal, 0 to 8) Zero (0) is sometimes displayed if an HDD is not installed.

Item	Content
Configuration Type	Configuration type Output example: PCM
Model	Storage system model: S1, S2, M, or H
<p>*To determine the model type, see <a href="#">PplInfo.csv (on page 268)</a>.</p> <ul style="list-style-type: none"> <li>▪ VSP F350, VSP F370, VSP F700, VSP F900: Install is Enabled for All Flash Array</li> <li>▪ VSP G350, VSP G370, VSP G700, VSP G900: Install is Disabled for All Flash Array</li> </ul>	

## DkuTempAveInfo.csv

This CSV file contains information about DB temperature for every two hours. A record is DB temperature information obtained from the environment monitor. A record output to the first line shows the latest temperature information. Because DB temperature information is measured by DBPS, items are displayed in this unit\*.

DkuTempAveInfo.csv shows the average temperature as DB temperature data. The total number of items depends on the model (VSP F350, VSP G350: 17, VSP F370, VSP G370: 25, VSP F700, VSP F900, VSP G700, VSP G900: 97).

The DB temperature data displayed in DkuTempAveInfo.csv (average temperature only), DkuTempMaxInfo.csv (maximum temperature only), and DkuTempMinInfo.csv (minimum temperature only) is the same value as the DB temperature data for DkuTempInfo.csv.

If the system is in maintenance mode or the SVP is rebooted, the data that is output every two hours might not contain data for the period. If a failure occurs in the storage system, the correct information might not be output.

Item	Description
Date	Year, month, and date when temperature data was acquired in the format:  YYYY/MM/DD hh:mm:ss
DB00 DBPS001 Temperature average	Average temperature (°C) for the two-hour period of DB00 DBPS001
DB47 DBPS472 Temperature average	Average temperature (°C) for the two-hour period of DB47 DBPS472  For VSP E990, item shows up to DB03 DBPS032.  For VSP F350, VSP G350, item shows up to DB07 DBPS072.

Item	Description
	For VSP F370, VSP G370, item shows up to DB11 DBPS112.

**Note:** An item name is displayed as DBxx DBPSxy. The names are listed in ascending order of the DB number. See [DkuTempInfo.csv \(on page 235\)](#) for locations and values for DBxx and DBPSxy.

## DkuTempInfo.csv

This CSV file contains information about DB temperature for every two hours. A record is DB temperature information obtained from the environment monitor. A record output to the first line shows the latest temperature information. Because DB temperature information is measured by DBPS, items are displayed in this unit\*.

DkuTempInfo.csv shows the average temperature as DB temperature data. The total number of items depends on the model (VSP E990: 25, VSP F350, VSP G350: 49, VSP F370, VSP G370: 73, VSP F700, VSP F900, VSP G700, VSP G900: 289).

The DB temperature data displayed in DkuTempAveInfo.csv (average temperature only), DkuTempMaxInfo.csv (maximum temperature only), and DkuTempMinInfo.csv (minimum temperature only) is the same value as the DB temperature data for DkuTempInfo.csv.

If the system is in maintenance mode or the SVP is rebooted, the data that is output every two hours might not contain data for the period. If a failure occurs in the storage system, the correct information might not be output.

Item	Description
Date	Year, month, and date when temperature data was acquired in the format: <i>YYYY/MM/DD hh:mm:ss</i>
DB00 DBPS001 Temperature average	Average temperature (°C) for the two-hour period of DB00 DBPS001
DB00 DBPS001 Temperature maximum value	Maximum temperature (°C) for the two-hour period of DB00 DBPS001
DB00 DBPS001 Temperature minimum value	Minimum temperature (°C) for the two-hour period of DB00 DBPS001
DB47 DBPS472 Temperature average	Average temperature (°C) for the two-hour period of DB47 DBPS472  For VSP E990, item shows up to DB03 DBPS032.

Item	Description
	For VSP F350, VSP G350, item shows up to DB07 DBPS072. For VSP F370, VSP G370, item shows up to DB11 DBPS112.
DB47 DBPS472 Temperature maximum value	Maximum temperature (°C) for the two-hour period of DB47 DBPS472 For VSP E990, item shows up to DB03 DBPS032. For VSP F350, VSP G350, item shows up to DB07 DBPS072. For VSP F370, VSP G370, item shows up to DB11 DBPS112.
DB47 DBPS472 Temperature minimum value	Minimum temperature (°C) for the two-hour period of DB47 DBPS472 For VSP E990, item shows up to DB03 DBPS032. For VSP F350, VSP G350, item shows up to DB07 DBPS072. For VSP F370, VSP G370, item shows up to DB11 DBPS112.

**Note:** An item name is displayed as DBxx DBPSxy. The names are listed in ascending order of the DB number.

The following tables list DBxx and DBPSxy: xx values, where xx is a value from 00 to 03 (VSP E990), 00 to 07 (VSP F350, VSP G350), 00 to 11 (VSP F370, VSP G370), or 00 to 47 (VSP F700, VSP F900, VSP G700, VSP G900).

DB #	0	1	2	3	4	5
xx	00	01	02	03	04	04
DBxx	DB00	DB01	DB02	DB03	DB04	DB05
DBxyy	DBPS00y	DBPS01y	DBPS02y	DBPS03y	DBPS04y	DBPS05y

DB #	42	43	44	45	46	47
xx	42	43	44	45	46	47

DB #	42	43	44	45	46	47
DBxx	DB42	DB43	DB44	DB45	DB46	DB47
DBxxy	DBPS42y	DBPS43y	DBPS44y	DBPS45y	DBPS46y	DBPS47y

The following table lists the DBPSxxy: y values (where DB# is 0 and xx is 00)

DB#	0	
y	1	2
DBPSxxy: y	DBPS001	DBPS002

## DkuTempMaxInfo.csv

This CSV file contains information about DB temperature for every two hours. A record is DB temperature information obtained from the environment monitor. A record output to the first line shows the latest temperature information. Because DB temperature information is measured by DBPS, items are displayed in this unit\*.

DkuTempMaxInfo.csv shows the maximum temperature as DB temperature data. The total number of items depends on the following model:

- VSP E990: 9
- VSP F350, VSP G350: 17
- VSP F370, VSP G370: 25
- VSP F700, VSP F900, VSP G700, VSP G900: 97

The DB temperature data displayed in DkuTempAveInfo.csv (average temperature only), DkuTempMaxInfo.csv (maximum temperature only), and DkuTempMinInfo.csv (minimum temperature only) is the same value as the DB temperature data for DkuTempInfo.csv.

If the system is in maintenance mode or the SVP is rebooted, the data that is output every two hours might not contain data for the period. If a failure occurs in the storage system, the correct information might not be output.

Item	Description
Date	Year, month, and date when temperature data was acquired in the format: <i>YYYY/MM/DD hh:mm:ss</i>
DB00 DBPS001 Temperature maximum value	Maximum temperature (°C) for the two-hour period of DB00 DBPS001

Item	Description
DB47 DBPS472 Temperature maximum value	Maximum temperature (°C) for the two-hour period of DB47 DBPS472  For VSP E990, item shows up to DB03 DBPS032.  For VSP F350, VSP G350, item shows up to DB07 DBPS072.  For VSP F370, VSP G370, item shows up to DB11 DBPS112.

**Note:** An item name is displayed as DBxx DBPSsxy. The names are listed in ascending order of the DB number. See [DkuTempInfo.csv \(on page 235\)](#) for locations and values for DBxx and DBPSsxy.

## DkuTempMinInfo.csv

This CSV file contains information about DB temperature for every two hours. A record is DB temperature information obtained from the environment monitor. A record output to the first line shows the latest temperature information. Because DB temperature information is measured by DBPS, items are displayed in this unit\*.

DkuTempMinInfo.csv shows the minimum temperature as DB temperature data. The total number of items depends on the following model:

- VSP E990: 9
- VSP F350, VSP G350: 17
- VSP F370, VSP G370: 25
- VSP F700, VSP F900, VSP G700, VSP G900: 97

The DB temperature data displayed in DkuTempAveInfo.csv (average temperature only), DkuTempMaxInfo.csv (maximum temperature only), and DkuTempMinInfo.csv (minimum temperature only) is the same value as the DB temperature data for DkuTempInfo.csv.

If the system is in maintenance mode or the SVP is rebooted, the data that is output every two hours might not contain data for the period. If a failure occurs in the storage system, the correct information might not be output.

Item	Description
Date	Year, month, and date when temperature data was acquired in the format:  <i>YYYY/MM/DD hh:mm:ss</i>
DB00 DBPS001 Temperature minimum value	Minimum temperature (°C) for the two-hour period of DB00 DBPS001

Item	Description
DB47 DBPS472 Temperature minimum value	Minimum temperature (°C) for the two-hour period of DB47 DBPS472  For VSP E990, item shows up to DB03 DBPS032.  For VSP F350, VSP G350, item shows up to DB07 DBPS072.  For VSP F370, VSP G370, item shows up to DB11 DBPS112.

## ELunInfo.csv

This CSV file contains information about external volumes. Information about one external volume is output to multiple records according to the number of prioritized paths between the local and the external storage systems.

For details of external volumes, see *Hitachi Universal Volume Manager User Guide*.

Item	Content
VDEV#	Virtual device number to which the external volume is mapped
Characteristic1	Identification number of the external volume <sup>1</sup>
Characteristic2	Extended information for identifying the external volume
Device	Product name reported to the host by the external volume <sup>1</sup>
Capacity(blocks)	Capacity of the external volume (in blocks)
Cache Mode	Indicates whether the write data from the host to the external storage system is reflected synchronously or asynchronously <ul style="list-style-type: none"> <li>▪ Enabled: Asynchronously</li> <li>▪ Disabled: Synchronously</li> </ul>
ECC Group	Number of parity group to which the external volume is mapped.  If the number starts with "E" (for example, E1-1), the parity group contains external volumes.  Range of values: E1-1 to E16384-4096
Current MPU	Number and name of a current MP unit controlling the parity group to which the external volume is mapped <ul style="list-style-type: none"> <li>▪ MPU-10</li> <li>▪ MPU-20</li> </ul>

Item	Content
Setting MPU	Number and name of an MP unit configured to control the external volume indicated by ECC Group <ul style="list-style-type: none"> <li>▪ MPU-10</li> <li>▪ MPU-20</li> </ul>
Vendor	Vendor name of the external storage system
Product Name	Product name of the external storage system
Serial Number#	Serial product number of the external storage system
Path Mode	Mode which indicates how the paths between local and external storage systems operate <ul style="list-style-type: none"> <li>▪ Multi</li> <li>▪ Single</li> <li>▪ ALUA</li> </ul>
Port	Name of a local port from which the external path is connected to the external storage system
WWN	Port identifier number of the external storage system Blank if "Package Type" is iSCSI
LUN	LU number set for the external volume.
Priority	Priority of the paths between the storage systems to be used for connection with the external volume. "1" indicates the path of the highest priority.
Status	Status of the path between storage systems. <ul style="list-style-type: none"> <li>▪ Normal</li> <li>▪ Blocked</li> </ul>
IO TOV	I/O timeout value for the external volume Range of values: 5 to 240
QDepth	The number of Read/Write commands that can be issued to the external volume at a time Range of values: 2 to 128
Resource Group ID (ECC Group)	Resource group ID for the parity group that is mapping external volumes (in decimal format) Range of values: 0 to 1023

Item	Content
Resource Group Name (ECC Group)	Resource group name of the parity group that is mapping external volumes
Load Balance Mode	<p>I/O load balance distribution logic specified for external volume</p> <ul style="list-style-type: none"> <li>▪ Normal Round-robin</li> <li>▪ Extended Round-robin</li> <li>▪ Disabled</li> </ul> <p>A hyphen is displayed if Single is specified in Path Mode</p>
Path Mode on Profile	<p>Path mode on profile information of the external storage system:</p> <ul style="list-style-type: none"> <li>▪ Multi</li> <li>▪ Single</li> </ul>
ALUA Settable	<p>Indicates whether ALUA mode can be set as path mode on the external storage system</p> <ul style="list-style-type: none"> <li>▪ Yes: ALUA mode can be set</li> <li>▪ No: ALUA mode cannot be set</li> </ul>
ALUA Permitted	<p>Indicates whether ALUA is used as path mode on the local storage system:</p> <ul style="list-style-type: none"> <li>▪ Enabled: ALUA mode is used</li> <li>▪ Disabled: ALUA mode is not used</li> </ul>
Target Port Asymmetric Access State	<p>Status of the port on the external storage system when the path mode is ALUA:</p> <ul style="list-style-type: none"> <li>▪ Active/Optimized</li> <li>▪ Active/Non-Optimized</li> </ul>
Package Type	<p>Type of CHB to which a port of the local storage system connecting to the external storage system belongs</p> <ul style="list-style-type: none"> <li>▪ Fibre: 16FC2 (CHB), 32FC4R (CHB)</li> <li>▪ iSCSI: 10iSCSI2o (CHB), 10iSCSI2c (CHB)</li> </ul>
IP Address	<p>IP address for an iSCSI target of an external storage system</p> <ul style="list-style-type: none"> <li>▪ IPv6: XXXX:XXXX:XXXX:XXXX:XXXX:XXXX:XXXX:XXXX (hexadecimal)</li> <li>▪ IPv4: XXX.XXX.XXX.XXX (decimal)</li> <li>▪ Blank if "Package Type" is iSCSI.</li> </ul>

Item	Content
TCP Port Number	TCP port number (1 through 65535) for the iSCSI target of an external storage system Blank if "Package Type" is Fibre.
iSCSI Target Name	iSCSI target name of an external storage system Blank if "Package Type" is Fibre.
Virtual Port ID	Virtual port number of own storage system to which external storage system is connected. If Virtual Port Mode is Disabled, this column to be blanked.
<b>Notes:</b>	
1. If the character string contains a comma, the comma is converted to a tab.	

## EnvMonInfo.csv

This CSV file contains information about the power and temperature of the storage system. Power and temperature measurements from the environment monitor are recorded every two hours.

No records are created if the DKC is turned off. If the system is in maintenance mode or the SVP is rebooted, up to two hours of records could be lost.

If a failure occurs in the storage system, the correct information might not be output.

Item	Description
Date	Year, month, and date when record data was acquired for the two-hour period in the format: <i>YYYY/MM/DD HH:MM:SS</i>
Electric power average	Average value of electric power (W)
Electric power maximum value	Maximum value of electric power (W)
Electric power minimum value	Minimum value of electric power (W) In the following cases, a lower value might be temporarily displayed: <ul style="list-style-type: none"> <li>▪ When the storage system is starting up</li> <li>▪ Right after replacing storage system parts</li> <li>▪ During or after microcode update</li> </ul>
DKC0 CLT01 Temperature average	DKC0: Average temperature of CLT01 (°C)

Item	Description
DKC0 CLT01 Temperature maximum value	DKC0: Maximum temperature of CLT011 (°C)
DKC0 CLT01 Temperature minimum value	DKC0: Minimum temperature of CLT01 (°C)
DKC5 CLT52 Temperature average	DKC5 CLT52: Average temperature of CL2 (°C)
DKC5 CLT52 Temperature maximum value	DKC5 CLT52: Maximum temperature of CL2 (°C)
DKC5 CLT52 Temperature minimum value	DKC5 CLT52: Minimum temperature of CL2 (°C)

A hyphen(-) is displayed if the power and temperature information cannot be acquired due to a unit or network failure.

## HduInfo.csv

This CSV file contains information about hard drive boxes (DB). A record is created for each drive box.

Item	Description
DB Location	DB location name
DB Status	Information about whether this DB is installed <ul style="list-style-type: none"> <li>▪ Installed</li> <li>▪ Not installed</li> </ul>
Slot Size	Slot size (inches) <ul style="list-style-type: none"> <li>▪ 2.5</li> <li>▪ 3.5</li> <li>▪ Blank for DBF (FMD or FMD DC2).</li> </ul>
DB Type	DB type <ul style="list-style-type: none"> <li>▪ DBS (DB for 2.5-inch drives)</li> <li>▪ DBL (DB for 3.5-inch drives)</li> </ul>

Item	Description
	<ul style="list-style-type: none"> <li>▪ DB60 (dense drive box for 3.5-inch drives)</li> <li>▪ DBF (DB for FMD or FMD DC2, 2PORT)</li> <li>▪ DBN (DB for 2.5-inch NVMe drives)</li> </ul>

## IscsiHostInfo.csv

This CSV file contains information about iSCSI Initiator (Host) set to the channel board port. A record is created for each iSCSI Host (Initiator) target.

Item	Content
Port	Port name
iSCSI Name	iSCSI host name
Host Name	Nickname for iSCSI host name
iSCSI Target ID <sup>1</sup>	iSCSI target number (hexadecimal format, 00 to fe)
<b>Notes:</b>	
<ol style="list-style-type: none"> <li>1. For the target information, see the record information with the same iSCSI target ID in IscsiTargetInfo.csv.</li> </ol>	

## IscsiPortInfo.csv

This CSV file contains information about iSCSI information set to the channel board port. A record is created for each iSCSI host (initiator) target.

Item	Content
Port	Port name
IPv4   IP Address	IPv4 address Output example: xxx.xxx.xxx.xxx (decimal)
IPv4   Subnet Mask	IPv4 subnet mask (decimal) Output example: xxx.xxx.xxx.xxx (decimal)
IPv4   Default Gateway	Port IPv4 default gateway Output example: xxx.xxx.xxx.xxx (decimal)

Item	Content
IPv6   Mode	Port IPv6 settings <ul style="list-style-type: none"> <li>▪ Enabled</li> <li>▪ Disabled</li> </ul>
IPv6   Link Local Address	Port IPv6 link local address <ul style="list-style-type: none"> <li>▪ Output example: xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx (hexadecimal)</li> <li>▪ Output example: Auto</li> </ul> Auto is displayed if the link local address is automatically set. Blank if "IPv6   Mode" is Disabled.
IPv6   Global Address	IPv6 global address of the port <ul style="list-style-type: none"> <li>▪ Output example: xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx (hexadecimal)</li> <li>▪ Output example: Auto</li> </ul> Auto is displayed if the global address is automatically set. Blank if "IPv6   Mode" is Disabled.
IPv6   Assigned Default Gateway	Port IPv6 assigned default gateway <ul style="list-style-type: none"> <li>▪ Output example: xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx (hexadecimal)</li> </ul> Blank if "IPv6   Mode" is Disabled.
Channel Speed	Data transfer speed of the port (10 Gbps)
Security Switch	Port security switch settings <ul style="list-style-type: none"> <li>▪ On</li> <li>▪ Off</li> </ul>
TCP Port Number	The number of the port for using socket (1 to 65535)
Ethernet MTU Size (Byte)   MTU	MTU settings <ul style="list-style-type: none"> <li>▪ 1500</li> <li>▪ 4500</li> <li>▪ 9000</li> </ul>
Keep Alive Timer (sec.)	Keep alive timer value of iSCSI (30 to 64800) (sec)
Selective ACK	Selective ACK mode <ul style="list-style-type: none"> <li>▪ Enabled</li> <li>▪ Disabled</li> </ul>

Item	Content
Delayed ACK	Delayed ACK mode <ul style="list-style-type: none"> <li>▪ Enabled</li> <li>▪ Disabled</li> </ul>
Maximum Window Size (KB)	Window scale option settings <ul style="list-style-type: none"> <li>▪ 64KB</li> <li>▪ 128KB</li> <li>▪ 256KB</li> <li>▪ 512KB</li> <li>▪ 1024KB</li> </ul>
iSNS Server   Mode	iSNS mode settings <ul style="list-style-type: none"> <li>▪ On</li> <li>▪ Off</li> </ul>
iSNS Server   IP Address	IP address of the iSNS server <ul style="list-style-type: none"> <li>▪ IPv4: xxx.xxx.xxx.xxx (decimal)</li> <li>▪ IPv6: xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx (hexadecimal)</li> <li>▪ Blank if "iSNS Server   Mode" is Off.</li> </ul>
iSNS Server   TCP Port Number	Port number of TCP used for iSNS (1 to 65535). Blank if "iSNS Server   Mode" is Off.
VLAN   Tagging Mode	VLAN tagging mode set to the port <ul style="list-style-type: none"> <li>▪ On</li> <li>▪ Off</li> </ul>
VLAN   ID	VLAN number set to the port (1 to 4094) Blank if "VLAN   Tagging Mode" is set to Off.
Resource Group ID (Port)	Resource group ID of the port (0 to 1023 in decimal)
Resource Group Name(Port)	Resource group name of the port
iSCSI Name	iSCSI name of the port
CHAP User Name	Authenticated user name of the port

Item	Content
IPv6   Global Address 2	<p>IPv6 global address 2 of the port</p> <ul style="list-style-type: none"> <li>▪ Output example: xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx (hexadecimal)</li> <li>▪ Output example: Auto</li> </ul> <p>Auto is displayed if the global address 2 is automatically set. Blank if "IPv6   Mode" is Disabled.</p>
Virtual Port Mode	<p>Virtual port mode of the port</p> <ul style="list-style-type: none"> <li>▪ Enabled</li> <li>▪ Disabled</li> </ul>

## IscsiTargetInfo.csv

This CSV file contains information about iSCSI target information set to the channel board port. A record is created for each iSCSI target.

Item	Content
Port	Port name
iSCSI Target Alias	iSCSI target alias
iSCSI Target ID	Number of the iSCSI target (00 to fe, hexadecimal)
iSCSI Target Name	Name of the iSCSI target
Host Mode	Host mode set to the iSCSI target (hexadecimal)
Host Mode Option	<p>Host mode option set to the iSCSI target (decimal)</p> <p>Separated with a semicolon (;) if multiple host mode options are set.</p>
Security Switch	<p>Security switch status set to the iSCSI target port</p> <ul style="list-style-type: none"> <li>▪ On</li> <li>▪ Off</li> </ul>
Authentication   Method	<p>Authentication method settings of the iSCSI target</p> <ul style="list-style-type: none"> <li>▪ CHAP</li> <li>▪ None</li> <li>▪ Comply with Host Setting</li> </ul>
Authentication   Mutual CHAP	<p>Mutual CHAP authentication function settings of the iSCSI target</p> <ul style="list-style-type: none"> <li>▪ Enabled</li> <li>▪ Disabled</li> </ul>

Item	Content
Authentication   User Name	User name set when iSCSI target was authenticated
Resource Group ID (iSCSI Target)	Resource group ID of the iSCSI target (0 to 1023)
Resource Group Name (iSCSI Target)	Resource group name of the iSCSI target

## JnlInfo.csv

This CSV file contains information about journals. A record is created for each journal.

Item	Content
JNL#	Journal number (in hexadecimal)
Current MPU	Number and name of MP unit currently controlling the journal (MPU-10, MPU-20)
Setting MPU	Number and name of MP unit configured to control the journal (MPU-10, MPU-20)

## LdevCapalInfo.csv

This CSV file contains information about LDEV capacities. A record is created for each of the classifications shown in "Volume Kind".

Item	Content
Volume Kind	The following classifications are output: <ul style="list-style-type: none"> <li>▪ Internal OPEN Volumes</li> <li>▪ External OPEN Volumes</li> <li>▪ Total OPEN Volumes</li> </ul>
Allocated LDEV Capacity (GB)	Allocated LDEV capacity
Unallocated LDEV Capacity (GB)	Unallocated LDEV capacity
Reserved Capacity (GB)	Reserved LDEV capacity

Item	Content
Total Volume Capacity (GB)	Total capacity of "Allocated LDEV Capacity", "Unallocated LDEV Capacity" and "Reserved Capacity"
Free Space (GB)	Free Space
Total Capacity (GB)	Total Capacity The sum of "Total Volume Capacity" and "Free Space"

## LdevCountInfo.csv

This CSV file contains information about the number of logical devices (LDEVs). A record is created for each of the classifications shown in "Volume Kind".

Item	Content
Volume Kind	The following classifications are output: <ul style="list-style-type: none"> <li>▪ Internal Volumes</li> <li>▪ External Volumes</li> <li>▪ Total Volumes</li> </ul>
Allocated OPEN LDEVs	The number of allocated open-system volumes (LDEVs).
Unallocated OPEN LDEVs	The number of unallocated open-system volumes (LDEVs).
Reserved OPEN LDEVs	The number of reserved open-system volumes (LDEVs).
V-VOL	The number of virtual volumes. Output only when "Volume Kind" is Total Volumes.
Total(All LDEVs)	Total number of LDEVs.
ECC Groups	Total number of parity groups.

## LdevInfo.csv

This CSV file contains information about logical devices (LDEVs). A record is created for each LDEV.

For details of LDEVs, see the *Provisioning Guide*.

Item	Content
ECC Group	Number of parity group where the LDEV belongs.

Item	Content
	Output example: X-Y (decimals) <ul style="list-style-type: none"> <li>▪ If the number starts with "E" (for example, E1-1), the parity group contains external volumes.</li> <li>▪ If "LDEV Type" is Dynamic Provisioning or Thin Image, a hyphen is output.</li> </ul>
LDEV#	LDEV number (00:00:00 to 00:fe:ff)
LDEV Name	LDEV name <sup>1</sup>
LDEV Emulation	LDEV emulation type
LDEV Type	LDEV type: <ul style="list-style-type: none"> <li>▪ Basic</li> <li>▪ Dynamic Provisioning</li> <li>▪ External</li> <li>▪ Thin Image</li> <li>▪ ALU</li> </ul>
LDEV Attribute	LDEV Attribute: <ul style="list-style-type: none"> <li>▪ CMDDEV (Command device)</li> <li>▪ CMDDEV<sup>1</sup> (Remote command device)</li> <li>▪ Journal (Journal volume)</li> <li>▪ Pool (Pool volume)</li> <li>▪ Quorum disk (used with global-active device)</li> <li>▪ ALU</li> <li>▪ SLU</li> <li>▪ Deduplication system data volume</li> <li>▪ Regular (Others)</li> </ul>
Volume Size(Cyl)	LDEV capacity (in cylinders)
Volume Size(MB)	LDEV capacity (in MB)
Volume Size(Blocks)	LDEV capacity (in blocks)
CVS	Information about whether the LDEV is a custom-sized volume: <ul style="list-style-type: none"> <li>▪ On: Custom-sized volume</li> <li>▪ Off: Others</li> </ul>

Item	Content
Pool ID	Pool number. This is blank except for the following cases: <ul style="list-style-type: none"> <li>▪ If "LDEV Type" is Dynamic Provisioning</li> <li>▪ If LDEV Attribute is Pool</li> </ul>
RAID Concatenation#0	Number of parity group to be concatenated to parity group (#0) identified by ECC Group. Blank if the parity group is not concatenated to another parity group.
RAID Concatenation#1	Number of parity group to be concatenated to parity group (#1) identified by ECC Group. Blank if the parity group is not concatenated to another parity group.
RAID Concatenation#2	Number of parity group to be concatenated to parity group (#2) identified by ECC Group. Blank if the parity group is not concatenated to another parity group.
ORACLE CHECK SUM	Information about whether this LDEV is an Oracle check sum target. <ul style="list-style-type: none"> <li>▪ On</li> <li>▪ Off</li> </ul>
Current MPU	Number of the MP unit currently controlling the LDEV. (MPU-10, MPU-20)
Setting MPU	Number of the MP unit configured to control LDEV. (MPU-10, MPU-20)
Allocated	Information about whether this LDEV is allocated to a host. <ul style="list-style-type: none"> <li>▪ "Y" is output for volumes accessible to the host.</li> </ul>
Pool Name	The pool's name <sup>1</sup> <ul style="list-style-type: none"> <li>▪ If the provisioning type is Dynamic Provisioning, the name of the pool related to the logical volume is displayed.</li> <li>▪ If the attribute is Pool, the name of the pool where the logical volume belongs is displayed.</li> <li>▪ When neither of the above are displayed, the pool name is blank.</li> </ul>
CmdDevSecurity	Indicates whether Security is specified as the attribute for the command device. <ul style="list-style-type: none"> <li>▪ Enabled: Command device security setting is set.</li> <li>▪ Disabled: Command device security setting is not set.</li> <li>▪ Blank: "LDEV Attribute" is not CMDDEV.</li> </ul>

Item	Content
CmdDevUserAuth	<p>Indicates whether User Authentication is specified as the attribute for the command device.</p> <ul style="list-style-type: none"> <li>▪ Enabled: User authentication setting is set.</li> <li>▪ Disabled: User authentication setting is not set.</li> <li>▪ Blank: "LDEV Attribute" is not CMDDEV.</li> </ul>
CmdDevDevGrpDef	<p>Indicates whether Device Group Definition is specified as the attribute for the command device.</p> <ul style="list-style-type: none"> <li>▪ Enabled: Device group definition setting is set.</li> <li>▪ Disabled: Device group definition setting is not set.</li> <li>▪ Blank: "LDEV Attribute" is not CMDDEV.</li> </ul>
Resource Group ID (LDEV)	LDEV resource group ID (number in the decimal format)
Resource Group Name (LDEV)	LDEV resource group name (0 to 1,023, decimal)
Encryption	<p>Indicates whether the parity group identified by ECC Group is encrypted.</p> <ul style="list-style-type: none"> <li>▪ For internal volumes: Enabled (encrypted) or Disabled (not encrypted)</li> <li>▪ For external volumes: blank</li> </ul>
T10 PI	<p>Indicates the T10 PI attribute set for the LDEV.</p> <ul style="list-style-type: none"> <li>▪ Enabled</li> <li>▪ Disabled</li> <li>▪ Blank if "LDEV Emulation" is not OPEN-V.</li> </ul>
ALUA Mode	<p>Indicates whether the ALUA mode is enabled.</p> <ul style="list-style-type: none"> <li>▪ Enabled: ALUA mode is enabled.</li> <li>▪ Disabled: ALUA mode is disabled.</li> </ul>
Accelerated Compression	<p>Indicates whether accelerated compression is enabled.</p> <p>For internal volumes:</p> <ul style="list-style-type: none"> <li>▪ Enabled: accelerated compression is enabled.</li> <li>▪ Disabled: accelerated compression is disabled.</li> </ul> <p>If the parity group with LDEV does not support accelerated compression, a blank space is displayed. Also, for external volumes, a blank is displayed.</p>
<b>Notes:</b>	

Item	Content
1.	If the character string contains a comma, the comma is converted to a tab.

## LdevStatus.csv

This CSV file contains information about the status of logical devices (LDEVs). A record is created for each LDEV.

Item	Content
VDEV#	Virtual device number in which the LDEV is defined
VDEV Status	VDEV status of "VDEV#" <ul style="list-style-type: none"> <li>▪ 1: Normal</li> <li>▪ 0: Abnormal</li> </ul>
HDEV#	LDEV number
HDEV Status	LDEV status <ul style="list-style-type: none"> <li>▪ 1: Normal</li> <li>▪ 0: Abnormal</li> </ul>
LDEV Emulation	LDEV emulation type
ECC Group	Number of the parity group where the LDEV belongs. <ul style="list-style-type: none"> <li>▪ If the number starts with "E" (for example, E1-1), the parity group contains external volumes.</li> <li>▪ If the type of the LDEV is a Dynamic Provisioning or Thin Image virtual volume, a hyphen is output.</li> </ul> <p>Refer to "LdevInfo.csv" for information about the LDEV type.</p>

## LPartition.csv

This CSV file contains information about the cache logical partitioning function. A record is created for each cache partition for a managed resource.

For details of the cache logical partitioning function, see the *Performance Guide*.

Item	Content
CLPR#	CLPR ID (in decimal)
CLPR Name	CLPR name

Item	Content
Cache Size(MB)	Cache size allocated to this CLPR (in MB)
ECC Group	<p>Number of parity group allocated to this CLPR.</p> <ul style="list-style-type: none"> <li>▪ If the number starts with "E" (for example, E1-1), the parity group contains external volumes.</li> <li>▪ If the type of the LDEV is a Dynamic Provisioning or Thin Image virtual volume, a hyphen is output.</li> </ul> <p>Refer to "LdevInfo.csv" for information about the LDEV type.</p>
LDEV#(V-VOL)	<p>LDEV number allocated to this CLPR.</p> <ul style="list-style-type: none"> <li>▪ VSP E990: (00:00:00 to 00:fe:ff)</li> <li>▪ VSP F350, VSP G350: (00:00:00 to 00:3f:ff)</li> <li>▪ VSP F370 or VSP G370: (00:00:00 to 00:7f:ff)</li> <li>▪ VSP F700, VSP G700: (00:00:00 to 00:bf:ff)</li> <li>▪ VSP F900, and VSP G900: (00:00:00 to 00:fe:ff)</li> </ul> <p>The type of this LDEV is Dynamic Provisioning, Thin Image, or ALU.</p>

## LunInfo.csv

This CSV file contains information about LU path definitions. A record is created for each host group. For more information about LU path definitions, see the *Provisioning Guide*.

Item	Description
Port	Port name
Host Group	<p>Host group name</p> <p>If "Package Type" is iSCSI, the iSCSI target alias is output.</p>
Host Mode	Host mode specified for this host group (hexadecimal)
Host Mode Option	<p>Host mode option set for this host group (decimal)</p> <p>If more than one option is specified, the options are separated by semicolons (;).</p>
LUN#	LUN number for this LU path definition (hexadecimal)
LDEV#	LDEV number for this LU path definition

Item	Description
Command Device	Information about whether the LDEV is a command device: <ul style="list-style-type: none"> <li>▪ On: Command Device</li> <li>▪ On*: Remote Command Device</li> <li>▪ Off: Others</li> </ul>
Command Security	Information about whether the command device is secured: <ul style="list-style-type: none"> <li>▪ On</li> <li>▪ Off</li> </ul>
CVS	Information about whether the LDEV is a custom-sized volume: <ul style="list-style-type: none"> <li>▪ On: Customized volume</li> <li>▪ Off: Other volumes</li> </ul>
CHB Location	Name of the CHB on which this port is installed CHB-1A/1B/1C/1D or CHB
Package Type	CHB type for CHB Location: <ul style="list-style-type: none"> <li>▪ Fibre:               <ul style="list-style-type: none"> <li>• 16FC2 (CHB)</li> <li>• 32FC4R (CHB)</li> </ul> </li> <li>▪ iSCSI:               <ul style="list-style-type: none"> <li>• 10iSCSI2o (CHB)</li> <li>• 10iSCSI2c (CHB)</li> </ul> </li> </ul>
Resource Group ID (Host Group)	Resource group ID of a host group (0 to 1,023, decimal)
Resource Group Name (Host Group)	Resource group name of a host group
T10 PI Mode	Indicates whether the T10 PI mode can be applied to the port for which the LU path is defined. <ul style="list-style-type: none"> <li>▪ Enabled</li> <li>▪ Disabled</li> <li>▪ Blank if "Package Type" is not 16FC2 (CHB) or 32FC4R (CHB).</li> </ul>

Item	Description
T10 PI	Information about the T10 PI attribute which is set for the LDEV number of the LU path definition. <ul style="list-style-type: none"> <li>▪ Enabled</li> <li>▪ Disabled</li> <li>▪ Blank if LDEV# is blank</li> </ul>
Asymmetric Access State	Asymmetric access status (output only for an open system CHB that is Fibre or FCoE) Indicates the asymmetric access status: <ul style="list-style-type: none"> <li>▪ Active/Optimized: Prioritized</li> <li>▪ Active/Non-Optimized: Lower priority</li> </ul> Blank if "Package Type" is iSCSI

## LunPortInfo.csv

This CSV file contains information about LU path definition. A record is created for each port.

For details of LU path definition, see the *Provisioning Guide*.

Item	Content
Port	Port name.
Security Switch	The setting status of the security switch: <ul style="list-style-type: none"> <li>▪ On</li> <li>▪ Off</li> </ul>
Port Address	Port address (2-digit hexadecimal number) 00 to ff Blank if "Package Type" is iSCSI
Loop ID	Port address (0 - 125, decimal) Blank if "Package Type" is iSCSI
Fabric	One of the Fibre topology settings indicating the setting status of the Fabric switch: <ul style="list-style-type: none"> <li>▪ On</li> <li>▪ Off</li> <li>▪ Blank if "Package Type" is iSCSI</li> </ul>

Item	Content
Connection	One of the Fibre topology settings: <ul style="list-style-type: none"> <li>▪ Point to Point</li> <li>▪ FC-AL</li> <li>▪ Blank if "Package Type" is iSCSI</li> </ul>
Channel Speed	Channel Speed of this port <ul style="list-style-type: none"> <li>▪ 1 Gbps</li> <li>▪ 4 Gbps</li> <li>▪ 8 Gbps</li> <li>▪ 10 Gbps</li> <li>▪ 16 Gbps</li> <li>▪ 32 Gbps</li> <li>▪ Auto</li> </ul>
WWN	WWN of this port (hexadecimal number) Blank if "Package Type" is iSCSI
CHB Location	CHB on which the port is installed.
Package Type	CHB type for CHB Location <ul style="list-style-type: none"> <li>▪ Fibre:               <ul style="list-style-type: none"> <li>• 16FC2 (CHB)</li> <li>• 32FC4R (CHB)</li> </ul> </li> <li>▪ iSCSI:               <ul style="list-style-type: none"> <li>• 10iSCSI2o (CHB)</li> <li>• 10iSCSI2c (CHB)</li> </ul> </li> </ul>
T10 PI Mode	Indicates whether the T10 PI mode can be applied to the port. <ul style="list-style-type: none"> <li>▪ Enabled</li> <li>▪ Disabled</li> <li>▪ Blank if "Package Type" is not 16FC2 (CHB) or 32FC4R (CHB)</li> </ul>

## MicroVersion.csv

This CSV file contains information about software versions.

**Table 16 For VSP G130, G/F350, G/F370, G/F700, G/F900:**

Item	Content
DKCMAIN	The version of the firmware for the RAID storage system (10 digits)
ROM BOOT	ROM BOOT firmware version (6 digits)
RAM BOOT	RAM BOOT firmware version (6 digits)
Config	Config version (8 digits)
HDD	HDD firmware version (4 digits) HDD version in the format "(HDD-device-type - code):(version)". If an HDD drive is not installed, only a colon is displayed.
Expander	Expander firmware version (6 digits)
CFM	CFM firmware version (8 digits)
DKB	DKB firmware version (6 digits)
Printout Tool	Printout tool version (xx-yy-zz-mm/aa)
CHB (FC32G)	32G FC protocol chip firmware version (8 digits)
CHB (iSCSI)	CHB(iSCSI) protocol chip firmware version (8 digits)
GUM	GUM firmware version (8 digits)

**Table 17 For VSP E990:**

Item	Content
DKCMAIN	The Version of the firmware for the RAID storage system (10 digits)
ROM BOOT	ROM BOOT firmware version (6 digits)
RAM BOOT	RAM BOOT firmware version (6 digits)
Config	Config version (8 digits)
HDD	HDD firmware version (4 digits) HDD version in the format "(HDD-device-type - code):(version)". If an HDD drive is not installed, only a colon is displayed.
CFM	CFM firmware version (8 digits)
Printout Tool	Printout tool version (xx-yy-zz-mm/aa)

Item	Content
CHB(FC32G)	32G FC protocol chip firmware version (8 digits)
CHB(iSCSI)	CHB9iSCSI) protocol ship firmware version (8 digits)
GUM	GUM firmware version (8 digits)
DKBN	DKBN firmware version (6 digits)
NSW	NSW firmware version (6 digits)
EDKBN	EDKBN firmware version (6 digits)

## MlcEnduranceInfo.csv

This CSV file contains information about endurance information of MLC. A record is created for each MLC endurance information.

If you change the SVP time 1 month or more, the history acquisition months will not be in order.

Item	Content
ECC Group	Number of parity groups of which this MLC (including FMD and FMD DC2 ) is a component. <ul style="list-style-type: none"> <li>▪ If it is a spare drive, Spare Drive is displayed.</li> <li>▪ If it is a free drive, Free Drive is displayed.</li> </ul>
CR#	C# and R# (2-digit hexadecimal numbers), which identify the PDEV Output in the format of "XX/YY" XX: C# YY: R#
Device Type-Code	Drive type code of this drive Output example: SLR5A-M800SS
Used Endurance Indicator (%)	The current used endurance of SSD life (0 to 100) The value of this indicator increases due to drive operation associated with internal processing of the storage system, and the host I/O. Even when no data is copied due to a drive failure, the value of this indicator increases because the spare drive also performs internal processing.
History1 (date)	Date on which the used endurance of SSD life was acquired (1 month ago)

Item	Content
	Output example: <i>yyyy/mm/dd</i>
History1 (%)	The used endurance of SSD life (0 to 100)(1 month ago)
History2 (date)	Date on which the used endurance of SSD life was acquired (2 months ago) Output example: <i>yyyy/mm/dd</i>
History2 (%)	The used endurance of SSD life (0 to 100) (2 months ago)
History3 (%) ... History 119 (%)	Life (0 to 100) (3 months ago ... 119 months ago)
History120 (date)	Date on which the used endurance of SSD life was acquired (120 months ago) Output example: <i>yyyy/mm/dd</i>
History120 (%)	The used endurance of SSD life (0 to 100) (120 months ago)

## ModePerLpr.csv

This CSV file contains information about system option modes. A record is created for each system option mode.

Item	Content
System Option Mode#	System option mode # (0 to 2047, decimal number)
LPR#0, LPR#1, ..., LPR#31	System option mode for LPR#0 to LPR#31 <ul style="list-style-type: none"> <li>▪ If the system option mode is on: On</li> <li>▪ If the system option mode is not on: Blank</li> </ul>

## MpPathStatus.csv

This CSV file contains information about the status of logical paths. A record is created for each MP blade or LR.

Item	Content
MPU#/CTL#	MP unit number or CTL number (2-digit hexadecimal number) <ul style="list-style-type: none"> <li>▪ For MP unit number MPU#00 to MPU#01</li> <li>▪ For CTL number CTL#00 to CTL#01</li> </ul>
CMG#00-00 to 01 CMG#01-00 to 01	Path status <sup>1</sup> for the MP unit number with the cache module (CMG#XX-YY) XX: I path, YY: CMG#
MPU#00-00 to 01 MPU#01-00 to 01	Path status <sup>1</sup> and the MP unit for the MP unit number (MPU#XX-YY) XX: I path, YY: MPU#
CMG#00-00 to 01 CMG#01-00 to 01	Path status <sup>1</sup> with the cache module for the CTL number (CMG#XX-YY) XX: I path, YY: CMG#
MPU#00-00 to 01 MPU#01-00 to 01	Path status <sup>1</sup> with the MP unit number for the CTL number (MPU#XX-YY) XX: I path, YY: MPU#
<b>Note:</b>	
1. 1=Normal, 0=Abnormal	

## MpPcbStatus.csv

This CSV file contains information about the status of MP Unit. A record is created for each MP unit.

**Table 18 MpPcbStatus.csv file (Title: <<MP PCB Status>>)**

Item	Content
MPU ID	MP unit ID (MPU-10, MPU-20)
Auto Assignment	Information about whether this MP unit is set to be automatically assigned to each resource. <ul style="list-style-type: none"> <li>▪ Enabled: Set to be automatically assigned</li> <li>▪ Disabled: Not set to be automatically assigned</li> </ul>
MPU Status	MP unit status*
MP#00, #01, ..., #19	MP status*

Item	Content
	<p>The number of output items differs for each model, because the number of installed MPs is different.</p> <ul style="list-style-type: none"> <li>▪ VSP E990: MP#00,01,...,1b</li> <li>▪ VSP F350, VSP G350: MP#00,01,...,05</li> <li>▪ VSP F370, VSP G370: MP#00,01,...,09</li> <li>▪ VSP F700, VSP G700: MP#00,01,...,11</li> <li>▪ VSP F900, VSP G900: MP#00,01,...,19</li> </ul>
<p><b>Note:</b> * 1=Normal, 0=Abnormal</p>	

## PcbRevInfo.csv

This CSV file contains information about revisions of packages such as channel boards (CHBs) and others. A record is created for each package.

**Table 19 PcbRevInfo.csv file (Title: <<PCB Revision Information>>)**

Item	Content
Cluster#	Cluster number 1 or 2
Location	Part name
FRU number	Product name of the package or some other name
PK Revision	Revision of the package
Factory	Factory manufacturing the package
Number	Serial number of the package
MAC Address	MAC address of the package

## PdevCapalInfo.csv

This CSV file contains information about physical device (PDEV) capacities. A record is created for each of the classifications shown in "PDEV Kind".

Item	Content
PDEV Kind	The following four classifications are output: <ul style="list-style-type: none"> <li>▪ OPEN System (TB)</li> <li>▪ Total Capacity (TB)</li> <li>▪ Number of PDEVs</li> </ul>
HDD Drive	HDD drive capacity (TB)
Spare Drive	Spare drive capacity (TB)
SSD Drive	SSD capacity (TB)
Free Drive	Free drive capacity (TB)

## PdevInfo.csv

This CSV file contains information about physical devices (PDEVs). A record is created for each PDEV.

Item	Content
ECC Group	Number of parity group of which this PDEV is a component. <ul style="list-style-type: none"> <li>▪ Spare Drive: For spare drives</li> <li>▪ Free Drive: For free drives</li> </ul>
Emulation Type	Emulation type for the parity group indicated by "ECC Group" <ul style="list-style-type: none"> <li>▪ Blank: "ECC Group" is Spare Drive.</li> <li>▪ Free Drive: "ECC Group" is Free Drive.</li> </ul>
CR#	C# and R# (2-digit hexadecimal numbers), which identify the PDEV Output in the format XX/YY, where: <ul style="list-style-type: none"> <li>▪ XX: C#</li> <li>▪ YY: R#</li> </ul>
PDEV Location	PDEV location name
Device Type	Drive type <ul style="list-style-type: none"> <li>▪ SAS</li> <li>▪ SSD</li> </ul>
RPM	Revolutions per minute Blank displays as RPM when the drive is SSD.

Item	Content
	For VSP E990, this item is displayed as Interface.
Device Type-Code	Device type code of this drive Output example: DKR5D-J600SS
Device Size	Drive size (inches) <ul style="list-style-type: none"> <li>▪ 2.5</li> <li>▪ 3.5</li> <li>▪ Blank for DBF (FMD or FMD DC2 )</li> </ul>
Device Capacity	Drive capacity (GB or TB)
Drive Version	Drive firmware version (4-digit hexadecimal number)
DKB1	Name of the DKB1 controlling the PDEV
DKB2	Name of the DKB2 controlling the PDEV
Serial Number #	Serial number of this drive ( <i>yy</i> <i>mm</i> <i>xxxxxx</i> ), where: <ul style="list-style-type: none"> <li>▪ <i>yy</i> Year (last 2 digits)</li> <li>▪ <i>mm</i> Month (2 digits)</li> <li>▪ <i>xxxxxx</i>: Serial number of this drive</li> </ul>
RAID Level	RAID level of the parity group indicated by "ECC Group" Blank if the "ECC Group" is Spare Drive or Free Drive
RAID Concatenation #0	Number of parity group to be concatenated to parity group (#0) identified by "ECC Group" <sup>1</sup>
RAID Concatenation #1	Number of parity group to be concatenated to parity group (#1) identified by "ECC Group" <sup>1</sup>
RAID Concatenation #2	Number of parity group to be concatenated to parity group (#2) identified by "ECC Group" <sup>1</sup>
Resource Group ID (ECC Group)	Resource group ID of parity group (0 to 1023, decimal number)
Resource Group Name (ECC Group)	Resource group name of parity group
Encryption	Encryption status of the parity group to which the PDEV belongs <ul style="list-style-type: none"> <li>▪ Enabled: Encryption enabled</li> <li>▪ Disabled: Encryption disabled</li> </ul>

Item	Content
Accelerated Compression	<p>Accelerated compression setting.</p> <ul style="list-style-type: none"> <li>▪ Enabled: accelerated compression is enabled.</li> <li>▪ Disabled: accelerated compression is disabled.</li> </ul> <p>If the parity group with PDEV does not support accelerated compression, or if the ECC Group is Spare Drive, a blank space is displayed.</p>
Automatically manage compressed space of FMD parity group	<p>Indicates whether to manage the compressed area of the FMD parity group automatically.<sup>2</sup></p> <ul style="list-style-type: none"> <li>▪ Enabled: The area is managed automatically.</li> <li>▪ Disabled: The area is not managed automatically</li> </ul> <p>If the parity group with PDEV does not support accelerated compression, a blank space is displayed.</p>
<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Blank if the parity group is not concatenated to another parity group or is Spare Drive.</li> <li>2. Blank if the parity group to which PDEV belongs does not support accelerated compression.</li> </ol>	

## PdevStatus.csv

This CSV file contains information about the status of physical devices (PDEVs). A record is created for each PDEV.

Item	Content
CR#	<p>C# and R# (2-digit hexadecimal numbers), which identify the PDEV</p> <p>Output in the format XX/YY, where:</p> <ul style="list-style-type: none"> <li>▪ XX: C#</li> <li>▪ YY: R#</li> </ul>
Pdev Status	PDEV status <sup>1</sup>
Port0 Status	Status of Port 0 on this PDEV <sup>1</sup>
Port1 Status	Status of Port 1 on this PDEV <sup>1</sup>
Pdev Location	Location name of this PDEV
<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. 1=Normal, 0=Abnormal</li> </ol>	

## PECBInfo.csv

This CSV file contains information about the PECB (PCIe channel board) and connecting destination for VSP F900 or VSP G900.

For VSP E990 and all other VSP Gx00 models or VSP Fx00 models, hyphens are displayed for all contents.

Item	Content
Location	PECB location name
Status	Whether the PECB is installed <ul style="list-style-type: none"> <li>▪ Installed</li> <li>▪ Not Installed</li> </ul>
Type	Destination module type of the PECB <ul style="list-style-type: none"> <li>▪ CHBB</li> </ul>
Expansion mode	Expansion mode set in the destination module of the PECB

## PkInfo.csv

This CSV file contains information about channel boards (CHBs). A record is created for each CHB.

**Table 20 PkInfo.csv file (Title: <<PK>>)**

Item	Content
CHB Location	CHB name
Port#	Number of the port installed on the CHB (2-digit hexadecimal number), 00 to ff
Port	Name of port installed on the CHB
Package Type	CHB type indicated on the CHB Location <ul style="list-style-type: none"> <li>▪ Fibre: 16FC2 (CHB), 32FC4R (CHB)</li> <li>▪ iSCSI: 10iSCSI2o (CHB), 10iSCSI2c (CHB)</li> </ul>
SFP Kind	SFP (Small Form factor Pluggable) Kind <ul style="list-style-type: none"> <li>▪ Short Wave</li> <li>▪ Long Wave</li> <li>▪ Blank if "Package Type" is 10iSCSI2c (CHB).</li> </ul>

Item	Content
SFP Status	SFP Status: <ul style="list-style-type: none"> <li>▪ Normal</li> <li>▪ Failed</li> <li>▪ Not Fix</li> <li>▪ Blank if "Package Type" is 10iSCSI2c (CHB).</li> </ul>
Fabric	One of the Fibre topology settings indicating the setting status of the Fabric switch: <ul style="list-style-type: none"> <li>▪ On</li> <li>▪ Off</li> </ul>
Connection	One of the Fibre topology settings <ul style="list-style-type: none"> <li>▪ Point to Point</li> <li>▪ FC-AL</li> </ul>
Port Address	Port address (00 to ff, 2-digit hexadecimal number) Blank if "Package Type" is iSCSI.
Resource Group ID (Port)	Resource group ID of port (0 to 1023, decimal number)
Resource Group Name (Port)	Resource group name of the port.
Port Internal WWN	Port WWN Blank if "Package Type" is iSCSI.
T10 PI Mode	Indicates whether the T10 PI mode can be applied to the port. <ul style="list-style-type: none"> <li>▪ Enabled</li> <li>▪ Disabled</li> <li>▪ Blank if "Package Type" is not 16FC2 (CHB) or 32FC4R (CHB).</li> </ul>
SFP Data Transfer Rate	Maximum transfer rate of SFP which the mounted package supports. <ul style="list-style-type: none"> <li>▪ 10G</li> <li>▪ 16G</li> <li>▪ 32G</li> <li>▪ Blank if the "Package Type" is 10iSCSI2c (CHB)</li> </ul>

## PpInfo.csv

This CSV file contains information about the software. A record is created for each software product.

For details about the license key, see [Managing license keys \(on page 155\)](#).

Item	Content
Program Product Name	Software name.
Install	Information about whether the installed license key is enabled or not <ul style="list-style-type: none"> <li>▪ Enabled: Installed and the software can be used</li> <li>▪ Disabled: Installed but the software cannot be used</li> </ul>
Key Type	Installed license key type <ul style="list-style-type: none"> <li>▪ Permanent</li> <li>▪ Temporary</li> <li>▪ Emergency</li> <li>▪ Term</li> </ul> <p>If no license key is installed, "Not Installed" is output.</p>
Permitted Volumes(TB)	Permitted volume capacity for this software (in TB) If no upper limit value is set for the capacity, "Unlimited" is output.
Expiration Date	Expiration date of the software. The format is <i>mm/dd/yyyy</i> (Month/Day/Year).
Status	License key status of the software <ul style="list-style-type: none"> <li>▪ Installed</li> <li>▪ Not Enough License</li> <li>▪ Grace Period</li> <li>▪ Expired</li> <li>▪ Not Installed</li> <li>▪ Installed (Disabled)</li> </ul>

## SMfundat.csv

This CSV file contains information about SM functions. A record is created for each of the classifications shown in "SM Install Function".

Item	Content
SM Install function	<p>The following classifications are output for VSP F350, VSP F370, VSP G350, VSP G370:</p> <ol style="list-style-type: none"> <li>1. Base</li> <li>2. Extension 1</li> <li>3. Extension 2</li> </ol> <p>The following classifications are output for VSP E990, VSP F700, VSP F900, VSP G700, VSP G900:</p> <ol style="list-style-type: none"> <li>1. Base</li> <li>2. Extension1</li> <li>3. Extension2</li> <li>4. Extension3</li> </ol>
Availability	<p>Information about whether the function of "SM Install function" is enabled</p> <ul style="list-style-type: none"> <li>▪ Enabled</li> <li>▪ Disabled</li> </ul>

## SsdDriveInfo.csv

This CSV file contains information about SSDs. A record is created for each SSD.

Item	Content
ECC Group	<p>Number of the parity group of which this SSD is a component.</p> <ul style="list-style-type: none"> <li>▪ Spare Drive: The SSD is a spare drive.</li> <li>▪ Free Drive: The SSD is a free drive.</li> </ul>
CR#	<p>C# and R# (2-digit hexadecimal numbers), which identify the PDEV</p> <p>Output in the format XX/YY, where:</p> <ul style="list-style-type: none"> <li>▪ XX: C#</li> <li>▪ YY: R#</li> </ul>
PDEV Location	<p>Drive type code of the PDEV location name for this drive</p>
Device Type-Code	<p>Drive type code</p> <p>Output example: SLR5A-M800SS</p>
Device Capacity	<p>Drive capacity in GB or TB</p>

Item	Content
SSD Device Type	SSD drive type <ul style="list-style-type: none"> <li>▪ MLC</li> <li>▪ FMD</li> <li>▪ FMD DC2</li> <li>▪ SSD(RI)</li> </ul>
Used Endurance Indicator (%)	The used endurance of SSD life (0 to 100)
Used Endurance Indicator Threshold (%)	Drive life threshold (0 to 100)
Used Endurance Indicator Warning SIM (%)	Warning SIM threshold (0 to 100)
FMD Battery Life Indicator Warning SIM (%)	Threshold of battery life warning SIM (0 to 100) Blank if SSD is other than FMD For VSP E990, no information is output.
FMD Battery Life Indicator (%)	Used battery life (0 to 100) Blank if SSD is other than FMD For VSP E990, no information is output.

## SsidInfo.csv

This CSV file contains information about SSIDs. A record is created for each SSID.

Item	Content
DEV# Start	First LDEV number for the SSID
DEV# End	Last LDEV number for the SSID
SSID	Subsystem ID (hexadecimal)

## SysoptInfo.csv

This CSV file contains information about system options.

Item	Content
Spare Disk Recover	Speed of copying data to the spare drive. <ul style="list-style-type: none"> <li>▪ Interleave mode</li> <li>▪ Full Speed mode</li> </ul>
Dynamic Sparing	Information about whether to perform automatic copy to a spare drive if the occurrences of drive failures exceed the threshold. <ul style="list-style-type: none"> <li>▪ On</li> <li>▪ Off</li> </ul>
Correction Copy	Information about whether to perform correction copy to a spare drive if a drive is blocked. <ul style="list-style-type: none"> <li>▪ On</li> <li>▪ Off</li> </ul>
Disk Copy pace	Speed of copying the spare drive in the Interleave mode. <ul style="list-style-type: none"> <li>▪ Faster</li> <li>▪ Medium</li> <li>▪ Slower</li> </ul>
System Option On	System options that are set to ON. Output example: modeXXXX (0 to 2047, decimal number)
Link Failure Threshold	Threshold to notify the link failure (0 to 255, decimal)

## WwnInfo.csv

This CSV file contains information about hosts. A record is created for each host.

Item	Content
Port	Port name.
Host Group	Host group name iSCSI target alias is output if the "Package Type" is iSCSI.
Host Mode	Host mode that is set for the host group (hexadecimal)
Host Mode Option	Host mode option that is set for the host group (decimal) Multiple options are separated by semicolons (;)
WWN	World Wide Name of the host bus adapter registered to the host group (hexadecimal number)

Item	Content
	Blank if the "Package Type" is iSCSI.
Nickname	Nickname of the host Blank if the "Package Type" is iSCSI.
Host Group#	Host group number (00 to fe, hexadecimal) iSCSI target ID will be output if the "Package Type" is iSCSI.
CHB Location	Name of port installed on the CHB
Package Type	CHB type indicated on the CHB Location <ul style="list-style-type: none"> <li>▪ Fibre: 16FC2 (CHB), 32FC4R(CHB)</li> <li>▪ iSCSI: 10iSCSI2o (CHB), 10iSCSI2c (CHB)</li> </ul>
T10 PI Mode	Indicates whether the T10 PI mode can be applied to the port. <ul style="list-style-type: none"> <li>▪ Enabled</li> <li>▪ Disabled</li> <li>▪ Blank if "Package Type" is not 16FC2 (CHB) or 32FC4R (CHB).</li> </ul>

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## Appendix C: SMI-S provider configuration file

To use this SMI-S function you must create a SMI-S provider configuration file. This section describes the SMI-S provider configuration files.

### Array-setting-01.properties file

The array-setting-01.properties file is an SMI-S provider user configuration file. This section describes the description format and organization format of SMI-S provider user configuration files and parameters to be defined.

#### File description format

The format of the array-setting-01.properties file includes the following items:

- File format: text
- Character code: ISO 8859-1
- Line-end symbol: \n, \r, or \r\n
- Comment: Line on which # or ! is the first non-space character

#### File organization format

The organization of the array-setting-01.properties file is shown here:

```
# comment line
parameter1= parameter1_setting_value
parameter2= parameter2_setting_value
# comment line
```

#### Parameters defined in user configuration files

The following table describes the parameters can be specified in user configuration files.

Parameter name	Description
ResourceGroup	Specifies the resource groups that the SMI-S provider can use. For parameter details, see <a href="#">ResourceGroup parameter (on page 274)</a> .

All parameters are optional. If no value is specified for a parameter, the default value applies.

## ResourceGroup parameter

Use the ResourceGroup parameter to specify resource groups that the SMI-S provider can use.

All resource groups are specified by default.

### Setting up the ResourceGroup parameter

Set up the parameter by using <RangeOfResourceGroupID> and <SingleResourceGroupID> with a comma (,) as a delimiter:

- <RangeOfResourceGroupID>: Specifies a range of resource group IDs
- <SingleResourceGroupID>: Specifies a single resource group ID

#### <RangeOfResourceGroupID> format

<Start ResourceGroupID>to<End ResourceGroupID>

- <Start ResourceGroupID>: ID of the first resource group in the specified range
- <End ResourceGroupID>: ID of the last resource group in the specified range

#### <SingleResourceGroupID> format

<ResourceGroupID>

- <ResourceGroupID>: ID of the resource group to be specified

### Example

```
ResourceGroup=1to2,4,6to8
```

In this example, resource groups having one of the following resource group IDs are used:

- 1, 2, 4, 6, and 8

## Appendix D: System option modes (SOMs)

System option modes allow the storage system to be configured to specific customer operating requirements.

### System option modes

To provide greater flexibility, the storage systems have additional operational parameters called system option modes (SOMs) that allow you to tailor the storage system to your unique operating requirements.

The table below lists and describes the SOMs for the following DKCMAIN firmware versions:

- VSP E series: 93-03-01
- VSP G130, G/F350, G/F370, G/F700, G/F900: 88-07-01

Review the SOMs for your storage system, and work with your service representative to ensure that the appropriate SOMs for your operational environment are configured on your storage system.



**Note:** The SOM information might have changed since this document was published. For the latest SOM information, contact customer support.

**Table 21 System option modes for VSP E series and VSP G130, G/F350, G/F370, G/F700, G/F900**

Mode	Category	Description	Default	MCU/RCU
15	Common	This SOM can reduce the host response time to be within about 6 seconds.	ON	-

Mode	Category	Description	Default	MCU/RCU
		<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM is used on a storage system where slow or delayed drive response may affect business operations.</li> <li>2. When Dynamic Sparing or Auto Correction Mode is used, because host I/Os conflict with copy processing, the I/O watching time is 30 seconds even when this SOM is set to ON.</li> <li>3. Even though SOM 15 is set to ON, the function does not apply to SATA or NL-SAS drives.</li> <li>4. When SOM 771 or SOM 797 is set to ON, the setting of SOM 771/797 is prioritized for the read I/O watching time.</li> <li>5. For additional details about this SOM (interaction with other SOMs, operational details), contact customer support (see SOM015 sheet).</li> </ol>		
22	Common	<p>Regarding the correction copy or the drive copy, in case ECCs/LRC PINs are set on the track of copy source HDD, SOM 22 can be used to interrupt the copy processing (default) or to create ECCs/LRC PINs on the track of copy target HDD to continue the processing.</p> <p><b>Mode 22 = ON:</b> If ECCs/LRC PINs (up to 64) have been set on the track of copy source HDD, ECCs/LRC PINs (up to 64) will be created on the track of copy target HDD so that the copy processing will continue. If the number of ECCs/LRC PINs exceeds 64, the corresponding copy processing will be interrupted.</p> <p><b>Mode 22 = OFF:</b> If ECCs/LRC PINs have been set on the track of copy source HDD, the copy processing will be interrupted. (First recover ECCs/LRC PINs by using the PIN recovery flow, and then perform the correction copy or the drive copy again).</p> <p>One of the controlling option for correction/drive copy.</p>	OFF	None
142	Common	<p>When a command issued to a drive turns to time-out, the failure is counted on the failure counter of the drive port. If the failure counter reaches the port blockage threshold, the drive port is blocked. When this SOM is set to ON, the port is blocked when the number of failures reaches the half point</p>	ON	-

Mode	Category	Description	Default	MCU/RCU
		<p>of the threshold, which mitigates the occurrence possibility of the host time-out.</p> <p><b>Mode 142 = ON (default):</b> The threshold value of blocking a drive port due to command time-out is changed to the half of the normal threshold.</p> <p><b>Mode 142 = OFF:</b> The threshold value of blocking a drive port due to command time-out does not change.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM should always be set to ON. This SOM can be set to OFF only when the customer does not allow to set this SOM to ON for a storage system already in production.</li> <li>2. This SOM is effective for the entire storage system.</li> </ol>		
144	Common	<p>This mode is intended to detect and block an HDD whose response is permanently delayed to keep reliability.</p> <ol style="list-style-type: none"> <li>1. Normal response delay detection logic</li> </ol> <p>Mode 144 = ON: When a response delay drive is detected, SSB=A4CE and A4DE are logged, the drive with response delay is blocked, and SSB=AE4A and SIM=EF0XXX or EF1XXX are reported.</p> <p>The behavior varies depending on the combinations of SOM settings. For details, contact customer support (see SOM144 sheet).</p> <p>Mode 144 = OFF: When a response delay drive is detected, SSB=A4CE and A4DE are logged, and SIM=DFFX is reported.</p> <p>The behavior varies depending on the combinations of SOM settings. For details, contact customer support (see SOM144 sheet).</p>	<p>ON (88-01-02 only)</p> <p>OFF (93-03-01 and later, 88-01-03 and later)</p>	-

Mode	Category	Description	Default	MCU/RCU
		<p><b>2. Early response delay detection logic</b></p> <p>When the logic that detects a minor drive response delay early, which is enabled or disabled by setting SOM1068 to ON or OFF, detects a drive response delay, the drive with response delay is blocked.</p> <p>SOM144 works with the logic and determines whether to block a drive or not when the logic detects a response delay.</p> <p>Mode 144 = ON: When a response delay is detected by the logic, SSB=A4CF and A4DD are logged, the drive with response delay is blocked, and then SSB=AE4A and SIM=EF0XXX or EF1XXX are reported.</p> <p>The behavior varies depending on the combinations of SOM settings. For details, contact customer support (see sheet SOM144).</p> <p>Mode 144 = OFF: When a response delay is detected by the logic, SSB=A4CF is logged and SIM=DFFX is reported.</p> <p>The behavior varies depending on the combinations of SOM settings. For details, contact customer support (see sheet SOM144).</p> <p><b>Note:</b> The mode is applied if a stable host response is prioritized by separating a drive whose response is permanently delayed at early stage when the drive delay is detected. To apply the mode, note that separating the drive causes decrease in redundancy.</p>		
310	Common	<p><b>Mode 310 = ON:</b> The monitoring timer for MP hang-up is 6 seconds and returning a response to the host within 8 seconds is guaranteed.</p> <p><b>Mode 310 = OFF (default):</b> The monitoring timer for MP hang-up is 8 seconds.</p>	OFF	-

Mode	Category	Description	Default	MCU/RCU
		<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM applies to a site where strict host response performance is required.</li> <li>2. If a hardware failure occurs when this SOM is set to ON, the time until MPB blockage is determined is shorter than usual.</li> </ol>		
448	Universal Replicator	<p><b>Mode 448 = ON:</b> After a physical path failure (such as path disconnection) is detected, a mirror is split (suspended) one minute after the detection. On the MCU side, the mirror is suspended one minute after read journal commands from the RCU stop. On the RCU side, the mirror is suspended one minute after read journal commands fail.</p> <p><b>Mode 448 = OFF (default):</b> After a physical path failure (such as path disconnection) is detected, a mirror is split (suspended) if the path is not restored within the path monitoring time set by the mirror option.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. The mode is applied when a user requires to suspend the pair one minute after a communication error between UR MCU and RCU is detected.</li> <li>2. When SOM 449 is set to ON, SOM 448 does not function.</li> </ol>	OFF	-
449	Universal Replicator	<p>This mode is used to enable and disable detection of communication failures between the MCU and RCU. The default setting is ON.</p> <p><b>Mode 449 = ON (default):</b> When a physical path failure is detected, the pair is not suspended. On the MCU side, checking read journal command disruption from the RCU is disabled, and monitoring read journal command failures is disabled on the RCU side.</p> <p><b>Mode 449 = OFF:</b> When a physical path failure is detected, the pair is suspended after the path monitoring time set by the mirror option has passed or after one minute. Detecting communication failures between the MCU and RCU is enabled. When this mode is set to OFF, SOM 448 can be enabled.</p>	ON	MCU

Mode	Category	Description	Default	MCU/RCU
		<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM is applied when disabling the detection of communication failures between the MCU and RCU in UR configuration is required.</li> <li>2. When this SOM is set to ON, SOM 448 does not work.</li> <li>3. This SOM setting is not changed by microcode upgrade.</li> <li>4. This SOM is not effective for remote paths between an Initiator port on the MCU and a Target port on the RCU.</li> <li>5. While a path from the RCU to MCU is disconnected, if the UR pair remains in Suspending or Deleting status, recover it in accordance with the procedure in Recovery from UR Failure in TROUBLE SHOOTING section of Maintenance Manual.</li> </ol>		
454	Virtual Partition Manager	<p>CLPR (function of Virtual Partition Manager) partitions the cache memory in the storage system into multiple virtual cache and assigns the partitioned virtual cache for each use. If a large amount of cache is required for a specific use, it can minimize the impact on other uses. The CLPR function works as follows depending on whether SOM 454 is set to ON or OFF.</p> <p><b>Mode 454 = OFF (default):</b> The amount of the entire destage processing is periodically determined by using the highest workload of all CLPRs (*a). (The larger the workload is, the larger the amount of the entire destage processing becomes.)</p> <p>*a: (Write Pending capacity of CLPR#x of concerned MPB) ÷ (Cache capacity of CLPR#x of concerned MPB), x=0 to 31</p> <p>CLPR whose value above is the highest of all CLPRs</p> <p>Because the destage processing would be accelerated depending on CLPR with high workload, when the workload in a specific CLPR increases, the risk of host I/O halt would be reduced.</p> <p>Therefore, set SOM 454 to OFF in most cases.</p>	OFF	-

Mode	Category	Description	Default	MCU/RCU
		<p><b>Mode 454 = ON:</b></p> <p>The amount of the entire destage processing is periodically determined by using the workload of the entire system (*b). (The larger the workload is, the larger the amount of the entire destage processing becomes.)</p> <p>*b: (Write Pending capacity of the entire system of concerned MPB) ÷ (Cache capacity of the entire system of concerned MPB)</p> <p><b>Caution:</b> Because the destage processing would not be accelerated even if CLPR has high workload, when the workload in a specific CLPR increases, the risk of host I/O halt would be increased. Therefore, set SOM 454 to ON only when a CLPR has constant high workload and the I/O performance in a CLPR with low workload has higher priority than host I/O halt in the CLPR with high workload.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. When this SOM is set to ON, even if there is an overloaded CLPR (CLPR with large Write Pending capacity), the amount of destage processing would not increase easily. Therefore TOV(MIH) may occur in the overloaded CLPR. Set this SOM to ON only when the overloaded state of a specific CLPR would not affect other CLPRs.</li> </ol> <p>When the UR function is used, if user volumes and journal volumes are defined in different CLPRs, when the CLPR to which the journal volumes are assigned overflows, the user volumes become inaccessible. Therefore it is recommended to set this SOM to OFF.</p> <ol style="list-style-type: none"> <li>2. Because the destage processing will have a lower priority in the overloaded CLPR, the overloaded state of the overloaded CLPR is not removed, and TOV(MIH) might occur.</li> </ol>		
457	Universal Volume Manager	<p>High-speed LDEV format for external volumes.</p> <p><b>Mode 457 = ON:</b> The high-speed LDEV format for external volumes is available by SOM 457 to ON. When SOM 457 is ON, if you select an external volume group and perform an LDEV format, any write processing on the external logical units will be skipped.</p>	OFF	Both

Mode	Category	Description	Default	MCU/RCU
		<p><b>Mode 457 = OFF (default):</b> High-speed LDEV format for external volumes is not available.</p> <p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>▪ If the LDEV is not written with data "0" before performing the function, the LDEV format might fail.</li> <li>▪ After the format processing, make sure to set SOM 457 to OFF.</li> </ul>		
459	ShadowImage	<p>When the S-VOL of an SI/SIz pair is an external volume, the transaction to change the status from SP-PEND to SPLIT is as follows:</p> <p><b>Mode 459 = ON (default):</b> When suspending an SI pair: Waits for the copy data in cache memory to completely destage to the external volume S-VOL before changing the pair status to SUSPEND.</p> <p><b>Mode 459 = OFF:</b> When suspending an SI pair: The status changes to SUSPEND as soon as all of the delta data is copied to S-VOL cache. The status does not wait for cache to destage to the S-VOL external volume.</p>	ON	-
467	ShadowImage Universal Volume Manager Volume Migration	<p>For the following features, the current copy processing slows down when the percentage of "dirty" data is 60% or higher, and it stops when the percentage is 75% or higher. Mode 467 is provided to prevent the percentage from exceeding 60%, so that the host performance is not affected.</p> <ul style="list-style-type: none"> <li>▪ SI</li> <li>▪ UVM</li> <li>▪ Volume Migration</li> </ul> <p><b>Mode 467 = ON (default):</b> Copy overload prevention. Copy processing stops when the percentage of "dirty" data reaches 60% or higher. When the percentage falls below 60%, copy processing restarts.</p> <p><b>Mode 467 = OFF:</b> Normal operation. The copy processing slows down if the dirty percentage is 60% or larger, and it stops if the dirty percentage is 75% or larger.</p> <p><b>Caution:</b> This SOM must always be set to ON when using an external volume as the secondary volume of any of the applicable replication products.</p>	ON	-

Mode	Category	Description	Default	MCU/RCU
		<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. It takes longer to finish the copy processing because it stops for prioritizing the host I/O performance.</li> <li>2. This SOM supports background copy only. The processing to copy the pre-update data to the S-VOL, which occurs when overwriting data to uncopied slots of P-VOL in Split processing or reading or writing data to uncopied slots of S-VOL, is not supported.</li> <li>3. Check the write pending rate of each CLPR per MP unit. Even though there is some free cache capacity in the entire system, if the write pending rate of an MP unit to which pairs* belong exceeds the threshold, the copy operation is stopped.</li> </ol> <p>*Applies to pairs of SI, Slz, FCv2, FCSE, and Volume Migration.</p>		
471	Thin Image	<p>Since the SIM-RCs generated when the Thin Image pool usage rate exceeds the threshold value can be resolved by users, these SIM-RCs are not reported to the maintenance personnel. This SOM is used to report these SIM-RCs to maintenance personnel.</p> <p>The SIM-RCs reported by setting the SOM to ON are: 601xxx (Pool utilization threshold exceeded), 603000 (SM space warning).</p> <p><b>Mode 471 = ON:</b> These SIM-RCs are reported to maintenance personnel.</p> <p><b>Mode 471 = OFF (default):</b> These SIM-RCs are not reported to maintenance personnel.</p> <p><b>Note:</b> Set this SOM to ON when it is required to inform maintenance personnel of these SIM-RCs.</p>	OFF	-
474	Universal Replicator	<p>UR initial copy performance can be improved by issuing a command from CCLI to execute a dedicated script consisting of UR initial copy (Nocopy), UR suspend, TC Sync initial copy, TC Sync delete, and UR resync.</p> <p><b>Mode 474 = ON:</b> For a suspended UR pair, a TC (Sync) pair can be created with the same P-VOL/S-VOL so that UR initial copy time can be reduced by using the dedicated script.</p>	OFF	Both

Mode	Category	Description	Default	MCU/RCU
		<p><b>Mode 474 = OFF (default):</b> For a suspended UR pair, a TC (Sync) pair cannot be created with the same P-VOL/S-VOL. For this, the dedicated script cannot be used.</p> <p>If the P-VOL and S-VOL are both DP-VOLs, initial copy performance might not improve with SOM 474 set to ON. This is because with DP-VOLs, not all areas in a volume are allocated for UR; therefore not all areas in the P-VOL are copied to the S-VOL. With less than the full amount of data in the P-VOL being copied, the initial copy completes in a shorter time, which might not be improved with SOM 474.</p>		

Mode	Category	Description	Default	MCU/RCU
		<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Set this SOM for both primary and secondary storage systems.</li> <li>2. When this SOM is set to ON: <ul style="list-style-type: none"> <li>▪ Execute all pair operations from CCI.</li> <li>▪ Use a dedicated script.</li> <li>▪ Initial copy operation is prioritized over update I/O. Therefore, the processing speed of the update I/O slows down.</li> </ul> </li> <li>3. If this SOM is set to ON, the processing speed of update I/O slows down by about 15 <math>\mu</math>s per command, version downgrade is disabled, and Take Over is not available.</li> <li>4. If this SOM is not set to ON for both sides, the behavior is as follows: <ul style="list-style-type: none"> <li>▪ OFF in primary and secondary storage systems: Normal UR initial copy performance.</li> <li>▪ ON in the primary storage system/OFF in the secondary storage system: TC Sync pair creation fails.</li> <li>▪ OFF in the primary storage system/ON in the secondary storage system: The update data is copied to the S-VOL synchronously.</li> </ul> </li> <li>5. While this SOM is set to ON, make sure not to perform microcode downgrade to an unsupported version.</li> <li>6. While this SOM is set to ON, make sure not to perform the Take Over function.</li> <li>7. This SOM cannot be applied to a UR pair that is the second mirror in a URxUR multi-target configuration, URxUR cascade configuration, or 3DC multi-target or cascading configuration of three UR sites. If applied, TC pair creation is rejected with SSB=CBED output.</li> <li>8. Before setting SOM 474 to ON, make sure that SOM 1091 is set to OFF. If SOM 1091 is set to ON, set it to OFF first, and then set SOM 474 to ON.</li> </ol>		

Mode	Category	Description	Default	MCU/RCU
506	Universal Replicator	<p>This SOM is used to enable Delta Resync with no host update I/O by copying only differential JNL instead of copying all data.</p> <p>The UR Delta Resync configuration is required.</p> <p><b>Mode 506 = ON:</b></p> <ul style="list-style-type: none"> <li>▪ Without update I/O: Delta Resync is enabled.</li> <li>▪ With update I/O: Delta Resync is enabled.</li> </ul> <p><b>Mode 506 = OFF:</b></p> <ul style="list-style-type: none"> <li>▪ Without update I/O: Total data copy of Delta Resync is performed.</li> <li>▪ With update I/O: Delta Resync is enabled.</li> </ul> <p><b>Note:</b> Even when SOM 506 is set to ON, the Delta Resync may fail and only the total data copy of the Delta Resync function is allowed if the necessary journal data does not exist on the primary storage system used for the Delta Resync operation.</p>	ON	Both
556	Open	<p>Prevents an error code from being set in the 8 - 11th bytes in the standard 16-byte sense byte.</p> <p><b>Mode 556 = ON:</b> An error code is not set in bytes 8 - 11 in the standard 16-byte sense byte.</p> <p><b>Mode 556 = OFF (default):</b> An error code is set in bytes 8 - 11 in the standard 16-byte sense byte.</p>	OFF	Both
589	Universal Volume Manager	<p>When this SOM is ON, the frequency of progress update of disconnection is changed.</p> <p><b>Mode 589 = ON:</b> For each external volume, progress is updated only when the progress rate is 100%.</p> <p><b>Mode 589 = OFF (default):</b> Progress is updated when the progress rate exceeds the previous level.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Set this SOM to ON when disconnecting an external volume while the specific host IO operation is online and its performance requirement is severe.</li> </ol>	OFF	Both

Mode	Category	Description	Default	MCU/RCU
		<p>2. Whether the disconnecting status for each external volume is progressed or not cannot be confirmed on Device Manager - Storage Navigator (It indicates “-“until just before the completion and at the last it changes to 100%).</p>		
689	TrueCopy global-active device	<p>Allows you to slow the initial copy and resync operations when the write-pending rate on the RCU exceeds 60%.</p> <p><b>Mode 689 = ON:</b> The initial copy and resync copy operations are slowed down when the Write Pending rate on RCU exceeds 60%.</p> <p>If the CLPR write pending rate where the initial copy target secondary volume belongs to is not over 60% but that of MP PCB where the S-VOL belongs to is over 60%, the initial copy operation is slowed down.</p> <p><b>Mode 689 = OFF (default):</b> The initial copy and resync copy operations are not slowed down when the Write Pending rate on RCU exceeds 60% (the same as before).</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM can be set online.</li> <li>2. The micro-programs on both MCU and RCU must support this SOM.</li> <li>3. This SOM should be set when requested by the user.</li> <li>4. Setting this SOM to ON is recommended when GAD is installed, as the performance degradation is more likely to occur due to active-active I/Os.</li> <li>5. If the write-pending status remains at 60% or higher on the RCU for a long time, it takes extra time for the initial copy and resync copy to be completed due to the slower copy operations.</li> <li>6. If the write pending rate of CLPR to which the initial copy target S-VOL belongs is not over 60% but that of MP PCB to which the S-VOL belongs is over 60%, the initial copy operation is slowed down.</li> </ol>	OFF	Both

Mode	Category	Description	Default	MCU/RCU
690	Universal Replicator	<p>This SOM is used to prevent Read JNL or JNL Restore when the Write Pending rate on RCU exceeds 60% as follows:</p> <ul style="list-style-type: none"> <li>▪ When CLPR of JNL-Volume exceeds 60%, Read JNL is prevented.</li> <li>▪ When CLPR of Data (secondary)-Volume exceeds 60%, JNL Restore is prevented.</li> </ul> <p><b>Mode 690 = ON:</b> Read JNL or JNL Restore is prevented when the Write Pending rate on RCU exceeds 60%.</p> <p><b>Mode 690 = OFF (default):</b> Read JNL or JNL Restore is not prevented when the Write Pending rate on RCU exceeds 60% (the same as before).</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM can be set online.</li> <li>2. This SOM should be set per customer's requests.</li> <li>3. If the Write Pending status long keeps 60% or more on RCU, it takes extra time for the initial copy to be completed by making up for the prevented copy operation.</li> <li>4. If the Write Pending status long keeps 60% or more on RCU, the pair status may become Suspend due to the JNL-Vol being full.</li> </ol>	OFF	RCU
696	Open	<p>(VSP G130, G/F350, G/F370, G/F700, G/F900) This SOM is available to enable or disable the QoS function.</p> <p><b>Mode 696 = ON:</b> QoS is enabled. (In accordance with the Share value set to SM, I/Os are scheduled. The Share value setting from RMLIB is accepted)</p> <p><b>Mode 696 = OFF (default):</b> QoS is disabled. (The Share value set to SM is cleared. I/O scheduling is stopped. The Share value setting from host is rejected.)</p> <p><b>Note:</b> Set this SOM to ON when you want to enable the QoS function.</p>	OFF	-
701	Universal Volume Manager	<p>Issues the Read command at the logical unit discovery operation using UVM.</p> <p><b>Mode 701 = ON:</b> The Read command is issued at the logical unit discovery operation.</p>	OFF	-

Mode	Category	Description	Default	MCU/RCU
		<p><b>Mode 701 = OFF (default):</b> The Read command is not issued at the logical unit discovery operation.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. When the external storage is TagmaStore USP/NSC and the Open LDEV Guard attribute (VMA) is defined on an external device, set this SOM to ON.</li> <li>2. When this SOM is set to ON, it takes longer time to complete the LU discovery. The amount of time depends on external storages.</li> <li>3. With this SOM OFF, if searching for external devices with VMA is set, the VMA information cannot be read.</li> <li>4. When this SOM is set to ON while the following conditions are met, the external volume is blocked: <ul style="list-style-type: none"> <li>▪ An external volume to which Nondisruptive migration (NDM) attribute is set exists.</li> <li>▪ The external volume is reserved by the host</li> </ul> </li> <li>5. As the VMA information is TagmaStore USP/NSC-specific, this SOM does not need to be ON when the external storage is other than TagmaStore USP/NSC.</li> <li>6. Set this SOM to OFF when an external volume to which nondisruptive migration (NDM) attribute is set exists.</li> </ol>		
704	ShadowImage Volume Migration	<p>To reduce the chance of MIH, this SOM can reduce the priority of ShadowImage, Volume Migration, or Resync copy internal IO requests so that host IO has a higher priority. This SOM creates new work queues where these jobs can be assigned with a lower priority.</p> <p><b>Mode 704 = ON:</b> Copy processing requested is registered into a newly created queue so that the processing is scheduled with lower priority than host I/O.</p> <p><b>Mode 704 = OFF (default):</b> Copy processing requested is not registered into a newly created queue. Only the existing queue is used.</p>	OFF	-

Mode	Category	Description	Default	MCU/RCU
		<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Apply this SOM when the load of host I/O to an ECC that uses ShadowImage or Volume Migration is high and the host I/O processing is delayed.</li> <li>2. If the PDEV is highly loaded, the priority of Read/Write processing made by ShadowImage, Volume Migration, or Resync may become lower. As a consequence the copy speed may be slower.</li> </ol>		
721	Common	<p>When a parity group is uninstalled or installed, the following operation is performed according to the setting of SOM 721.</p> <p><b>Mode 721 = ON:</b> When a parity group is uninstalled or installed, the LED of the drive for uninstallation is not illuminated, and the instruction message for removing the drive does not appear. Also, the windows other than that of parity group, such as DKA or DKU, are unavailable to select.</p> <p><b>Mode 721 = OFF (default):</b> When a parity group is uninstalled or installed, the operation is as before: the LED of the drive is illuminated, and the drive must be unmounted and remounted.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. When the RAID level or emulation type is changed for the existing parity group, this SOM should be applied only if the drive mounted position remains the same at the time of the parity group uninstallation or installation.</li> <li>2. After the operation using this SOM is completed, this SOM must be set back to OFF; otherwise, the LED of the drive to be removed will not be illuminated at subsequent parity group uninstalling operations.</li> </ol>	OFF	-
725	Universal Volume Manager	This SOM determines the action that will be taken when the status of an external volume is Not Ready.	OFF	-

Mode	Category	Description	Default	MCU/RCU
		<p><b>Mode 725 = ON:</b> When Not Ready is returned, the external path is blocked and the path status can be automatically recovered (Not Ready blockade). Note that the two behaviors, automatic recovery and block, may be repeated.</p> <p>When the status of a device is Not Ready blockade, Device Health Check is executed after 30 seconds.</p> <p><b>Mode 725 = OFF (default):</b> When Not Ready is returned three times in three minutes, the path is blocked and the path status cannot be automatically recovered (Response error blockade).</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Applying this SOM is prohibited when USP VVM is used as an external storage system and its external volume is DP-VOL.</li> <li>2. Applying this SOM is recommended when the above condition (1) is not met and SUN storage is used as an external storage.</li> <li>3. Applying this SOM is recommended when the above condition (1) is not met and EMC CX series or Fujitsu Fibre CAT CX series is used as an external storage.</li> <li>4. Applying this SOM is recommended if the above condition (1) is not met and a maintenance operation such as firmware update causing controller reboot is executed on the external storage side while a storage system other than Hitachi product is used as an external storage system.</li> <li>5. While USP VVM is used as an external storage system and its volume is DP-VOL, if some Pool-VOLs constituting the DP-VOL are blocked, external path blockade and recovery occurs repeatedly.</li> <li>6. When a virtual volume mapped by UVM is set to pool-VOL and used as DP-VOL in local storage system, this SOM can be applied without problem.</li> </ol>		
729	Dynamic Provisioning Data Retention Utility	When a DP pool is full, if any write operation is requested to the area where the page allocation is not provided, this SOM can enable the DRU Protect attribute for the target DP-VOL.	OFF	-

Mode	Category	Description	Default	MCU/RCU
		<p><b>Mode 729 = ON:</b> Set the DRU Protect attribute for the target DP-VOL when any write operation is requested to the area where the page allocation is not provided at a time when the DP pool is full. (Not to set in the case of Read request.)</p> <p><b>Mode 729 = OFF (default):</b> Do not set the DRU Protect attribute for the target DP-VOL when any write operation is requested to the area where the page allocation is not provided at a time when DP pool is full.</p> <p>For details, contact customer support (see SOM729 &amp; 803 sheet).</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM is applied when: <ul style="list-style-type: none"> <li>▪ The threshold of pool is high (for example, 95%) and the pool may be full.</li> <li>▪ File system is used.</li> <li>▪ Data Retention Utility is installed.</li> </ul> </li> <li>2. Since the Protect attribute is set for V-VOL, the Read operation cannot be allowed as well.</li> <li>3. When Data Retention Utility is not installed, the desired effect is not achieved.</li> <li>4. Protect attribute can be released from the <b>Data Retention</b> window of Device Manager - Storage Navigator after releasing the full status of the pool by adding a Pool-VOL.</li> <li>5. The Virtual Volume Protection (VVP) function can be enabled/disabled for each pool. With SOM 729 disabled, VVP is also disabled by default, but you can enable VVP for each pool as needed. With SOM 729 enabled, VVP is also enabled automatically (by default) when you create a new pool. <b>Caution:</b> A pool is NOT protected by ANY FUNCTION if you deliberately turn VVP for the pool from ON (default) to OFF, even with SOM 729 enabled.</li> <li>6. When HMO 63 or 73 is set to ON, the setting of the HMO is prioritized over the SOM 729 setting, so that the behavior remains the same as when SOM 729 is OFF even when it is set to ON.</li> </ol>		

Mode	Category	Description	Default	MCU/RCU
734	Dynamic Provisioning	<p>When exceeding the pool threshold, the SIM is reported as follows:</p> <p><b>Mode 734 = ON:</b> A SIM is reported at the time when the pool usage rate exceeds the pool threshold (warning, system, or depletion). Once the pool usage rate falls below the pool threshold, and then exceeds again, the SIM is reported again. If the pool usage rate continues to exceed the warning threshold and the depletion threshold, the SIM (SIM-RC625000) is repeatedly reported every eight (8) hours until the pool usage rate falls below the depletion threshold.</p> <p><b>Mode 734 = ON (default):</b> A SIM is reported at the time when the pool usage rate exceeds the pool threshold (variable threshold or fixed threshold). Once the pool usage rate falls below the pool threshold, and then exceeds again, the SIM is reported again. If the pool usage rate continues to exceed the variable threshold and the fixed threshold, the SIM (SIM-RC625000) is repeatedly reported every eight (8) hours until the pool usage rate falls below the higher threshold.</p> <p><b>Mode 734 = OFF:</b> A SIM is reported at the time when the pool usage rate exceeds the pool threshold (variable threshold or fixed threshold). Once the pool usage rate falls below the pool threshold, and then exceeds again, the SIM is reported again. The SIM is not reported while the pool usage rate continues to exceed both of the variable threshold and the fixed threshold.</p>	ON	-
741	Dynamic Provisioning	<p>This SOM enables to switch over whether to report the following SIM for users to the service personnel:</p> <p>SIM-RC 625000 (DP pool usage rate continues to exceed the threshold)</p> <p><b>Mode 741 = ON:</b> SIM is reported to the service personnel.</p> <p><b>Mode 741 = OFF (default):</b> SIM is not reported to the service personnel.</p>	OFF	-

Mode	Category	Description	Default	MCU/RCU
		<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>This SOM is set to ON to have SIM for users reported to the service personnel: <ul style="list-style-type: none"> <li>For the system where SNMP and E-mail notification are not set.</li> <li>If Device Manager - Storage Navigator is not periodically activated.</li> </ul> </li> <li>When SOM 734 is turned OFF, SIM-RC625000 is not reported; accordingly the SIM is not reported to the service personnel even though this SOM is ON.</li> </ol>		
745	Universal Volume Manager	<p>Enables to change the area where the information is obtained as the Characteristic1 item from SYMMETRIX.</p> <p><b>Mode 745 = ON:</b></p> <ul style="list-style-type: none"> <li>The area where the information is obtained as the Characteristic1 item from SYMMETRIX is changed.</li> <li>When CheckPaths or Device Health Check (1/ hour) is performed, the information of an already-mapped external volume is updated to the one after change.</li> </ul> <p><b>Mode 745 = OFF (default):</b></p> <ul style="list-style-type: none"> <li>The area where the information is obtained as the Characteristic1 item from SYMMETRIX is set to the default.</li> <li>When CheckPaths or Device Health Check (1/ hour) is performed, the information of an already-mapped external volume is updated to the default.</li> </ul>	OFF	-

Mode	Category	Description	Default	MCU/RCU
		<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM is applied when the EMC SYMMETRIX is connected using UVM.</li> <li>2. Enable the setting of EMC SCSI Flag SC3 for the port of the EMC SYMMETRIX storage connected with the storage system and disable the setting of Flag SPC2. If the setting of EMC SCSI Flag SC3 is not enabled or the setting of Flag SPC2 is enabled, the effect of this SOM may not be achieved.</li> <li>3. If you want to enable this SOM immediately after setting, perform Check Paths on each path one by one for all the external ports connected to the EMC SYMMETRIX storage. But, without doing Check Paths, the display of Characteristic1 can automatically be changed by the Device Health Check to be performed once an hour. If SSB=AD02 occurs and a path is blocked, perform Check Paths on this path again.</li> </ol>		
749	Dynamic Provisioning Dynamic Tiering Thin Image	<p>This SOM disables the HDP Rebalance function and the HDT Tier relocation function which allow the drives of all ECC Groups in the pool to share the load.</p> <p><b>Mode 749 = ON:</b> The HDP Rebalance function and the HDT Tier relocation function are disabled.</p> <p><b>Mode 749 = OFF (default):</b> The HDP Rebalance function and the HDT Tier relocation function are enabled.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM is applied when no change in performance characteristic is desired.</li> <li>2. When a pool is newly installed, the load may be concentrated on the installed pool volumes.</li> <li>3. When 0 data discarding is executed, load may be unbalanced among pool volumes.</li> <li>4. Pool VOL deletion while this SOM is set to ON fails. To delete pool VOLs, set this SOM to OFF.</li> </ol>	OFF	-
757	Common	<p>Enables/disables output of in-band audit logs.</p> <p><b>Mode 757 = ON:</b> In-band audit log is not output.</p>	OFF	-

Mode	Category	Description	Default	MCU/RCU
		<p><b>Mode 757 = OFF (default):</b> In-band audit log is output.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Mode 757 applies to the sites where outputting the In-band audit logs is not needed.</li> <li>2. When this SOM is set to ON: <ul style="list-style-type: none"> <li>▪ There is no access to SM for the In-band audit logs, which can avoid the corresponding performance degradation.</li> <li>▪ SM is not used for the In-band audit logs.</li> </ul> </li> <li>3. If outputting the In-band audit log is desired, set this SOM to OFF.</li> </ol>		
784	TrueCopy Global-active device	<p>This SOM can reduce the MIH watch time of RI/O for a TC or GAD pair internally so that update I/Os can continue by using an alternate path without MIH or time-out occurrence in the environment where Mainframe host MIH is set to 15 seconds, or Open host time-out time is short (15 seconds or less). This SOM is effective at initial pair creation or Resync operation for TC or GAD. (Not effective by just setting this SOM to ON.)</p> <p>This SOM is applied to TC and GAD. This SOM supports Fibre remote copy paths but not iSCSI.</p> <p><b>Mode 784 = ON:</b> The MIH time of RIO is internally reduced so that, even though a path failure occurs between storage systems in the environment where host MIH time is set to 15 seconds, update I/Os can be processed by using an alternate path promptly, lowering the possibility of host MIH occurrence.</p> <p><b>Mode 784 = OFF (default):</b> The operation is processed in accordance with the TC or GAD specification.</p>	OFF	Both

Mode	Category	Description	Default	MCU/RCU
		<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM is applied to the environment where Mainframe host MIH time is set to 15 seconds.</li> <li>2. This SOM is applied to the environment where OPEN host time-out time is set to 15 seconds or less.</li> <li>3. This SOM is applied to reduce RI/O MIH time to 5 seconds.</li> <li>4. This function is available for all the TC and GAD pairs on the storage system, unable to specify the pairs that are using this function or not.</li> <li>5. For a TC or GAD pair with this SOM effective (RI/O MIH time is 5 seconds), the setting of RI/O MIH time made at RCU registration (default is 15 seconds, which can be changed within range from 10 to 100 seconds) is invalid. However, RI/O MIH time displayed on Device Manager - Storage Navigator and CCI is not "5 seconds" but is what set at RI/O registration.</li> <li>6. If a failure occurs on the switched path between storage systems, Mainframe host MIH or Open server time-out may occur.</li> <li>7. If an MP to which the path between storage systems belongs is overloaded, switching to an alternate path delays and host MIH or time-out may occur.</li> <li>8. If an RI/O retry occurs due to other factors than RI/O MIH (5 sec), such as a check condition report issued from RCU to MCU, the RI/O retry is performed on the same path instead of an alternate path. If a response delay to the RI/O occurs constantly on this path due to path failure or link delay, host MIH or time-out may occur due to response time accumulation for each RI/O retried within 5 seconds.</li> <li>9. Even though this SOM is set to ON, if Mainframe host MIH time or Open host time-out time is set to 10 seconds or less, host MIH</li> </ol>		

Mode	Category	Description	Default	MCU/RCU
		<p>or time-out may occur due to a path failure between storage systems.</p> <p><b>10.</b> Operation commands are not available for promptly switching to an alternate path.</p> <p><b>11.</b> This SOM works for the pair for which initial pair creation or Resync operation is executed.</p> <p><b>12.</b> Micro-program downgrade to an unsupported version cannot be executed unless all the TC and GAD pairs are suspended or deleted.</p> <p><b>13.</b> For operational specifications in each combination of MCU and RCU of TC, contact customer support (see SOM784 sheet).</p> <p><b>14.</b> For GAD pairs, this SOM is effective if the microcode version supports GAD.</p> <p><b>15.</b> This SOM does not support iSCSI paths between storage systems. When iSCSI is used for paths between storage systems, the time to switch to an alternate path cannot be reduced. For this, if a failure occurs on a path between storage systems in an environment where host time-out time is short, a time-out may occur on the host side. A time-out may also occur on the host side when a failure occurs on an iSCSI path between storage systems if storage system paths of Fibre and iSCSI coexist in an environment where host time-out time is short so that the configuration where storage system paths of Fibre and iSCSI coexist is not supported too.</p>		
803	Dynamic Provisioning Data Retention Utility	<p>While a DP pool VOL is blocked, if a read or write I/O is issued to the blocked pool VOL, this SOM can enable the Protect attribute of DRU for the target DP-VOL.</p> <p><b>Mode 803 = ON:</b> While a DP pool VOL is blocked, if a read or write I/O is issued to the blocked pool VOL, the DRU attribute is set to Protect.</p> <p><b>Mode 803 = OFF (default):</b> While a DP pool VOL is blocked, if a read or write I/O is issued to the blocked pool VOL, the DRU attribute is not set to Protect.</p> <p>For more details, contact customer support (see SOM729 &amp; 803 sheet).</p>	OFF	-

Mode	Category	Description	Default	MCU/RCU
		<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>This SOM is applied when: <ul style="list-style-type: none"> <li>A file system using DP pool VOLs is used.</li> <li>Data Retention Utility is installed.</li> </ul> </li> <li>Because the DRU attribute is set to Protect for the V-VOL, a read I/O is also disabled.</li> <li>If Data Retention Utility is not installed, the expected effect cannot be achieved.</li> <li>The Protect attribute of DRU for the DP V-VOL can be released on the <b>Data Retention</b> window of Device Manager - Storage Navigator after recovering the blocked pool VOL.</li> <li>The Virtual Volume Protection (VVP) function can be enabled/disabled for each pool. With SOM 803 disabled, VVP is also disabled by default, but you can enable VVP for each pool as needed. With SOM 803 enabled, VVP is also enabled automatically (by default) when you create a new pool. <b>Caution:</b> A pool is NOT protected by ANY FUNCTION if you deliberately turn VVP for the pool from ON (default) to OFF, even with SOM 803 enabled.</li> </ol>		
855	ShadowImage Volume Migration	<p>By switching this SOM to ON/OFF when ShadowImage is used with SOM 467 set to ON, copy processing is continued or stopped as follows.</p> <p><b>Mode 855 = ON:</b> When the amount of dirty data is within the range from 58% to 63%, the next copy processing is continued after the dirty data created in the previous copy is cleared to prevent the amount of dirty data from increasing (copy after destaging). If the amount of dirty data exceeds 63%, the copy processing is stopped.</p> <p><b>Mode 855 = OFF (default):</b> The copy processing is stopped when the amount of dirty data is over 60%.</p> <p>For details, contact customer support (see SOM855 sheet).</p>	OFF	-

Mode	Category	Description	Default	MCU/RCU
		<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>This SOM is applied when all the following conditions are met <ul style="list-style-type: none"> <li>ShadowImage is used with SOM 467 set to ON.</li> <li>Write pending rate of an MP unit that has LDEV ownership of the copy target is high</li> <li>Usage rate of a parity group to which the copy target LDEV belongs is low.</li> <li>ShadowImage copy progress is delayed.</li> </ul> </li> <li>This SOM is available only when SOM 467 is set to ON.</li> <li>If the workload of the copy target parity group is high, the copy processing may not be improved even if this SOM is set to ON.</li> </ol>		
867	Dynamic Provisioning Dynamic Tiering	<p>All-page reclamation (discarding all mapping information between DP pool and DP volumes) is executed in DP-VOL LDEV format. This new method is enabled or disabled by setting this SOM to ON or OFF.</p> <p><b>Mode 867 = ON (default):</b> LDEV format of the DP-VOL is performed with page reclamation.</p> <p><b>Mode 867 = OFF:</b> LDEV format of the DP-VOL is performed with 0 data writing.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>This SOM is applied from factory shipment.</li> <li>Do not change the setting of this SOM during DP-VOL format.</li> <li>If the setting of this SOM is changed during DP-VOL format, the change is not reflected to the format of the DP-VOL being executed but the format continues in the same method.</li> </ol>	ON	-
896	Dynamic Provisioning Dynamic Tiering Thin Image	<p>This SOM enables or disables the background format function performed on an unformatted area of a DP/DT/TI pool.</p> <p>For information regarding operating conditions, see the <i>Provisioning Guide</i>.</p> <p><b>Mode 896 = ON:</b> The background format function is disabled.</p>	OFF	-

Mode	Category	Description	Default	MCU/RCU
		<p><b>Mode 896 = OFF (default):</b> The background format function is enabled.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM is applied when you need to disable the background format for a DP/DT/TI pool due to a concern of performance degradation of other functions in an environment where a DP-VOL is used by other functions.</li> <li>2. When the background format function is enabled, because up to 42 MB/s of ECCG performance is used, local copy performance may degrade by about 10%. Therefore, confirm whether the 10% performance degradation is acceptable or not before enabling the function.</li> <li>3. When a Dynamic Provisioning VOL on an external storage system, which is used as an external VOL, is used as a pool VOL, if the external pool on the external storage side becomes full due to the background format, the external VOL may be blocked.  If the external pool capacity is smaller than the external VOL capacity (Dynamic Provisioning VOL of external storage system), do not enable the background format function.</li> <li>4. If the background format function is disabled by changing this SOM setting, the format progress is initialized and the entire area becomes unformatted.</li> </ol>		
899	Volume Migration	<p>In combination with the SOM 900 setting, this SOM determines whether to execute and when to start the I/O synchronous copy change as follows.</p> <p><b>Mode 899 = ON (default):</b></p> <ul style="list-style-type: none"> <li>▪ SOM 900 is ON: I/O synchronous copy starts without retrying Volume Migration.</li> <li>▪ SOM 900 is OFF: I/O synchronous copy starts when the threshold of Volume Migration retry is exceeded. (Recommended)</li> </ul>	ON	-

Mode	Category	Description	Default	MCU/RCU
		<p><b>Mode 899 = OFF:</b></p> <ul style="list-style-type: none"> <li>▪ SOM 900 is ON: I/O synchronous copy starts when the number of retries reaches half of the threshold of Volume Migration retry.</li> <li>▪ SOM 900 is OFF: Volume Migration is retired and I/O synchronous copy is not executed.</li> </ul> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM is applied when improvement of Volume Migration success rate is desired under the condition that there are many updates to a migration source volume of Volume Migration.</li> <li>2. During I/O synchronous copy, host I/O performance degrades.</li> </ol>		
900	Volume Migration	<p>In combination with SOM 899 setting, this SOM determines whether to execute and when to start the I/O synchronous copy change as follows.</p> <p><b>Mode 900 = ON:</b></p> <ul style="list-style-type: none"> <li>▪ SOM 899 is ON: I/O synchronous copy starts without retrying Volume Migration.</li> <li>▪ SOM 899 is OFF: I/O synchronous copy starts when the number of retries reaches half of the threshold of Volume Migration retry.</li> </ul> <p><b>Mode 900 = OFF (default):</b></p> <ul style="list-style-type: none"> <li>▪ SOM 899 is ON: I/O synchronous copy starts when the threshold of Volume Migration retry is exceeded. (Recommended)</li> <li>▪ SOM 899 is OFF: Volume Migration is retired and I/O synchronous copy is not executed.</li> </ul> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM is applied when improvement of Volume Migration success rate is desired under the condition that there are many updates to a migration source volume of Volume Migration.</li> <li>2. During I/O synchronous copy, host I/O performance degrades.</li> </ol>	OFF	-
901	Dynamic Tiering	By setting this SOM to ON or OFF, the page allocation method of Tier Level ALL when the drive type of tier1 is SSD changes as follows.	OFF	-

Mode	Category	Description	Default	MCU/RCU
		<p><b>Mode 901 = ON:</b> For tier1 (drive type is SSD), pages are allocated until the capacity reaches the limit. Without consideration of exceeding performance limitation, allocation is done from highly loaded pages until reaching the capacity limit</p> <p>When the capacity of tier1 reaches the threshold value, the minimum value of the tier range is set to the starting value of the lower IOPH zone, and the maximum value of the lower tier range is set to the boundary value.</p> <p><b>Mode 901 = OFF (default):</b> For tier1 (drive type is SSD), page allocation is performed based on performance potential limitation. With consideration of exceeding performance limitation, allocation is done from highly loaded pages but at the point when the performance limitation is reached, pages are not allocated any more even there is free space.</p> <p>When the capacity of tier1 reaches the threshold value, the minimum value of the tier range is set to the boundary value, and the maximum value of the lower tier range is set to a value of <i>boundary-value</i> × 110% + 5 [IOPH].</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM is applied when pages with the maximum capacity need to be allocated to tier1 (drive type is SSD) with Dynamic Tiering.</li> <li>2. When Tier1 is SSD while SOM 901 is set to ON, the effect of SOM 897 and 898 to the gray zone of Tier1 and Tier2 is disabled and the SOM 901 setting is enabled instead. In addition, the settings of SOM 897 and 898 are effective for Tier2 and Tier3.</li> <li>3. The following is recommended when applying SOM 901.            actual I/O value (total number of I/Os of all tiering policies) &lt; performance potential value of Tier1* × 0.6            * The performance potential value of Tier1 displayed on Monitor information by using Dx-ray.</li> </ol>		

Mode	Category	Description	Default	MCU/RCU
		For more details about the interactions between SOMs 897, 898, and 901, contact customer support (see SOM897_898_901 sheet).		
904	Dynamic Tiering	<p>By setting this SOM to ON or OFF, the number of pages to be migrated per unit time at tier relocation is changed.</p> <p><b>Mode 904 = ON:</b> The number of pages to be migrated at tier relocation is set to up to one page per second.</p> <p><b>Mode 904 = OFF (default):</b>No restriction on the number of pages to be migrated at tier relocation (existing specification).</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM is applied when the requirement for response time is severe.</li> <li>2. The number of pages to be migrated per unit time at tier relocation decreases.</li> </ol>	OFF	-
908	Universal Replicator	<p>This SOM can change CM capacity allocated to MPBs with different workloads.</p> <p><b>Mode 908 = ON:</b> The difference in CM allocation capacity among MPBs with different workload is large.</p> <p><b>Mode 908 = OFF (default):</b> The difference in CM allocation capacity among MPBs with different workload is small (existing operation) .</p>	OFF	Both

Mode	Category	Description	Default	MCU/RCU
		<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. If a CLPR is used by only some MPBs among all the installed MPBs, set this SOM to ON for the CLPR to increase CM capacity allocated to the MPBs that use the CLPR.  Example: (a) A CLPR only for UR JNLG. (b) A configuration where MPBs and CLPRs are separately used for Open and Mainframe systems.</li> <li>2. Since CM capacity allocated to MPBs with low load is small, the performance is affected by a sudden increase in load.</li> <li>3. SOM 908 cannot be used with SOM 933. When SOM 933 is set to ON, the function of SOM 908 is canceled even though SOM 908 is ON.</li> <li>4. This SOM is effective for a CLPR. Therefore, when setting this SOM to ON/OFF, select target "LPRXX (XX=00 to 31)". For example, even when CLPR0 is defined (any of CLPR1 to 31 are not defined), select "LPR00" first and then set this SOM to ON/OFF.</li> </ol>		
930	Dynamic Provisioning Dynamic Tiering ShadowImage	<p>When this SOM is set to ON, all of the zero data page reclamation operations in processing are stopped. (Also the zero data page reclamation cannot be started.)</p> <p>* Zero data page reclamation by WriteSame and UNMAP functions, and IO synchronous page reclamation are not disabled.</p> <p><b>Mode 930 = ON:</b> All of the zero data page reclamation operations in processing are stopped at once. (Also the zero data reclamation cannot be newly started.)</p> <p><b>Mode 930 = OFF (default):</b> The zero data page reclamation is performed.</p> <p>For details about interactions with SOM 755, contact customer support (see SOM930 sheet).</p>	OFF	-

Mode	Category	Description	Default	MCU/RCU
		<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM is applied when stopping or disabling zero data page reclamation by user request is required.</li> <li>2. When this SOM is set to ON, the zero data page reclamation does not work at all. <ul style="list-style-type: none"> <li>* Zero data page reclamation by Write Same and UNMAP, and IO synchronous page reclamation can work.</li> </ul> </li> <li>3. When downgrading micro-program to a version that does not support this SOM while this SOM is set to ON, set this SOM to OFF after the downgrade. <ul style="list-style-type: none"> <li>* Because the zero data page reclamation does not work at all while this SOM is set to ON.</li> </ul> </li> <li>4. This SOM is related to SOM 755.</li> </ol>		
937	Dynamic Provisioning  Dynamic Tiering	<p>By setting this SOM to ON, HDT monitoring data is collected even if the pool is a DP pool.</p> <p><b>Mode 937 = ON:</b> HDT monitoring data is collected even if the pool is a DP pool.</p> <p>Only Manual execution mode and Period mode are supported.</p> <p><b>Mode 937 = OFF (default):</b> HDT monitoring data is not collected if the pool is a DP pool</p>	OFF	-

Mode	Category	Description	Default	MCU/RCU
		<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM is applied when HDT monitoring data collection is required in DP environment.</li> <li>2. When HDT is already used, do not set this SOM to ON.</li> <li>3. For HDT monitoring data collection, shared memory for HDT must be installed. For details, contact customer support (see SOM937 sheet).</li> <li>4. If monitoring data collection is performed without shared memory for HDT installed, an error is reported and the monitoring data collection fails.</li> <li>5. Before removing the shared memory for HDT, set this SOM to OFF and wait for 30 minutes.</li> <li>6. Tier relocation with monitoring data collected when this SOM is set to ON is disabled.</li> <li>7. When DP is converted into HDT (after purchase of software license), the collected monitoring data is discarded.</li> <li>8. Before downgrading the micro-program to an unsupported version, set SOM 937 to OFF and wait for at least 30 minutes.</li> </ol>		
972	Common	<p>By setting this SOM, THP Page Size in Inquiry Page E3h is changed. THP Page Size varies depending on the combination of SOM 972 and 973 settings. For details, contact customer support (see SOM972_973 sheet).</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM is applied when a delay in host I/O response due to reclamation processing occurs in a customer environment.</li> <li>2. Reclamation processing is delayed.</li> <li>3. This SOM is to prioritize host I/O response over reclamation processing in VxVM environment, so that the time required for reclamation processing may increase when this SOM is set to ON.</li> </ol> <p>For details about the interaction between this SOM and SOM 1069, contact customer support (see SOM1069 sheet).</p>	OFF	-

Mode	Category	Description	Default	MCU/RCU
973	Common	<p>By setting this SOM, THP Page Size in Inquiry Page E3h is changed. THP Page Size varies depending on the combination of SOM972 and 973 settings. For details, contact customer support (see SOM972_973 sheet).</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM is applied when a delay in host I/O response due to reclamation processing occurs in a customer environment.</li> <li>2. When this SOM is set to ON, reclamation processing is delayed.</li> <li>3. This SOM is to prioritize host I/O response over reclamation processing in VxVM environment, so that the time required for reclamation processing may increase when this SOM is set to ON.</li> </ol> <p>For details about the interaction between this SOM and SOM 1069, contact customer support (see SOM1069 sheet).</p>	OFF	-
1015	Universal Replicator	<p>When a delta resync is performed in a 3DC multi-target configuration with TC and UR, this SOM is used to change the pair status to PAIR/Duplex directly and then complete the delta resync. If the delta resync fails and all differential data items are copied, the pair status changes to COPY/Pending regardless of the SOM 1015 setting, and then it changes to PAIR/Duplex.</p> <p>When the existing delta resync function is required (pair status changes to COPY/Pending and then to PAIR/Duplex), set this SOM to ON before performing delta resync. If SOM 1015 is set (ON or OFF) while delta resync is being performed, the setting is not applied.</p> <p><b>Mode 1015 = ON:</b> The pair status changes to COPY/Pending and then to PAIR/Duplex when a delta resync is performed in a 3DC multi-target configuration.</p> <p><b>Mode 1015 = OFF (default):</b> The pair status changes directly to PAIR/Duplex when a delta resync is performed in a 3DC multi-target configuration.</p> <p><b>Notes:</b></p>	OFF	MCU

Mode	Category	Description	Default	MCU/RCU
		<ol style="list-style-type: none"> <li>1. The pair status changes directly to PAIR/Duplex when this SOM is OFF (default). Set this SOM to ON only when the status change to COPY/Pending and then PAIR/Duplex is required.</li> <li>2. Set this SOM on the site of TC S-VOL in TC-UR 3DC configuration. If site switch by delta resync might occur, set this SOM on both TC primary and secondary sites.</li> <li>3. For microcode versions and storage system models that do not support this SOM, even if this SOM is set to OFF on L site of TC-UR delta configuration, the behavior does not change but the status changes to COPY/Pending and then the delta resync is completed.</li> <li>4. Regardless of the remote command device setting, the copy status does not change to COPY/Pending and then the delta resync is completed.</li> <li>5. If a delta resync fails, all-data copy works. In this case, the pair status changes to COPY/Pending and then the delta resync is completed even when this SOM is set to OFF.</li> <li>6. When this SOM setting is default (OFF), a delta resync operation is completed without pair status change to COPY/Pending. Therefore, if an operation depends on the pair status changing to COPY/Pending, such as running the CCI pairevtwait command, set this SOM to ON.</li> <li>7. When this SOM setting is default (OFF) (pair status changes directly to PAIR/Duplex), SIMs and SSBs that are reported due to a pair status change to COPY/Pending are not reported.</li> <li>8. If this SOM is set to ON or OFF during delta resync, the setting is not applied. Change this SOM setting before delta resync.</li> <li>9. During delta resync, downgrading the microcode to a version that does not support this SOM is disabled in TC-UR delta configuration. If microcode downgrade is disabled (FunctionID:0701) when delta resync is not in process, suspend the UR pair and then retry the microcode replacement.</li> </ol>		

Mode	Category	Description	Default	MCU/RCU
1021	Universal Volume Manager	<p>This SOM can enable or disable the auto-recovery for external volumes of an EMC storage system.</p> <p><b>Mode 0121 = ON:</b> An external volume that is blocked due to Not Ready status can be recovered automatically regardless of the type of external storage system.</p> <p><b>Mode 1021 = OFF (default):</b> An external volume that is blocked due to Not Ready status might not be recovered automatically depending on the type of external storage system.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM is applied when the auto-recovery of external volumes that are blocked due to Not Ready status is desired in UVM connection using an ECM storage system as an external storage system.</li> <li>2. When this SOM is set to ON and the connected external storage system is not in stable status (such as failure and recovery from failure), a blockage due to Not Ready status and auto-recovery might occur repeatedly.</li> </ol>	OFF	-
1043	Universal Replicator	<p>This SOM disables journal copy.</p> <p><b>Mode 1043 = ON:</b> When the following conditions are met at the UR secondary site, the journal copy is disabled.</p> <p>For VSP G/F350, G/F370, G/F700, G/F900, the following conditions (1) and (2) or (1) and (3) are met:</p> <ol style="list-style-type: none"> <li>1. 4,096 or more journals are accumulated at the secondary site.</li> <li>2. The CLPR write pending rate for journal volumes of MP unit for which journal ownership at the RCU is defined is 25% or higher (including the write pending rate for other than journal volumes).</li> <li>3. The initiator operating rate of the MP unit for which journal ownership at the RCU is defined is 40% or higher.</li> </ol>	OFF	Both

Mode	Category	Description	Default	MCU/RCU
		<p><b>Note:</b> Even though the above conditions are met, journal copy is not disabled when all time stamps of the journals accumulated are the same in a consistency group containing multiple journals.</p> <p><b>Mode 1043 = OFF (default):</b> The journal copy is not disabled.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM applies when one of the following conditions is met: <ol style="list-style-type: none"> <li>a. Multiple journals are registered in a consistency group of CCI.</li> <li>b. Multiple journals are registered in an extended consistency group.</li> <li>c. Journals are accumulated at the secondary site, causing the system performance to decrease.</li> </ol> </li> <li>2. If SOM 690 is set to ON and the Write Pending rate is 60% or higher, the journal copy is disabled regardless of the setting of this SOM.</li> <li>3. When the host write speed is faster than the JNL copy speed, the usage rate of the master journal increases.</li> <li>4. This SOM is effective within the range of each CLPR. Therefore, an operation target LPRxx (xx= 00 to 31) needs to be selected before setting this SOM to ON/OFF.  For example, when setting this SOM only to CLPR0 (even though this SOM is not set to CLPR 1 to 31), select "LPR00" and then set this SOM to ON/OFF. If "System" is selected and then this SOM is set to ON, this SOM is not effective for any of the CLPRs.</li> <li>5. Set SOM 1043 to ON when journals are not accumulated at the RCU. If journals have already been accumulated at the RCU, journal copy does not start until the journal usage rate becomes 0%. (If you need to set SOM 1043 to ON while journals are accumulated, set Purge Suspend, and then perform resync.)</li> </ol>		
1067	Universal Replicator	(VSP G130, G/F350, G/F370, G/F700, G/F900) This SOM is used to enable microcode downgrade to a	OFF	Both

Mode	Category	Description	Default	MCU/RCU
		<p>version that does not support URxUR (including delta).</p> <p><b>Mode 1067 = ON:</b> Even when a UR pair has been registered, downgrading the microcode to a version that does not support URxUR (including delta) is allowed.</p> <p><b>Mode 1067 = OFF (default):</b> If any UR pair has been registered, downgrading the microcode to a version that does not support URxUR (including delta) is not allowed.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM is applied to enable microcode downgrade to a version that does not support URxUR (including delta) if the configuration where any UR pair has been registered is not URxUR (including delta).</li> <li>2. Setting this SOM to ON allows microcode downgrade at sites where only 1 mirror is used in URxUR multi-target configuration without delta resync and cascade configuration (L or R site in multi-target, and P or R site in cascade), but the following phenomena occur after microcode downgrade. Make sure that the target storage system does not contain pairs of URxUR configuration.</li> </ol> <p>Phenomena:</p> <ol style="list-style-type: none"> <li>a. When the microcode is downgraded at S site (local or remote) in multi-target configuration, the pair between P site and the target S site cannot be resynchronized.</li> <li>b. When the pair between I site and R site in cascade configuration is resynchronized, the pair status cannot change from COPY to PAIR.</li> <li>c. When the microcode is downgraded at R site in cascade configuration, the pair between I site and R site cannot be resynchronized.</li> </ol>		
1068	Common	This mode can detect and report a minor drive response delay early by severely checking drives.	OFF	-

Mode	Category	Description	Default	MCU/RCU
		<p><b>Mode 1068 = ON:</b> Drive response delay is checked and detected with conditions that are more severe than current conditions.</p> <p>When SOM 144 is set to ON, the drive with response delay is blocked.</p> <p>Target drive: HDD, FMD, SSD</p> <p><b>Mode 1068 = OFF:</b> Drive response delay is checked and detected with current conditions.</p> <p>The behavior varies depending on the combinations of SOM settings. For details, contact customer support (see SOM144 sheet).</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Apply this mode to detect a minor delay in drive response.</li> <li>2. When a delay is suspected, a processing to refer to the statistics data and determine the delay works.</li> <li>3. If SOM 157 is set to ON, the output prevention status of SSB=A4CE is not cleared in one-day cycle.</li> <li>4. When applying this mode only, a SIM for delay detection is reported but the HDD is not blocked. To block the HDD, SOM 144 also needs to be applied.</li> </ol>		
1069	Common	<p>By setting this SOM, the INQUIRY Page E3h field is changed. The field varies depending on the combination of SOMs 972, 973, and 1069. For details, contact customer support (see SOM1069 sheet).</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM is applied when the page problem occurs in an environment where Symantec ASL 6.0.5 or higher is used and SOM 972 and/or 973 is set to ON.</li> <li>2. When this SOM is set to ON, reclamation processing is delayed.</li> <li>3. The priority of setting when SOMs are set at the same time is SOM 1069, 972, and then 973. The setting of higher priority SOM is enabled.</li> </ol>	OFF	-

Mode	Category	Description	Default	MCU/RCU
1070	Global-active device	<p>This SOM changes the processing for a group operation with GAD consistency group (CTG).</p> <p><b>Mode 1070 = ON:</b> The status change of all pairs in a consistency group. is performed for 50 msec.</p> <p><b>Mode 1070 = OFF (default):</b> The status change of all pairs in a consistency group is performed for 1 msec.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM is applied when reducing the time to complete status change of all pairs in a consistency group at a group operation (suspension and resync operation) with the GAD CTG function. In a system configuration where host I/O performance is prioritized, do not use this SOM because setting this SOM may affect the host I/O performance.</li> <li>2. The MP usage rate increases during status change of all pairs in a consistency group. For details about approximate percentage increase in MP usage rate, contact customer support (see SOM1070 sheet).</li> </ol>	OFF	Both
1080	Global-active device Universal Volume Manager	<p>This SOM is intended for a case that multiple external connection paths are connected to a Target port on an external system with a quorum disk and there is a path whose performance degrades. For such a case, this SOM can eliminate impacts on commands run for other external devices that share the Target port with the quorum disk on the external system by setting the time to run a reset command for the Target port to be the same (15 seconds) as that to run other commands for the other external devices.</p> <p><b>Mode 1080 = ON:</b> The time to run the reset command for the quorum disk on the external system is 15 seconds to eliminate the impacts on commands run for the other external devices that share the Target port with the quorum disk on the external system.</p> <p>If a response to ABTS is delayed for 12 seconds or longer, the quorum disk may be blocked.</p>	OFF	-

Mode	Category	Description	Default	MCU/RCU
		<p><b>Mode 1080 = OFF (default):</b> The time to run a reset command for the quorum disk when performance of a path degrades is 3 seconds so that a retry is performed by an alternate path to avoid quorum disk blockage.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM is applied if avoiding impacts on commands for other external devices sharing a Target port on an external system side with a quorum disk is prioritized over preventing quorum disk blockage when a response to ABTS is delayed.</li> </ol> <p>The delay is caused due to path performance degradation in a configuration where the Target port is shared between external devices and the quorum disk.</p> <ol style="list-style-type: none"> <li>2. When connection performance degradation occurs, the quorum disk blockage is more likely to occur.</li> </ol>		
1083	Dynamic Provisioning Universal Volume Manager	<p>This SOM enables or disables DP-VOL deletion while an external volume associated with the DP-VOL with data direct mapping attribute is not disconnected.</p> <p><b>Mode 1083 = ON:</b> DP-VOL deletion is enabled.</p> <p><b>Mode 1083 = OFF (default):</b> DP-VOL deletion is disabled.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM is applied when the following conditions are met. <ul style="list-style-type: none"> <li>▪ A DP-VOL with data direct mapping attribute is deleted.</li> <li>▪ The data of external volume with data direct mapping attribute associated with a deletion target DP-VOL with data direct mapping attribute will not be used again.</li> </ul> </li> <li>2. When SOM 1083 is set to ON, the data of external volumes cannot be guaranteed.</li> <li>3. When DP-VOL deletion is performed without disconnecting an external volume, the data of the external volume cannot be guaranteed.</li> </ol>	OFF	-

Mode	Category	Description	Default	MCU/RCU
1086	Dynamic Provisioning Universal Volume Manager	<p>This SOM enables or disables the performance improvement for Dynamic Provisioning volumes that are Universal Volume Manager volumes used as pool volumes.</p> <p><b>Mode 1086 = ON (default):</b> The performance improvement is enabled.</p> <p><b>Mode 1086 = OFF:</b> The performance improvement is disabled.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM is applied when the IOPS performance of an external storage system is higher than 80k × the number of installed MPBs, which is the value of IOPS that an entire local storage system sends to an external storage system.</li> <li>2. When it is required to set this SOM to OFF, if IOPS sent from the local storage system to the external storage system is higher than 80k × the number of installed MPBs, reduce the IOPS to lower than 80k × the number of installed MPBs, and then set this SOM to OFF. (Otherwise CWP increases and cache is overloaded.)</li> </ol>	ON	-
1093	Dynamic Provisioning Dynamic Tiering Thin Image	<p>(VSP G130, G/F350, G/F370, G/F700, G/F900) This SOM is used to disable background unmap during microcode downgrade from a version that supports pool reduction rate correction to a version that does not support the function.</p> <p><b>Mode 1093 = ON:</b> Background unmap cannot work.</p> <p><b>Mode 1093 = OFF (default):</b> Background unmap can work.</p>	OFF	-

Mode	Category	Description	Default	MCU/RCU
		<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM is applied when downgrading microcode from a version that supports pool reduction rate correction to a version that does not support the function is disabled.</li> <li>2. When pool capacity shrinking is performed for an FMD parity group while the mode is set to ON, the pool capacity shrinking cannot be completed. Make sure to set the mode to OFF prior to performing pool capacity shrinking for an FMD parity group.</li> </ol>		
1096	Universal Replicator	<p>This SOM disables read-journal frequency reduction.</p> <p><b>Mode 1096 = ON:</b> The read-journal frequency reduction does not work.</p> <p><b>Mode 1096 = OFF (default):</b> The read-journal frequency reduction works.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This SOM is applied when a significant delay, which is about 200 msec or longer, occurs in the line between MCU and RCU.</li> <li>2. When this SOM is set to ON while round-trip delay time is small (about less than 20 msec), the usage rate of RCU Initiator increases by 10% x the number of journals.</li> <li>3. Even though this SOM is supposed to be applied to UR RCU, apply it to both MCU and RCU on the premise of DR operation.</li> <li>4. This SOM is effective for each CLPR, so that select the operation target LPRxx (xx=00 to 31), and then set this SOM to ON/OFF. For example, when only CLPR0 is defined (CLPR1 to 31 are not defined), select LPR00 and then set this SOM to ON/OFF. This SOM is not effective for any CLPRs if "System" is selected even when this SOM is set to ON.</li> </ol>	OFF	Both
1097	Common	<p>This SOM disables the warning LED to blink when specific SIMs are reported.</p> <p><b>Mode 1097 = ON (default):</b> When SIM=452XXX, 462XXX, 3077XY, 4100XX, or 410100 is reported, the warning LED does not blink.</p>	ON	-

Mode	Category	Description	Default	MCU/RCU
		<p><b>Mode 1097 = OFF:</b> When SIM=452XXX, 462XXX, 3077XY, 4100XX, or 410100 is reported, the warning LED blinks.</p> <p><b>Note:</b> This SOM disables the warning LED to blink when specific SIMs are reported.</p>		
1106	Dynamic Provisioning Dynamic Tiering	<p>On VSP G130, G/F350, G/F370, G/F700, G/F900, this SOM is used to monitor the page usage rate of parity groups defined to a pool, and perform rebalance (the same as the rebalance that works at pool expansion or after 0 data page reclamation) to balance the usage rate if the rate differs significantly among parity groups. On VSP E series, this SOM is used to perform rebalance even when the number of reclaimed pages is 0 after 0 data page reclamation.</p> <p><b>Mode 1106 = ON:</b> The rebalance (the same as the rebalance that works at pool expansion or after 0 data page reclamation) (*3) works when one of the following conditions is met (VSP E series) or when the following condition (1) is met (VSP G130, G/F350, G/F370, G/F700, G/F900):</p> <ol style="list-style-type: none"> <li>1. The usage rate is checked for parity groups in a pool once a day, and the usage rate is not balanced (*1) among parity groups.</li> <li>2. After 0 data page reclamation, the number of reclaimed pages is 0 (*2).</li> </ol> <p><b>Mode 1106 = OFF (default):</b> The rebalance does not work even when the usage rate is not balanced.</p> <p>*1: How to determine whether usage rate is unbalanced among parity groups</p> <p>The pool usage rate is determined as unbalanced when there is 25% or more difference between the usage rate of each parity group in the pool and the average.</p> <p><b>Note:</b> The term "page usage rate" refers to the percentage of the number of assigned pages in each PG compared to the total number of pages in the pool. For HDT pools, the term "total number of pages" is the number of pages assigned within each specific tier.</p>	OFF	-

Mode	Category	Description	Default	MCU/RCU
		<p>Examples:</p> <ol style="list-style-type: none"> <li>1. In an HDP pool, if the usage rates of PG1, PG2, and PG3 are 50%, 40%, and 30% respectively, it is not determined as unbalanced.  Because the average parity group usage rate is <math>(50\% + 40\% + 30\%) / 3 = 40\%</math> and the difference in the rate between each parity group and the average is 10% at the maximum.</li> <li>2. In an HDP pool, if the usage rates of PG1, PG2, and PG3 are 80%, 40%, and 30% respectively, it is determined as unbalanced.  Because the average parity group usage rate is <math>(80\% + 40\% + 30\%) / 3 = 50\%</math> and the difference in the rate between each parity group and the average is 30% at the maximum.</li> <li>3. In an HDT pool, if the usage rates of PG1, PG2, and PG3 are 80% (SSD), 40% (SAS15K) and 30% (SAS15K), it is not determined as unbalanced, because: <ul style="list-style-type: none"> <li>▪ The average parity group usage rate of Tier1 is <math>(80\%) / 1 = 80\%</math> and the difference in the rate between the parity group and the average is 0%.</li> <li>▪ The average parity group usage rate of Tier2 is <math>(40\% + 30\%) / 2 = 35\%</math> and the difference in the rate between the parity group and the average is 5% at the maximum.</li> </ul> </li> </ol> <p>*2: Condition for rebalance after 0 data page reclamation (VSP E series) When the mode is set to ON, rebalance works even when reclaimed page is 0 at 0 data page reclamation. (VSP G130, G/F350, G/F370, G/F700, G/F900) Regardless of the mode setting, rebalance works when one or more pages are reclaimed at 0 data page reclamation.</p> <p><b>Note:</b> This SOM is applied when balancing the usage rate is required at a customer site where the usage rate is not even.</p>		

Mode	Category	Description	Default	MCU/RCU
1113	Deduplication and Compression	<p>If a problem occurs while the capacity saving function is enabled and the MP usage rate needs to be reduced to identify the failure, use this mode to stop asynchronous processing of host I/Os by the capacity saving function other than garbage collection and de-staging.</p> <p><b>Mode 1113 = ON:</b> The asynchronous processing of host I/Os by the capacity saving function, other than garbage collection and de-staging, is stopped.</p> <p><b>Note:</b> While the capacity reduction processing is not working, the capacity saving rate might degrade.</p> <p><b>Mode 1113 = OFF (default):</b> The capacity saving function fully works.</p> <p><b>Relationship between SOM 1113 and SOM 1112:</b> When both modes are set to ON, the setting of SOM 1112 is prioritized over that of SOM 1113. When SOM 1112 is set to ON, all asynchronous processing for host I/Os among those related to the capacity saving function are stopped, including garbage collection and de-staging, so that write I/Os to V-VOLs with Compression or Deduplication and Compression set are disabled.</p>	OFF	-
1115	Deduplication and Compression	<p>When LDEV format is performed for a virtual volume with capacity saving (Compression, or Deduplication and Compression, the same hereinafter) enabled, data is initialized without using metadata regardless of the mode setting.</p> <p><b>Mode 1115 = ON:</b> When LDEV format is performed for a virtual volume with capacity saving enabled, the data is initialized without using the metadata.</p> <p><b>Mode 1115 = OFF (default):</b> When LDEV format is performed for a virtual volume with capacity saving enabled, normal formatting is performed, but if one of the following conditions is met, the data is initialized without using metadata.</p> <ul style="list-style-type: none"> <li>▪ There is a pinned slot.</li> <li>▪ The capacity saving status is "Failed".</li> <li>▪ The virtual volume is blocked (Normal restore cannot be performed).</li> </ul>	(VSP E series) ON (VSP G/F350, G/F370, G/F700, G/F900) OFF	-

Mode	Category	Description	Default	MCU/RCU
		<p>The processing time increases with increase in pool capacity. Estimate of processing time:</p> $\text{Processing time (minutes)} = (\text{pool capacity (TB)} / 40) + 5$ <p>If the result of dividing the pool capacity by 40 has decimal places, round it up to the next integer.</p> <p>The processing finishes early if there is less capacity of allocated pages. For example, in the case of a 4-PB pool, normal formatting (SOM 1115 OFF) is faster if the LDEV capacity is 50 GB or less, therefore the performance of LDEV format without using metadata is better.</p>		
1118	Open	<p>This SOM is used to disable the ENC reuse function.</p> <p><b>Mode 1118 = ON:</b> When a failure occurs in the Expander chip mounted on a controller board (CTL5, CTLSE) or an ENC board, the reuse function does not work but SIM=CF12XX is reported and the ENC is blocked.</p> <p><b>Mode 1118 = OFF (default):</b> When a failure occurs in the Expander chip mounted on a controller board (CTL5, CTLSE) or an ENC board, the reuse function works.</p> <p>If the ENC is reusable, SIM=CF12XX and then CF14XX are reported, and the ENC is reused.</p> <p>If the ENC is not reusable, SIM=CF12XX is reported, and the ENC is blocked.</p> <p><b>Note:</b> The ENC reuse function is enabled as default. This SOM is applied when you want to disable the ENC reuse function.</p>	OFF	-
1169	Deduplication and Compression	<p>(VSP E series) This mode can enable or disable the deduplication processing that works during resync processing from P-VOL to S-VOL by the copy function for DP-VOLs with capacity saving in Inline mode enabled.</p> <p><b>Mode 1169 = ON:</b> Deduplication processing is not performed during resync processing.*</p> <p><b>Mode 1169 = OFF:</b> Deduplication processing is performed during resync processing.</p>	OFF	-

Mode	Category	Description	Default	MCU/RCU
		<p>* To reduce the capacity consumption in the case that the pool capacity is almost depleted for example, the deduplication processing might be performed during the resync processing. In particular, the following cases apply:</p> <ul style="list-style-type: none"> <li>▪ The usage rate exceeds the warning threshold.</li> <li>▪ Free capacity is smaller than about 240 GB.</li> </ul> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. When SOM 1280 is ON, deduplication processing is performed even when SOM 1169 is ON.</li> <li>2. If conditions to disable deduplication processing by SOM 1191 are met, deduplication processing is not performed even when SOM 1169 is OFF. For details about the conditions to disable deduplication processing, contact customer support (see SOM1191 sheet).</li> <li>3. When SOM 1169 is set to ON, like the post mode, estimating and reserving the capacity of a temporary storing area in the copy target DP volume or pool in advance is necessary.</li> <li>4. SOM 1169 is not effective for the initial copy at pair creation, but there are some exceptional cases for SI and VM, such as pair creation using a used volume for S-VOL. In this case, deduplication processing is performed or not performed according to the mode setting.</li> <li>5. SOM 1169 is not related to determining whether to perform deduplication processing in synchronization with initial write. For example, the setting of SOM 1169 does not contribute to a reduction in time to migrate data to a newly defined volume.</li> </ol>		
1174	Open Universal Volume Manager	<p>This SOM is used to disable a path that is logged in from a host or an external storage system (host path and external path) to be used as an external path.</p> <p><b>Mode 1174 = ON:</b> A path logged in from a host or an external storage system is excluded from the WWN discovery target.</p>	OFF	-

Mode	Category	Description	Default	MCU/RCU
		<p><b>Mode 1174 = OFF:</b>A path logged in from a host or external storage system is included in the WWN discovery target.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Apply SOM 1174 when discovery is performed while specifying a universal port that is being logged in from a host or an external storage system.</li> <li>2. If SOM 1174 is set to ON, external volumes cannot be created using the paths being logged in from hosts and external storage systems.</li> <li>3. If WWN discovery is performed while SOM 1174 is set to ON, the storage system being logged in from hosts and external storage systems are displayed as [Unknown] in the discovery result.</li> </ol>		
1180	Common	<p>(VSP G130, G/F350, G/F370, G/F700, G/F900) This SOM determines when SSB=A4DB is logged for a drive whose response is delayed.</p> <p><b>Mode 1180 = ON:</b> SSB=A4DB is logged when a delayed response is detected once. The SSB is logged once an hour per drive.</p> <p><b>Mode 1180 = OFF:</b> SSB=A4DB is not logged until a delayed response is detected four times in a row (existing behavior).</p> <p><b>Note:</b> Apply this mode when detecting drives whose response tends to be delayed is required and dump information is not available. This mode can be used for criteria to determine whether to replace a drive with response delay when a performance issue occurs.</p>	OFF	-
1191	Deduplication and Compression	<p>When online data migration is performed on volumes whose capacity saving mode is set to deduplication and compression and inline, setting SOM 1191 to ON can mitigate the I/O performance degradation caused by the deduplication processing.</p> <p><b>Mode 1191 = ON:</b> Inline deduplication processing is disabled when the average of MP usage rates on the entire storage system is 50% or higher. When SOM 1191 is ON, SOM 1191 applies to the entire storage system.</p>	OFF	-

## Appendix D: System option modes (SOMs)

Mode	Category	Description	Default	MCU/RCU
		<p><b>Mode 1191 = OFF:</b> Inline deduplication processing is not disabled regardless of the average MP usage rate.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Before setting this mode to ON, estimate the temporary area in a pool and then reserve it in advance. For details, see the Caution* below.</li> <li>2. By setting the mode to ON, the inline deduplication processing is disabled when the average MP usage is 50% or higher even though SOM 1280 is set to ON.</li> <li>3. When SOM 1169 is set to ON, the inline deduplication at copy processing is disabled regardless of SOM 1191 setting.</li> </ol> <p>* <b>Caution:</b> When SOM 1191 is ON and MP usage (entire storage system) reaches or exceeds 50%, the pool used capacity increases due to consumption of temporary area for post-process deduplication processing. Before enabling this SOM, verify that there is enough pool capacity by using the following conditional expressions, and then set SOM 1191 to ON only when the applicable conditional expression is met:</p> <ul style="list-style-type: none"> <li>▪ If SOM 1191 is set to ON during data migration: <div style="background-color: #f0f0f0; padding: 5px; margin: 5px 0;"> <math display="block">\frac{\text{pool-capacity} \times \text{depletion-threshold} [\%]}{100} &gt; \text{current-pool-used-capacity} + \frac{(\text{data-capacity-to-be-migrated} \times (100 - \text{estimated-compression-ratio} [\%])^*)}{100}</math> </div> </li> <li>▪ If SOM 1191 is set to ON during normal operations: <div style="background-color: #f0f0f0; padding: 5px; margin: 5px 0;"> <math display="block">\frac{\text{pool-capacity} \times \text{depletion-threshold} [\%]}{100} &gt; \text{current-pool-used-capacity} + \frac{(\text{data-capacity-to-be-written-to-non-write-area} \times (100 - \text{estimated-compression-ratio} [\%])^*)}{100}</math> </div> </li> </ul>		

Mode	Category	Description	Default	MCU/RCU
		<p>where <i>estimated-compression-ratio</i> is the ratio of the estimated compression reduction effect. To convert the compression ratio in the N:1 format to percentage, use the following equation:</p> $\text{compression-ratio} [\%] = (1 - 1 \div N) \times 100$ <p>If the estimated compression ratio is not specified, use 0% to calculate.</p>		
1198	TrueCopy Universal Replicator global-active device	<p>To expand TC, UR, and GAD pair capacity, the difference management method must be changed from shared memory (SM) difference management to hierarchical difference management. This mode is used to enable changing the difference management method by using CCI. The difference management method is changed at the first TC, UR, or GAD pair creation or resync operation after setting this mode.</p> <p><b>Mode 1198 = ON:</b> The difference management method for volumes of 4 TB or less used in TC, UR, or GAD pairs is changed to hierarchical difference management regardless of SOM 5, SOM 6, and SOM 1199 settings.</p> <p><b>Mode 1198 = OFF:</b></p> <ul style="list-style-type: none"> <li>▪ When SOM 1198 is OFF and SOM 1199 is ON, the difference management method for volumes of 4 TB or less used in TC, UR, or GAD pairs is changed to SM difference management.</li> <li>▪ When both SOM 1198 and SOM 1199 are OFF, the difference management method is not changed.</li> </ul> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Apply this mode when the storage system does not have an SVP and you want to expand the capacity of volumes used in TC, UR, or GAD pairs.</li> <li>2. Changing the difference management method can affect the I/O response performance depending on the I/O pattern.</li> <li>3. Changing the difference management method can affect the initial copy time depending on the conditions.</li> </ol>	OFF	Both

Mode	Category	Description	Default	MCU/RCU
1199	TrueCopy Universal Replicator global-active device	<p>This mode is used to enable changing the difference management method from hierarchical difference management back to SM difference management if necessary for some reasons after the method was changed to hierarchical difference management by setting SOM 1198 to ON. The difference management method is changed at the first TC, UR, or GAD pair creation or resync operation after setting this mode.</p> <p><b>Mode 1199 = ON:</b></p> <ul style="list-style-type: none"> <li>▪ When both SOM 1199 and SOM 1198 are ON, the difference management method for volumes of 4 TB or less used in TC, UR, or GAD pairs is changed to hierarchical difference management regardless of SOM 5 and 6 settings.</li> <li>▪ When SOM 1199 is ON and SOM 1198 is OFF, the difference management method for volumes of 4 TB or less used in TC, UR, or GAD pairs is changed to SM difference management regardless of SOM 5 and 6 settings.</li> </ul> <p><b>Mode 1199 = OFF:</b></p> <ul style="list-style-type: none"> <li>▪ When SOM 1199 is OFF and SOM 1198 is ON, the difference management method for volumes of 4 TB or less used in TC, UR, or GAD pairs is changed to hierarchical difference management regardless of SOM 5 and 6 settings.</li> <li>▪ When both SOM 1199 and SOM 1198 are OFF, the difference management method is not changed.</li> </ul> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Apply this mode when the storage system does not have an SVP and you want to expand the capacity of volumes used in TC, UR, or GAD pairs.</li> <li>2. Changing the difference management method can affect the I/O response performance depending on the I/O pattern.</li> <li>3. Changing the difference management method can affect the initial copy time depending on the conditions.</li> </ol>	OFF	Both

Mode	Category	Description	Default	MCU/RCU
1204	Dynamic Provisioning, Dynamic Tiering, Thin Image	<p>This mode is intended to improve the page migration performance when the MP usage rate is within the range from 30% to 50%.</p> <p><b>Mode 1204 = ON:</b> When the MP usage rate is within the range 30 to 50%, the processing interval is shortened to improve the page migration throughput.</p> <p><b>Mode 1204 = OFF:</b> There is no change for the processing interval.</p> <p>For details, see sheet SOM 1204.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Apply this mode when the following conditions are met: <ul style="list-style-type: none"> <li>▪ The MP usage rate constantly exceeds 30%.</li> <li>▪ Prioritizing the page migration processing over the I/O processing is required.</li> </ul> </li> <li>2. When SOM 1204 is set to ON, the operation frequency of the relocation processing increases so that the host I/O response performance is degraded.</li> <li>3. When SOM 904 is set to ON, the SOM 904 setting is prioritized.</li> <li>4. By setting SOM 1204 to ON, the MP usage rate increases by 3 to 10% due to the asynchronous processing, and the host I/O response may be degraded.</li> </ol>	OFF	-
1205	Dynamic Provisioning, Dynamic Tiering, Thin Image	<p>Changes the background unmap processing speed for FMC drives.</p> <p><b>Mode 1205 = ON:</b> Background unmap runs at up to 42 MB/s.</p> <p><b>Mode 1205 = OFF:</b> Background unmap runs at up to 10 GB/s.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. The mode is applied to prevent the host response performance from being degraded due to background unmap.</li> <li>2. When SOM 1122 is set to ON, the SOM 1122 setting is prioritized.</li> <li>3. As releasing physical areas runs at the normal speed, the following phenomena may occur,</li> </ol>	OFF	-

Mode	Category	Description	Default	MCU/RCU
		<p>though the phenomena are solved immediately after the physical area release is complete:</p> <ul style="list-style-type: none"> <li>▪ The used pool capacity does not decrease immediately after vDP volume deletion.</li> <li>▪ The saving ratio seems to be lower temporarily.</li> <li>▪ The used pool capacity may increase due to rebalance.</li> </ul>		

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