

# Hitachi Virtual Storage Platform F1500 and G1x00

SVOS RF 8.3

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## SNMP Agent User Guide

This document describes and provides instructions for using the SNMP Agent on Hitachi Virtual Storage Platform F1500 and Hitachi Virtual Storage Platform G1x00 storage systems.

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## Preface

This document describes and provides instructions for using the SNMP Agent on Hitachi Virtual Storage Platform G1x00, and Hitachi Virtual Storage Platform F1500 storage systems.

Please read this document carefully to understand how to use this product, and maintain a copy for reference purposes.

### Intended audience

This document is intended for system administrators, Hitachi Vantara representatives, and authorized service providers who install, configure, and operate Hitachi Virtual Storage Platform G1x00, and Hitachi Virtual Storage Platform F1500 storage systems.

Readers of this document should be familiar with the following:

- Data processing and RAID storage systems and their basic functions.
- Hitachi Virtual Storage Platform G1x00, and Virtual Storage Platform F1500 storage systems and the *Product Overview*.
- The Device Manager - Storage Navigator software for the Hitachi Virtual Storage Platform G1x00, and Virtual Storage Platform F1500, and the *System Administrator Guide*.

### Product version

This document revision applies to:

- Microcode 80-06-6x or later
- SVOS RF 8.3 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

- Updated the alert level of the following trap reference codes:
  - 627xxx
  - 628xxx

## Referenced documents

- *Command Control Interface User and Reference Guide*, MK-90RD7010
- *Provisioning Guide for Mainframe Systems*, MK-92RD8013
- *Provisioning Guide for Open Systems*, MK-92RD8014
- *System Administrator Guide*, MK-92RD8016





## 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:<br/>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:<br/><code>pairdisplay -g group</code></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.<br>Example: <code>pairdisplay -g oradb</code>   |

| Convention          | Description   |
|---------------------|---|
| < > 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> |
| [ ] 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        | <p>Indicates that you have a choice between two or more options or arguments. Examples:</p> <p>[ a   b ] indicates that you can choose a, b, or nothing.</p> <p>{ a   b } indicates that you must choose either a or b.</p>   |

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 |
| 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<br>Open-systems:<br><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.



## Getting help

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[Hitachi Vantara Community](#) is a global online community for Hitachi Vantara customers, partners, independent software vendors, employees, and prospects. It is the destination to get answers, discover insights, and make connections. **Join the conversation today!** Go to [community.hitachivantara.com](https://community.hitachivantara.com), register, and complete your profile.

## Comments

Please send us your comments on this document to [doc.comments@hitachivantara.com](mailto:doc.comments@hitachivantara.com). Include the document title and number, including the revision level (for example, -07), and refer to specific sections and paragraphs whenever possible. All comments become the property of Hitachi Vantara Corporation.

**Thank you!**

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## Chapter 1: Introduction

This chapter provides an overview of the SNMP implementation for monitoring Hitachi Virtual Storage Platform G1x00, and Virtual Storage Platform F1500 storage systems, including the agent and management functions.

### SNMP Manager overview

SNMP Manager is installed in the network management station. It collects and manages information from SNMP agents installed in the managed devices on the network.

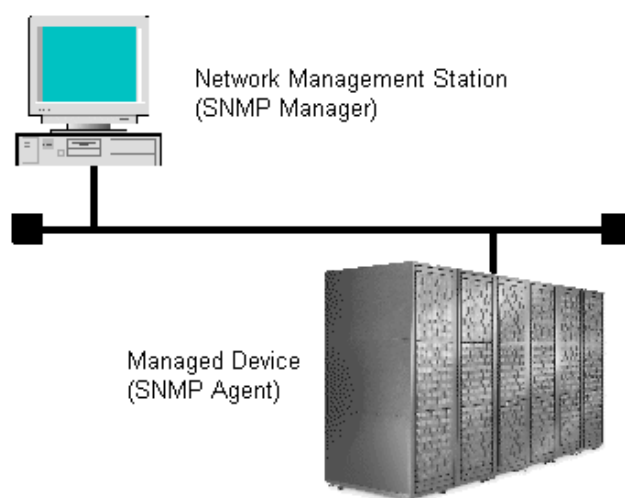
The SNMP Manager graphically displays information collected from two or more SNMP agents, accumulates the information in the database, and analyzes problems discovered while accumulating this information.

 **Note:** SNMP versions v1, v2c, and v3 are supported.

### How SNMP works

Simple Network Management Protocol (SNMP) is an industry-standard protocol for managing and monitoring network devices, including disk devices, routers, and hubs. SNMP uses Simple Gateway Management Protocol (SGMP) to manage TCP/IP gateways.

The following figure shows an example SNMP environment.



An SNMP manager monitors the devices, which are referred to as managed nodes. Typically, an SNMP Manager polls the SNMP agents on a periodic basis. The manager receives the reports from the agents and determines whether the devices are operating normally. If an abnormal event occurs, an SNMP Agent can report the condition without a request from the manager, by using a trap message.

When an SNMP manager polls an agent, the following dialogue takes place:

- An SNMP Manager sends a request packet to an SNMP Agent, which requests data regarding the status of the managed node.
- The SNMP Agent sends a response packet back to the SNMP Manager.
- SNMP uses the TCP/IP User Datagram Protocol (UDP). If the SNMP Agent does not respond within a specified time period, the SNMP Manager re-sends the request packet. That time period is set by the system administrator, taking into account the network traffic and operation policy.
- If an SNMP Agent again does not respond to the resent packet, the SNMP Manager assumes that an error has occurred. Depending on the times set for polling and response, this dialogue can take several seconds.

If an SNMP Agent detects an abnormal event, it sends a trap to the SNMP Manager. However, if a trap is dropped in transmission, the SNMP Manager does not know that it was sent. For this reason, you should use both polling and traps to determine whether an abnormal event has occurred.

## Management Information Base overview

The standardized configuration and database of network management information is called a Management Information Base (MIB). A standard MIB is common to all SNMP interfaces. An extension MIB is defined by the particular managed device or protocol.

A MIB is a collection of standardized configuration and network management information that is contained in each device on the network. Each MIB contains a set of parameters called managed objects. Each managed object consists of a parameter name, one or more parameters, and a group of operations that can be executed with the object. The MIB defines the type of information that can be obtained from a managed device, and the device settings that can be controlled from a management system.

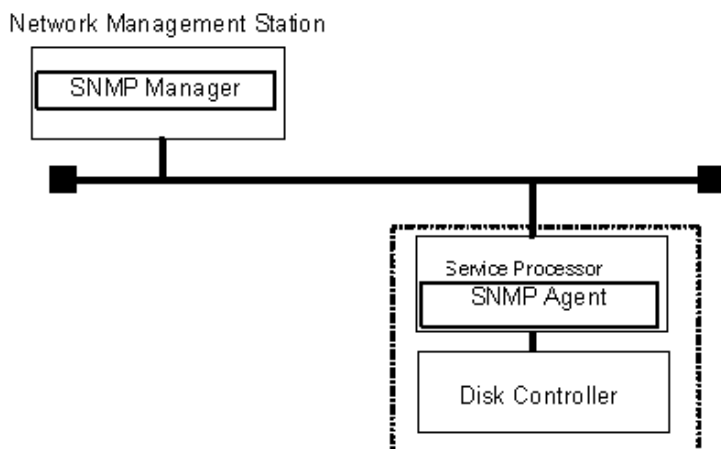
The MIB definition file, `VSPG1000MIB.txt`, is located in the `program\SNMP` folder of the software media kit.

## SNMP Agent configuration

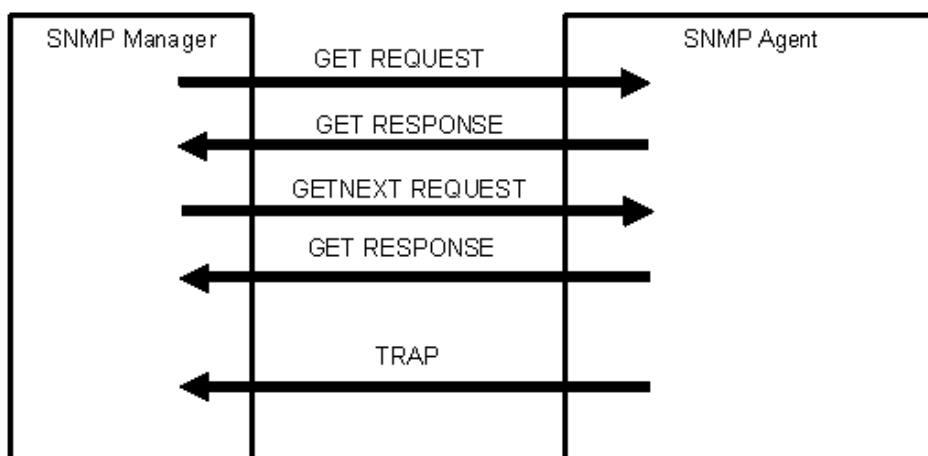
The SNMP Agent is installed on the service processor (SVP), which is the computer within the storage system that manages the storage system.

The storage system has an exclusive LAN for communications with the SVP and a separate LAN for SNMP. The configuration of each Network Management Station is determined by the type of SNMP manager.

The following figure illustrates the SNMP environment.



The following figure shows an example of SNMP operations using an SNMP manager.



## SNMP Agent overview

The SNMP Agent is mounted on a managed device (such as a hard disk) in the network. It collects error information, the usage condition, and other information about the device, and forwards the information to the SNMP Manager.

The SNMP Agent reports disk storage system failures to the manager using the SNMP trap function.

## SNMP traps

An SNMP Agent reports storage system errors to the SNMP Manager using the SNMP trap function.

When an error occurs, the SNMP Agent issues an SNMP trap to the SNMP Manager that includes the product number, nickname, reference code, and an identifier of the component.

The following table lists the types of events that trigger an SNMP Agent trap.

| Events                     | Description  |
|----------------------------|--|
| Acute failure detected.    | All operations in a storage system stopped.                |
| Serious failure detected.  | Operation in a component where a failure occurred stopped. |
| Moderate failure detected. | Partial failure.   |
| Service failure detected.  | Minor failure.   |

An SNMP Agent logs the most recent 10,000 traps, so you can see the trap history of a particular device.

## SNMP Agent operations

Operations that an SNMP Agent can perform fall into the categories GET REQUEST, GETNEXT REQUEST, GETBULK REQUEST, and TRAP.

The following table describes the types of SNMP Agent operations.

| Operation       | Description  |
|-----------------|--|
| GET REQUEST     | Obtains a specific MIB object value.<br>GET REQUEST is the request from an SNMP Manager, and GET RESPONSE is the agent's response to that request.               |
| GETNEXT REQUEST | Continuously finds a MIB object.<br>GETNEXT REQUEST is the request from an SNMP Manager, and GET RESPONSE is the agent's response to that request.               |
| GETBULK REQUEST | Continuously finds specified MIB objects only.<br>GETBULK REQUEST is the request from an SNMP Manager, and GET RESPONSE is the agent's response to that request. |
| TRAP            | Reports an event (failure) to an SNMP Manager.<br>TRAP occurs without a request from the SNMP Manager.   |

## SNMP Agent reported errors

Several different types of errors can be reported when GET REQUEST, GETNEXT REQUEST, and GETBULK REQUEST operations are sent to an SNMP Agent.

The following table describes the errors that can be reported and suggests corrective action.

| Error          | Description   | Corrective action  |
|----------------|---|--|
| noError (0)    | Normal  | N/A  |
| noSuchName (2) | <ul style="list-style-type: none"> <li>▪ There are no MIB objects that are required. (Not supported.)</li> <li>▪ The GETNEXT REQUEST command that is specified for the following object identifier of the last supported MIB object is received.</li> </ul> | Verify that the name of the requested object is correct. |
|                | SET REQUEST is received.  | SET REQUEST operation is not supported.                  |
| genErr (5)     | Error occurred for other reasons.   | Retry the operation.                                     |

## Component status information from SNMP Manager

You can obtain the status information of certain storage system components from the SNMP Manager.

The following table lists the components for which the status can be obtained.

| Area           | Component name |
|----------------|----------------|
| Storage System | Processors     |
|                | BUS            |
|                | Cache          |
|                | Shared memory  |
|                | Power supplies |
|                | Batteries      |
|                | Fans           |
|                | Others         |
| Disk Unit      | Power supplies |
|                | Fans           |
|                | Environments   |
|                | Drives         |

The following table lists the status of storage system components, as well as the trap report functions.

| Status                    | Description  |
|---------------------------|--|
| Normal                    | Normal operation.  |
| Acute failure detected    | All operations in a storage system stopped.                |
| Serious failure detected  | Operation in a component where a failure occurred stopped. |
| Moderate failure detected | Partial failure.   |
| Service failure detected  | Minor failure.   |

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## Chapter 2: Using SNMP

By using the Hitachi Device Manager - Storage Navigator, you can manage alert settings, SNMP trap notification, SNMP request authentication, test SNMP trap reports.

### Editing alert settings

This topic describes how to set the Edit Alert Settings.



**Caution:** Be sure to document your storage system name before this process, because the settings will be cleared when the SVP is replaced.

#### Before you begin

You must have the Storage Administrator (Initial Configuration) role to perform this task. For more information, see the *System Administrator Guide*.

#### Procedure

1. Display the Device Manager - Storage Navigator main window.
2. From the **Settings** menu, select **Environmental Setting > Edit Alert Settings**.
3. For **Notification Alert**, select one of the following:
  - **All** (Sends alerts of all SIMs.)
  - **Host Report** (Sends alerts only of SIMs that report to hosts. Alert destinations are common to Syslog, SNMP, and Email.)
4. Select the **SNMP** tab.
5. For **Extension SNMP**, select **Enable** to enable that option.
6. In **System Group Information**, enter the **Storage System Name**, **Contact**, and **Location**.

Changes made to information here are also reflected in the **Storage System** window in Device Manager - Storage Navigator.
7. Click **Finish**.
8. Enter a name for the task in the **Confirm** window, confirm the settings, and then click **Apply**.

### Managing SNMP trap notification

Use the procedure for the SNMP version you use to set SNMP trap notification. The items to specify are different depending on the SNMP version.




## Adding trap notification for SNMP v1 and SNMP v2c

This topic describes the procedure to add IP addresses and communities to trap notification for SNMP v1 and SNMP v2c.

### Before you begin

You must have the Storage Administrator (Initial Configuration) role to perform this task. For more information, see the *System Administrator Guide*

### Procedure

1. Display the Device Manager - Storage Navigator main window.
  2. From the **Settings** menu, select **Environmental Setting > Edit Alert Settings**.
  3. Select the **SNMP** tab.
  4. Under **SNMP Agent**, click **Enable**.
  5. Under **SNMP Version**, select **v1** or **v2c**.
  6. Under **Registered Sending Trap Settings**, click **Add**.
  7. In the **Add Sending Trap Setting** window, under **Community**, enter a community name or select from the list of existing community names.  
You can enter up to 180 alphanumeric characters. The following special characters are not allowed: ", \, ;, :, , , \*, ?, <, >, |, /, ^, &, ', and %.  
Do not use a space either at the beginning or the end.
  8. Under **Send Trap To**, perform one or more of the following steps:
    - To enter a new IP address, select **IPv4** or **IPv6**, and then enter the IP address.
    - To use an existing IP address, select from the list of existing IP addresses.
    - To add more than one IP address, click **Add IP Address** to add additional input fields.
    - To delete an IP address from **Send Trap To**, click the minus (-) button next to the IP address.
-  **Note:** Any IP address that has all values set to zero (0) cannot be specified for IPv4 and IPv6. The IPv6 address is specified by entering eight hexadecimal numbers that are separated by colons (:) using a maximum of 4 digits from zero (0) to FFFF inclusive. The default form of the IPv6 address can be specified.
9. Click **OK**.  
The IP address and community you entered are added to the **Registered Sending Trap Settings** table.
  10. Click **Finish**.
  11. In the **Confirm** window, enter a name for the task, confirm the settings, and then click **Apply**.

## Adding trap notification for SNMP v3

This topic describes the procedure to add IP addresses and users to trap notification for SNMP v3.

### Before you begin

You must have the Storage Administrator (Initial Configuration) role to perform this task. For more information, see the *System Administrator Guide*.

### Procedure

1. Display the Device Manager - Storage Navigator main window.
2. From the **Settings** menu, select **Environmental Setting > Edit Alert Settings**.
3. Select the **SNMP** tab.
4. Under **SNMP Agent**, click **Enable**.
5. Under **SNMP Version**, select **v3**.
6. Under **Registered Sending Trap Settings**, click **Add**.
7. In the **Add Sending Trap Setting** window, under **Send Trap To**, select **IPv4** or **IPv6**, and enter an IP address.



**Note:** Any IP address that has all values set to zero (0) cannot be specified for IPv4 and IPv6. The IPv6 address is specified by entering eight hexadecimal numbers that are separated by colons (:) using a maximum of 4 digits from zero (0) to FFFF inclusive. The default form of the IPv6 address can be specified.

8. Under **User Name**, enter a user name.  
You can enter up to 32 alphanumeric characters. The following special characters are not allowed: ", \, ;, :, , , \*, ?, <, >, |, /, ^, &, and %.  
Do not use a space either at the beginning or the end.
9. Under **Authentication**, select whether to **Enable** or **Disable** authentication.  
If you select **Enable**, complete the following steps:
  - a. For **Protocol**, select an authentication type.
  - b. For **Password**, enter a password.
10. Under **Encryption**, select whether to **Enable** or **Disable** encryption.



**Note:** If you select **Disable** for **Authentication**, **Encryption** is automatically disabled.

If you select **Enable**, complete the following steps:

- a. For **Protocol**, select an encryption type.
  - b. For **Key**, enter a key.
  - c. For **Re-enter Key**, enter the same key for confirmation.
11. Click **OK**.  
The IP address and user you entered are added to the **Registered Sending Trap Settings** table.

12. Click **Finish**.
13. In the **Confirm** window, enter a name for the task, confirm the settings, and then click **Apply**.

## Changing trap notification for SNMP v1 and SNMP v2c

This topic describes the procedure to change the IP addresses and communities for trap notification for SNMP v1 and SNMP v2c.

### Before you begin

You must have the Storage Administrator (Initial Configuration) role to perform this task.

For more information, see the *System Administrator Guide*.

### Procedure

1. Display the Device Manager - Storage Navigator main window.
2. From the **Settings** menu, select **Environmental Setting > Edit Alert Settings**.
3. Select the **SNMP** tab.
4. Under **SNMP Agent**, click **Enable**.
5. Under **SNMP Version**, select **v1** or **v2c**.
6. Under **Registered Sending Trap Settings**, select the trap setting you want to change, and then click **Change**.  
The **Change Sending Trap Setting** window opens.
7. If you want to change the **Community**, select the **Community** check box, and then enter a community name or select from the list of existing community names.  
You can enter up to 180 alphanumeric characters. The following special characters are not allowed: ", \, ;, :, , , \*, ?, <, >, |, /, ^, &, ', and %.  
Do not use a space either at the beginning or the end.
8. If you want to make changes under **Send Trap to**, select the **Send Trap to** check box, and then perform one or more of the following steps:
  - To enter a new IP address, select **IPv4** or **IPv6**, and then enter the IP address.
  - To use an existing IP address, select from the list of existing IP addresses.
  - To add more than one IP address, click **Add IP Address** to add additional input fields.
  - To delete an IP address from **Send Trap To**, click the minus (-) button next to the IP address.



**Note:** Any IP address that has all values set to zero (0) cannot be specified for IPv4 and IPv6. The IPv6 address is specified by entering eight hexadecimal numbers that are separated by colons (:) using a maximum of 4 digits from zero (0) to FFFF inclusive. The default form of the IPv6 address can be specified.

9. Click **OK**.  
The IP address and community you entered are changed in the **Registered Sending Trap Settings** table.
10. Click **Finish**.
11. In the **Confirm** window, enter a name for the task, confirm the settings, and then click **Apply**.

## Changing trap notification for SNMP v3

This topic describes the procedure to change the IP addresses and users for SNMP v3 trap notification.

### Before you begin

You must have the Storage Administrator (Initial Configuration) role to perform this task. For more information, see the *System Administrator Guide*.

### Procedure

1. Display the Device Manager - Storage Navigator main window.
2. From the **Settings** menu, select **Environmental Setting > Edit Alert Settings**.
3. Select the **SNMP** tab.
4. Under **SNMP Agent**, click **Enable**.
5. Under **SNMP Version**, select **v3**.
6. Under **Registered Sending Trap Settings**, select the trap setting you want to change, and then click **Change**.  
The **Change Sending Trap Setting** window opens.
7. If you want to make changes under **Send Trap to**, select the **Send Trap to** check box, select **IPv4** or **IPv6**, and then enter an IP address.



**Note:** Any IP address that has all values set to zero (0) cannot be specified for IPv4 and IPv6. The IPv6 address is specified by entering 8 hexadecimal numbers that are separated by colons (:) using a maximum of 4 digits from zero (0) to FFFF inclusive. The default form of the IPv6 address can be specified.

8. If you want to change the **User Name**, select the **User Name** check box, and then enter a user name.  
You can enter up to 32 alphanumeric characters. The following special characters are not allowed: ", \, ;, :, , , \*, ?, <, >, |, /, ^, &, and %.  
Do not use a space either at the beginning or the end.
9. If you want to make changes under **Authentication**, select the **Authentication** check box, and then select whether to **Enable** or **Disable** authentication.  
If you select **Enable**, perform the following steps:
  - a. To change the **Protocol**, select the **Protocol** check box, and then select an authentication type.

- b. To change the **Password**, select the **Password** check box, and then enter a password.
10. If you want to make changes under **Encryption**, select the **Encryption** check box, and then select whether to **Enable** or **Disable** encryption.



**Note:** If you select **Disable** for **Authentication**, **Encryption** is automatically disabled.

If you select **Enable**, perform the following steps:

- a. To change the **Protocol**, select the **Protocol** check box, and then select an encryption type.
  - b. To change the **Key**, select the **Key** check box, enter a key, and then enter the key again under **Re-enter Key** for confirmation.
11. Click **OK**.  
The IP address and user you entered are changed in the **Registered Sending Trap Settings** table.
12. Click **Finish**.
13. In the **Confirm** window, enter a name for the task, confirm the settings, and then click **Apply**.

## Deleting SNMP trap notification

This topic describes the procedure to delete IP addresses and communities or users from SNMP trap notification.

### Before you begin

You must have the Storage Administrator (Initial Configuration) role to perform this task. For more information, see the *System Administrator Guide*.

### Procedure

1. Display the Device Manager - Storage Navigator main window.
2. From the **Settings** menu, select **Environmental Setting > Edit Alert Settings**.
3. Select the **SNMP** tab.
4. Under **SNMP Agent**, click **Enable**.
5. Under **SNMP Version**, select your SNMP version.
6. Under **Registered Sending Trap Settings**, select one or more specific combinations of IP address and community or user, and then click **Delete**.
7. Click **Finish**.
8. In the **Confirm** window, enter a name for the task, confirm the settings, and then click **Apply**.

## Managing SNMP request authentication

Use the procedure for the SNMP version you use to set SNMP request authentication. The items to specify are different depending on the SNMP version.

### Adding request authentication for SNMP v1 and SNMP v2c

This topic describes how to add IP addresses and communities for request authentication for SNMP v1 and SNMP v2c.

#### Before you begin

You must have the Storage Administrator (Initial Configuration) role to perform this task.


For more information, see the *System Administrator Guide*.

#### Procedure

1. Display the Device Manager - Storage Navigator main window.
2. From the **Settings** menu, select **Environmental Setting > Edit Alert Settings**.
3. Select the **SNMP** tab.
4. Under **SNMP Agent**, click **Enable**.
5. Under **SNMP Version**, select **v1** or **v2c**.
6. Under **Registered Request Authentication Settings**, click **Add**.
7. In the **Add Request Authentication Setting** window, under **Community**, enter a community name or select from the list of existing community names.

You can enter up to 180 alphanumeric characters. The following special characters are not allowed: ", \, ;, :, , , \*, ?, <, >, |, /, ^, &, ', and %.

Do not use a space either at the beginning or the end.

8. Under **Request Permitted**, complete one of the following steps:
    - If you want to allow REQUEST operations from all managers, select the **All** check box.
    - If you want to allow REQUEST operations only from specified managers, perform one or more of the following steps:
      - To enter a new IP address, select **IPv4** or **IPv6**, and then enter the IP address.
      - To use an existing IP address, select from the list of existing IP addresses.
      - To add more than one IP address, click **Add IP Address** to add additional input fields.
      - To delete an IP address from **Send Trap To**, click the minus (-) button next to the IP address.
-  **Note:** Any IP address that has all values set to zero (0) cannot be specified for IPv4 and IPv6. The IPv6 address is specified by entering eight hexadecimal numbers that are separated by colons (:) using a maximum of 4 digits from zero (0) to FFFF inclusive. The default form of the IPv6 address can be specified.
9. Click **OK**  
The community and IP address that you entered are added to the **Registered Request Authentication Settings** table.
  10. Click **Finish**.
  11. In the **Confirm** window, enter a name for the task, confirm the settings, and then click **Apply**.

## Adding request authentication for SNMP v3

This topic describes how to add users for SNMP v3 request authentication.

### Before you begin

You must have the Storage Administrator (Initial Configuration) role to perform this task. For more information, see the *System Administrator Guide*.

### Procedure

1. Display the Device Manager - Storage Navigator main window.
2. From the **Settings** menu, select **Environmental Setting > Edit Alert Settings**.
3. Select the **SNMP** tab.
4. Under **SNMP Agent**, click **Enable**.
5. Under **SNMP Version**, select **v3**.
6. Under **Registered Request Authentication Settings**, click **Add**.

7. In the **Add Request Authentication Setting** window, under **User Name**, enter a user name.

You can enter up to 32 alphanumeric characters. The following special characters are not allowed: ", \, ;, :, , , \*, ?, <, >, |, /, ^, &, and %.

Do not use a space either at the beginning or the end.

8. Under **Authentication**, select whether to **Enable** or **Disable** authentication.
  - If you select **Enable**, complete the following steps:
    - a. For **Protocol**, select an authentication type.
    - b. For **Password**, enter a password.
9. Under **Encryption**, select whether to **Enable** or **Disable** encryption.



**Note:** If you select **Disable** for **Authentication**, **Encryption** is automatically disabled.

If you select **Enable**, complete the following steps:

- a. For **Protocol**, select an encryption type.
  - b. For **Key**, enter a key.
  - c. For **Re-enter Key**, enter the same key for confirmation.
10. Click **OK**.  
The user you entered is added to the **Registered Request Authentication Settings** table.
  11. Click **Finish**.
  12. In the **Confirm** window, enter a name for the task, confirm the settings, and then click **Apply**.

## Changing request authentication for SNMP v1 and SNMP v2c

This topic describes how to change IP addresses and communities for request authentication for SNMP v1 and SNMP v2c.

### Before you begin

You must have the Storage Administrator (Initial Configuration) role to perform this task.

For more information, see the *System Administrator Guide*.

### Procedure

1. Display the Device Manager - Storage Navigator main window.
2. From the **Settings** menu, select **Environmental Setting > Edit Alert Settings**.
3. Select the **SNMP** tab.
4. Under **SNMP Agent**, click **Enable**.
5. Under **SNMP Version**, select **v1** or **v2c**.
6. Under **Registered Request Authentication Settings**, select the authentication setting you want to change, and then click **Change**.  
The **Change Request Authentication Setting** window opens.



7. If you want to make changes under **Community**, select the **Community** check box, and then enter a community name or select from the list of existing community names.

You can enter up to 180 alphanumeric characters. The following special characters are not allowed: ", \, ;, :, , , \*, ?, <, >, |, /, ^, &, ', and %.

Do not use a space either at the beginning or the end.

8. If you want to make changes under **Request Permitted**, select the **Request Permitted** check box, and then complete one of the following steps:
  - If you want to allow REQUEST operations from all managers, select the **All** check box.
  - If you want to allow REQUEST operations only from specified managers, perform one or more of the following steps:
    - To enter a new IP address, select **IPv4** or **IPv6**, and then enter the IP address.
    - To use an existing IP address, select from the list of existing IP addresses.
    - To add more than one IP address, click **Add IP Address** to add additional input fields.
    - To delete an IP address from **Send Trap To**, click the minus (-) button next to the IP address.



**Note:** Any IP address that has all values set to zero (0) cannot be specified for IPv4 and IPv6. The IPv6 address is specified by entering 8 hexadecimal numbers that are separated by colons (:) using a maximum of 4 digits from zero (0) to FFFF inclusive. The default form of the IPv6 address can be specified.

9. Click **OK**.  
The community and IP address that you entered are changed in the **Registered Request Authentication Settings** table.
10. Click **Finish**.
11. In the **Confirm** window, enter a name for the task, confirm the settings, and then click **Apply**.

## Changing request authentication for SNMP v3

This topic describes how to change users and authentication settings for SNMP v3 request authentication.

### Before you begin

You must have the Storage Administrator (Initial Configuration) role to perform this task. For more information, see the *System Administrator Guide*.

### Procedure

1. Display the Device Manager - Storage Navigator main window.
2. From the **Settings** menu, select **Environmental Setting > Edit Alert Settings**.

3. Select the **SNMP** tab.
4. Under **SNMP Agent**, click **Enable**.
5. Under **SNMP Version**, select **v3**.
6. Under **Registered Request Authentication Settings**, click **Change**.  
The **Change Request Authentication Setting** window opens.
7. If you want to change the **User Name**, select the **User Name** check box, and then enter a user name.

You can enter up to 32 alphanumeric characters. The following special characters are not allowed: ", \, ;, :, , , \*, ?, <, >, |, /, ^, &, and %.

Do not use a space either at the beginning or the end.

8. If you want to make changes under **Authentication**, select the **Authentication** check box, and then select whether to **Enable** or **Disable** authentication.

If you select **Enable**, perform the following steps:

- a. To change the **Protocol**, select the **Protocol** check box, and then select an authentication type.
- b. To change the **Password**, select the **Password** check box, and then enter a password.

9. If you want to make changes under **Encryption**, select the **Encryption** check box, and then select whether to **Enable** or **Disable** encryption.



**Note:** If you select **Disable** for **Authentication**, **Encryption** is automatically disabled.

If you select **Enable**, perform the following steps:

- a. To change the **Protocol**, select the **Protocol** check box, and then select an encryption type.
- b. To change the **Key**, select the **Key** check box, enter a key, and then enter the key again under **Re-enter Key** for confirmation.

10. Click **OK**.  
The user you entered is added to the **Registered Request Authentication Settings** table.
11. Click **Finish**.
12. In the **Confirm** window, enter a name for the task, confirm the settings, and then click **Apply**.

## Deleting SNMP request authentication

This topic describes how to delete IP addresses and communities or users from request authentication.

### Before you begin

You must have the Storage Administrator (Initial Configuration) role to perform this task.

For more information, see the *System Administrator Guide*.

### Procedure

1. Display the Device Manager - Storage Navigator main window.
2. From the **Settings** menu, select **Environmental Setting > Edit Alert Settings**.
3. Select the **SNMP** tab.
4. Under **SNMP Agent**, click **Enable**.
5. Under **SNMP Version**, select your SNMP version.
6. Under **Registered Request Authentication Settings**, select one or more specific combinations of IP address and community or user, and then click **Delete**.
7. Click **Finish**.
8. In the **Confirm** window, enter a name for the task, confirm the settings, and then click **Apply**.

## Testing the SNMP trap report

This topic describes the procedure to test the SNMP trap report.

### Before you begin

You must have the Storage Administrator (Initial Configuration) role to perform this task.

For more information, see the *System Administrator Guide*.

### Procedure

1. Display the Device Manager - Storage Navigator main window.
2. From the **Settings** menu, select **Environmental Setting > Edit Alert Settings**.
3. Select the **SNMP** tab.
4. Click **Send Test SNMP Trap**.  
Reports the test SNMP trap to the IP address registered in the storage system.  
Reports the events registered in the storage system instead of the events that are set on the **SNMP** tab. If you want to test the events set on the **SNMP** tab, click **Finish** and apply to the storage system, and then report the test SNMP trap.
5. Verify whether the SNMP trap report (reference code 7fffff) is received by the SNMP manager registered in the community.

## Chapter 3: SNMP supported MIBs

You can use the SNMP supported MIBs reference to find information on the standard and extension MIB specifications, and trap configuration.

### SNMP Agent failure report trap contents

A standard extension trap protocol data unit (PDU) includes the product number of the device that experienced the failure, the device nickname, and a failure reference code. A failure report trap contains additional information about the failure, such as the area, date, and time of the failure.

If you obtain the information with the **GetRequest** command, access the MIB by using the product number of the device as an index.

The following table shows the failure report trap.

| Name                   | Object identifier           | Type              | Description  |
|------------------------|-----------------------------|-------------------|--|
| eventTrapSerial Number | .1.3.6.1.4.1.116.5.11.4.2.1 | INTEGER           | The product number of the device that experienced the failure. |
| eventTrapNickname      | .1.3.6.1.4.1.116.5.11.4.2.2 | DisplayString     | The device nickname .  |
| eventTrapREFERENCE     | .1.3.6.1.4.1.116.5.11.4.2.3 | DisplayString     | The failure reference code.                                    |
| eventTrapPartID        | .1.3.6.1.4.1.116.5.11.4.2.4 | OBJECT IDENTIFIER | The area where the failure occurred.*                          |
| eventTrapDate          | .1.3.6.1.4.1.116.5.11.4.2.5 | DisplayString     | Failure occurrence date.                                       |
| eventTrapTime          | .1.3.6.1.4.1.116.5.11.4.2.6 | DisplayString     | Failure occurrence time.                                       |
| eventTrapDescription   | .1.3.6.1.4.1.116.5.11.4.2.7 | DisplayString     | Detailed information of a failure.                             |

| Name   | Object identifier | Type | Description |
|--|-------------------|------|-------------|
| *The object identifier for a failure in a storage system processor would be .1.3.6.1.4.1.116.5.11.4.1.1.6.1.2. |                   |      |             |

## SNMP Agent extension trap types

SNMP Agent extension trap types are set according to the severity. The character strings following "RaidEventUser" indicate their severity.

The following table describes the SNMP Agent extension trap types.

| Specific Trap Code | Trap                  | Description  |
|--------------------|-----------------------|--|
| 1                  | RaidEventUserAcute    | All operations in a storage system stopped.                |
| 2                  | RaidEventUserSerious  | Operation in a component where a failure occurred stopped. |
| 3                  | RaidEventUserModerate | Partial failure.   |
| 4                  | RaidEventUserService  | Minor failure.   |

## Standard MIB specifications

### MIBs supported by SNMP Agent

SNMP Agent supports a limited number of MIBs. If you send a GET request for an object (MIB) that is not supported, you will receive `NoSuchName` as a GET RESPONSE.

The following table lists MIBs and indicates whether they are supported.

| MIB                  | Supported?      |     |
|----------------------|-----------------|-----|
| Standard MIB: MIB-II | system group    | Yes |
|                      | interface group | No  |
|                      | at group        | No  |
|                      | ip group        | No  |
|                      | icmp group      | No  |



An SNMP Agent mounts only system groups in mib-2, as shown in the following table.

| Name  | Description  | Mounted value  |
|---|--|--|
| sysObjectID<br>{system 2}                                       | This is the product identification number.           | Fixed value. See <a href="#">Object identifier system (on page 30)</a> .<br>1.3.6.1.4.1.116.3.11.4.1.1 |
| sysUpTime<br>{system 3}   | An accumulated time from an SNMP agent.              | Unit: 100 ms   |
| sysContact<br>{system 4}  | A manager who manages an agent or a contact address. | Maximum 180 characters in an ASCII characters string. Input by a user from an SNMP setting window.*    |
| sysName<br>{system 5}   | The name of an agent manager                         | Maximum 180 characters in an ASCII characters string. Input by a user from an SNMP setting window.*    |
| sysLocation<br>{system 6}                                       | An agent setup location.                             | Maximum 180 characters in an ASCII characters string. Input by a user from an SNMP setting window.*    |
| sysService<br>{system 7}  | Value indicating a service.                          | Fixed value 76 (decimal)   |
| *The following symbols cannot be used: \, / ; * ? " < >   & % ^ |  |  |

## Extension MIB specifications

### Extension MIB configuration

The following shows the extension MIB object system for the storage system.

```
raidExMibRoot(1)
├─raidExMibName(1)      SVP product name
├─raidExMibVersion(2)   SVP Micro-program version
├─raidExMibAgentVersion(3) Extension MIB internal version
├─raidExMibDkcCount(4)  Number of DKC under the control of SVP
├─raidExMibRaidListTable(5) List of DKC under the control of SVP
├─raidExMibDKCHWTable(6)  Disk control device information
├─raidExMibDKUHWTable(7)  Disk device information
└─raidExMibTrapListTable(8) Error information list
```

The following figures show an example extension MIB configuration.

```

├ - enterprises(1)
  └ - hitachi(116)
    |
    └ - systemExMib(5)
      └ - storageExMib(11)
        └ - raidExMib(4)
          └ - raidExMibDummy(1)
            └ - raidExMibRoot(1) → ①

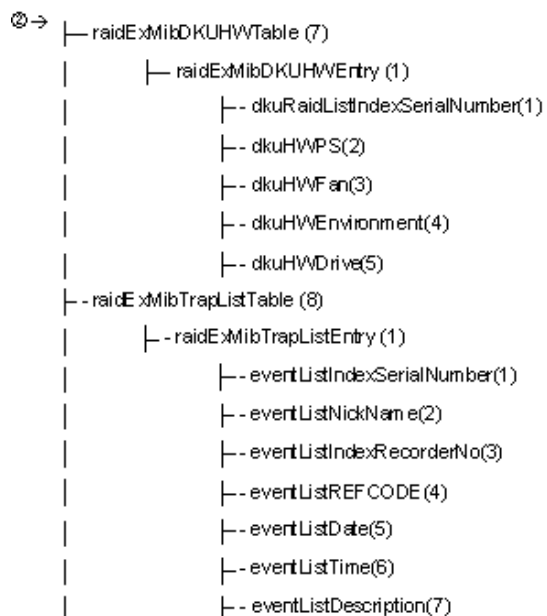
```

```

① → └ - raidExMibRoot(1)
      └ - raidExMibName(1)
      └ - raidExMibVersion(2)
      └ - raidExMibAgentVersion(3)
      └ - raidExMibDkcCount(4)
      └ - raidExMibRaidListTable(5)
        └ - raidExMibRaidListEntry (1)
          └ - raidlistSerialNumber(1)
          └ - raidlistMibNickName(2)
          └ - raidlistDKCMainVersion(3)
          └ - raidlistDKCProductName(4)
      └ - raidExMibDKCHWTable (6)
        └ - raidExMibDKCHWEntry(1)
          └ - dkcRaidListIndexSerialNumber(1)
          └ - dkchWProcessor(2)
          └ - dkchWCSW(3)
          └ - dkchWCache(4)
          └ - dkchWVSM(5)
          └ - dkchWPS(6)
          └ - dkchWBattery(7)
          └ - dkchWFan(8)
          └ - dkchWEnvironment(9)
      → ②

```





## raidExMibName

raidExMibName indicates the SVP product name.

```

raidExMibName          OBJECT-TYPE
SYNTAX                 DisplayString
ACCESS                 read-only
STATUS                 mandatory
DESCRIPTION            "SVP product name."
 ::= { raidExMibRoot 1 }

```

## raidExMibVersion

raidExMibVersion indicates the micro-program version.

```

raidExMibVersion       OBJECT-TYPE
SYNTAX                 DisplayString
ACCESS                 read-only
STATUS                 mandatory
DESCRIPTION            "SVP Micro-program version."
 ::= { raidExMibRoot 2 }

```

## raidExMibAgentVersion

raidExMibAgentVersion indicates the internal version of the extension MIB.

```

raidExMibAgentVersion OBJECT-TYPE
SYNTAX          DisplayString
ACCESS          read-only
STATUS          mandatory
DESCRIPTION    "Extension agent version."
 ::= { raidExMibRoot 3 }

```

## raidExMibDkcCount

raidExMibDkcCount suggests the number of a storage system under the control of the SVP.

```

raidExMibDkcCount      OBJECT TYPE
SYNTAX                INTEGER
ACCESS                read-only
STATUS                mandatory
DESCRIPTION            "Number of DKC which is registered
                        on the SVP"
 ::= { raidExMibRoot 4}

```

## raidExMibRaidListTable

raidExMibRaidListTable indicates the storage system under the control of the SVP.

```

raidExMibRaidListTable OBJECT TYPE
SYNTAX                SEQUENCE OF raidExMibRaidListEntry
ACCESS                not-accessible
STATUS                mandatory
DESCRIPTION            "List of DKC which is registered
                        on the SVP."
 ::= { raidExMibRoot 5}

raidExMibRaidListEntry OBJECT TYPE
SYNTAX                RaidExMibRaidListEntry
ACCESS                not-accessible
STATUS                mandatory
DESCRIPTION            "Entry of DKC list."
INDEX                 { raidlistSerialNumber }
 ::= { raidExMibRaidListTable 1}

```

The following table lists the information displayed for each storage system

| Name  | Type          | Description                            | Mounted value        | Attribute |
|---|---------------|--|----------------------|-----------|
| raidlistSerialNumber<br>::=RaidExMibRaidListEntry(1)                          | INTEGER       | Storage system product number (index). | 1 - 99,999           | read-only |
| raidlistMibNickName<br>::=RaidExMibRaidListEntry(2)                           | DisplayString | Storage system nickname.               | (Max. 18 characters) | read-only |
| raidlistDKCMainVersion<br>::=RaidExMibRaidListEntry(3)                        | DisplayString | Microcode version.                     | Max. 10 characters   | read-only |
| raidlistDKCProductName<br>::=RaidExMibRaidListEntry(4)                        | DisplayString | Storage system product type.           | 7 characters*        | read-only |
| * RAID800 will be used as storage system product type raidlistDKCProductName. |               |  |                      |           |

## raidExMibDKCHWTable

raidExMibDKCHWTable indicates the status of the storage system components.

```

raidExMibDKCHWTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RaidExMibDKCHWEntry
    ACCESS      not-accessible
    STATUS      mandatory
    DESCRIPTION "Error information of the DKC."
    ::= { raidExMibRoot 6 }

raidExMibDKCHWEntry OBJECT-TYPE
    SYNTAX      RaidExMibDKCHWEntry
    ACCESS      not-accessible
    STATUS      mandatory
    DESCRIPTION "Entry of DKC information."
    INDEX       {dkcRaidListIndexSerialNumber}
    ::= { raidExMibDKCHWTable 1 }

```

The following table lists the information displayed for each storage system component.

| Name  | Type    | Description                                | MIB value  | Attribute |
|---|---------|--|------------|-----------|
| dkcRaidListIndexSerialNumber<br>::=raidExMibDKCHWEntry(1)   | INTEGER | Storage system product number (index).     | 1 - 99,999 | read-only |
| dkcHWProcessor<br>::=raidExMibDKCHWEntry(2)   | INTEGER | Status of processor.                       | See Note   | read-only |
| dkcHWCSW<br>::=raidExMibDKCHWEntry(3)   | INTEGER | Status of internal star.                   | See Note   | read-only |
| dkcHWCache<br>::=raidExMibDKCHWEntry(4)   | INTEGER | Status of cache.                           | See Note   | read-only |
| dkcHWSM<br>::=raidExMibDKCHWEntry(5)  | INTEGER | Status of shared memory.                   | See Note   | read-only |
| dkcHWPS<br>::=raidExMibDKCHWEntry(6)  | INTEGER | Status of power supply.                    | See Note   | read-only |
| dkcHWBattery<br>::=raidExMibDKCHWEntry(7)   | INTEGER | Status of battery.                         | See Note   | read-only |
| dkcHWFan<br>::=raidExMibDKCHWEntry(8)   | INTEGER | Status of fan.                             | See Note   | read-only |
| dkcHWEEnvironment<br>::=raidExMibDKCHWEntry(9)  | INTEGER | Information of an operational environment. | See Note   | read-only |
| <p><b>Note:</b></p> <p>The status of each component is a single digit which shows the following:</p> <p>1: Normal.</p> <p>2: Acute failure detected.</p> <p>3: Serious failure detected.</p> <p>4: Moderate failure detected.</p> |         |  |            |           |

| Name                         | Type | Description | MIB value | Attribute |
|------------------------------|------|-------------|-----------|-----------|
| 5: Service failure detected. |      |             |           |           |

## raidExMibDKUHWTable

raidExMibDKUHWTable indicates the status of the storage system components.

```

raidExMibDKUHWTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RaidExMibDKUHWEntry
    ACCESS      not-accessible
    STATUS      mandatory
    DESCRIPTION "Error information of the DKU."
    ::= { raidExMibRoot 7 }

raidExMibDKUHWEntry OBJECT-TYPE
    SYNTAX      RaidExMibDKUHWEntry
    ACCESS      not-accessible
    STATUS      mandatory
    DESCRIPTION "Entry of DKU information."
    INDEX       { dkuRaidListIndexSerialNumber }
    ::= { raidExMibDKUHWTable 1 }

```

The following table lists the information displayed for each disk device component.

| Name  | Type    | Description                            | MIB value  | Attribute |
|---|---------|--|------------|-----------|
| dkuRaidListIndexSerialNumber<br>::=raidExMibDKUHWEntry(1) | INTEGER | Storage system product number (index). | 1 - 99,999 | read-only |
| dkuHWPS<br>::=raidExMibDKUHWEntry(2)                      | INTEGER | Status of power supply.                | See Note   | read-only |
| dkuHWFan<br>::=raidExMibDKUHWEntry(3)                     | INTEGER | Status of fan.                         | See Note   | read-only |
| dkuHWEnvironment<br>::=raidExMibDKUHWEntry(4)             | INTEGER | Status of environment monitor.         | See Note   | read-only |

| Name  | Type        | Description      | MIB value | Attribute |
|---|-------------|------------------|-----------|-----------|
| dKuHwDrive<br>::=raidExMibDKUHwEntry(5 )  | INTEGE<br>R | Status of drive. | See Note  | read-only |
| <p><b>Note:</b></p> <p>The status of each component is a single digit which shows the following:</p> <p>1: Normal.</p> <p>2: Acute failure detected.</p> <p>3: Serious failure detected.</p> <p>4: Moderate failure detected.</p> <p>5: Service failure detected.</p> |             |                  |           |           |

## raidExMibTrapListTable

raidExMibTrapListTable shows the history of the failure traps.

```

raidExMibTrapListTable OBJECT TYPE
SYNTAX                   SEQUENCE OF RaidExMibTrapListEntry
ACCESS                   not-accessible
STATUS                   mandatory
DESCRIPTION              "Trap list table."
 ::= { raidExMibRoot 8 }

raidExMibTrapListEntry OBJECT TYPE
SYNTAX                   RaidExMibTrapListEntry
ACCESS                   non-accessible
STATUS                   mandatory
DESCRIPTION              "Trap list table index."
INDEX                    { eventListIndexSerialNumber ,
                          eventListIndexRecordNo }
 ::= { raidExMibTrapListTable 1 }

```

The following table lists the information displayed for each failure.

| Name                           | Type    | Description                                  | MIB value  | Attribute |
|--------------------------------|---------|--|------------|-----------|
| eventListIndexSerialNu<br>mber | INTEGER | Storage system<br>product number<br>(index). | 1 - 99,999 | read-only |

| Name  | Type          | Description                             | MIB value                            | Attribute |
|---|---------------|---|--------------------------------------|-----------|
| ::=raidExMibTrapListEntry(1)                            |               |   |                                      |           |
| eventListNickname<br>::=raidExMibTrapListEntry (2)      | DisplayString | Storage system nickname.                | 18 characters maximum                | read-only |
| eventListIndexRecordNo<br>::=raidExMibTrapListEntry (3) | Counter       | Number of records.                      | 1-256                                | read-only |
| eventListREFCODE<br>::=raidExMibTrapListEntry (4)       | DisplayString | Reference code (index).                 | 6 characters                         | read-only |
| eventListData<br>::=raidExMibTrapListEntry (5)          | DisplayString | Date when the failure occurred.         | <i>yyyy/mm/dd</i><br>(10 characters) | read-only |
| eventListTime<br>::=raidExMibTrapListEntry (6)          | DisplayString | Time when the failure occurred.         | <i>hh:mm:ss</i><br>(8 characters)    | read-only |
| eventListDescription<br>::=raidExMibTrapListEntry (7)   | DisplayString | Detailed information about the failure. | 256 characters maximum               | read-only |

## Chapter 4: SNMP failure trap reference

You can use the SNMP failure trap reference to identify trap reference codes to see what section it affects and the alert levels.

### SNMP failure trap reference codes

The following table lists and describes the SNMP failure trap reference codes.

For details on alert levels, see the *System Administrator Guide*.

| Trap reference code |        |        | Description  | Section         | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|--|-----------------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |  |                 |             |                          |
| 18                  | 00     | 00     | AuditLog lost  | DKC environment | MODERATE    | Yes                      |
| 18                  | 01     | 00     | AuditLog Access Impossible   | Drive           | MODERATE    | Yes                      |
| 21                  | 20     | xx     | Channel port blocking  | Processor       | MODERATE    | Yes                      |
| 21                  | 80     | xx     | Logical path(s) on the remote copy connections was logically blocked (Due to an error condition) | Processor       | MODERATE    | Yes <sup>2</sup>         |
| 21                  | 81     | xx     | RIO PATH AUTOMATICALLY RECOVERED   | Processor       | SERVICE     | Yes                      |
| 21                  | 90     | xx     | AL_PA VALUE CONFLICT   | Processor       | SERVICE     | No                       |
| 21                  | 93     | xx     | LINK FAILURE   | Processor       | SERIOUS     | Yes                      |
| 21                  | 94     | xx     | LINK FAILURE2  | Processor       | SERIOUS     | Yes                      |
| 21                  | a3     | xx     | HTP blocking   | Processor       | MODERATE    | Yes                      |
| 21                  | a4     | xx     | Fiber Cable Failure  | Processor       | SERVICE     | No                       |



| Trap reference code |        |        | Description   | Section   | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|---|-----------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |   |           |             |                          |
| 21                  | a6     | xx     | Optical signal output failure   | Processor | MODERATE    | No                       |
| 21                  | a7     | xx     | LED status change failure   | Processor | MODERATE    | No                       |
| 21                  | a8     | xx     | SFP wrong type  | Processor | MODERATE    | No                       |
| 21                  | a9     | xx     | IP address conflict detection   | Processor | SERVICE     | No                       |
| 21                  | aa     | xx     | SFP TxFault   | Processor | MODERATE    | No                       |
| 21                  | bx     | xx     | HTP hard error  | Processor | MODERATE    | Yes                      |
| 21                  | d0     | xx     | External storage system connection path blocking                            | Processor | MODERATE    | Yes                      |
| 21                  | d1     | xx     | External storage system connection path restore                             | Processor | SERVICE     | No                       |
| 21                  | d2     | xx     | Threshold over by external storage system connection path response time-out | Processor | SERVICE     | Yes                      |
| 21                  | d4     | xx     | Blocking the Data Migration path  | Processor | MODERATE    | No                       |
| 21                  | d5     | xx     | Data Migration Path Recovery  | Processor | SERVICE     | No                       |
| 30                  | 70     | xx     | CHK1A THRESHOLD OVER  | Processor | SERVICE     | No                       |
| 30                  | 71     | xx     | CHK1B THRESHOLD OVER  | Processor | SERVICE     | No                       |
| 30                  | 72     | xx     | CHK3 THRESHOLD OVER   | Processor | SERVICE     | No                       |
| 30                  | 73     | xx     | PROCESSOR BLOCKING  | Processor | MODERATE    | Yes                      |
| 30                  | 75     | xx     | FM ERROR  | Processor | MODERATE    | Yes                      |
| 30                  | 76     | xx     | Incorrect SUM value of FM   | Processor | SERVICE     | No                       |
| 30                  | 77     | xx     | PROCESSOR MEMORY TEMPORARY ERROR  | Processor | SERVICE     | No                       |

| Trap reference code |        |        | Description                          | Section   | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|--------------------------------------|-----------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |                                      |           |             |                          |
| 30                  | 80     | xx     | WCHK1 dump                           | Processor | MODERATE    | No                       |
| 30                  | a1     | 00     | DKC Blockade                         | Processor | ACUTE       | Yes                      |
| 32                  | xx     | xx     | CHA/DKA - CM Logical path blockade   | Cache     | MODERATE    | No                       |
| 33                  | xx     | xx     | CHA/DKA - MP Logical path blockade   | Cache     | MODERATE    | No                       |
| 34                  | xx     | xx     | MP - CM Logical path blockade        | Cache     | MODERATE    | No                       |
| 35                  | xx     | xx     | MP - MP Logical path blockade        | Cache     | MODERATE    | No                       |
| 38                  | 8f     | 00     | P/S OFF IMPOSSIBLE                   | PS(DKC)   | MODERATE    | No                       |
| 38                  | 9f     | 00     | P/S OFF IMPOSSIBLE(DEVICE RESERVED)  | PS(DKC)   | MODERATE    | No                       |
| 38                  | c1     | x0     | MPB temperature abnormality          | Processor | MODERATE    | No                       |
| 39                  | 90     | xx     | Undefined Package is mounted         | Processor | MODERATE    | No                       |
| 39                  | 91     | xx     | V-R OR SERIAL NUMBER IS INCONSISTENT | Processor | MODERATE    | No                       |
| 39                  | 92     | x0     | MPB temperature abnormality warning  | Processor | MODERATE    | No                       |
| 39                  | 93     | xx     | REPLACE FAILED                       | Processor | MODERATE    | No                       |
| 39                  | 9d     | x0     | MP injustice dc voltage control      | Processor | MODERATE    | No                       |
| 39                  | 9e     | x0     | INJUSTICE ce MODE                    | Processor | MODERATE    | No                       |
| 39                  | 9f     | x0     | Injustice CEDT0                      | Processor | MODERATE    | No                       |
| 39                  | b0     | xx     | SMA SLAVE ERROR                      | Processor | SERVICE     | No                       |

| Trap reference code |        |        | Description  | Section   | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|--|-----------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |  |           |             |                          |
| 39                  | b2     | 00     | CPU frequency setting failure                            | Processor | SERVICE     | No                       |
| 3a                  | 0x     | xx     | LDEV Blockade (Effect of microcode error)                | Processor | MODERATE    | Yes                      |
| 3c                  | 95     | 00     | CHA/DKA Type disagreement                                | Processor | MODERATE    | No                       |
| 3c                  | c0     | xx     | CHA patrol check error                                   | Processor | SERVICE     | No                       |
| 3c                  | c1     | xx     | CHA Memory Correctable error                             | Processor | SERVICE     | No                       |
| 3c                  | cd     | xx     | CHA Injustice dc voltage control                         | Processor | MODERATE    | No                       |
| 3c                  | ce     | xx     | CHA temperature abnormality                              | Processor | MODERATE    | No                       |
| 3d                  | c0     | xx     | DKA patrol check error                                   | Processor | SERVICE     | No                       |
| 3d                  | c1     | xx     | DKA Memory Correctable error                             | Processor | SERVICE     | No                       |
| 3d                  | cd     | xx     | DKA Injustice dc voltage control                         | Processor | MODERATE    | No                       |
| 3d                  | ce     | xx     | DKA temperature abnormality                              | Processor | MODERATE    | No                       |
| 41                  | 00     | xx     | Format complete  | Drive     | SERVICE     | No                       |
| 41                  | 01     | 00     | Quick Format finish                                      | Drive     | SERVICE     | No                       |
| 43                  | 4x     | xx     | DRIVE MEDIA ERROR <sup>6</sup>                           | Drive     | SERVICE     | No                       |
| 43                  | bx     | xx     | Drive blockade (media)(with redundancy) <sup>6</sup>     | Drive     | SERIOUS     | Yes                      |
| 43                  | cx     | xx     | Drive blockade (media) (without redundancy) <sup>6</sup> | Drive     | SERIOUS     | Yes                      |
| 45                  | 1x     | xx     | CORRECTION COPY START <sup>6</sup>                       | Drive     | SERVICE     | Yes                      |
| 45                  | 2x     | xx     | CORRECTION COPY NORMAL END <sup>6</sup>                  | Drive     | SERVICE     | Yes                      |
| 45                  | 3x     | xx     | CORRECTION COPY ABNORMAL END <sup>6</sup>                | Drive     | SERIOUS     | Yes                      |

| Trap reference code |        |        | Description  | Section                     | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|--|-----------------------------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |  |                             |             |                          |
| 45                  | 4x     | xx     | CORRECTION COPY DISCONTINUED <sup>6</sup>  | Drive                       | SERVICE     | No                       |
| 45                  | 5x     | xx     | Correction copy warning end(With blockade LDEV or some error) <sup>6</sup>             | Drive                       | SERVICE     | Yes                      |
| 46                  | 1x     | xx     | DYNAMIC SPARING(DRIVE COPY)START <sup>6</sup>  | Drive                       | SERVICE     | Yes                      |
| 46                  | 2x     | xx     | DYNAMIC SPARING(DRIVE COPY)NORMAL END <sup>6</sup>                                     | Drive                       | SERVICE     | Yes                      |
| 46                  | 3x     | xx     | DYNAMIC SPARING(DRIVE COPY)ABNORMAL END <sup>6</sup>                                   | Drive                       | MODERATE    | Yes                      |
| 46                  | 4x     | xx     | DYNAMIC SPARING(DRIVE COPY)DISCONTINUED <sup>6</sup>                                   | Drive                       | SERVICE     | No                       |
| 46                  | 5x     | xx     | Dynamic sparing warning end(With blockade LDEV or some error)(Drive copy) <sup>6</sup> | Drive                       | SERVICE     | Yes                      |
| 47                  | dx     | xx     | SIMF/SI Copy abnormal end  | Failure with paired volumes | MODERATE    | Yes                      |
| 47                  | e5     | 00     | All FlashCopy(R) Option abnormal end by SM volatile                                    | Failure with paired volumes | MODERATE    | Yes                      |
| 47                  | e7     | 00     | Forcible suspend by SM volatile (SIMF/SI)  | Failure with paired volumes | MODERATE    | Yes                      |
| 47                  | ec     | 00     | Thin Image ABNORMAL END BY SM VOLATILE   | Failure with paired volumes | MODERATE    | Yes                      |
| 47                  | fx     | xx     | Volume Migration Abnormal End  | Volume Migration            | MODERATE    | No <sup>3</sup>          |
| 48                  | 21     | xx     | PRE STAGING ABNORMAL END   | Cache Residency             | SERVICE     | No <sup>3</sup>          |
| 49                  | 10     | xx     | CACHE WRITE PENDING RATIO IS OVER 65%  | Cache                       | SERVICE     | No                       |

| Trap reference code |        |        | Description  | Section                     | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|--|-----------------------------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |  |                             |             |                          |
| 4a                  | 10     | 00     | OEM drive Microcode exchange start                           | Drive                       | SERVICE     | No                       |
| 4a                  | 20     | 00     | OEM drive Microcode exchange normal end                      | Drive                       | SERVICE     | No                       |
| 4a                  | 30     | 00     | OEM drive Microcode exchange abnormal end                    | Drive                       | MODERATE    | No                       |
| 4a                  | 40     | 00     | OEM drive Microcode exchange discontinued                    | Drive                       | SERVICE     | No                       |
| 4a                  | 80     | xx     | Expander Micro Exchange failed                               | Processor                   | MODERATE    | No                       |
| 4b                  | 2x     | xx     | Compatible FlashCopy(R) ABNORMAL END                         | Failure with paired volumes | MODERATE    | Yes                      |
| 4b                  | 3x     | xx     | Thin Image ABNORMAL END                                      | Failure with paired volumes | MODERATE    | Yes                      |
| 4b                  | 4x     | xx     | FlashCopy(R) Hierarchical memory access error                | Failure with paired volumes | MODERATE    | Yes                      |
| 4c                  | 10     | xx     | PDEV Erase Start   | Drive                       | SERVICE     | No                       |
| 4c                  | 20     | xx     | PDEV Erase Normal End  | Drive                       | SERVICE     | No                       |
| 4c                  | 30     | xx     | PDEV Erase Abnormal End                                      | Drive                       | SERVICE     | No                       |
| 4c                  | 4x     | xx     | Flash module drive initialization failed <sup>6</sup>        | Drive                       | MODERATE    | Yes                      |
| 4d                  | 1x     | xx     | Differential area blocking                                   | Drive                       | SERIOUS     | Yes                      |
| 50                  | 1x     | xx     | DRIVE TEMPORARY ERROR  | Drive                       | SERVICE     | No                       |
| 50                  | 2x     | xx     | DRIVE MEDIA ERROR <sup>6</sup>                               | Drive                       | SERVICE     | No                       |
| 50                  | 5x     | xx     | Flash module drive internal battery error (ORM) <sup>6</sup> | Drive                       | SERVICE     | No                       |
| 50                  | 8x     | xx     | Flash module drive internal battery error <sup>6</sup>       | Drive                       | MODERATE    | No                       |

| Trap reference code |        |        | Description   | Section                   | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|---|---------------------------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |   |                           |             |                          |
| 50                  | bx     | xx     | Flash drive End of life <sup>6</sup>                      | Drive                     | SERVICE     | Yes                      |
| 50                  | cx     | xx     | Flash module drive End of life <sup>6</sup>               | Drive                     | SERVICE     | Yes                      |
| 50                  | dx     | xx     | Flash module drive battery warning <sup>6</sup>           | Drive                     | SERVICE     | No                       |
| 50                  | ex     | xx     | Flash module drive battery capacity shortage <sup>6</sup> | Drive                     | MODERATE    | No                       |
| 50                  | f0     | 00     | Flash module drive micro-program version warning          | Drive                     | MODERATE    | No                       |
| 60                  | 1x     | xx     | Pool utilization threshold excess                         | Thin Image pool           | MODERATE    | Yes                      |
| 60                  | 2x     | xx     | Pool blocking   | Thin Image pool           | MODERATE    | Yes                      |
| 60                  | 30     | 00     | SM Space Warning  | SM                        | MODERATE    | Yes <sup>4</sup>         |
| 60                  | 4x     | xx     | Exceeded Threshold of actual pool use rate                | Thin Image pool           | MODERATE    | Yes                      |
| 60                  | 5x     | xx     | Actual pool use rate reaches upper limit                  | Thin Image pool           | MODERATE    | Yes                      |
| 60                  | 6x     | xx     | Exceeded Fixed outage Threshold of pool use rate          | Thin Image pool           | MODERATE    | Yes                      |
| 61                  | 00     | xx     | BACKUP/RESTORE SM INFORMATION FAILED                      | SM                        | MODERATE    | No                       |
| 62                  | 0x     | xx     | The DP POOL Warning Threshold was exceeded.               | Dynamic Provisioning pool | MODERATE    | Yes                      |
| 62                  | 2x     | xx     | The DP POOL FULL  | Dynamic Provisioning pool | MODERATE    | Yes                      |
| 62                  | 3x     | xx     | The DP POOL error is detected (XXX : Pool ID)             | Dynamic Provisioning pool | MODERATE    | Yes                      |

| Trap reference code |        |        | Description   | Section                   | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|---|---------------------------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |   |                           |             |                          |
| 62                  | 40     | 00     | SM(DP/TI) AREA DEPLETION                            | Dynamic Provisioning pool | MODERATE    | Yes                      |
| 62                  | 50     | 00     | DP pool threshold continues to be exceeded          | Dynamic Provisioning pool | MODERATE    | Yes                      |
| 62                  | 6x     | xx     | The DP POOL Depletion threshold was exceeded        | Dynamic Provisioning pool | MODERATE    | Yes                      |
| 62                  | 7x     | xx     | The DP POOL LDEV blockade                           | Dynamic Provisioning pool | SERIOUS     | Yes                      |
| 62                  | 80     | 00     | DP Protect attribute setting of DRU                 | Dynamic Provisioning pool | SERIOUS     | Yes                      |
| 62                  | 9x     | xx     | Exceeded Warning Threshold of DP pool use rate      | Dynamic Provisioning pool | MODERATE    | Yes                      |
| 62                  | ax     | xx     | Actual DP pool use rate reaches upper limit         | Dynamic Provisioning pool | MODERATE    | Yes                      |
| 62                  | b0     | 00     | Threshold of DP pool use rate remains exceeded      | Dynamic Provisioning pool | MODERATE    | Yes                      |
| 62                  | cx     | xx     | Exceeded Depletion Threshold of DP pool use rate    | Dynamic Provisioning pool | MODERATE    | Yes                      |
| 62                  | dx     | xx     | Exceeded Fixed outage Threshold of DP pool use rate | Dynamic Provisioning pool | MODERATE    | Yes                      |
| 62                  | ex     | xx     | Exceeded DP pool depletion threshold for TI pairs   | Dynamic Provisioning pool | MODERATE    | Yes                      |

| Trap reference code |        |        | Description  | Section                   | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|--|---------------------------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |  |                           |             |                          |
| 63                  | 1x     | xx     | Auto pool expansion failed due to system error     | Dynamic Provisioning pool | MODERATE    | Yes                      |
| 63                  | 2x     | xx     | Auto pool expansion failed due to pool error       | Dynamic Provisioning pool | MODERATE    | Yes                      |
| 63                  | 4x     | xx     | Auto pool expansion failed due to no more LDEV IDs | Dynamic Provisioning pool | MODERATE    | Yes                      |
| 64                  | 1x     | xx     | Tier relocation is not completed                   | Dynamic Tiering pool      | SERVICE     | Yes                      |
| 66                  | 00     | xx     | LDEV Blockade (Effect of Encryption key lost)      | SM                        | MODERATE    | No                       |
| 66                  | 01     | 00     | No free encryption key                             | Encryption key            | MODERATE    | Yes                      |
| 66                  | 02     | 00     | Remaining free encryption key warning              | Encryption key            | SERVICE     | Yes                      |
| 66                  | 10     | xx     | Acquisition of encryption key from KMS failed      | Encryption key            | MODERATE    | Yes                      |
| 67                  | 00     | 00     | Warning for depletion of cache management devices  | Thin Image                | MODERATE    | Yes                      |
| 68                  | 00     | xx     | Dedupe and compression abnormality detect          | DKC environment           | MODERATE    | Yes                      |
| 70                  | xx     | 00     | Logical inconsistency                              | SVP failure               | MODERATE    | No                       |
| 71                  | xx     | 00     | Heap error   | SVP failure               | MODERATE    | No                       |
| 72                  | xx     | 00     | File error   | SVP failure               | MODERATE    | No                       |
| 73                  | xx     | 00     | LAN error  | SVP failure               | MODERATE    | No                       |



| Trap reference code |        |        | Description                             | Section     | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|---|-------------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |   |             |             |                          |
| 74                  | xx     | xx     | SSVP error                              | SVP failure | MODERATE    | Yes                      |
| 75                  | xx     | 00     | Windows error                           | SVP failure | MODERATE    | No                       |
| 76                  | 00     | 00     | CUDG3 detected error                    | SVP failure | MODERATE    | No                       |
| 76                  | 04     | 00     | CUDG3 detected error                    | SVP failure | MODERATE    | No                       |
| 76                  | 10     | 00     | LCDG3 detected error                    | SVP failure | MODERATE    | No                       |
| 79                  | 00     | xx     | BOOT detected error                     | SM          | MODERATE    | No                       |
| 7a                  | 00     | 00     | NORMAL END                              | SVP failure | SERVICE     | No                       |
| 7a                  | 01     | 00     | ABNORMAL END(SVP)                       | SVP failure | SERVICE     | No                       |
| 7a                  | 02     | 00     | ABNORMAL END(MP)                        | SVP failure | SERVICE     | No                       |
| 7a                  | 03     | xx     | VERSION CHK ERROR                       | SVP failure | SERVICE     | No                       |
| 7a                  | 04     | xx     | Sum check error                         | SVP failure | SERVICE     | No                       |
| 7a                  | 05     | xx     | HTP patch error                         | SVP failure | SERVICE     | No                       |
| 7a                  | 10     | 00     | WARNING(CONFIGURATION INCONSISTENCY)    | SVP failure | SERVICE     | No                       |
| 7a                  | 11     | 00     | WARNING(S-SVP BUSY)                     | SVP failure | SERVICE     | No                       |
| 7a                  | 12     | xx     | Warning (HTP busy)                      | SVP failure | SERVICE     | No                       |
| 7a                  | 20     | 00     | INTERNET DOWNLOAD ERROR                 | SVP failure | SERVICE     | No                       |
| 7a                  | 23     | 00     | Discontinuation by the user             | SVP failure | SERVICE     | No                       |
| 7b                  | 00     | 03     | ISDN Router failure                     | SVP failure | MODERATE    | Yes                      |
| 7c                  | 00     | 00     | SVP reboot stop (FD Inserted)           | SVP failure | MODERATE    | No                       |
| 7c                  | 01     | 0x     | Battery replacement should be scheduled | Battery     | SERVICE     | No                       |

| Trap reference code |        |        | Description  | Section     | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|--|-------------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |  |             |             |                          |
| 7c                  | 02     | 00     | Audit Log failure of Host instruction configuration change | SVP failure | MODERATE    | No                       |
| 7c                  | 03     | 00     | Audit Log FTP Transfer failed                              | SVP failure | MODERATE    | Yes                      |
| 7c                  | 04     | 00     | Dump Tool failed   | SVP failure | SERVICE     | Yes                      |
| 7c                  | 05     | 00     | Invalid SIM data detection                                 | SVP failure | SERVICE     | No                       |
| 7c                  | 07     | 00     | Memory allocation failure                                  | SVP failure | MODERATE    | No                       |
| 7c                  | 08     | 00     | Dump collection starts                                     | SVP failure | SERVICE     | No                       |
| 7c                  | 09     | 00     | Dump collection ends normally                              | SVP failure | SERVICE     | No                       |
| 7c                  | 0a     | 00     | Dump collection ends abnormally                            | SVP failure | SERVICE     | No                       |
| 7c                  | 0b     | 00     | Cancellation of the dump collection completed              | SVP failure | SERVICE     | No                       |
| 7e                  | 12     | xx     | MP Operating Ratio Error                                   | Monitor     | MODERATE    | Yes                      |
| 7e                  | 20     | xx     | Loss Of Signal Count(Fibre) Excess                         | Monitor     | MODERATE    | No                       |
| 7e                  | 21     | xx     | Bad Received Character Count(Fibre) Excess                 | Monitor     | MODERATE    | No                       |
| 7e                  | 22     | xx     | Loss Of Synchronization Count(Fibre) Excess                | Monitor     | MODERATE    | No                       |
| 7e                  | 23     | xx     | Link Failure Count(Fibre) Excess                           | Monitor     | MODERATE    | No                       |
| 7e                  | 24     | xx     | Received EOFa Count(Fibre) Excess                          | Monitor     | MODERATE    | No                       |
| 7e                  | 25     | xx     | Discarded Frame Count(Fibre) Excess                        | Monitor     | MODERATE    | No                       |
| 7e                  | 26     | xx     | Bad CRC Count(Fibre) Excess                                | Monitor     | MODERATE    | No                       |

| Trap reference code |        |        | Description                             | Section                | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|---|------------------------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |   |                        |             |                          |
| 7e                  | 27     | xx     | Protocol Error Count(Fibre) Excess      | Monitor                | MODERATE    | No                       |
| 7e                  | 28     | xx     | Expired Frame Count (Fibre) Excess      | Monitor                | MODERATE    | No                       |
| 7e                  | 29     | xx     | HTP/FNP Multiplicity Excess             | Monitor                | MODERATE    | No                       |
| 7e                  | 2c     | xx     | HTP/FNP Read Data Transfer Ratio Error  | Monitor                | MODERATE    | No                       |
| 7e                  | 2d     | xx     | HTP/FNP Write Data Transfer Ratio Error | Monitor                | MODERATE    | No                       |
| 7e                  | 2e     | xx     | HTP/FNP Operating Ratio Error           | Monitor                | MODERATE    | No                       |
| 7e                  | 30     | 00     | Read Hit Ratio Excess                   | Monitor                | MODERATE    | No                       |
| 7e                  | 40     | xx     | Link Failure Count(FCoE) Excess         | MONITORING INFORMATION | MODERATE    | No                       |
| 7e                  | 41     | xx     | Virtual Link Failure Count(FCoE) Excess | MONITORING INFORMATION | MODERATE    | No                       |
| 7e                  | 43     | xx     | Symbol Error Count(FCoE) Excess         | MONITORING INFORMATION | MODERATE    | No                       |
| 7e                  | 45     | xx     | FCS Error Count(FCoE) Excess            | MONITORING INFORMATION | MODERATE    | No                       |
| 7e                  | ax     | xx     | Cache Use Ratio Error                   | Monitor                | MODERATE    | No                       |
| 7e                  | bx     | xx     | Cache Write Pending Ratio Error         | Monitor                | MODERATE    | No                       |

| Trap reference code |        |        | Description                                   | Section     | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|---|-------------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |   |             |             |                          |
| 7e                  | cx     | xx     | Cache MCU Side File Use Ratio Error           | Monitor     | MODERATE    | No                       |
| 7f                  | f1     | 00     | TCMF/TC                                       | SVP failure | SERVICE     | No                       |
| 7f                  | f1     | 02     | SIMF/SI                                       | SVP failure | SERVICE     | No                       |
| 7f                  | f1     | 03     | URMF/UR                                       | SVP failure | SERVICE     | No                       |
| 7f                  | f1     | 04     | TI  | SVP failure | SERVICE     | No                       |
| 7f                  | f1     | 05     | FlashCopy(R)                                  | SVP failure | SERVICE     | No                       |
| 7f                  | f1     | 06     | Volume Migration                              | SVP failure | SERVICE     | No                       |
| 7f                  | f2     | xx     | STANDBY SVP FAIL                              | SVP failure | MODERATE    | No                       |
| 7f                  | f3     | xx     | SVP FAIL OVER                                 | SVP failure | MODERATE    | No                       |
| 7f                  | f7     | xx     | The term of validity is over                  | License key | MODERATE    | Yes                      |
| 7f                  | f8     | xx     | The capacity of validity is over              | License key | MODERATE    | Yes                      |
| 7f                  | f9     | xx     | The PP is invalid by assumption PP invalidity | License key | MODERATE    | Yes                      |
| 7f                  | fa     | 0x     | Synchronization time failure                  | SVP failure | SERVICE     | Yes                      |
| ac                  | 52     | xx     | HDU power off(CL1)                            | PS(DKU)     | MODERATE    | Yes                      |
| ac                  | 53     | xx     | HDU power off(CL2)                            | PS(DKU)     | MODERATE    | Yes                      |
| ac                  | 54     | xx     | HDU power recovered(CL1)                      | PS(DKU)     | SERVICE     | No                       |
| ac                  | 55     | xx     | HDU power recovered(CL2)                      | PS(DKU)     | SERVICE     | No                       |
| ac                  | 60     | 00     | DKC was set to power error mode               | PS(DKC)     | MODERATE    | No                       |
| ac                  | 61     | 00     | DKC was released from power error mode        | PS(DKC)     | SERVICE     | No                       |

| Trap reference code |        |        | Description  | Section             | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|--|---------------------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |  |                     |             |                          |
| ac                  | 62     | 00     | When DKC was set to power error mode, Urgent Destaging start succeeded | PS(DKC)             | SERVICE     | No                       |
| ac                  | 63     | 00     | When DKC was set to power error mode, Urgent Destaging start failed.   | PS(DKC)             | MODERATE    | No                       |
| ac                  | 80     | 0x     | Server failure   | DKC environment     | SERIOUS     | No                       |
| ac                  | 90     | 00     | DB Validation error  | Drive               | SERIOUS     | No <sup>3</sup>          |
| af                  | 14     | x0     | MPB overcurrent detection warning                                      | Environmental error | MODERATE    | No                       |
| af                  | 50     | xx     | DKUPS error  | PS(DKU)             | MODERATE    | No                       |
| af                  | 60     | xx     | DKUPS AC input error   | PS(DKU)             | MODERATE    | Yes                      |
| af                  | 70     | 00     | HDU External temperature warning                                       | Environmental error | MODERATE    | Yes                      |
| af                  | 71     | 00     | HDU External temperature Alarm   | Environmental error | MODERATE    | Yes                      |
| af                  | 80     | xx     | SSW error  | DKC environment     | MODERATE    | No                       |
| af                  | d1     | xx     | Battery charge EMPTY   | Battery             | MODERATE    | No                       |
| af                  | d4     | xx     | CM Backup mounting warning   | Cache               | MODERATE    | No                       |
| af                  | f0     | xx     | SSW data disagreement  | DKC environment     | MODERATE    | No                       |
| bf                  | 10     | 1x     | External temperature alarm   | Environmental error | MODERATE    | Yes                      |

| Trap reference code |        |        | Description                                      | Section             | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|--|---------------------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |  |                     |             |                          |
| bf                  | 11     | 1x     | External high temperature warning                | Environmental error | MODERATE    | Yes                      |
| bf                  | 12     | 1x     | External low temperature warning                 | Environmental error | MODERATE    | Yes                      |
| bf                  | 13     | 1x     | Internal temperature alarm                       | Environmental error | MODERATE    | Yes                      |
| bf                  | 14     | 1x     | Internal temperature warning_2                   | Environmental error | MODERATE    | Yes                      |
| bf                  | 15     | 1x     | Internal temperature warning_1                   | Environmental error | MODERATE    | Yes                      |
| bf                  | 16     | 1x     | External high temperature warning (40 degrees C) | Environmental error | MODERATE    | Yes                      |
| bf                  | 22     | xx     | SSVP voltage warning (PS_SUB)                    | PS(DKC)             | MODERATE    | Yes                      |
| bf                  | 23     | xx     | SSVP voltage warning (SVP supply)                | PS(DKC)             | MODERATE    | Yes                      |
| bf                  | 4x     | 1x     | DKCPS warning                                    | PS(DKC)             | MODERATE    | Yes                      |
| bf                  | 6x     | 1x     | DKCPS input voltage abnormality                  | PS(DKC)             | MODERATE    | Yes                      |
| bf                  | 7x     | 1x     | DKCFAN warning                                   | Fan(DKC)            | MODERATE    | Yes                      |
| bf                  | 85     | a3     | JP remains                                       | Environment         | MODERATE    | Yes                      |
| bf                  | 86     | a3     | JP remains                                       | Environment         | MODERATE    | Yes                      |
| bf                  | 9x     | ax     | Communication Error between SSVP and MN          | DKC environment     | MODERATE    | No                       |
| bf                  | a0     | ax     | Logic PS voltage alarm disagreement              | PS(DKC)             | MODERATE    | No                       |

| Trap reference code |        |        | Description                               | Section         | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|---|-----------------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |   |                 |             |                          |
| bf                  | a2     | ax     | External temperature disagreement         | DKC environment | MODERATE    | No                       |
| bf                  | a3     | ax     | Internal temperature alarm disagreement   | DKC environment | MODERATE    | No                       |
| bf                  | a4     | ax     | Internal temperature warning disagreement | DKC environment | MODERATE    | No                       |
| bf                  | a5     | ax     | PSOFFREQ I/F disagreement                 | DKC environment | MODERATE    | No                       |
| bf                  | a6     | ax     | PSOFFOK I/F disagreement                  | DKC environment | MODERATE    | No                       |
| bf                  | a7     | ax     | SYSON I/F disagreement                    | DKC environment | MODERATE    | No                       |
| bf                  | a8     | ax     | DKCPS I/F disagreement                    | DKC environment | MODERATE    | No                       |
| bf                  | a9     | ax     | DKCPS I/F disagreement                    | DKC environment | MODERATE    | No                       |
| bf                  | aa     | a0     | DKCPS I/F disagreement                    | DKC environment | MODERATE    | No                       |
| bf                  | aa     | a4     | DKCPS I/F disagreement                    | DKC environment | MODERATE    | No                       |
| bf                  | ab     | a0     | DKCPS I/F disagreement                    | DKC environment | MODERATE    | No                       |

| Trap reference code |        |        | Description                           | Section         | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|---------------------------------------|-----------------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |                                       |                 |             |                          |
| bf                  | ab     | a4     | DKCPS I/F disagreement                | DKC environment | MODERATE    | No                       |
| bf                  | ac     | a0     | Communication Error between MN and MN | Environment     | MODERATE    | No                       |
| bf                  | ac     | a1     | Communication Error between MN and MN | Environment     | MODERATE    | No                       |
| bf                  | ac     | a4     | Communication Error between MN and MN | Environment     | MODERATE    | No                       |
| bf                  | ac     | a5     | Communication Error between MN and MN | Environment     | MODERATE    | No                       |
| bf                  | ad     | a3     | Cable connection error                | Environment     | MODERATE    | No                       |
| bf                  | ad     | a4     | Cable connection error                | Environment     | MODERATE    | No                       |
| bf                  | ae     | a1     | Cable connection error                | Environment     | MODERATE    | No                       |
| bf                  | af     | a0     | PCTL/PNL abnormally                   | Environment     | MODERATE    | No                       |
| bf                  | af     | a4     | PCTL/PNL abnormally                   | Environment     | MODERATE    | No                       |
| bf                  | bx     | ax     | PCTL/PNL abnormally                   | DKC environment | MODERATE    | No                       |
| bf                  | c0     | 10     | DKC ALARM LED light on                | DKC environment | SERIOUS     | Yes                      |
| bf                  | e3     | a2     | Duplex SVP Setup fail                 | SVP failure     | MODERATE    | Yes                      |
| bf                  | e4     | 00     | SVP FAN0 error                        | SVP failure     | MODERATE    | No                       |
| bf                  | e4     | 01     | SVP FAN1 error                        | SVP failure     | MODERATE    | No                       |



| Trap reference code |        |        | Description                              | Section     | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|--|-------------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |  |             |             |                          |
| bf                  | e4     | 02     | SVP FAN2 error                           | SVP failure | MODERATE    | No                       |
| bf                  | e4     | 06     | EXTENDER Hardware error                  | SVP failure | MODERATE    | No                       |
| bf                  | e4     | 07     | USB interface error                      | SVP failure | MODERATE    | No                       |
| bf                  | e4     | 08     | SVP receiving voltage error (CL1)        | SVP failure | MODERATE    | No                       |
| bf                  | e4     | 09     | SVP receiving voltage error (CL2)        | SVP failure | MODERATE    | No                       |
| cf                  | 10     | xx     | SAS CTL blocking                         | Processor   | MODERATE    | Yes                      |
| cf                  | 11     | xx     | SAS Port (WideLink) is partially blocked | Processor   | SERVICE     | No                       |
| cf                  | 12     | xx     | SAS PORT blocked                         | Processor   | MODERATE    | Yes                      |
| cf                  | 13     | xx     | SAS-CTL Error detection                  | Processor   | SERIOUS     | Yes                      |
| cf                  | 6x     | xx     | Logical DMA blocking                     | Processor   | MODERATE    | Yes                      |
| cf                  | 80     | xx     | DRR TEMPORARY ERROR                      | Processor   | SERVICE     | No                       |
| cf                  | 81     | xx     | DMA temporary error                      | Processor   | SERVICE     | No                       |
| cf                  | 82     | xx     | DRR BLOCKING                             | Processor   | MODERATE    | Yes                      |
| cf                  | 83     | xx     | DMA blocking                             | Processor   | MODERATE    | Yes                      |
| cf                  | 88     | xx     | LR blocking                              | Processor   | MODERATE    | Yes                      |
| cf                  | 89     | xx     | All DMA blocking                         | Processor   | MODERATE    | Yes                      |
| cf                  | bx     | xx     | MFDMA blocking                           | Processor   | MODERATE    | Yes                      |

| Trap reference code |        |        | Description  | Section                     | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|--|-----------------------------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |  |                             |             |                          |
| cf                  | dx     | xx     | Logical DRR blocking   | Processor                   | MODERATE    | No                       |
| d0                  | 0x     | xx     | TCMF/TC started the initial copy or out of sync for this volume                            | Failure with paired volumes | SERVICE     | Yes                      |
| d0                  | 1x     | xx     | TCMF/TC completed the initial copy for this volume   | Failure with paired volumes | SERVICE     | Yes                      |
| d0                  | 2x     | xx     | TCMF/TC for this volume was deleted(Operation from an SVP/Web Console or a host processor) | Failure with paired volumes | SERVICE     | Yes                      |
| d0                  | 6x     | xx     | TCMF completed the Create pair(No copy suspend)  | Failure with paired volumes | SERVICE     | Yes                      |
| d1                  | 0x     | xx     | Remote Copy pair status change (MCU Command) (From Simplex to Duplex Pending)              | Failure with paired volumes | SERVICE     | Yes                      |
| d1                  | 1x     | xx     | Remote Copy pair status change (MCU Command) (From Simplex to Duplex)                      | Failure with paired volumes | SERVICE     | Yes                      |
| d1                  | 2x     | xx     | Remote Copy pair status change (MCU Command) (From Duplex Pending to Duplex)               | Failure with paired volumes | SERVICE     | Yes                      |
| d1                  | 3x     | xx     | Remote Copy pair status change (MCU Command) (From Duplex Pending to Suspend)              | Failure with paired volumes | SERVICE     | Yes                      |
| d1                  | 4x     | xx     | Remote Copy pair status change (MCU Command) (From Duplex to Suspend)                      | Failure with paired volumes | SERVICE     | Yes                      |
| d1                  | 5x     | xx     | Remote Copy pair status change (MCU Command) (From Duplex to Simplex)                      | Failure with paired volumes | SERVICE     | Yes                      |

| Trap reference code |        |        | Description   | Section                     | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|---|-----------------------------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |   |                             |             |                          |
| d1                  | 6x     | xx     | Remote Copy pair status change (MCU Command) (From Duplex Pending to Simplex)                                       | Failure with paired volumes | SERVICE     | Yes                      |
| d1                  | 7x     | xx     | Remote Copy pair status change (MCU Command) (From Suspend to Simplex)  | Failure with paired volumes | SERVICE     | Yes                      |
| d1                  | 8x     | xx     | Remote Copy pair status change (MCU Command) (From Suspend to Duplex Pending)                                       | Failure with paired volumes | SERVICE     | Yes                      |
| d1                  | 9x     | xx     | Remote Copy pair status change (MCU Command) (From Duplex Pending to Suspend(continue))                             | Failure with paired volumes | SERVICE     | Yes                      |
| d1                  | ax     | xx     | Remote Copy pair status change (MCU Command) (From Duplex Pending to Suspend(complete))                             | Failure with paired volumes | SERVICE     | Yes                      |
| d1                  | bx     | xx     | Remote Copy pair status change (MCU Command) (From Suspend (continue) to Suspend)                                   | Failure with paired volumes | SERVICE     | Yes                      |
| d4                  | 0x     | xx     | TCMF/TC for this volume was suspended (Due to an unrecoverable failure on the remote copy connections)              | Failure with paired volumes | SERIOUS     | Yes                      |
| d4                  | 1x     | xx     | TCMF/TC for this volume was suspended (Due to an unrecoverable failure on the P-VOL or the remote copy connections) | Failure with paired volumes | SERIOUS     | Yes                      |
| d4                  | 2x     | xx     | TCMF/TC for this volume was suspended (Due to an unrecoverable failure on the S-VOL)                                | Failure with paired volumes | SERIOUS     | Yes                      |

| Trap reference code |        |        | Description   | Section                     | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|---|-----------------------------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |   |                             |             |                          |
| d4                  | 3x     | xx     | TCMF for this volume was suspended (Caused by DFW to the S-VOL was prohibited)                  | Failure with paired volumes | SERIOUS     | Yes                      |
| d4                  | 4x     | xx     | TCMF/TC for this volume was suspended (Due to an internal error condition detected by the RCU)  | Failure with paired volumes | SERIOUS     | Yes                      |
| d4                  | 5x     | xx     | TCMF/TC for this volume was suspended (Caused by Delete pair operation was issued to the S-VOL) | Failure with paired volumes | SERIOUS     | Yes                      |
| d4                  | 6x     | xx     | The S-VOL has suspended. (Due to an unrecoverable failure on the remote copy connections)       | Failure with paired volumes | SERIOUS     | Yes                      |
| d4                  | 7x     | xx     | The S-VOL has suspended (Due to an unrecoverable failure on the S-VOL)                          | Failure with paired volumes | SERIOUS     | Yes                      |
| d4                  | fx     | xx     | Status of the P-VOL was not consistent with the S-VOL   | Failure with paired volumes | SERIOUS     | Yes                      |
| d5                  | 7x     | xx     | Command device operation execution of command device in state of ONLINE                         | Drive                       | SERVICE     | No                       |
| d8                  | 0x     | xx     | A volume to be used by the URMF/UR was defined  | Failure with paired volumes | SERVICE     | Yes <sup>5</sup>         |
| d8                  | 1x     | xx     | The volume being used by the URMF/UR began a copying  | Failure with paired volumes | SERVICE     | Yes <sup>5</sup>         |
| d8                  | 2x     | xx     | The volume being used by the URMF/UR completed a copying  | Failure with paired volumes | SERVICE     | Yes <sup>5</sup>         |
| d8                  | 3x     | xx     | The volume being used by the URMF/UR received a request for suspension                          | Failure with paired volumes | SERVICE     | Yes <sup>5</sup>         |

| Trap reference code |        |        | Description  | Section                     | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|--|-----------------------------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |  |                             |             |                          |
| d8                  | 4x     | xx     | The volume being used by the URMF/UR completed a suspension transaction                  | Failure with paired volumes | SERVICE     | Yes <sup>5</sup>         |
| d8                  | 5x     | xx     | The volume being used by the URMF/UR received a request for deletion                     | Failure with paired volumes | SERVICE     | Yes <sup>5</sup>         |
| d8                  | 6x     | xx     | The volume being used by the URMF/UR completed the deletion                              | Failure with paired volumes | SERVICE     | Yes <sup>5</sup>         |
| d8                  | 7x     | xx     | The volume being used by the URMF/UR was defined (placed in the PSUS status immediately) | Failure with paired volumes | SERVICE     | Yes <sup>5</sup>         |
| d8                  | 8x     | xx     | A Delta volume to be used by the URMF/UR was defined                                     | Failure with paired volumes | SERVICE     | Yes <sup>5</sup>         |
| d8                  | 9x     | xx     | A Delta volume to be used by the URMF/UR was redefined                                   | Failure with paired volumes | SERVICE     | Yes <sup>5</sup>         |
| d9                  | 0x     | xx     | A change to an S-VOL was received from the MCU (From Simplex to Duplex Pending)          | Failure with paired volumes | SERVICE     | Yes <sup>5</sup>         |
| d9                  | 1x     | xx     | A change to an S-VOL was received from the MCU (From Simplex to Duplex)                  | Failure with paired volumes | SERVICE     | Yes <sup>5</sup>         |
| d9                  | 2x     | xx     | A change to an S-VOL was received from the MCU (From Duplex Pending to Duplex)           | Failure with paired volumes | SERVICE     | Yes <sup>5</sup>         |
| d9                  | 3x     | xx     | A change to an S-VOL was received from the MCU (From Duplex Pending to Suspend)          | Failure with paired volumes | SERVICE     | Yes <sup>5</sup>         |
| d9                  | 4x     | xx     | A change to an S-VOL was received from the MCU (From Duplex to Suspend)                  | Failure with paired volumes | SERVICE     | Yes <sup>5</sup>         |

| Trap reference code |        |        | Description   | Section                     | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|---|-----------------------------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |   |                             |             |                          |
| d9                  | 5x     | xx     | A change to an S-VOL was received from the MCU (From Duplex to Simplex)         | Failure with paired volumes | SERVICE     | Yes <sup>5</sup>         |
| d9                  | 6x     | xx     | A change to an S-VOL was received from the MCU (From Duplex Pending to Simplex) | Failure with paired volumes | SERVICE     | Yes <sup>5</sup>         |
| d9                  | 7x     | xx     | A change to an S-VOL was received from the MCU (From Suspend to Simplex)        | Failure with paired volumes | SERVICE     | Yes <sup>5</sup>         |
| d9                  | 8x     | xx     | A change to an S-VOL was received from the MCU (From Suspend to Duplex Pending) | Failure with paired volumes | SERVICE     | Yes <sup>5</sup>         |
| d9                  | 9x     | xx     | A change to an S-VOL was received from the MCU (HOLD -> PAIR)                   | Failure with paired volumes | SERVICE     | Yes <sup>5</sup>         |
| d9                  | ax     | xx     | A change to an S-VOL was received from the MCU (HOLD -> COPY)                   | Failure with paired volumes | SERVICE     | Yes <sup>5</sup>         |
| d9                  | bx     | xx     | A change to an S-VOL was received from the MCU (HOLD -> SMPL)                   | Failure with paired volumes | SERVICE     | Yes <sup>5</sup>         |
| d9                  | cx     | xx     | A change to an S-VOL was received from the MCU (From Simplex to Suspend)        | Failure with paired volumes | SERVICE     | Yes <sup>5</sup>         |
| d9                  | dx     | xx     | A change to an S-VOL was received from the MCU (SMPL -> HOLD)                   | Failure with paired volumes | SERVICE     | Yes <sup>5</sup>         |
| d9                  | ex     | xx     | A change to an S-VOL was received from the MCU (PSUx(Suspend) -> HOLD)          | Failure with paired volumes | SERVICE     | Yes <sup>5</sup>         |
| d9                  | fx     | xx     | A change to an S-VOL was received from the MCU (From Duplex to Duplex Pending)  | Failure with paired volumes | SERVICE     | Yes <sup>5</sup>         |

| Trap reference code |        |        | Description   | Section                     | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|---|-----------------------------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |   |                             |             |                          |
| da                  | 0x     | xx     | A change to an S-VOL was received from the RCU (A request for suspension was received.)                                     | Failure with paired volumes | SERVICE     | No                       |
| da                  | 1x     | xx     | A change to an S-VOL was received from the RCU (A suspension transaction was completed.)                                    | Failure with paired volumes | SERVICE     | No                       |
| da                  | 2x     | xx     | A change to an S-VOL was received from the RCU (An instruction to delete a pair was received in the Suspend status.)        | Failure with paired volumes | SERVICE     | No                       |
| da                  | 3x     | xx     | A change to an S-VOL was received from the RCU (An instruction to delete a pair was received in the Duplex Pending status.) | Failure with paired volumes | SERVICE     | No                       |
| da                  | 4x     | xx     | A change to an S-VOL was received from the RCU (An instruction to delete a pair was received in the Duplex status.)         | Failure with paired volumes | SERVICE     | No                       |
| da                  | 5x     | xx     | A change to an S-VOL was received from the RCU (A pair deletion was completed.)   | Failure with paired volumes | SERVICE     | No                       |
| da                  | 6x     | xx     | A change to an S-VOL was received from the RCU (An instruction to delete a pair was received in the Hold status.)           | Failure with paired volumes | SERVICE     | No                       |
| dc                  | 0x     | xx     | PAIR SUSPEND(RIO PATH CLOSE)  | Failure with paired volumes | SERIOUS     | Yes <sup>5</sup>         |
| dc                  | 1x     | xx     | PAIR SUSPEND(MVOL ERROR)  | Failure with paired volumes | SERIOUS     | Yes <sup>5</sup>         |

| Trap reference code |        |        | Description   | Section                     | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|---|-----------------------------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |   |                             |             |                          |
| dc                  | 2x     | xx     | PAIR SUSPEND(RVOL ERROR)  | Failure with paired volumes | SERIOUS     | Yes <sup>5</sup>         |
| dc                  | 4x     | xx     | PAIR SUSPEND(SUSPEND REPORT)  | Failure with paired volumes | SERIOUS     | Yes <sup>5</sup>         |
| dc                  | 5x     | xx     | PAIR SUSPEND(SIMPLEX REPORT)  | Failure with paired volumes | SERIOUS     | Yes <sup>5</sup>         |
| dc                  | 6x     | xx     | PAIR SUSPEND(COMMUNICATION ERROR AT RCU)  | Failure with paired volumes | SERIOUS     | Yes <sup>5</sup>         |
| dc                  | 7x     | xx     | PAIR SUSPEND(ERROR DETECTED AT RCU)   | Failure with paired volumes | SERIOUS     | Yes <sup>5</sup>         |
| dc                  | 8x     | xx     | A volume being used by an S-VOL was suspended (PS OFF on the MCU side was detected) | Failure with paired volumes | SERVICE     | No                       |
| dc                  | 9x     | xx     | ERASE FAIL  | Failure with paired volumes | SERIOUS     | Yes <sup>5</sup>         |
| dc                  | ax     | xx     | Pair suspend (Spread by error of another Affiliate)                                 | Failure with paired volumes | SERIOUS     | Yes <sup>5</sup>         |
| dc                  | e0     | xx     | URMF/UR M-JNL Meta overflow warning   | Failure with paired volumes | MODERATE    | No                       |
| dc                  | e1     | xx     | URMF/UR M-JNL Data overflow warning   | Failure with paired volumes | MODERATE    | No                       |
| dc                  | e2     | xx     | URMF/UR R-JNL Meta overflow warning   | Failure with paired volumes | MODERATE    | No                       |



| Trap reference code |        |        | Description  | Section                     | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|--|-----------------------------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |  |                             |             |                          |
| dc                  | e3     | xx     | URMF/UR R-JNL Data overflow warning  | Failure with paired volumes | MODERATE    | No                       |
| dc                  | f0     | xx     | The URMF/UR Read JNL was interrupted for one minute (A failure on the MCU side was detected)       | Failure with paired volumes | MODERATE    | No                       |
| dc                  | f1     | xx     | The URMF/UR Read JNL was interrupted for five minutes (A failure on the MCU side was detected)     | Failure with paired volumes | SERIOUS     | No                       |
| dc                  | f2     | xx     | The URMF/UR Read JNL was interrupted for one minute (A failure on the RCU side was detected)       | Failure with paired volumes | MODERATE    | No                       |
| dc                  | f3     | xx     | The URMF/UR Read JNL was interrupted for five minutes (A failure on the RCU side was detected)     | Failure with paired volumes | SERIOUS     | No                       |
| dc                  | f4     | xx     | URMFxURMF/URxUR M-JNL Meta full Warning  | Failure with paired volumes | MODERATE    | No                       |
| dc                  | f5     | xx     | URMFxURMF/URxUR M-JNL Data full Warning  | Failure with paired volumes | MODERATE    | No                       |
| dd                  | 0x     | xx     | GAD for this volume was suspended (Due to an unrecoverable failure on the remote copy connections) | Failure with paired volumes | SERIOUS     | Yes                      |
| dd                  | 1x     | xx     | GAD for this volume was suspended (Due to a failure on the volume)                                 | Failure with paired volumes | SERIOUS     | Yes                      |
| dd                  | 2x     | xx     | GAD for this volume was suspended (Due to an internal error condition detected)                    | Failure with paired volumes | SERIOUS     | Yes                      |

| Trap reference code |        |        | Description  | Section                     | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|--|-----------------------------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |  |                             |             |                          |
| dd                  | 3x     | xx     | Status of the P-VOL was not consistent with the S-VOL                            | Failure with paired volumes | SERIOUS     | Yes                      |
| de                  | e0     | xx     | Quorum Disk Restore  | Drive                       | SERVICE     | Yes                      |
| de                  | f0     | xx     | Quorum Disk Blocked  | Drive                       | SERIOUS     | Yes                      |
| df                  | 6x     | xx     | Drive port temporary error (Drive path: Boundary 0) <sup>6</sup>                 | Drive                       | SERVICE     | No                       |
| df                  | 7x     | xx     | Drive port temporary error (Drive path: Boundary 1) <sup>6</sup>                 | Drive                       | SERVICE     | No                       |
| df                  | 8x     | xx     | DRIVE PORT BLOCKADE(PATH 0) <sup>6</sup>   | Drive                       | MODERATE    | Yes                      |
| df                  | 9x     | xx     | DRIVE PORT BLOCKADE(PATH 1) <sup>6</sup>   | Drive                       | MODERATE    | Yes                      |
| df                  | ax     | xx     | LDEV blockade(Drive path: Boundary 0/Effect of Drive port blockade) <sup>6</sup> | Drive                       | SERIOUS     | Yes                      |
| df                  | bx     | xx     | LDEV blockade(Drive path: Boundary 1/Effect of Drive port blockade) <sup>6</sup> | Drive                       | SERIOUS     | Yes                      |
| df                  | cx     | xx     | Drive Link Rate Abnormality (Path 0) <sup>6</sup>                                | Drive                       | SERVICE     | Yes                      |
| df                  | dx     | xx     | Drive Link Rate Abnormality (Path 1) <sup>6</sup>                                | Drive                       | SERVICE     | Yes                      |
| df                  | fx     | xx     | Response late Drive <sup>6</sup>   | Drive                       | SERVICE     | No                       |
| ef                  | 0x     | xx     | Drive blockade (drive)(with redundancy) <sup>6</sup>                             | Drive                       | SERIOUS     | Yes                      |
| ef                  | 1x     | xx     | Drive blockade (drive) (without redundancy) <sup>6</sup>                         | Drive                       | SERIOUS     | Yes                      |
| ef                  | 2x     | xx     | DRIVE BLOCKADE(EFFECT OF DRIVE COPY NORMAL END) <sup>6</sup>                     | Drive                       | SERVICE     | Yes                      |
| ef                  | 4x     | xx     | PINNED SLOT  | Drive                       | MODERATE    | No                       |

| Trap reference code |        |        | Description   | Section         | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|---|-----------------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |   |                 |             |                          |
| ef                  | 5x     | xx     | Abnormal end of Write processing in External storage system | Drive           | MODERATE    | No                       |
| ef                  | 9x     | xx     | LDEV blockade (Effect of drive blockade) <sup>6</sup>       | Drive           | SERIOUS     | Yes                      |
| ef                  | ax     | xx     | DRIVE TEMPORARY ERROR <sup>6</sup>                          | Drive           | SERVICE     | No                       |
| ef                  | cx     | xx     | Correction access occurred <sup>6</sup>                     | Drive           | SERIOUS     | Yes                      |
| ef                  | d0     | 00     | External storage system connection device blockade          | Drive           | SERIOUS     | Yes                      |
| ef                  | d4     | 00     | Blocking the Data Migration source device                   | Drive           | MODERATE    | No                       |
| ef                  | fe     | xx     | UNIT CONNECTION ERROR                                       | DKC environment | MODERATE    | Yes                      |
| ef                  | ff     | 0x     | DRIVE CLOSE(DKU TYPE UNMATCH)                               | Drive           | SERIOUS     | No                       |
| fe                  | 00     | 00     | Cache battery is being charged                              | Cache           | SERIOUS     | Yes                      |
| fe                  | 01     | 0x     | End of Cache Write Through                                  | Cache           | SERVICE     | No                       |
| fe                  | 02     | 0x     | Start of Cache Write Through                                | Cache           | MODERATE    | Yes                      |
| fe                  | 03     | 0x     | Cache SSD mounting capacity shortage                        | Cache           | SERIOUS     | No                       |
| ff                  | 4x     | xx     | PINNED SLOT   | Cache           | MODERATE    | No                       |
| ff                  | 5x     | xx     | Abnormal end of Read processing in External storage system  | Drive           | MODERATE    | No                       |
| ff                  | 9c     | 0x     | MPA warning   | Cache           | MODERATE    | No                       |
| ff                  | c2     | xx     | CACHE MODULE GROUP BLOCKADE PROCESSING END                  | Cache           | SERVICE     | Yes                      |

| Trap reference code |        |        | Description   | Section | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|---|---------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |   |         |             |                          |
| ff                  | c3     | 0x     | CACHE PACKAGE BLOCKADE PROCESSING END                       | Cache   | SERVICE     | Yes                      |
| ff                  | cc     | 0x     | CM/CMA patrol check error                                   | Cache   | SERVICE     | No                       |
| ff                  | cd     | 0x     | Area is volatilized   | Cache   | SERVICE     | No                       |
| ff                  | ce     | 0x     | Package is volatilized                                      | Cache   | SERVICE     | No                       |
| ff                  | cf     | xx     | Package is volatilized                                      | Cache   | SERVICE     | No                       |
| ff                  | de     | xx     | WDCP loss of duplicated information                         | SM      | SERVICE     | No                       |
| ff                  | e2     | 0x     | SM area blocking  | SM      | SERIOUS     | Yes                      |
| ff                  | e4     | 0x     | REPLACE FAILED  | Cache   | SERIOUS     | No                       |
| ff                  | e6     | 00     | CONFIGURATION INFORMATION COMPARE ERROR                     | SM      | ACUTE       | No                       |
| ff                  | e7     | 00     | Rebooted with volatilization after an instantaneous down    | SM      | SERIOUS     | Yes                      |
| ff                  | e8     | 00     | Definition/Installation mismatch                            | SM      | ACUTE       | No                       |
| ff                  | ea     | 0x     | RECOVERY OF AREA BLOCKED TEMPORARILY WAS COMPLETED          | SM      | SERVICE     | Yes                      |
| ff                  | ee     | 0x     | AREA TEMPORARY BLOCKING                                     | SM      | SERVICE     | Yes                      |
| ff                  | ef     | 00     | Rebooted without volatilization after an instantaneous down | SM      | SERVICE     | No                       |
| ff                  | f0     | xx     | DIMM Correctable error                                      | Cache   | SERVICE     | No                       |
| ff                  | f1     | xx     | Cache temporary error                                       | Cache   | SERVICE     | Yes                      |
| ff                  | f2     | xx     | Module group blocking                                       | Cache   | MODERATE    | Yes                      |
| ff                  | f3     | 0x     | PACKAGE BLOCKING  | Cache   | MODERATE    | Yes                      |
| ff                  | f4     | 00     | AREA BLOCKING   | Cache   | SERIOUS     | Yes                      |

| Trap reference code |        |        | Description                                      | Section | Alert level | Host report <sup>1</sup> |
|---------------------|--------|--------|--|---------|-------------|--------------------------|
| SIM 22              | SIM 23 | SIM 13 |  |         |             |                          |
| ff                  | f4     | 01     | AREA BLOCKING                                    | Cache   | SERIOUS     | Yes                      |
| ff                  | f5     | 0x     | Both areas failed                                | Cache   | MODERATE    | No                       |
| ff                  | f6     | xx     | CM Injustice dc voltage control                  | Cache   | MODERATE    | No                       |
| ff                  | f8     | 0x     | CMA Memory Correctable error                     | Cache   | SERVICE     | No                       |
| ff                  | f9     | 0x     | REPLACE FAILED                                   | Cache   | SERVICE     | No                       |
| ff                  | fa     | xx     | Battery warning                                  | Battery | MODERATE    | No                       |
| ff                  | fb     | xx     | CMBK warning                                     | Cache   | MODERATE    | No                       |
| ff                  | fc     | xx     | CM Temperature abnormality warning               | Cache   | MODERATE    | No                       |
| ff                  | fd     | xx     | Module group failure detection outside of config | Cache   | SERVICE     | No                       |
| ff                  | fe     | xx     | Warning for forcible volatile mode               | Cache   | MODERATE    | No                       |

## Legend:

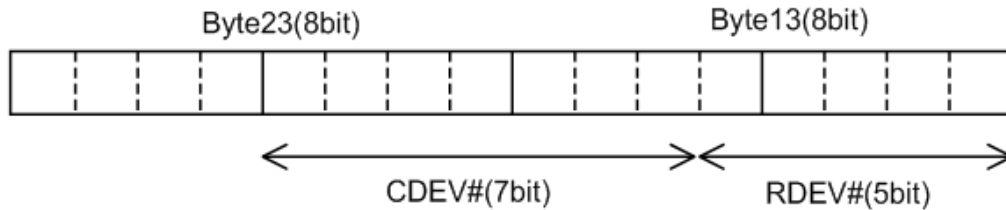
- **Yes:** This SIM performs the host report.
  - **No:** This SIM does not perform the host report.
  - **x:** A hexadecimal number between 0 and f.
1. If you select All for Notification Alert in the **Edit Alert Settings** window, the SNMP agent reports all SIMs. If you select Host Report, the SNMP agent reports only SIMs that perform the host report.
  2. If the DKC emulation type is I-2105 or I-2107, SIMs are reported to the host only if SOM 308 is enabled. However, SOM 308 is disabled by default.
  3. This SIM is not reported to the host, but the SNMP agent reports the SIM when Host Report is selected for Notification Alert in the **Edit Alert Settings** window.
  4. The SNMP agent does not report this SIM when Host Report is selected for Notification Alert in the **Edit Alert Settings** window, because the SIM is reported to the host, but not to the SVP.
  5. SIMs are not reported to the host by default. To enable reporting of service SIMs, see the *Hitachi Universal Replicator for Mainframe User Guide*.

| Trap reference code  |        |        | Description | Section | Alert level | Host report <sup>1</sup> |
|--|--------|--------|-------------|---------|-------------|--------------------------|
| SIM 22   | SIM 23 | SIM 13 |             |         |             |                          |
| 6. xxx: CDEV#/RDEV#. For details, see <a href="#">Converting CDEV and RDEV numbers to box and drive numbers (on page 70)</a> . |        |        |             |         |             |                          |

## Converting CDEV and RDEV numbers to box and drive numbers

To identify the location of an error, convert the CDEV and RDEV numbers to box and drive numbers.

CDEV and RDEV numbers are output as hexadecimal numbers in the following format:



### Base drive box number

The base drive box number is a three-digit octal number that is mapped to a specific two-digit hexadecimal CDEV number. The following table lists drive box numbers based on the first and second digits of the CDEV numbers.

| Second digit of CDEV | First digit of CDEV |     |     |     |     |     |
|----------------------|---------------------|-----|-----|-----|-----|-----|
|                      | 0_                  | 1_  | 2_  | 3_  | 4_  | 5_  |
| _0                   | 000                 | 020 | 040 | 100 | 120 | 140 |
| _1                   | 002                 | 022 | 042 | 102 | 122 | 142 |
| _2                   | 004                 | 024 | 044 | 104 | 124 | 144 |
| _3                   | 006                 | 026 | 046 | 106 | 126 | 146 |
| _4                   | 001                 | 021 | 041 | 101 | 121 | 141 |
| _5                   | 003                 | 023 | 043 | 103 | 123 | 143 |
| _6                   | 005                 | 025 | 045 | 105 | 125 | 145 |
| _7                   | 007                 | 027 | 047 | 107 | 127 | 147 |
| _8                   | 010                 | 030 | 050 | 110 | 130 | 150 |
| _9                   | 012                 | 032 | 052 | 112 | 132 | 152 |
| _A                   | 014                 | 034 | 054 | 114 | 134 | 154 |
| _B                   | 016                 | 036 | 056 | 116 | 136 | 156 |
| _C                   | 011                 | 031 | 051 | 111 | 131 | 151 |
| _D                   | 013                 | 033 | 053 | 113 | 133 | 153 |
| _E                   | 015                 | 035 | 055 | 115 | 135 | 155 |
| _F                   | 017                 | 037 | 057 | 117 | 137 | 157 |

For example:

- CDEV 42 corresponds to drive box 124.
- CDEV 5F corresponds to drive box 157.

### Base drive number

The base drive number is the RDEV number converted from hexadecimal to a two-digit decimal number. For example:

- RDEV 0C corresponds to drive 12.
- RDEV 22 corresponds to drive 16.

**Examples of exact box and drive numbers**

The format for a specific drive in a specific drive box is:

- **Drive box number:** HDU-<mapped-CDEV-number>
- **Drive number:** HDD<mapped-CDEV-number>-<converted-RDEV-number>

The following table provides examples of CDEV and RDEV numbers and their corresponding drive box and drive numbers.

| CDEV#/RDEV# | Drive box number | Drive number |
|-------------|------------------|--------------|
| 04/02       | HDU-001          | HDD001-02    |
| 3F/0A       | HDU-117          | HDD117-10    |
| 45/15       | HDU-123          | HDD123-21    |



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## Chapter 5: Troubleshooting

This chapter provides troubleshooting information for the Hitachi SNMP Agent.

### Solving SNMP problems

This topic describes some problems that can occur with SNMP. You should install a secondary SVP. Otherwise, traps could be reported to an IP address that is not specified in SNMP settings.

The following problems can occur:

#### **SNMP security function**

If the SNMP security function is working, and a command is executed from an IP address that is not entered, you will get a "no reply" return, and a certification error is received for a trap.

#### **SNMP cold trap function**

- Depending on your network environment, you might not receive SNMP agent cold traps when the SVP is rebooted.
- The SNMP agent might report Link up/Link down Trap when the SVP reboots.
- A number of Link up/Link down Traps may be reported when the SVP OS is Windows 7.

#### **Abnormal response to SNMP command**

If an error occurs in the SVP, traps might not be sent.

#### **Problems inputting MIB definition files**

If you cannot input two or more MIB definition files because of the specifications of the SNMP manager software, use the MIB definition files for your storage system. Error reports include storage system nicknames, which can be used to identify each storage system.

# Glossary

## **community name**

An SNMP entity in which up to 32 names and up to 32 IP addresses can be registered.

## **extension trap**

An error message generated by a third-party node and sent to the SNMP agent.

## **failure trap**

An error message that indicates a problem within a managed node.

## **IPv4**

Internet Protocol, Version 4

## **IPv6**

Internet Protocol, Version 6

## **managed device**

A network node on which the SNMP Agent software is installed. Using the agent, managed devices exchange node-specific information with the SNMP management software.

## **managed node**

See managed device.

## **management information base (MIB)**

A virtual database of objects that can be monitored by a network management system. SNMP uses standardized MIBs that allow any SNMP-based tool to monitor any device defined by a MIB file.

## **Simple Network Management Protocol (SNMP)**

An industry-standard protocol that is used to manage and monitor network-attached devices for conditions that warrant administrative attention. The devices can include disk devices, routers, and hubs. SNMP uses Simple Gateway Management Protocol (SGMP) to manage TCP/IP gateways.

## **SNMP Agent**

Software that is installed on the SVP and responds to queries from SNMP Manager.

## **SNMP Manager**

Software that is installed on the network management station that collects and manages information from SNMP agents installed in the managed devices on the network.

## **SNMP trap**

An event generated by an SNMP agent from the managed resource that communicates an event, such as an error or failure.

## **user datagram protocol (UDP)**

Software that requests data regarding the status of a managed node.

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