# Command Control Interface

**01-68-03/01**

## User and Reference Guide

This document describes and provides instructions for using the Command Control Interface (CCI) software to configure and perform operations on the Hitachi RAID storage systems.

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# Preface

This document describes and provides instructions for using the Command Control Interface (CCI) software to configure and perform operations on RAID storage systems.

Please read this document carefully to understand how to use these products, and maintain a copy for your reference.

## Intended audience

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

Readers of this document should be familiar with the following:

- Data processing and RAID storage systems and their basic functions.

- The Hitachi RAID storage system and the *Hardware Guide* for the storage system.

- The management software for the storage system (for example, *Hitachi Device Manager - Storage Navigator*).

- The host systems attached to the Hitachi RAID storage system.

## Product version

This document revision applies to CCI version 01-68-03/01 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 the Hitachi Vantara Support Website: https://knowledge.hitachivantara.com/Documents.

## Changes in this revision

- Modified descriptions about the relationship between volume pair status and ShadowImage command acceptance.

- Added instructions for SVP/GUM restart and microcode replacement when using out-of-band communication.

- Updated SSB error code tables.

# Document conventions

This document uses the following typographic conventions:

| Convention | Description |
|---|---|
| **Bold** | <ul><li>Indicates text in a window, including window titles, menus, menu options, buttons, fields, and labels. Example:<br>Click **OK**.</li><li>Indicates emphasized words in list items.</li></ul> |
| *Italic* | <ul><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>`pairdisplay -g group`<br>(For exceptions to this convention for variables, see the entry for angle brackets.)</li></ul> |
| `Monospace` | Indicates text that is displayed on screen or entered by the user. Example: `pairdisplay -g oradb` |
| < > angle brackets | Indicates variables in the following scenarios:<ul><li>Variables are not clearly separated from the surrounding text or from other variables. Example:<br>`Status-<report-name><file-version>.csv`</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 | Indicates that you have a choice between two or more options or arguments. Examples:<br>[ a \| b ] indicates that you can choose a, b, or nothing.<br>{ a \| b } indicates that you must choose either a or b. |

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

| Icon | Label | Description |
|---|---|---|
| | Note | Calls attention to additional information. |
| | Tip | Provides helpful information, guidelines, or suggestions for performing tasks more effectively. |
| | Important | Highlights information that is essential to the completion of a task. |
| | Caution | Warns the user of adverse conditions and/or consequences (for example, disruptive operations, data loss, or a system crash). |
| | CAUTION | Warns the user of a hazardous situation that, if not avoided, could result in major or minor injury. |
| | 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 ($10^3$) bytes |
| 1 megabyte (MB) | 1,000 KB or $1,000^2$ bytes |
| 1 gigabyte (GB) | 1,000 MB or $1,000^3$ bytes |
| 1 terabyte (TB) | 1,000 GB or $1,000^4$ bytes |
| 1 petabyte (PB) | 1,000 TB or $1,000^5$ bytes |
| 1 exabyte (EB) | 1,000 PB or $1,000^6$ 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 |

| Logical capacity unit | Value |
|---|---|
| 1 cylinder | Mainframe: 870 KB<br><br>Open-systems:<br><br>▪ OPEN-V: 960 KB<br><br>▪ Others: 720 KB |
| 1 KB | 1,024 ($2^{10}$) bytes |
| 1 MB | 1,024 KB or $1,024^2$ bytes |
| 1 GB | 1,024 MB or $1,024^3$ bytes |
| 1 TB | 1,024 GB or $1,024^4$ bytes |
| 1 PB | 1,024 TB or $1,024^5$ bytes |
| 1 EB | 1,024 PB or $1,024^6$ bytes |

# Accessing product documentation

Product user documentation is available on the Hitachi Vantara Support Website: 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

The Hitachi Vantara Support Website is the destination for technical support of products and solutions sold by Hitachi Vantara. To contact technical support, log on to the Hitachi Vantara Support Website for contact information: https://support.hitachivantara.com/en_us/contact-us.html.

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, register, and complete your profile.

# Comments

Please send comments to 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 LLC.

**Thank you!**

# Chapter 1:  Overview

This guide provides an overview of the Command Control Interface (CCI) software and CCI operations on the Hitachi RAID storage systems.

## About Command Control Interface

The Command Control Interface software enables you to perform storage system configuration and data management operations by issuing commands to Hitachi RAID storage systems.

CCI continues to provide the proven functionality that has been available for the USP V/VM and previous storage system models, including in-system replication, remote replication, and data protection operations.

In addition, CCI for VSP and later provides command-line access to provisioning and storage management operations that are available in the GUI software (for example, Storage Navigator). CCI commands can be used interactively or in scripts to automate and standardize storage administration functions, thereby simplifying the job of the storage administrator and reducing administration costs.

> **Note:** If a storage system rejects CCI commands, verify the software licenses for the storage system (for example, TrueCopy) and the status of the software product and storage system.

## CCI functions

### CCI functions matrix

The following table lists and describes the CCI functions available on the RAID storage systems.

| Function | Storage system | | | |
|---|---|---|---|---|
| | **VSP** | **HUS VM** | **VSP 5000 series**<br><br>**VSP G1x00, VSP F1500** | **VSP E series**<br><br>**VSP G130, G/F350, G/F370, G/F700, G/F900**<br><br>**VSP Gx00 models, VSP Fx00 models** |
| Local copy (open) | Yes | Yes | Yes | Yes |
| Local copy (mainframe) | Yes[1] | No | Yes | No |
| Remote copy (open) | Yes | Yes | Yes | Yes |
| Remote copy (mainframe) | Yes[1] | No | Yes | No |
| Data protection | Yes | Yes | Yes | Yes |
| VSS configuration | Yes | Yes | Yes | Yes |
| SRM SRA | Yes | Yes | Yes[2] | Yes[2] |
| Provisioning (raidcom) | Yes | Yes | Yes | Yes |
| Out-of-band method | Yes | Yes | Yes | Yes |
| User authentication | Yes | Yes | Yes | Yes |
| LDEV nickname | Yes | Yes | Yes | Yes |
| LDEV group | Yes | Yes | Yes | Yes |
| Resource group | Yes | Yes | Yes | Yes |
| Resource lock | Yes | Yes | Yes | Yes |

**Notes:**

1. If DKCMAIN microcode version of the VSP storage system is 70-03-3*x-xx*/*xx* or later, the operation of TrueCopy for Mainframe, Universal Replicator for Mainframe, and ShadowImage for Mainframe can be performed from Command Control Interface.

2. See the VMware Compatibility Guide on the VMware web page for the latest support status.

# Provisioning functions

The `raidcom` configuration setting command enables you to perform provisioning functions, such as setting commands or creating LDEVs, from CCI. For information about the configuration setting command (`raidcom` command), see Provisioning operations with CCI (on page 185).

# Asynchronous command processing

For the **raidcom** configuration setting commands, asynchronous command processing is used for operations that take time to process on the storage system. Once an asynchronous command has been issued, you can execute additional commands without having to wait for the asynchronous command to complete. You can also monitor the completion status of asynchronous commands by using a status reference command (for example, **raidcom get command_status**).
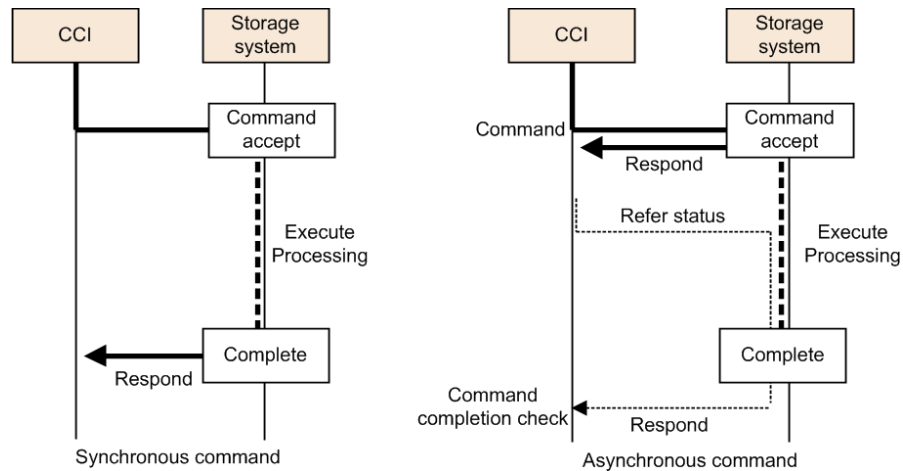


## Command execution modes

CCI provides two command execution modes:

- Transaction mode, in which a script file is specified with the `-zt` option

- Line-by-line mode, in which commands are executed row-by-row for the configuration setting (**raidcom**) commands

You can use transaction mode to execute the following checking:

- **Context check**: This check is executed when a script file is specified by `-zt` option. It checks the context of preceding commands and determines whether a subsequent command can be executed.

  Specifying example:

  ```
  raidcom -zt <script_file>
  ```

- **Configuration check**: This check verifies that the actual storage system configuration is valid (implemented) for the resources specified in the commands (for example, LDEVs, ports, pools).

  Syntax example:

  ```
  raidcom get ldev -ldev_id -cnt 65280 -store<work_file>
  ```

  ```
  raidcom -zt <script_file> -load<work_file>
  ```

Chapter 1: Overview

# Precheck function

CCI provides a precheck function for the configuration setting (`raidcom`) commands that checks the command before it is executed.

In earlier versions of CCI, an error was returned when the syntax of a command to be executed was not correct. The precheck function checks the command syntax before the command is executed. To use the precheck function, specify either the `-checkmode precheck` option or the `-zt` option.

The following table shows the summary of the checking function combinations between the precheck function and the transaction mode.

| Command syntax | Syntax check | Context check | Config check | Execution |
|---|---|---|---|---|
| `raidcom <command>` | Executed | Not executed | Not executed | Executed |
| `raidcom <command> -checkmode precheck` | Executed | Not executed | Not executed | Not executed |
| `raidcom -zt <script file>` | Executed | Executed | Not executed | Executed |
| `raidcom get ldev -ldev_id -cnt 65280`<br>  `-store<work_file>`<br><br>`raidcom -zt <script_file> -load <work_file>` | Executed | Executed | Executed | Executed |
| `raidcom -zt <script file> -checkmode precheck` | Executed | Executed | Not executed | Not executed |
| `raidcom get ldev -ldev_id -cnt 65280`<br>  `-store<work_file>`<br><br>`raidcom -zt <script_file> -load <work_file>`<br>  `-checkmode precheck` | Executed | Executed | Executed | Not executed |

## Command execution by the in-band and out-of-band methods

The two methods for issuing commands from a host are the in-band method and the out-of-band method:

- **In-band method**:

  The method issues a command from a UNIX/PC host connected directly to a storage system via Fibre Channel or iSCSI. Older CCI versions (that do not support VSP) can only issue commands by using the in-band method. In this method, when a command is issued, it is sent to the dedicated LDEV (command device) of the storage system selected by the user via Fibre Channel or iSCSI from CCI on the host.

  If the CCI version is 01-68-03/00 or later, a volume (namespace) connected using NVMe-oF can be defined as a command device.

  A volume (namespace) connected using NVMe-oF cannot be defined as a remote command device regardless of the CCI version.

- **Out-of-band method**:

  This method issues commands from a UNIX/PC host connected to the storage system via LAN. As shown in the following figure, CCI supporting VSP and later models can issue commands using the out-of-band method. Client PCs that are not connected directly to storage systems can execute the same scripts as the in-band method.

  When a command is issued by using the out-of-band method, the command is sent to a virtual command device via LAN from CCI on the host. Virtual command devices are created when a command is executed using the out-of-band method. A virtual command device can be created by specifying the location to create a virtual command device in the configuration definition file. For details on how to create command devices, see HORCM_CMD (out-of-band method). Note, however, that the location you can create virtual command devices varies depending on the storage system models. For details about the location, see System configuration using CCI (on page 87).

  In any of the following cases, the communication between CCI and the storage system using the out-of-band method is disabled.

  - Replacing the storage system microcode
  - The SVP/GUM using out-of-band communication is rebooting or an error occurs
  - Errors occurring in some MPs

Use the in-band method when you always need to keep the connection between CCI and the storage system as in the Universal Replicator MxN configuration. For notes on the Universal Replicator MxN configuration, see Notice on system operation (on page 337).

⚠️ **Caution:**

- When a huge number of commands are issued in short intervals in cooperation with SRM, the response speed of a command may decrease. When issuing the commands in quantities in short intervals, it is recommended to use the In-Band method.

- In either of the following cases, communication between CCI and the storage system by the In-Band method becomes unavailable:

  - While exchanging a micro code of the storage system

  - While rebooting or when a failure occurs in SVP/GUM that using Out-Of-Band communication

  - When a failure occurs in some MP

  If it is necessary to always connect CCI to the storage system like MxN configuration of the Universal Replicator, use the In-Band method. See Notice on system operation (on page 337) for the notes on the MxN configuration of Universal Replicator.

The following figure illustrates in-band and out-of-band CCI operations. For details about the in-band and out-of-band system configurations, see System configuration using CCI (on page 87).
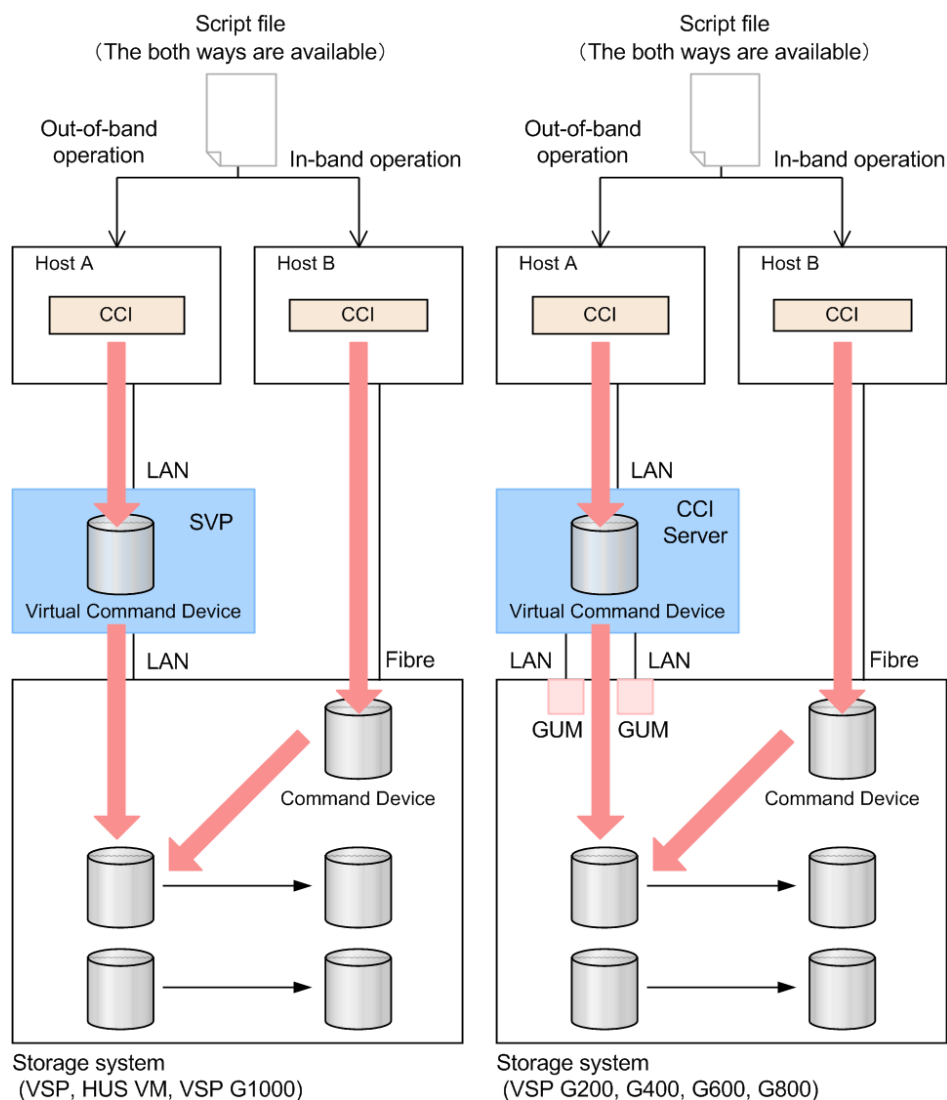
The following table provides a comparison of in-band and out-of-band operations. For details about commands and the user authentication function, see Controlling user resources (on page 95).

| Route | Command | Specification |
|---|---|---|
| In-band | Replication | The requirement for user authentication depends on the setting of user authentication. |
|  | Provisioning | User authentication is required. User authentication mode of the command device must be enabled. |
| Out-of-band | Replication | User authentication is required. For virtual command devices, user authentication mode is always enabled. |

| Route | Command | Specification |
|---|---|---|
| | Provisioning | User authentication is required. For virtual command devices, user authentication mode is always enabled. |

The CCI instance uses the UDP ports in the following table. If the default port is used by another application, change the port.

| # | Connection method[1] | Default port | How to change the default port [2] |
|---|---|---|---|
| 1 | Port used by In-Band method and Out-of-Band method | ▪ For non-specified instance number: 31000<br><br>▪ For specified instance number: 31001+X (X: Instance number) | Specify the port number you want to use to the HORCM_MON service in the configuration definition file, and then restart the CCI instance. |
| 2 | Port used by Out-of-Band method | ▪ For non-specified instance number: 34000<br><br>▪ For specified instance number: 34001+X (X: Instance number) | Specify the port number you want to use to the HORCM_IPSCPORT environment variable, and then restart the CCI instance. |

📄 **Note:**

1.  The Out-Of-band method uses both UDP ports #1 and #2 in the table.
2.  When using the Out-Of-band method, do not set the same port number for the UDP ports #1 and #2 in the table.

## User authentication mode

You must enable the user authentication mode on the CCI command device. For the virtual command device the user authentication mode is always enabled.

When user authentication mode is enabled, use the user ID and password that you created using Device Manager - Storage Navigator or the maintenance utility to log in to the storage system.

## SVP/GUM restart and microcode replacement when using out-of-band communication

**If MxN configuration in Universal Replicator is NOT managed with out-of-band communication**

When out-of-band communication is used, the communication between CCI and the storage system cannot be established during the SVP/GUM restart or the microcode replacement. Therefore, to perform the SVP/GUM restart or the microcode replacement, take either of the following actions:

**Action A**

Perform the following steps:

1. Stop the CCI instance.
2. Perform the SVP/GUM restart or the microcode replacement. (SVP restart or the microcode replacement is performed by maintenance personnel.)
3. Restart the CCI instance.

**Action B**

Take all of the following actions:

- Do not use the CCI command during the SVP/GUM reboot or the microcode replacement.

- If a message ID "HORCM_101" is output to the system log file* on the CCI host during the SVP/GUM restart or the microcode replacement, disregard the message.

> **Note:** * The system log file on UNIX-based system is the syslog file, and the system log file on Windows-based system is the event log file.

**If MxN configuration in Universal Replicator is managed with out-of-band communication**

When out-of-band communication is used, the communication between CCI and the storage system cannot be established during the SVP/GUM restart or the microcode replacement. Therefore, to perform the SVP/GUM restart or the microcode replacement, use the following procedure:

1. Split a Universal Replicator pair.
2. Stop CCI.
3. Perform the SVP/GUM restart or the microcode replacement.

   (SVP restart or the microcode replacement is performed by maintenance personnel.)

4. Restart CCI.
5. Resynchronize the Universal Replicator pair.

## LDEV nickname function

You can assign a unique nickname of up to 32 characters to an LDEV.

# LDEV grouping function

In CCI versions prior to the Hitachi Virtual Storage Platform, you needed to define the copy groups in the CCI configuration definition file on each host. When the copy group information changed, the configuration definition file needed to be edited on each host. In CCI versions after the VSP, the information registered in the storage system can be used. This LDEV grouping function can minimize the description of the CCI configuration definition file on each host. When the copy group information changes, you need to update only one configuration definition file, saving time and eliminating the chance for error due to mismatching edits.

The LDEV grouping functionality is implemented using device names, device groups, and copy groups:

**Device name**

- A name that can be assigned to one LDEV per device group.

- Each name is associated with a device group to which the LDEV belongs.

- An LDEV nickname can be assigned to the LDEV as a unique name for the LDEV that is not related with a device group. Only one LDEV nickname can be assigned to each LDEV.

**Device group**

- A group of one or more LDEVs. One LDEV can belong to multiple device groups.

- A device group can belong to only one copy group.

- If you want to construct a mirror or cascade, you need to define a different device group and a device name in each copy group.

**Copy group**

A group that is defined by specifying two device groups: one device group at the primary site and one device group at the secondary site.

# Resource group function

Using Resource Group function, the storage administrator for each resource group can access only the resources in the resource group. The storage administrator cannot access resources in other resource groups. This prevents the risk of destroying the data by another storage administrator in the other resource groups or of leaking out the data.

# Resource locking function

The resource locking function prevents conflict among multiple users.

User scripts cannot be guaranteed to work correctly when multiple users are using the following different interfaces:

- Storage Navigator

- Device Manager - Storage Navigator

- SVP

▪ Maintenance utility (VSP G130, G/F350, G/F370, G/F700, G/F900, VSP Gx00 models and VSP Fx00 models)

▪ Maintenance PC

You can use the lock command while the script is running to ensure completion. To use the lock command, user authentication is required.

# CCI functions available on all RAID storage systems

CCI provides the following functionality on all Hitachi RAID storage systems.

▪ In-system replication

▪ Remote replication

▪ Data protection

## In-system replication

CCI provides command-line control for in-system (local) replication operations, including ShadowImage, Thin Image, and Copy-on-Write Snapshot. CCI displays local replication information and allows you to perform operations by issuing commands or by executing script files.

## Remote replication

CCI provides command-line control for remote replication operations, including TrueCopy, Universal Replicator, and global-active device. CCI displays remote replication information and allows you to perform operations by issuing commands or by executing script files.

For remote copy operations, CCI interfaces with the system software and high-availability (HA) software on the host as well as the software on the RAID storage system. CCI provides failover operation commands that support mutual hot standby in conjunction with industry-standard failover products (for example, MC/ServiceGuard, HACMP, FirstWatch®). CCI also supports a scripting function for defining multiple operations in a script (or text) file. Using CCI scripting, you can set up and execute a large number of commands in a short period of time while integrating host-based high-availability control over copy operations.

## Data protection

CCI supports data protection operations, using Hitachi Data Retention Utility.

The CCI software enables you to set and verify the parameters for guarding at the volume level. Once guarding is enabled, the RAID storage system conceals the target volumes from SCSI commands such as SCSI Inquiry and SCSI Read Capacity, prevents reading and writing to the volume, and protects the volume from being used as a copy volume (the TrueCopy, Universal Replicator, global-active device, or ShadowImage paircreate operation fails).

# Chapter 2:  CCI software environment

This guide describes the CCI software environment, including the RAID storage system, log and trace files, user-created files, and the user environment variable.

## Overview of the CCI software environment

The CCI software environment includes components on the Hitachi RAID storage systems and the CCI software on the host servers and/or on the Storage Navigator computer or management client. The CCI components on the storage systems include the user data volumes and CCI command devices.

Each CCI instance on a host server includes:

- CCI application files, referred to as **HORC Manager (HORCM)**

  - Log and trace files

  - A command server

  - Error monitoring and event reporting files

  - A configuration management feature

- Configuration definition file (user-defined)

- User execution environments for the Hitachi Vantara features, including the commands, a command log, and a monitoring function.

The CCI commands also have interface considerations (see CCI and the SCSI command interface).

# CCI components on the RAID storage system

## Command device

CCI commands are issued by the CCI software to the RAID storage system command device. The command device is a user-selected, dedicated logical volume on the storage system that functions as the interface to the CCI software on the host. The command device is dedicated to CCI communications and cannot be used by any other applications. The command device accepts CCI read and write commands that are issued by the storage system. The command device also returns read requests to the host. The volume designated as the command device is used only by the storage system and is blocked from the user. The command device uses 32 MB, and the remaining volume space is reserved for CCI and its utilities. The command device can be any OPEN-x device (for example, OPEN-V) that is accessible to the host. A LUN Expansion volume cannot be used as a command device. A Virtual LVI/Virtual LUN volume as small as 36 MB (for example, OPEN-3-CVS) can be used as a command device.

> ⚠️ **Caution:** Make sure the volume to be selected as the command device does not contain any user data. The command device will be inaccessible to the host.

The CCI software on the host issues read and write commands to the command device. When CCI receives an error notification in reply to a read or write request to the RAID storage system, the CCI software switches to an alternate command device, if one is defined. If a command device is blocked (for example, for online maintenance), you can switch to an alternate command device manually. If no alternate command device is defined or available, all TrueCopy and ShadowImage commands terminate abnormally, and the host will not be able to issue commands to the storage system. Therefore, one or more alternate command devices (see Alternate command device function.) must be set to avoid data loss and storage system downtime.

If the CCI version is 01-68-03/00 or later, a volume (namespace) connected using NVMe-oF can be defined as a command device. To use a device file for NVMe-oF, specify the $-n$ option when running the command or set the HORCC_NVME environment variable before the operation. Also, set HORCM_NVME to ENABLE in the configuration definition file. For details about HORCM_NVME, see HORCM_NVME (on page 59).

A namespace can only be defined as a command device by using CCI on Linux x64. For more information about the platforms supported when a namespace is defined as a command device, see the Command Control Interface Installation and Configuration Guide.

Each command device must be set using the LUN Manager software on Storage Navigator. In addition, for using a Provisioning command, user authentication is required. Set the security attribute of the command device with user authentication. For information and instructions on setting a command device, see the *Provisioning Guide* for the storage system.

Each command device must also be defined in the HORCM_CMD section of the configuration definition file for the CCI instance on the attached host. If an alternate command device is not defined in the configuration definition file, the CCI software might not be able to use the device.

The CCI Data Protection Facility uses an enhanced command device that has an attribute to indicate protection ON or OFF.

Chapter 2: CCI software environment

> 📄 **Note:**
>
> ▪ For Solaris operations, the command device must be labeled.

To enable dual path of the command device, make sure to include all paths to the command device on a single line in the HORCM_CMD section of the configuration definition file. The following shows an example with two controller paths to the command device. Putting the path information on separate lines might cause parsing issues, and failover might not occur unless the HORCM startup script is restarted.

```
HORCM_CMD #dev_name dev_name dev_name /dev/rdsk/c1t66d36s2 /dev/
rdsk/c2t66d36s2
```

## Command device guarding

In the customer environment, a command device might be attacked by the maintenance program of the Solaris Server, after that usable instance will be exhausted, and CCI instance would not start up on all servers (except attacked server). This might happen due to incorrect operation of the maintenance personnel for the UNIX Server. In this case, the command device should be protected against operator error, as long as it can be seen as the device file from the maintenance personnel.

Thus, the RAID microcode (for the command device) and CCI support this protection in order to guard from similar access.

### Guarding method

Currently, assignment of the instance via the command device is ONE phase. Therefore, if the command device reads a special allocation area of the instance through the maintenance tool and so on, then it causes a fault of full space of the instance, because the command device interprets as assignment of the instance from CCI.

CCI has TWO phases that it reads to acquire usable LBA, and writes with the acquired LBA in attaching sequence to the command device, so the command device can confirm whether it was required as the assignment for CCI or not, by detecting and adding two status bits to the instance assignment table.

The following figure shows the current assignment sequence.
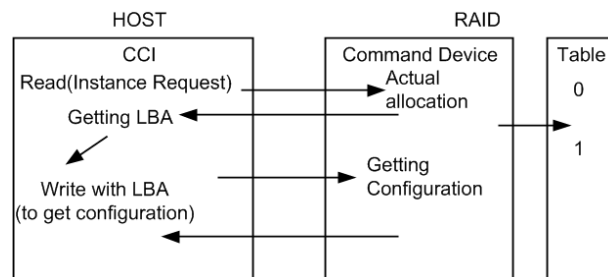


The following figure shows improved assignment sequence.
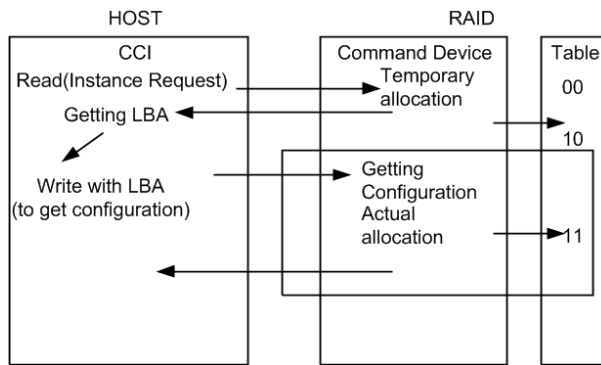
The command device performs the assignment of an instance through TWO phases that have "temporary allocation (1 0)" and "actual allocation (1 1)" to the instance assignment table.

If the command device is attacked, the instance assignment table is filled with "temporary allocation (1 0)" status. After that, the command device will detect a fault of full space as the instance assignment, clear up all "temporary allocation (1 0)", and then reassign the required instance automatically.

This does not require a service representative to switch the command device "OFF/ON" to clear up the instance table.

## *Verifying the CCI instance number*

CCI provides a way to verify the number of "temporary allocations (1 0)" and "actual allocations (1 1)" on the instance table so that you can confirm validity of the CCI instance number in use. The **horcctl -DI** command shows the number of CCI instances since HORCM was started as follows.

Example without command device security:

```
# horcctl -DI
Current control device = /dev/rdsk/c0t0d0 AI = 14 TI = 0 CI = 1
```

Example with command device security:

```
# horcctl -DI
Current control device = /dev/rdsk/c0t0d0* AI = 14 TI = 0 CI = 1
```

**AI**

NUM of actual instances in use

**TI**

NUM of temporary instances in RAID

**CI**

NUM of instances using current (own) instance

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## Alternate command device function

The CCI software issues commands to the command device via the UNIX/PC raw I/O interface. If the command device fails in any way, all CCI commands are terminated abnormally, and you cannot use any commands. Because the use of alternate I/O path is platform dependent, restrictions are placed upon it. For example, on HP-UX systems, only devices subject to the LVM can use the alternate path PV-LINK. To avoid command device failure, CCI supports an alternate command device function.

> **Note:** When you set a redundant path to the command device by using alternate path software, make sure that path switching occurs only in case of a failure. For example, you cannot use round robin.

- **Definition of alternate command devices**: To use an alternate command device, you must define two or more command devices for the HORCM_CMD item in the configuration definition file. When two or more devices are defined, they are recognized as alternate command devices. Create all alternate command devices within the same resource group of the same storage system.

- **Timing of alternate command devices**: When the HORCM receives an error notification in reply from the operating system via the raw I/O interface, the alternate command device is used. You can also change to the alternate command device forcibly by using the `horcct1 -C` switch command. However, if you specified HORCM_CMD for the volume belonging to a virtual storage machine that you created, you cannot use the `horcct1 -C` switch command, and therefore you cannot switch to the alternate command device forcibly.

- **Operation of alternating command**: If the command device is blocked due to online maintenance, the switch command should be issued in advance. If the switch command is issued again after completion of the online maintenance, the previous command device is activated.

- **Multiple command devices on HORCM startup**: If at least one command device is available during one or more command devices described to the configuration definition file, then HORCM can start with a warning message to the startup log by using the available command device. Confirm that all command devices can be changed by using the **`horcctl -C`** command option, or HORCM has been started without the warning message to the HORCM startup log.

The following figure shows the alternate command device function.

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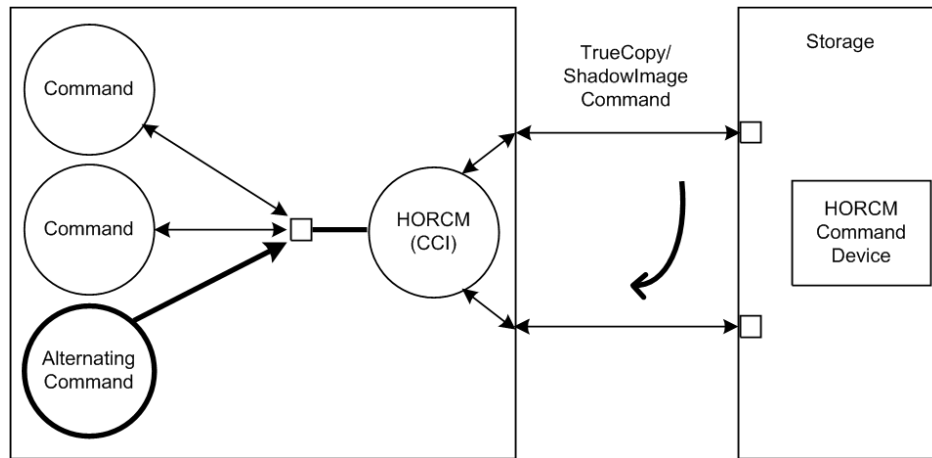
## Remote command device

A remote command device is a command device on an external (UVM) storage system that is mapped as a command device of the local storage system. When commands are issued to a remote command device, the UR/URz journal operations are processed using the UVM FC path between the arrays. Use of a remote command device provides improved performance for 3DC configurations by providing separate paths for UR/URz journal processing and data replication.

The remote command device (RCD) requirements are:

- Virtual Storage Platform G1000, G1500, Virtual Storage Platform F1500, Virtual Storage Platform 5000 series:

  - RCD is required in 3DC TC/UR and 3DC TCz/URz configurations, including intermix configurations with VSP or USP V/VM.

  - RCD is required in 3DC URxUR and 3DC URzxURz configurations, including intermix configurations with VSP or USP V/VM.

  - RCD is not required in GAD 3DC delta resync (GAD+UR) configurations.

- Virtual Storage Platform G200, G400, G600, G800 and Virtual Storage Platform F400, F600, F800:

  - RCD is required in 3DC TC/UR and URxUR configurations.

  - RCD is not required in GAD 3DC delta resync (GAD+UR) configurations.

- Virtual Storage Platform: RCD is recommended in 3DC TC/UR and 3DC TCz/URz configurations. If there is intermix with VSP G1000, G1500, VSP F1500, or VSP 5000 series, RCD is required.

- Hitachi Unified Storage VM: RCD is recommended in 3DC TC/UR configurations.

The remote command device is defined using Device Manager - Storage Navigator. For more information, see the *Hitachi Universal Volume Manager User Guide*.

A volume (namespace) connected using NVMe-oF cannot be defined as a remote command device.

# CCI and the SCSI command interface

When CCI commands are converted into a special SCSI command format, a SCSI through driver that can send specially formatted SCSI commands to the RAID storage system is needed. As a result, OS support for CCI depends on the OS capabilities. It is necessary to use a read/write command that can easily be issued by many UNIX/PC server platforms. For example, ioctl() can be used for the following platforms: HP-UX, Linux, Solaris, Windows, IRIX64, OpenVMS and zLinux.

- **SCSI command format used**: Use a RD/WR command that can be used with special LDEVs, since they should be discriminated from the normal RD/WR command.

- **Recognition of the control command area (LBA#)**: The host issues control commands through the raw I/O special file of a special LDEV. Since the specific LU (command device) receiving these commands is viewed as a normal disk by the SCSI interface, the OS can access its local control area. The RAID storage system must distinguish such accesses from the control command accesses. Normally, several megabytes of the OS control area are used starting at the initial LBA#. To avoid using this area, a specific LBA# area is decided and control commands are issued within this area. The command LBA# recognized by the storage system is shown below, provided the maximum OS control area is 16 MB.

The following figure shows the relationship of the special file to the special LDEV.
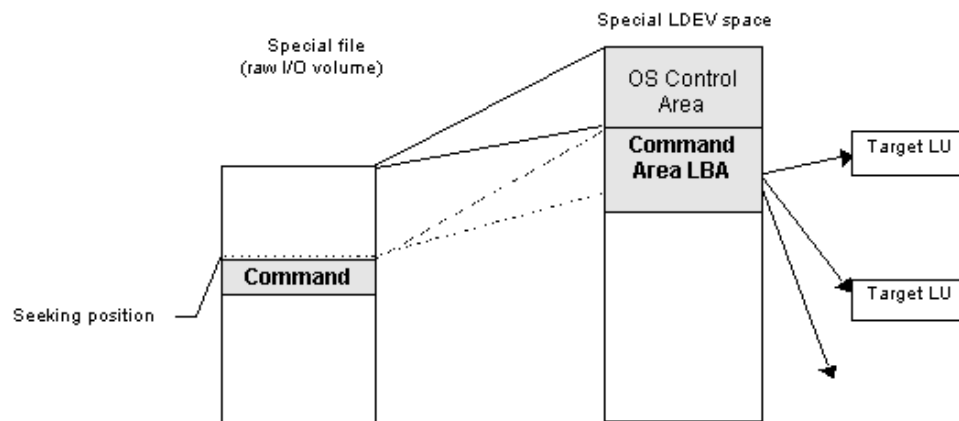


32,768   LBA#   32,768 * 2 (In "block" units, 512 bytes per block)
The host seeks 32,768 * 512 bytes and issues a command.

- **Acceptance of commands**: A command is issued in the LBA area of the special LDEV explained above. The RD/WR command meeting this requirement should be received especially as a CCI command. A command is issued in the form of WR or WR-RD. When a command is issued in the form of RD, it is regarded as an inquiry (equivalent to a SCSI inquiry), and a CCI recognition character string is returned.

## Command competition

The CCI commands are asynchronous commands issued via the SCSI interface. As a result, if several processes issue these commands to a single LDEV, the storage system cannot take the proper action. To avoid such a problem, two or more write commands should not be issued to a single LDEV. The command initiators should not issue two or more write commands to a single LDEV unless the storage system can receive commands with independent initiator number * LDEV number simultaneously.

The following figure shows the HORCM and command issue process.
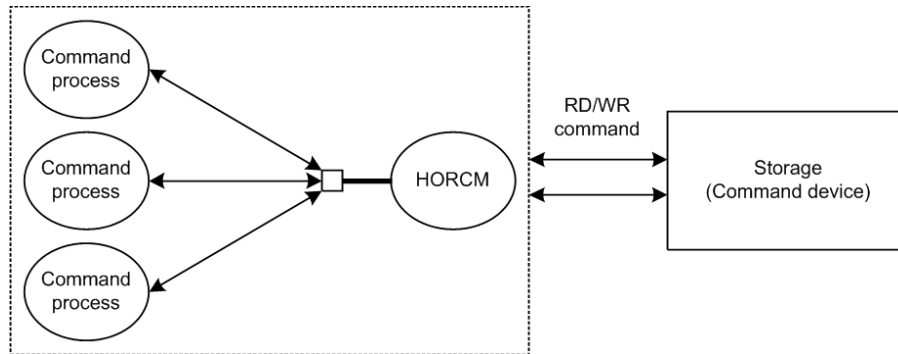


## Command flow

This figure shows the flow of read/write command control for a specified LBA#.
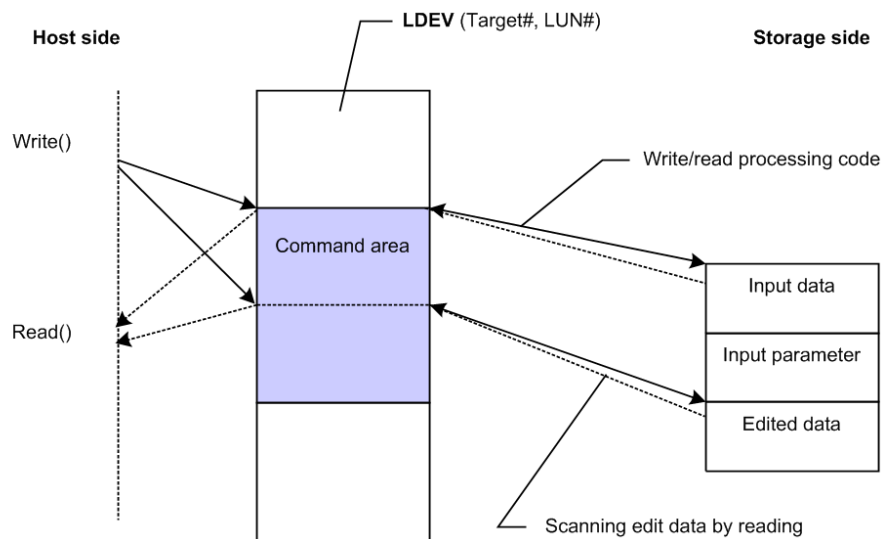


## Issuing commands for LDEVs within a LUSE device

A LUSE device is a group of LDEVs regarded as a single logical unit. Because it is necessary to know the configuration of the LDEVs when issuing a command, a new command is used to specify a target LU and acquire LDEV configuration data, as shown in the following figure.

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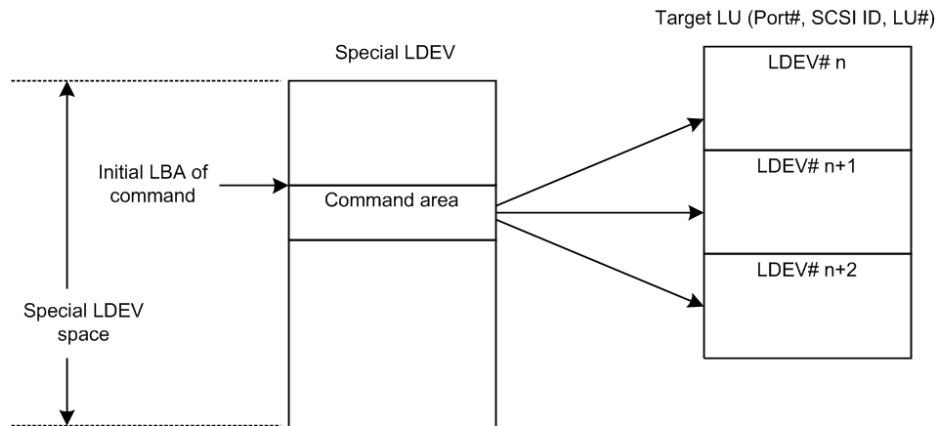
# CCI instance components on the host server

## HORCM operational environment

The HORCM operates as a daemon process on the host server and is activated either automatically when the server machine starts up or manually by the startup script. HORCM reads the definitions specified in the configuration file upon startup. The environment variable HORCM_CONF is used to define the location of the configuration file to be referenced. The following figure shows the HORCM operational environment.
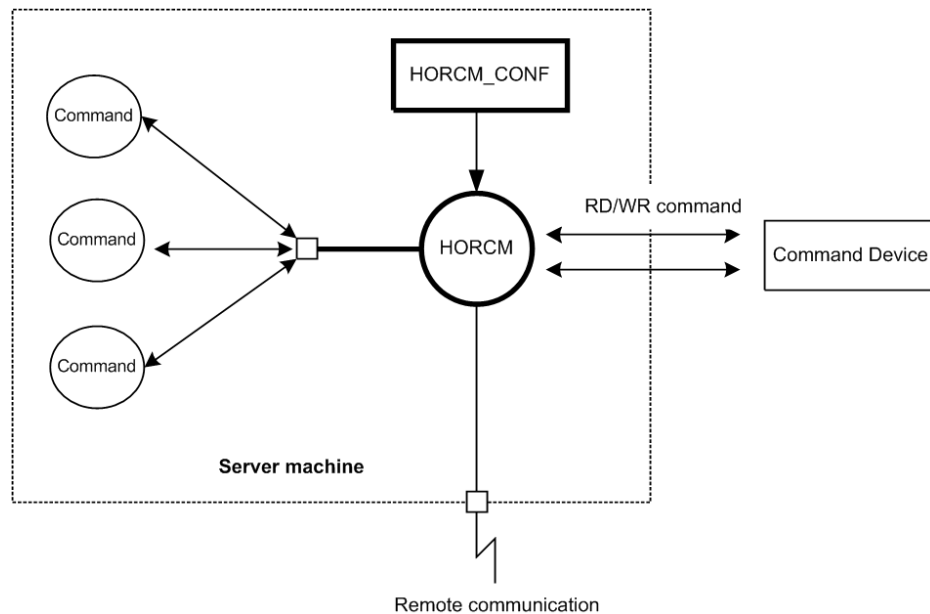
## CCI instance configurations

The basic unit of the CCI software structure is the CCI instance. A CCI instance consists of HORC manager (HORCM), CCI commands, the user-defined configuration definition file, and the log function for maintenance. Each instance uses its own configuration definition file to manage volume relationships while maintaining awareness of the other CCI instances. Each CCI instance normally resides on separate servers (one node per instance). If two or more instances are run on a single server (for example, for test operations), it is possible to activate two or more instances using instance numbers. The CCI commands to be used are selected by the environment variable (HORCC_MRCF). The default command execution environment for CCI is TrueCopy.

The CCI instance shown in the following figure has a remote execution link and a connection to the RAID storage system. The remote execution link is a network connection to another PC to allow you to execute CCI functions remotely. The connection between the CCI instance and the storage system illustrates the connection between the CCI software on the host and the command device. The command device accepts CCI commands and communicates read and write I/Os between the host and the volumes on the storage system. The host does not communicate CCI commands directly to the volumes on the storage system -- the CCI commands always go through the command device.

The following figure illustrates CCI instance configuration and components.
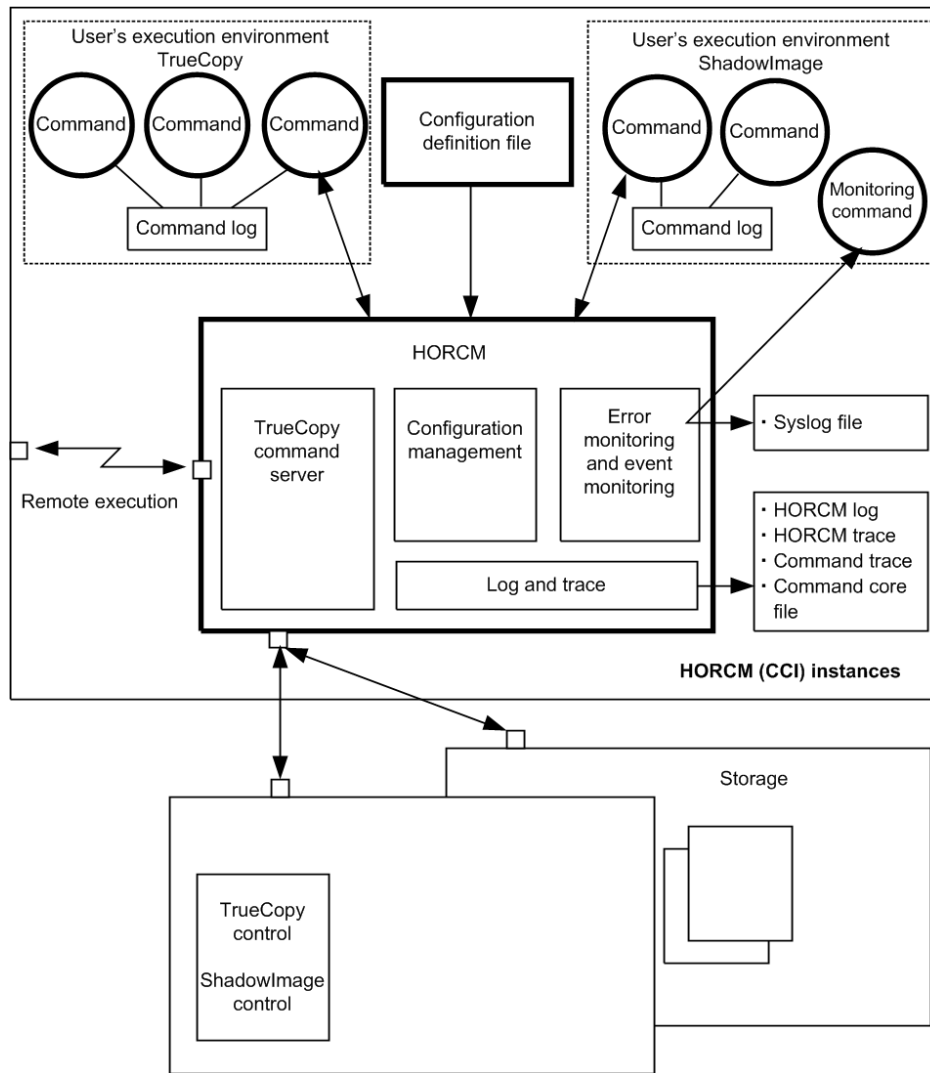
The four possible CCI instance configurations are:

▪ **One host connected to one storage system**: Connecting one host to one storage system allows you to maintain multiple copies of your data for testing purposes or as an offline backup. Each CCI instance has its own operation manager, server software, and scripts and commands, and each CCI instance communicates independently with the command device. The RAID storage system contains the command device that communicates with the CCI instances as well as the primary and secondary volumes of both CCI instances.

▪ **One host connected to two storage systems**: Connecting the host to two storage systems enables you to migrate data or implement disaster recovery by maintaining duplicate sets of data in two different storage systems. You can implement disaster recovery solutions by placing the storage systems in different geographic areas. Each CCI instance has its own operation manager, server software, and scripts and commands, and each CCI instance communicates independently with the command device. Each RAID storage system has a command device that communicates with each CCI instance independently. Each storage system contains the primary volumes of its connected CCI instance and the secondary volumes of the other CCI instance (located on the same host in this case).

- **Two hosts connected to one storage system**: Having two attached hosts to one storage system, one host for the primary volume and the other host for the secondary volume, allows you to maintain and administer the primary volumes while the secondary volumes can be taken offline for testing. The CCI instances of separate hosts are connected via the LAN so that they can maintain awareness of each other. The RAID storage system contains the command device that communicates with both CCI instances (one on each host) and the primary and secondary volumes of both CCI instances

- **Two hosts connected to two storage systems**: Two hosts connected to two storage systems also allows the most flexible disaster recovery plan, because both sets of data are administered by different hosts. This guards against storage system failure as well as host failure.The CCI instances of separate hosts are connected via the LAN so that they can maintain awareness of each other. Each RAID storage system has a command device that communicates with each CCI instance independently. Each storage system contains the primary volumes of its connected CCI instance and the secondary volumes of the other CCI instance (located on a different host in this case).

## Host machines that can be paired

When you perform a pair operation, the version of CCI should be the same on the primary and secondary sites. As a particular application uses HORC, users sometimes use a HORC volume as the data backup volume for the server. In this case, CCI requires that the CCI instance correspond to each OS platform that is located on the secondary site for the pair operation of data backup on the primary servers of each OS platform.

However, it is possible to prepare only one server at a secondary site by supporting CCI communications among different OSs (including the converter for **little-endian** vs. **big-endian**).

The following figure represents CCI's communication among different OSs, and the table below shows the supported communication (32-bit, 64-bit) among different OSs. Please note the following terms that are used in the example:

- RM-H: Value of HORCMFCTBL environment variable for an HP-UX CCI instance on Windows

- RM-S: Value of HORCMFCTBL environment variable for a Solaris CCI instance on Windows

Restriction: CCI's communications among different operating systems is supported on HP-UX, Solaris, AIX, Linux, and Windows (this is not supported on Tru64 UNIX/Digital UNIX). Also, CCI does not require that the HORCMFCTBL environment variable be set—except for RM-H and RM-S instances (to ensure that the behavior of the operating system platform is consistent across different operating systems).
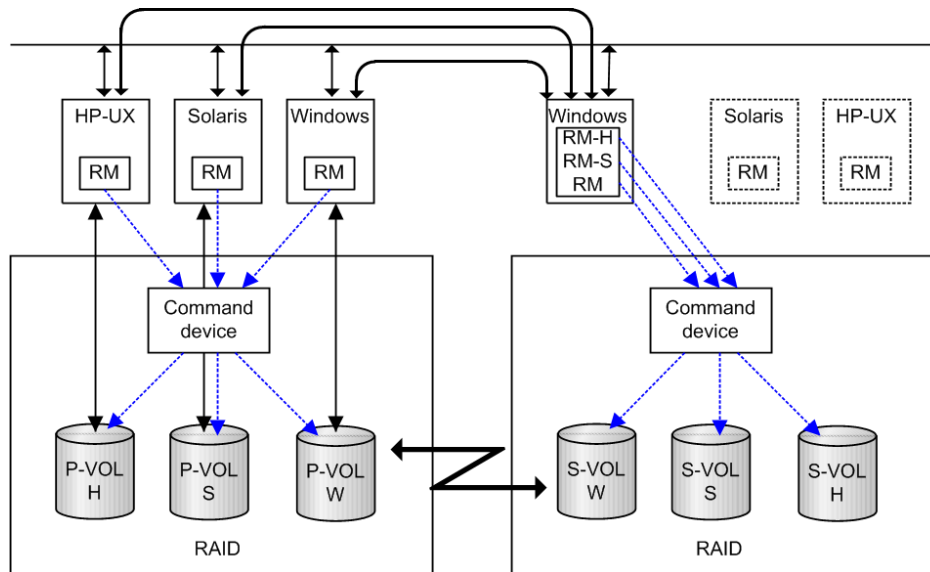
| | | HORCM 32 bit | | HORCM 64 bit | |
|---|---|---|---|---|---|
| **HORCM** | | **little** | **big** | **little** | **big** |
| 32 bit | little | AV | AV | AV | - |
| | big | AV | AV | AV | - |
| 64 bit | little | AV | AV | AV | - |
| | big | - | - | - | - |

## Configuration definition file

The CCI configuration definition file is a text file that defines a CCI instance. The connected hosts, volumes and groups known to the CCI instance are defined in the configuration definition file. Physical volumes (special files) used independently by the servers are combined when paired logical volume names and group names are given to them. The configuration definition file describes the correspondence between the physical volumes used by the servers and the paired logical volumes and the names of the remote servers connected to the volumes. See the *Command Control Interface Installation and Configuration Guide* for instructions on creating the CCI configuration definition file.

The following figure illustrates the configuration definition of paired volumes.

Explanation of symbols:
Pn : Port name
Tn : Target ID
Ln : LUN number
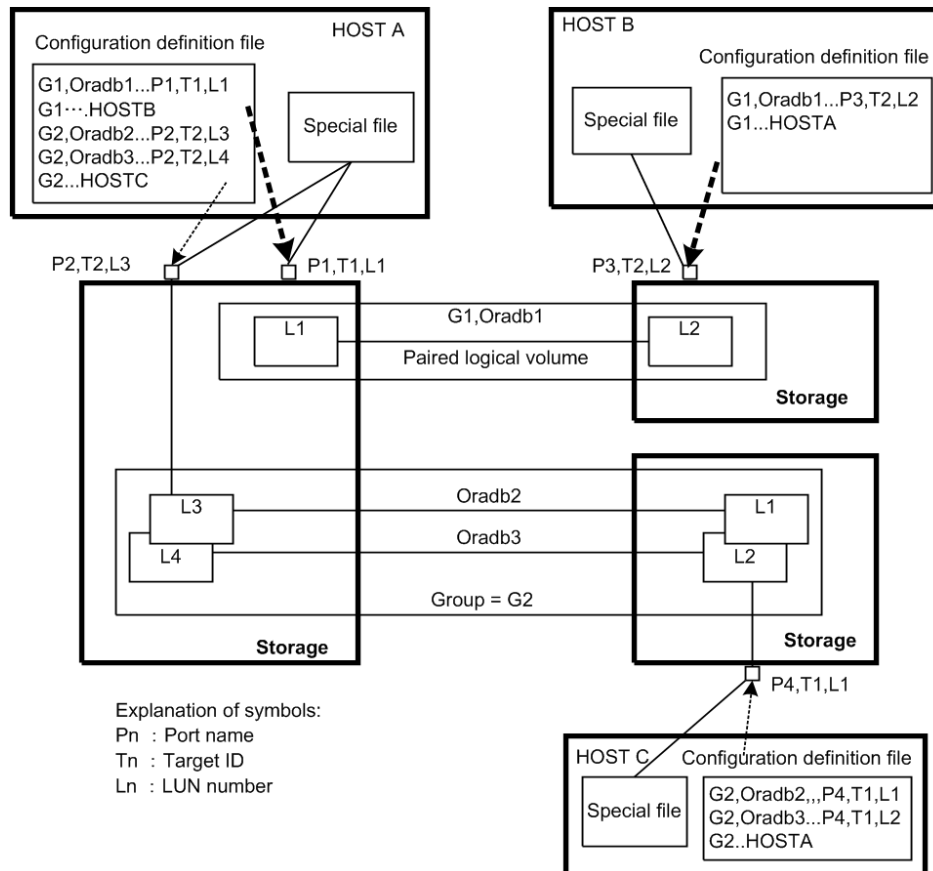
Configuration file example — UNIX-based servers

Note that # at the beginning of a line indicates a comment.

```
HORCM_MON
#ip_address service poll(10ms) timeout(10ms)
HST1          horcm  1000       3000

HORCM_CMD
#unitID 0... (seq#30014)
#dev_name dev_name dev_name
/dev/rdsk/c0t0d0
#unitID 1... (seq#30015)
#dev_name dev_name dev_name
/dev/rdsk/c1t0d0

HORCM_DEV
#dev_group dev_name port#  TargetID  LU#  MU#
oradb      oradb1   CL1-A      3      1    0
oradb      oradb2   CL1-A      3      1    1
oralog     oralog1  CL1-A      5      0
oralog     oralog2  CL1-A1     5      0
oralog     oralog3  CL1-A1     5      1
oralog     oralog4  CL1-A1     5      1    h1
HORCM_INST
```

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```
#dev_group ip_address service
oradb       HST2       horcm
oradb       HST3       horcm
oralog      HST3       horcm
```

Configuration file example — Windows servers

```
 horcmU.conf - Notepad                                           _ □ ✕
File  Edit  Search  Help
HORCM_MON
#ip_address      service         poll(10ms)        timeout(10ms)
POLLUX           horcm0          1000              3000


HORCM_CMD
#dev_name                  dev_name            dev_name
\\.\PHYSICALDRIVE2


HORCM_DEV
#dev_group       dev_name        port#         TargetID        LU#
VG01             kate1           CL1-A         0               0
#VG02            kate2           CL1-C         4               0
#VG02            oradb3          CL1-B         2               4



HORCM_INST
#dev_group       ip_address      service
VG01             POLLUX          horcm1
```
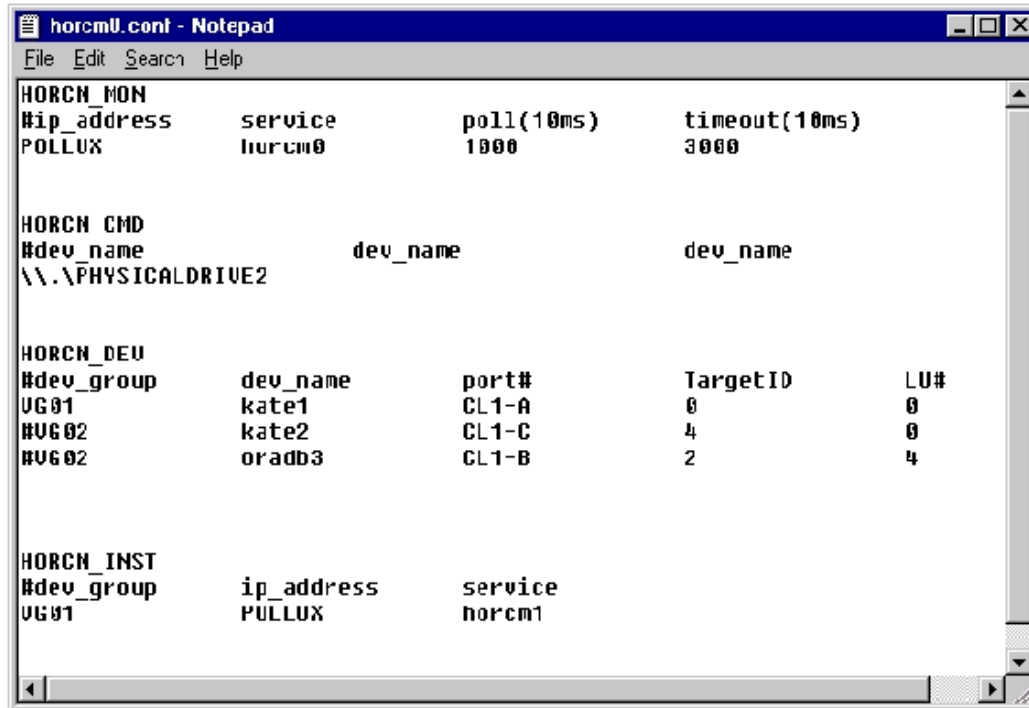
The following table lists the parameters defined in the configuration file and specifies the default value, type, and limit for each parameter.

| Parameter | Default | Type | Limit |
|---|---|---|---|
| ip_address | None | Character string | 63 characters |
| Service | None | Character string or numeric value | 15 characters |
| poll (10 ms) | 1000 | Numeric value[1] | None |
| timeout (10 ms) | 3000 | Numeric value[1] | None |
| dev_name for HORCM_CMD | None | Character string | 63 characters<br><br>Recommended value = 8 char. or fewer |
| dev_name for HORCM_DEV | None | Character string | 31 characters |
| dev_group | None | Character string | 31 characters |

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| Parameter | Default | Type | Limit |
|---|---|---|---|
| | | | Recommended value = 8 char. or less |
| port #[3] | None | Character string | 31 characters |
| target ID | None | Numeric value[1] | 7 characters |
| LU# | None | Numeric value[1] | 7 characters |
| MU# | 0 | Numeric value[1] | 7 characters |
| Serial#[2] | None | Numeric value[1] | 12 characters |
| CU:LDEV(LDEV#) | None | Numeric value | 6 characters |
| dev_name for HORCM_CMD | None | Character string | 63 characters Recommended value = 8 char. or less |

**Notes:**

1. Use decimal notation for numeric values (not hexadecimal).
2. For VSP G1x00 and VSP F1500, add a "3" at the beginning of the serial number. For example, for serial number 12345, enter 312345.
3. Use CLx-y format. For example, CL1 indicates the first three characters of the port number (CLx-y). The ranges that can be set for parameters (x/y) vary depending on the storage system types. For details about the parameter setting ranges, see the Provisioning Guide.

Do not edit the configuration definition file while CCI is running. Shut down CCI, edit the configuration file as needed, and then restart CCI.

When you change the system configuration, it is required to shut down CCI once and rewrite the configuration definition file to match with the change and then restart CCI.

When you change the storage system configuration (microprogram, cache capacity, LU path, CHB removal, NVM subsystem port removal, and so on), you need to restart CCI regardless of the necessity of the configuration definition file editing.

When you restart CCI, confirm that there is no contradiction in the connection configuration by using the `-c` option of **pairdisplay** command and **raidqry** command. But you cannot confirm the consistency of the P-VOL and S-VOL capacity with the `-c` option of **pairdisplay** command. Confirm the capacity of each volume by using the **raidcom** command.

Do not mix pairs created with the "At-Time Split" option (-m grp) and pairs created without this option in the same group defined in the CCI configuration file. If you do, a **pairsplit** operation might end abnormally, or S-VOLs of the P-VOLs in the same consistency group (CTG) might not be created correctly at the time the **pairsplit** request is received.

# Configuration definition file settings

This section describes the settings in the configuration definition file:

## HORCM_MON

The monitor parameter (HORCM_MON) defines the following values:

- **Ip_address**: Specifies the local host name or the IP address of the local host. When you specify the name of a local host that has multiple IP addresses, one of the IP addresses is selected at random and used. If you want to use all IP addresses, specify NONE for IPv4 or NONE6 for IPv6.

- **Service**: Specifies the UDP port name assigned to the HORCM communication path, which is registered in "/etc/services" ("%windir%\system32\drivers\etc\services" in Windows, "SYS$SYSROOT:[000000.TCPIP$ETC]SERVICES.DAT" in OpenVMS). If a port number is specified instead of a port name, the port number will be used.

  > 📄 **Note:** As the port number to be specified for the HORCM_MON service, the value (34001 + *<instance-number>*) for each instance running on the host server cannot be specified.

- **Poll**: The interval for monitoring paired volumes. To reduce the HORCM daemon load, make this interval longer. If set to -1, the paired volumes are not monitored. The value of -1 is specified when two or more CCI instances run on a single machine.

- **Timeout**: The time-out period of communication with the remote server.

If HORCM_MON is not specified, then the following are set as defaults.

```
HORCM_MON
```

```
#ip_address    service       poll(10ms)    timeout(10ms)
```

```
NONE          default_port    1000           3000H
```

Default_port:

For none specified HORCM instance: "31000 + 0"

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For instance HORCM X : "31000 + X + 1"

## HORCM_CMD (in-band method)

When using the in-band method, define the UNIX device path or Windows physical device number and specify a command device that can be accessed by CCI for HORCM_CMD. You can specify multiple command devices in HORCM_CMD to provide failover in case the original command device becomes unavailable.

> **Tip:** To enhance redundancy, you can make multiple command devices available for a single storage system. This configuration is called command device alternative configuration. For this configuration, command devices are listed horizontally in a line in the configuration definition file. CMD1 and CMD2 in the following example are command devices of the same storage system:
>
> ```
> HORCM_CMD
> CMD1 CMD2
> ```
>
> Aside from the command device alternative configuration, to control multiple storage systems in one configuration definition file, you can list command devices of each storage system in one configuration definition file. In this case, command devices are listed vertically. CMD1 and CMD2 in the following example are command devices of different storage systems:
>
> ```
> HORCM_CMD
> CMD1
> CMD2
> ```

> **Tip:** When you specify a command device, you can enter up to 4095 characters per line. If you enter more than 4095 characters in a line, the exceeding part is processed as the characters in the next line.

The command device must be mapped to the SCSI/iSCSI/Fibre/NVMe using LUN Manager first. The mapped command devices can be identified by the "-CM" at the end of product ID displayed by the **inqraid** command. The following are the examples for the **inqraid** command.

**Example for the inqraid command (UNIX host)**

```
# ls /dev/rdsk/c1t0* | /HORCM/usr/bin/inqraid -CLI -sort
DEVICE_FILE PORT SERIAL LDEV CTG H/M/12 SSID R:Group PRODUCT_ID
```

```
c1t0d0s2 CL2-E 63502 576 - - - - - OPEN-V-CM
```

```
c1t0d1s2 CL2-E 63502 577 - s/s/ss 0006 1:02-01 OPEN-V -SUN
```

```
c1t0d2s2 CL2-E 63502 578 - s/s/ss 0006 1:02-01 OPEN-V -SUN
```

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The command device is /dev/rdsk/c1t0d2s2.

**Example for the `inqraid` command (displaying a device file for NVMe-oF on Linux)**

```
# ls /dev/nvme* | /HORCM/usr/bin/inqraid -CLI -sort -n
DEVICE_FILE PORT SERIAL LDEV CTG H/M/12 SSID R:Group PRODUCT_ID
nvme4n1 CL1-D 500054 1536 - - 0011 A:00002 OPEN-V-CM
nvme2n1 CL1-H 500054 2049 - - 0012 A:00000 OPEN-V
```

The command device is /dev/nvme4n1.

**Example for the `inqraid` command (Windows host)**

```
D:\HORCM\etc>inqraid $Phys -CLI
```

```
\\.\PhysicalDrive1:
```

```
# Harddisk1 -> [VOL61459_449_DA7C0D92] [OPEN-3 ]
```

```
\\.\PhysicalDrive2:
```

```
# Harddisk2 -> [VOL61459_450_DA7C0D93] [OPEN-3-CM ]
```

The command device is \\.\PhysicalDrive2.

After the process of command device mapping, set HORCM_CMD of the configuration definition file as follows.

```
\\.\CMD-<Serial Number>:<Device special file name>
```

<Serial Number>: Sets the serial number. For VSP G1x00 and VSP F1500, add a "3" at the beginning of the serial number. For example, for serial number 12345, enter 312345.

<Device special file name>: Sets the device special file name of a command device.

**Example with serial number 64015 and device special file name, /dev/rdsk/*is specified:**

```
HORCM_CMD
#dev_name dev_name dev_name
\\.\CMD-64015:/dev/rdsk/*
```

> ⚠️ **Caution:** To enable dual path of the command device under UNIX systems, make sure to include all paths to the command device on a single line in the HORCM_CMD section of the configuration definition file. Entering path information on separate lines might cause syntax parsing issues, and failover might not occur unless the HORCM startup script is restarted on the UNIX system.

When two or more storage systems are connected, CCI identifies each storage system using unit IDs. The unit ID is assigned sequentially in the order described in HORCM_CMD of the configuration definition file. For a command device alternative configuration, a special file for multiple command devices is written.

> ⚠️ **Caution:** When storage systems are shared by two or more servers, unit IDs and serial numbers must be consistent among the servers. List serial numbers of the storage systems in HORCM_CMD of the configuration definition file in the same order. The following figure illustrates unit IDs when multiple servers share multiple storage systems.

The following figure shows the configuration and unit IDs for multiple storage systems.
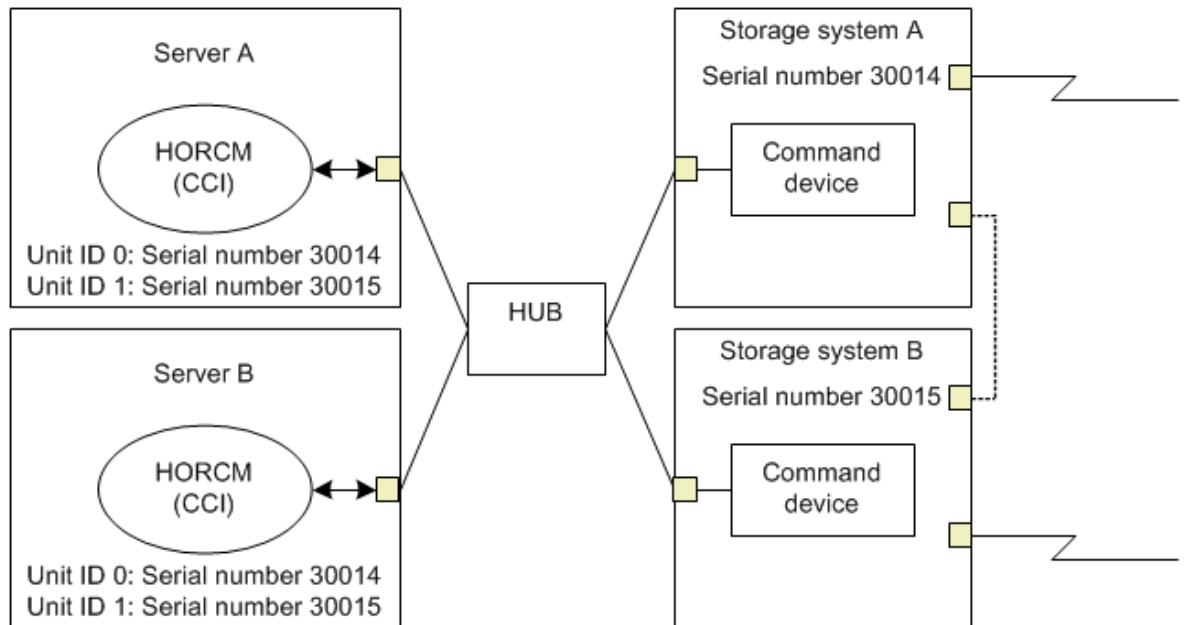


## Specifying command devices for Windows

Normally, physical drives are specified for command devices in storage systems. However, CCI provides a method that is not affected by changes of physical drives in Windows by using the following naming format to specify the serial number, LDEV number, and port number in that order:

```
\\.\CMD-Ser#-ldev#-Port#
```

- When specifying the serial number for VSP 5000 series, add a "5" at the beginning of the serial number. For example, for serial number 12345, enter 512345.

- When specifying the serial number for VSP G1x00 and VSP F1500, add a "3" at the beginning of the serial number. For example, for serial number 12345, enter 312345.

The following example specifies 30095 for the storage system's serial number, 250 for the LDEV number, and CL1-A for the port number:

```
HORCM_CMD
#dev_name dev_name dev_name
\\.\CMD-30095-250-CL1-A
```

- Minimum specification

  For the command device with serial number 30095, specify as follows:

  ```
  \\.\CMD-30095
  ```

- Command devices in the multi-path environment

  Specify serial number 30095, and LDEV number 250 as follows:

  ```
  \\.\CMD-30095-250
  ```

- Other specifications

  Specify serial number 30095, LDEV number 250, and port number CLI-A as follows:

  ```
  \\.\CMD-30095-250-CL1-A
  ```

  or

  ```
  \\.\CMD-30095-250-CL1
  ```

## *Specifying command devices for UNIX*

Device files are specified for command devices in UNIX. However, CCI provides a method that is not affected by changes of device files in UNIX by using the following naming format specifying the serial number, LDEV number, and port number in that order:

```
\\.\CMD-Ser#-ldev#-Port#:HINT
```

- When specifying the serial number for VSP 5000 series, add a "5" at the beginning of the serial number. For example, for serial number 12345, enter 512345.

- When specifying the serial number for VSP G1x00 and VSP F1500, add a "3" at the beginning of the serial number. For example, for serial number 12345, enter 312345.

The following example specifies 30095 for the storage system's serial number, 250 for the LDEV number, and CL1-A for the port number:

```
HORCM_CMD
#dev_name dev_name dev_name
\\.\CMD-30095-250-CL1-A:/dev/rdsk/
```

HINT provides a path to scan and specifies a directory ending with a slash (/) or a name pattern including the directory. Device files are searched via a name filter similar to the **inqraid** command.

- To find command devices from /dev/rdsk/, enter: ' `/dev/rdsk/*`

- To find command devices from /dev/rdsk/c10, enter: ' `/dev/rdsk/c10*`

- To find command devices from /dev/rhdisk, enter: ' `/dev/rhdisk*`

For a command device alternative configuration, HINT of the second command device can be omitted. In this case, command devices are searched from the device file that was scanned first.

```
HORCM_CMD
#dev_name dev_name dev_name
\\.\ CMD-30095-CL1:/dev/rdsk/ \\.\ CMD-30095-CL2
```

- **Minimum specification**: For the command device of a storage system with serial number 30095, specify as follows.

```
\\.\CMD-30095:/dev/rdsk/
```

- **Command devices in the multi-path environment**: Specify storage system's serial number 30095 and LDEV number 250 as follows.

```
\\.\CMD-30095-250:/dev/rdsk/
```

- **Other specifications**: An alternate path with storage system's serial number 30095 and LDEV number 250 can be specified as follows.

```
\\.\CMD-30095-250-CL1:/dev/rdsk/  \\.\CMD-30095-250-CL2
\\.\CMD-30095:/dev/rdsk/c1  \\.\CMD-30095:/dev/rdsk/c2
```

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> 📄 **Note:** If the hardware configuration is changed during the time an OS is running in Linux, the name of a special file corresponding to the command device might be changed. At this time, if HORCM was started by specifying the special file name in the configuration definition file, HORCM cannot detect the command device, and the communication with the storage system might fail.
>
> To prevent this failure, specify the path name allocated by udev to the configuration definition file before booting HORCM. Use the following procedure to specify the path name. In this example, the path name for `/dev/sdgh` can be found.
>
> 1. Find the special file name of the command device by using **inqraid** command. Command example:
>
>    ```
>    [root@myhost ~]# ls /dev/sd* | /HORCM/usr/bin/inqraid -
>    CLI | grep CM sda CL1-B 30095 0 - - 0000 A:00000 OPEN-V-
>    CM sdgh CL1-A 30095 0 - - 0000 A:00000 OPEN-V-CM
>    [root@myhost ~]#
>    ```
>
> 2. Find the path name from the `by-path` directory. Command example:
>
>    ```
>    [root@myhost ~]# ls -l /dev/disk/by-path/ | grep sdgh
>    lrwxrwxrwx. 1 root root 10 Jun 11 17:04 2015
>    pci-0000:08:00.0- fc-0x50060e8010311940-lun-0 -> ../../
>    sdgh [root@myhost ~]#
>    ```
>
>    In this example, "pci-0000:08:00.0-fc-0x50060e8010311940-lun-0" is the path name.
>
> 3. Enter the path name to HORCM_CMD in the configuration definition file as follows.
>
>    ```
>    HORCM_CMD /dev/disk/by-path/pci-0000:08:00.0-
>    fc-0x50060e8010311940-lun-0
>    ```
>
> 4. Boot the HORCM instance as usual.
>
> c1 and c2 in the device special file of the command device indicate the first two characters of the device file name.

## HORCM_CMD (out-of-band method)

When executing commands using the out-of-band method, use a virtual command device instead of a command device. By specifying the location to create a virtual command device in HORCM_CMD, you can create a virtual command device.

The location where the virtual command device can be created is different according to the type of the storage system. For details about locations, see System configuration using CCI.

## To create a virtual command device on an SVP

Specify the following to HORCM_CMD of the configuration definition file.

```
\\.\IPCMD-<SVP IP address>-<UDP communication port number>[-Unit ID]
```

- <SVP IP address>: Sets an IP address of SVP.

- <UDP communication port number>: Sets the UDP communication port number.

  - For VSP 5000 series, VSP G1x00, and VSP F1500: This value is fixed at 31001.

  - For VSP E series, VSP G/F350, G/F370, G/F700, G/F900, VSP G200, G400, G600, G800, VSP F400, F600, F800: Specify the UDP communication port number of the CCI server running on the SVP.

- [-Unit ID]: Sets the unit ID of the storage system for the multiple units connection configuration. This can be omitted.

## To create a virtual command device on the maintenance utility

Specify the following to HORCM_CMD of the configuration definition file:

```
\\.\IPCMD-<GUM IP address>-<UDP communication port number>[-Unit ID]
```

- <GUM IP address>: Sets an IP address of the maintenance utility (GUM).

- <UDP communication port number>: Sets the UDP communication port number. These values (31001 and 31002) are fixed.

- [-Unit ID]: Sets the unit ID of the storage system for the multiple units connection configuration. This can be omitted.

> **Note:** To use the maintenance utility, set the combination of all GUM IP addresses in the storage system and the UDP communication port numbers by an alternative configuration. For details about how to set the combination, see the *Example for case of alternative configuration of the combination of all GUM IP addresses in the storage system and the UDP communication port numbers* below.

## Using a CCI server port as a virtual command device:

Specify the following in HORCM_CMD of the configuration definition file:

```
\\.\IPCMD-<CCI server IP address>-<CCI port number>[-Unit ID]
```

- <CCI server IP address>: Sets the IP address of the CCI server.

- <CCI port number>: Sets the CCI port number.

- [-Unit ID]: Sets the unit ID of the storage system for the multiple units connection configuration. This can be omitted.

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**Example for the case of IPv4**

```
HORCM_CMD
#dev_name dev_name dev_name
\\.\IPCMD-158.214.135.113-31001
```

**Example for the case of IPv6**

```
HORCM_CMD
#dev_name dev_name dev_name
\\.\IPCMD-fe80::209:6bff:febe:3c17-31001
```

**Example for the case when both the in-band and out-band methods are used**

```
HORCM_CMD
#dev_name dev_name dev_name
\\.\CMD-64015:/dev/rdsk/*  \\.\IPCMD-158.214.135.113-31001
```

**Example for the case when both the in-band and out-band methods are used in a command device alternative configuration**

```
HORCM_CMD
#dev_name dev_name
\\.\CMD-64015:/dev/rdsk/*  \\.\IPCMD-158.214.135.113-31001
HORCM_CMD
#dev_name dev_name
\\.\IPCMD-158.214.135.113-31001  \\.\CMD-64015:/dev/rdsk/*
```

**Example for the case of virtual command devices in a cascade configuration (three units)**

```
HORCM_CMD
#dev_name dev_name dev_name
\\.\IPCMD-158.214.135.113-31001
\\.\IPCMD-158.214.135.114-31001
\\.\IPCMD-158.214.135.115-31001
```

**Example for case of alternative configuration of the combination of all GUM IP addresses in the storage system and the UDP communication port numbers. In this case, enter the IP address without a line feed.**

```
HORCM_CMD#dev_name dev_name dev_name\\.\IPCMD-192.168.0.16-31001\\.\IPCMD-
192.168.0.17-31001\\.\IPCMD-192.168.0.16-31002\\.\IPCMD-192.168.0.17-31002
```

An IP address and a port number can be expressed using a host name and a service name.

## HORCM_DEV

The device parameter (HORCM_DEV) defines the RAID storage system device addresses for the paired logical volume names. When the server is connected to two or more storage systems, the unit ID is expressed by port# extension. Each group name is a unique name discriminated by a server that uses the volumes, the attributes of the volumes (such as database data, redo log file, UNIX file), recovery level, etc. The group and paired logical volume names described in this item must reside in the remote server. The hardware iSCSI/Fibre port, target ID, and LUN as hardware components need not be the same.

The following values are defined in the HORCM_DEV parameter:

**dev_group**

Names a group of paired logical volumes. A command is executed for all corresponding volumes according to this group name.

**dev_name**

Names the paired logical volume within a group (that is, name of the special file or unique logical volume). The name of paired logical volume must be different to the dev name in another group.

**Port#**

Defines the RAID storage system port number of the volume that connects to the dev_name volume. The following "n" shows unit ID when the server is connected to two or more storage systems (for example, CL1-A1 = CL1-A in unit ID 1). If the "n" option is omitted, the unit ID is 0. The port is not case sensitive (for example, CL1-A = cl1-a = CL1-a = cl1-A).

| - | Basic | | | | Option | | | | Option | | | | Option | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CL1 | An | Bn | Cn | Dn | En | Fn | Gn | Hn | Jn | Kn | Ln | Mn | Nn | Pn | Qn | Rn |
| CL2 | An | Bn | Cn | Dn | En | Fn | Gn | Hn | Jn | Kn | Ln | Mn | Nn | Pn | Qn | Rn |

The following ports can be specified only for the 9900V:

| - | Basic | | | | Option | | | | Option | | | | Option | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CL3 | an | bn | cn | dn | en | fn | gn | hn | jn | kn | ln | mn | nn | pn | qn | rn |
| CL4 | an | bn | cn | dn | en | fn | gn | hn | jn | kn | ln | mn | nn | pn | qn | rn |

For 9900V, CCI supports four types of port names for host groups:

- Specifying the port name without a host group: CL1-A CL1-An, where n is the unit ID if there are multiple RAID storage systems

- Specifying the port name with a host group: CL1-A-g, where g is the host group CL1-An-g, where n-g is the host group g on CL1-A in unit ID=n

The following ports can be specified for USP V/VM:

| - | Basic | | | | Option | | | | Option | | | | Option | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CL5 | an | bn | cn | dn | en | fn | gn | hn | jn | kn | ln | mn | nn | pn | qn | rn |
| CL6 | an | bn | cn | dn | en | fn | gn | hn | jn | kn | ln | mn | nn | pn | qn | rn |
| CL7 | an | bn | cn | dn | en | fn | gn | hn | jn | kn | ln | mn | nn | pn | qn | rn |
| CL8 | an | bn | cn | dn | en | fn | gn | hn | jn | kn | ln | mn | nn | pn | qn | rn |
| CL9 | an | bn | cn | dn | en | fn | gn | hn | jn | kn | ln | mn | nn | pn | qn | rn |
| CLA | an | bn | cn | dn | en | fn | gn | hn | jn | kn | ln | mn | nn | pn | qn | rn |
| CLB | an | bn | cn | dn | en | fn | gn | hn | jn | kn | ln | mn | nn | pn | qn | rn |
| CLC | an | bn | cn | dn | en | fn | gn | hn | jn | kn | ln | mn | nn | pn | qn | rn |
| CLD | an | bn | cn | dn | en | fn | gn | hn | jn | kn | ln | mn | nn | pn | qn | rn |
| CLE | an | bn | cn | dn | en | fn | gn | hn | jn | kn | ln | mn | nn | pn | qn | rn |
| CLF | an | bn | cn | dn | en | fn | gn | hn | jn | kn | ln | mn | nn | pn | qn | rn |
| CLG | an | bn | cn | dn | en | fn | gn | hn | jn | kn | ln | mn | nn | pn | qn | rn |

**Target ID**

Defines the iSCSI/Fibre target ID (TID) number of the physical volume on the specified port.

**LU#**

Defines the iSCSI/Fibre logical unit number (LU#) of the physical volume on the specified target ID and port.

> **Note:** In case of fibre channel, if the TID and LU# displayed on the system are different than the TID on the fibre address conversion table, then you must use the TID and LU# indicated by the `raidscan` command in the CCI configuration file.

**MU# for ShadowImage (HOMRCF)**

Defines the mirror unit number (0 - 2) to use the redundant mirror for the identical LU on the ShadowImage. If this number is omitted, it is assumed to be (MU#0). The cascaded mirroring of the S-VOL is expressed as virtual volumes using the mirror descriptors (MU#1-2) in the configuration definition file. The MU#0 of a mirror descriptor is used for connection of the S-VOL. The mirror descriptor (MU#0-2) can be used in ShadowImage and Copy-on-Write Snapshot. MU#3-63 can be used in Copy-on-Write Snapshot only. When you enter the MU number for a ShadowImage/Copy-on-Write Snapshot pair into the configuration definition file, specify only the number, for example, "0" or "1".

> 📄 **Note:** When you enter the MU number for a ShadowImage/Copy-on-Write Snapshot pair into the configuration definition file, if you add an "h" before the number, for example, "h0" or "h1", it might not be recognized as a ShadowImage/Copy-on-Write Snapshot pair and might not be operated.

| | SMPL | | P-VOL | | S-VOL | |
|---|---|---|---|---|---|---|
| **Feature** | **MU#0-2** | **MU#3 - 63** | **MU#0-2** | **MU#3 - 63** | **MU# 0** | **MU#1 - 63** |
| ShadowImage | Valid | Not valid | Valid | Not valid | Valid | Not valid |
| Copy-on-Write Snapshot | Valid | Valid | Valid | Valid | Valid | Not valid |

**MU# for TrueCopy/Universal Replicator/global-active device**

Defines the mirror unit number (0 - 3) if using redundant mirror for the identical LU on TC/UR/GAD. If this number is omitted, it is assumed to be (MU#0). You can specify only MU#0 for TrueCopy, and 4 MU numbers (MU#0 - 3) for Universal Replicator and global-active device. When you enter the MU number for a TC/UR/GAD pair into the configuration definition file, add an "h" before the number, for example, "h0" or "h1".

> 📄 **Note:** When you enter the MU number for a TC/UR/GAD pair into the configuration definition file, if you specify the number without adding an "h" before, for example, "0" or "1", it might not be recognized as a TC/UR/GAD pair and might not be operated.

| | SMPL | | P-VOL | | S-VOL | |
|---|---|---|---|---|---|---|
| **Feature** | **MU#0** | **MU#1 - 3** | **MU#0** | **MU#1 - 3** | **MU#0** | **MU#1 - 3** |
| TrueCopy | Valid | Not valid | Valid | Not valid | Valid | Not valid |
| UR | Valid | Valid | Valid | Valid | Valid | Valid |

## HORCM_INST

The instance parameter (HORCM_INST) defines the network address (IP address) of the remote server (active or standby). It is used to view or change the status of the paired volume in the remote server (active or standby). When the primary volume is shared by two or more servers, there are two or more remote servers using the secondary volume. Thus, it is necessary to describe the addresses of all of these servers.

The following values are defined in the HORCM_INST parameter:

**dev_group**

The server name described in dev_group of HORC_DEV.

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**ip_address**

> The network address of the specified remote server.

**service**

> The port name assigned to the HORCM communication path (registered in the /etc/ services file). If a port number is specified instead of a port name, the port number will be used.

A configuration for multiple networks can be found using the `raidqry -r <group>` command on each host. The current HORCM network address can be changed using `horcctl -NC <group>` on each host.

When you use all IP addresses of the local host in a configuration for multiple networks, specify NONE (for IPv4) or NONE6 (for IPv6) to the ip_address of the HORCM_MON parameter.

See the figure below for configuration for multiple networks.

```
HORCM_MON                                           HORCM_MON
#ip_address  service poll(10ms)  timeout(10ms)      #ip_address  service poll(10ms)  timeout(10ms)
NONE         horcm    1000        3000               NONE         horcm    1000        3000
.                                                    .
.                                                    .
HORCM_INST                                          HORCM_INST
#dev_group  ip_address       service               #dev_group  ip_address       service
oradb       HST1_IPA         horcm                  oradb       HST2_IPA         horcm
oradb       HST1_IPB         horcm                  oradb       HST3_IPA         horcm
                                                    oradb       HST2_IPB         horcm
                                                    oradb       HST3_IPB         horcm
```
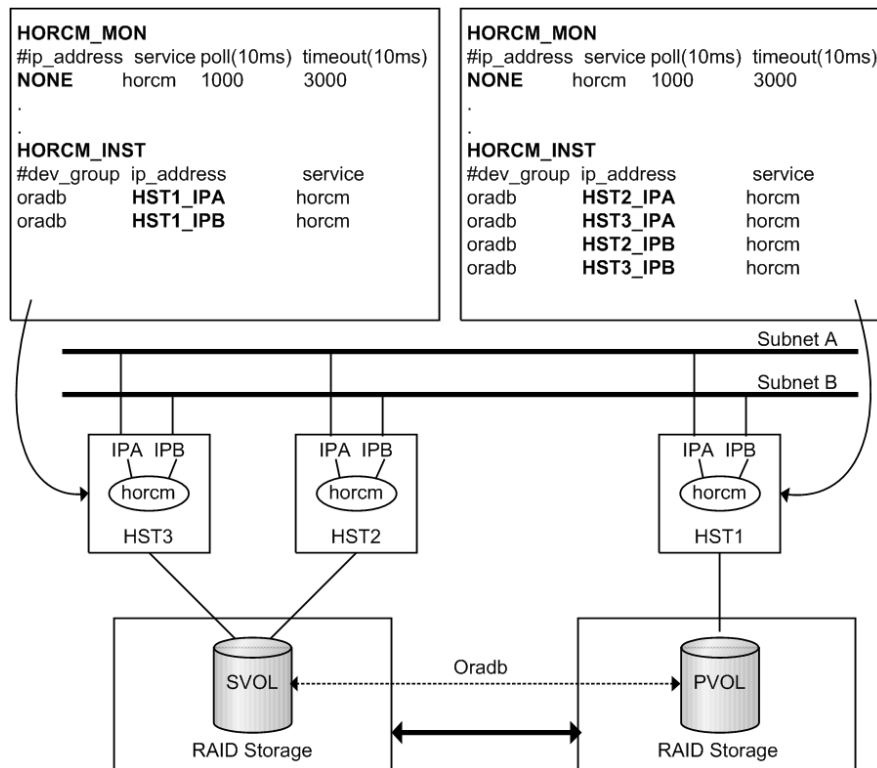


## HORCM_LDEV

The HORCM_LDEV parameter is used for specifying stable LDEV# and Serial# as the physical volumes corresponding to the paired logical volume names. Each group name is unique and typically has a name fitting its use (for example, database data, Redo log file, UNIX file). The group and paired logical volume names described in this item must also be known to the remote server.

**dev_group**

> This parameter is the same as HORCM_DEV parameter.

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**dev_name**

This parameter is the same as HORCM_DEV parameter.

**MU#**

This parameter is the same as HORCM_DEV parameter.

**Serial#**

This parameter is used to specify the serial number of RAID box.

▪ When specifying the serial number for VSP 5000 series, add a "5" at the beginning of the serial number. For example, for serial number 12345, enter 512345.

▪ When specifying the serial number for VSP G1x00 and VSP F1500, add a "3" at the beginning of the serial number. For example, for serial number 12345, enter 312345.

**CU:LDEV(LDEV#)**

This parameter is used to describe the LDEV number in the RAID storage system and supports three types of format as LDEV#.

```
#dev_group    dev_name    Serial#         CU:LDEV(LDEV#)    MU#
    oradb     dev1        30095           02:40               0
    oradb     dev2        30095           02:41               0
```

▪ Specifying "CU:LDEV" in hex.

Example for LDEV# 260:

01:04

▪ Specifying "LDEV" in decimal used by the CCI inqraid command.

Example for LDEV# 260:

260

▪ Specifying "LDEV" in hex used by the CCI inqraid command.

Example for LDEV# 260:

0x104

> 📄 **Note:** The HORCM_LDEV format can only be used on the TagmaStore USP/TagmaStore NSC. LDEV# will be converted to "Port#, Targ#, Lun#" mapping to this LDEV internally, because the RAID storage system needs to specify "Port#, Targ#, Lun#" for the target device. This feature is TagmaStore USP/TagmaStore NSC microcode dependent; if HORCM fails to start, HORCM_DEV needs to be used.

## HORCM_LDEVG

The HORCM_LDEVG parameter defines the device group information that the CCI instance reads. For details about device group, see LDEV grouping function.

The following values are defined.

**Copy group**

Specifies a name of copy group. This is equivalent to the dev_group of HORCM_DEV and HORCM_LDEV parameters.

CCI operates by using the information defined here.

**ldev_group**

Specifies a name of device group that the CCI instance reads.

**Serial#:**

Specifies a storage system serial number.

- When specifying the serial number for VSP 5000 series, add a "5" at the beginning of the serial number. For example, for serial number 12345, enter 512345.

- When specifying the serial number for VSP G1x00 and VSP F1500, add a "3" at the beginning of the serial number. For example, for serial number 12345, enter 312345.

```
HORCM_LDEVG
#Copy_Group  ldev_group  Serial#
ora          grp1        64034
```

## HORCM_INSTP

The HORCM_INSTP parameter is used when specifying a path ID for the link of TrueCopy/Universal Replicator/global-active device as well as HORCM_INST parameter. You can specify from 1 to 255 for the path ID. If you do not specify the Path ID, the behavior is the same as when 'HORCM_INST' is used.

```
HORCM_INSTP
dev_group      ip_address      service    pathID
VG01           HSTA            horcm      1
VG02           HSTA            horcm      2
```

📄 **Note:** The path ID can be specified at TrueCopy, Universal Replicator, Universal Replicator for Mainframe, and global-active device. However, the path ID cannot be specified at UR/URz when connecting USP V/VM and USP/NSC. The same path ID must be specified between the site of P-VOL and S-VOL because the path ID is used at the **paircreate** command.

## HORCM_ALLOW_INST

The HORCM_ALLOW_INST parameter is used to restrict the users using the virtual command device. The allowed IP addresses and port numbers are as follows.

**For IPv4**

```
HORCM_ALLOW_INST
#ip_address      service
```

```
158.214.135.113  34000
158.214.135.114  34000
```

**For IPv6**

```
HORCM_ALLOW_INST
#ip_address       service
fe80::209:6bff:febe:3c17  34000
```

> 📄 **Note:** Note: If CCI clients not defined HORCM_ALLOW_INST, HORCM instance starting up is rejected by SCSI check condition (SKEY=0x05, ASX=0xfe) and CCI cannot be started up.

### HORCM_NVME

The HORCM_NVME parameter is used to perform the following operations:

- Define a namespace for NVMe-oF as a command device.
- Perform the operation on a pair volume with a namespace for NVMe-oF defined by enabling the command device security setting.

To perform these operations, specify the following:

```
HORCM_NVME
ENABLE
```

To cancel these operations, specify the following:

```
HORCM_NVME
DISABLE
```

If HORCM_NVME is omitted, the same processing as when DISABLE is specified is running.

For more information about the CCI versions supported when a namespace is defined as a command device, see Command device (on page 29).

## Correspondence of the configuration definition file for cascading volume and mirror descriptors

The CCI software (HORCM) is capable of keeping a record of the multiple pair configurations per LDEV. CCI distinguishes the records of the each pair configuration by MU#. You can assign 64 MU#s for local copy products and 4 MU#s for remote copy products as the following figure, you can define up to 68 device groups (records of pair configuration) in the configuration definition file.

See the following figure for management of pair configuration by mirror descriptors.
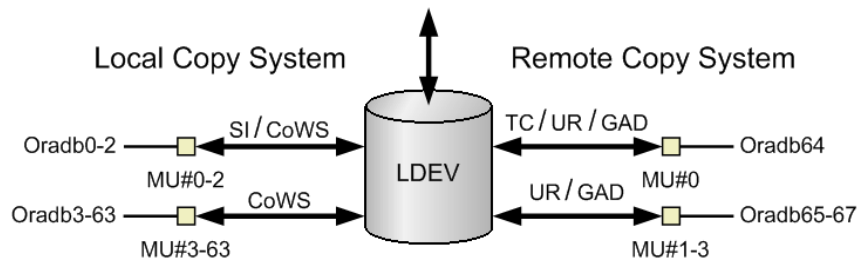
**Legend**
SI: ShadowImage    CoWS: Copy-on-Write Snapshot
TC: TrueCopy    UR: Universal Replicator    GAD: global-active device

## Correspondence of configuration file and mirror descriptors

The group name and MU# that are noted in the HORCM_DEV section of the configuration definition file are assigned to the corresponding mirror descriptors. This outline is described in the following table. "Omission of MU#" is handled as MU#0, and the specified group is registered to MU#0 on ShadowImage/Copy-on-Write Snapshot and TrueCopy/Universal Replicator/global-active device. Also, when you note the MU# in HORCM_DEV, the sequence of the MU# can be random (for example, 2, 1, 0).

| | MU#0 | | ShadowImage (Copy-on-Write Snapshot) only | UR/GAD |
|---|---|---|---|---|
| **HORCM_DEV parameter in configuration file** | **TC/ UR/ GAD** | **SI** | **MU#1-#2** <br> **(MU#3-#63)** | **MU#1-#3** |
| `HORCM_DEV` | oradev1 | oradev1 | – | – |
| `#dev_group  dev_name  port#  TargetID` <br> `LU# MU#` | | | | |
| `Oradb      oradev1  CL1-D    2      1` | | | | |

| HORCM_DEV parameter in configuration file | MU#0 | | ShadowImage (Copy-on-Write Snapshot) only | UR/GAD |
| | TC/ UR/ GAD | SI | MU#1-#2 (MU#3-#63) | MU#1-#3 |
|---|---|---|---|---|
| `HORCM_DEV`<br><br>`#dev_group  dev_name  port#  TargetID LU# MU#`<br><br>`Oradb       oradev1   CL1-D     2     1`<br><br>`Oradb1      oradev11  CL1-D     2 1    1`<br><br>`Oradb2      oradev21  CL1-D     2 1    2` | oradev1 | oradev1 | oradev11<br><br>oradev21 | – |
| `HORCM_DEV`<br><br>`#dev_group  dev_name  port#  TargetID LU# MU#`<br><br>`Oradb       oradev1   CL1-D     2     1`<br><br>`Oradb1      oradev11  CL1-D     2 1    0`<br><br>`Oradb2      oradev21  CL1-D     2 1    1`<br><br>`Oradb3      oradev31  CL1-D     2 1    2` | oradev1 | oradev11 | oradev21<br><br>oradev31 | – |

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| HORCM_DEV parameter in configuration file | MU#0 | | ShadowImage (Copy-on-Write Snapshot) only | UR/GAD |
| | TC/ UR/ GAD | SI | MU#1-#2 (MU#3-#63) | MU#1-#3 |
| --- | --- | --- | --- | --- |
| HORCM_DEV<br><br>#dev_group  dev_name  port#  TargetID LU# MU#<br><br>Oradb        oradev1   CL1-D     2 1    0 | – | oradev1 | – | – |
| HORCM_DEV<br><br>#dev_group  dev_name  port#  TargetID LU# MU#<br><br>Oradb        oradev1   CL1-D     2 1    h0 | oradev1 | – | – | – |
| HORCM_DEV<br><br>#dev_group  dev_name  port#  TargetID LU# MU#<br><br>Oradb        oradev1   CL1-D     2 1    0<br><br>Oradb1       oradev1   CL1-D     2 1    1<br><br>Oradb2       oradev21  CL1-D     2 1    2 | – | oradev1 | oradev11<br><br>oradev21 | – |

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| HORCM_DEV parameter in configuration file | MU#0 | | ShadowImage (Copy-on-Write Snapshot) only | UR/GAD |
| --- | --- | --- | --- | --- |
| | TC/ UR/ GAD | SI | MU#1-#2 (MU#3-#63) | MU#1-#3 |
| `HORCM_DEV` | oradev1 | oradev11 | – | oradev21 |
| `#dev_group  dev_name  port#  TargetID LU# MU#` | | | | oradev31 |
| | | | | oradev41 |
| `Oradb       oradev1  CL1-D     2      1` | | | | |
| `Oradb1      oradev11 CL1-D     2` `1    0` | | | | |
| `Oradb2      oradev21 CL1-D     2` `1    h1` | | | | |
| `Oradb3      oradev31 CL1-D     2` `1    h2` | | | | |
| `Oradb4      oradev41 CL1-D     2` `1    h3` | | | | |

## Cascading connection and configuration files

A volume of the cascading connection describes entity in a configuration definition file on the same instance, and classifies connection of volume through the mirror descriptor. In case of TrueCopy/ShadowImage cascading connection, too, the volume entity describes to a configuration definition file on the same instance. The following figure shows an example.

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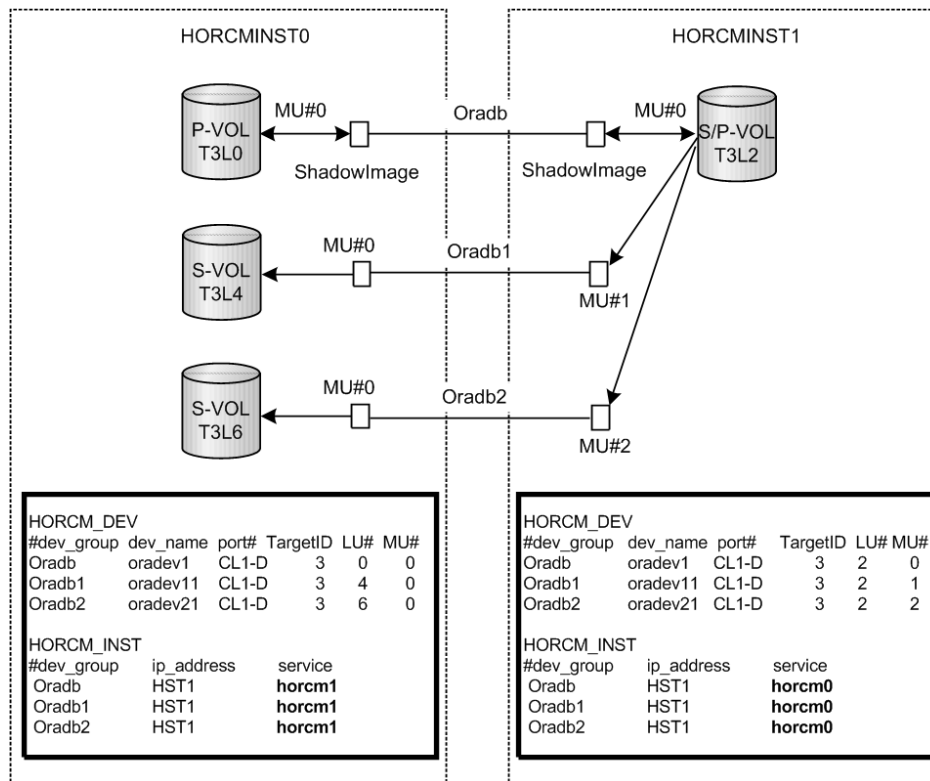
## ShadowImage

Since ShadowImage is a mirrored configuration within one storage system, it can be described as a volume of the cascading connection according to two configuration definition files. For a ShadowImage-only cascading connection, the specified group is assigned to the mirror descriptor (MU#) of ShadowImage, specifically defining "0" as the MU# for ShadowImage. The following figures show ShadowImage cascading configurations and the **pairdisplay** information for each configuration.

### Pairdisplay on HORCMINST0
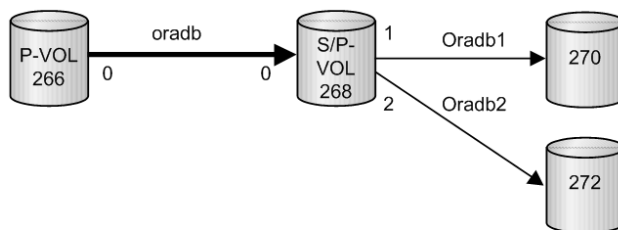


```
# pairdisplay -g oradb -m cas
Group   PairVol(L/R) (Port#,TID,LU-M),Seq#,LDEV#.P/S,Status, Seq#,P-LDEV# M
oradb   oradev1(L)  (CL1-D , 3,  0-0) 30053  266..P-VOL PAIR,30053    268  -
oradb   oradev1(R)  (CL1-D , 3,  2-0) 30053  268..S-VOL PAIR,-----    266  -
oradb1  oradev11(R) (CL1-D , 3,  2-1) 30053  268..P-VOL PAIR,30053    270  -
oradb2  oradev21(R) (CL1-D , 3,  2-2) 30053  268..P-VOL PAIR,30053    272  -
```

**Pairdisplay on HORCMINST1**
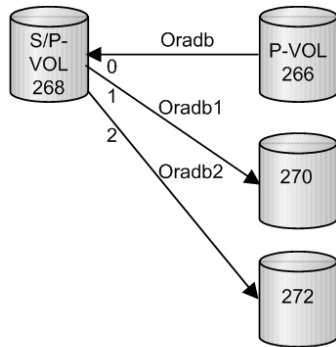


```
# pairdisplay -g oradb -m cas
Group   PairVol(L/R) (Port#,TID,LU-M),Seq#,LDEV#.P/S,Status, Seq#,P-LDEV# M
oradb   oradev1(L)   (CL1-D , 3,  2-0)30053   268..S-VOL PAIR,-----      266  -
oradb1  oradev11(L) (CL1-D , 3,  2-1)30053  268..P-VOL PAIR,30053    270  -
oradb2  oradev21(L) (CL1-D , 3,  2-2)30053  268..P-VOL PAIR,30053    272  -
oradb    oradev1(R)   (CL1-D , 3,  0-0)30053   266..P-VOL PAIR,30053    268  -
```
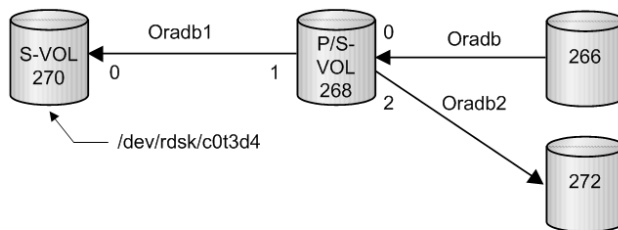
**Pairdisplay on HORCMINST0**



```
# pairdisplay -d /dev/rdsk/c0t3d4 -m cas
Group   PairVol(L/R) (Port#,TID,LU-M),Seq#,LDEV#.P/S,Status, Seq#,P-LDEV# M
oradb1  oradev11(L) (CL1-D , 3,  4-0)30053   270..S-VOL PAIR,-----      268  -
oradb1  oradev11(R) (CL1-D , 3,  2-1)30053  268..P-VOL  PAIR,30053    270  -
oradb    oradev1(R)   (CL1-D , 3,  2-0)30053  268..S-VOL  PAIR,-----      266  -
oradb2  oradev21(R) (CL1-D , 3,  2-2)30053  268..P-VOL  PAIR,30053    272  -
```

## Cascading connections for TrueCopy and ShadowImage

The cascading connections for TrueCopy/ShadowImage can be set up by using three configuration definition files that describe the cascading volume entity in a configuration definition file on the same instance. The mirror descriptor of ShadowImage and TrueCopy definitely describe "0" as MU#, and the mirror descriptor of TrueCopy does not describe "0" as MU#.

## TrueCopy/ShadowImage cascading connection and configuration file
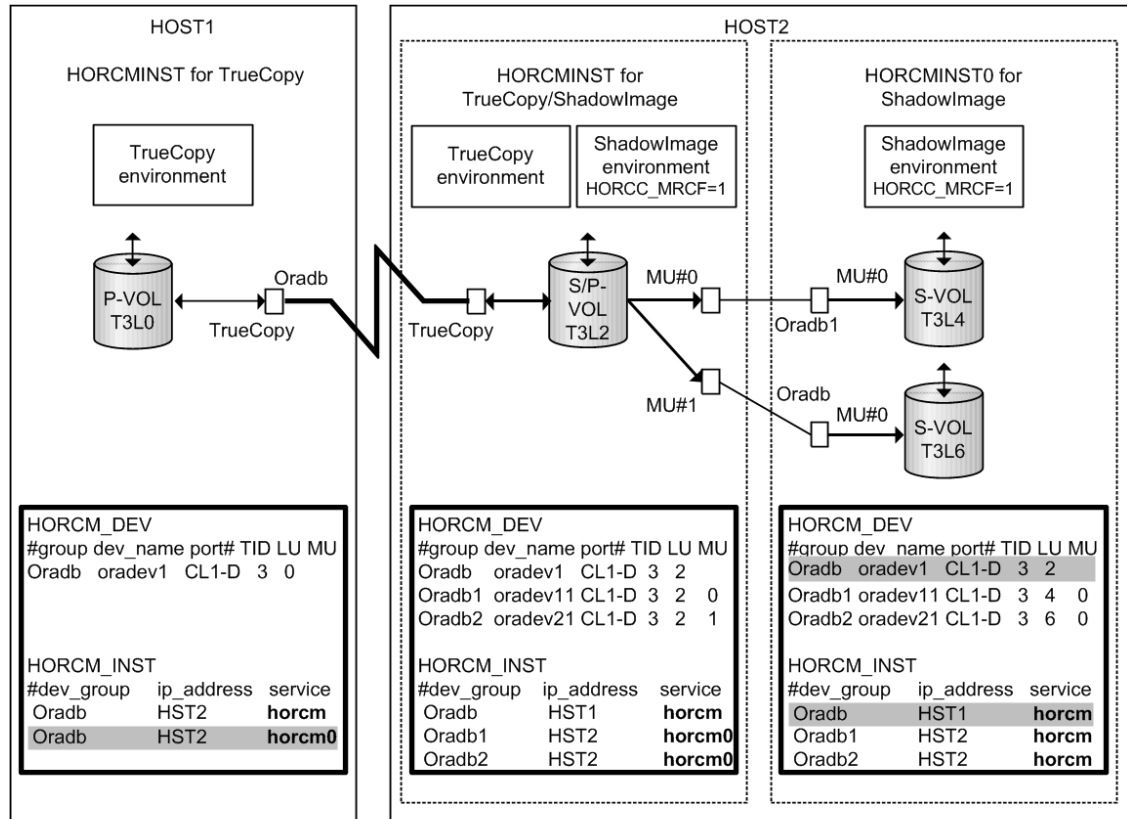


*Note:* Shaded portions: If HORCMINST0 needs to manage Hitachi TrueCopy's paired volume, and then "oradb" must describe that there is a connection to HST1 via HORCMINST0.

The following figures show TrueCopy/ShadowImage cascading configurations and the `pairdisplay` information for each configuration.

## Pairdisplay for TrueCopy on HOST1
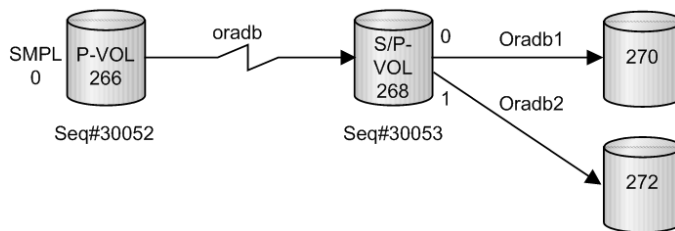


```
# pairdisplay -g oradb -m cas
Group   PairVol(L/R) (Port#,TID,LU-M),Seq#,LDEV#.P/S,Status, Seq#,P-LDEV# M
oradb   oradev1(L)   (CL1-D , 3,  0-0) 30052   266..SMPL  ----,-----        ----   -
oradb   oradev1(L)   (CL1-D , 3,  0)   30052   266..P-VOL COPY,30053   268    -
oradb1  oradev11(R)  (CL1-D , 3,  2-0) 30053   268..P-VOL COPY,30053   270    -
oradb2  oradev21(R)  (CL1-D , 3,  2-1) 30053   268..P-VOL PSUS,30053   272    W
oradb   oradev1(R)   (CL1-D , 3,  2)   30053   268..S-VOL COPY,-----    266    -
```

**Pairdisplay for TrueCopy on HOST2 (HORCMINST)**
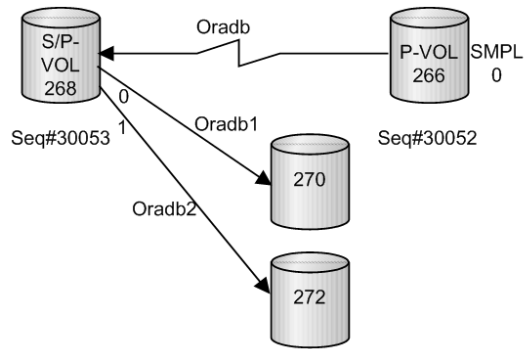


```
# pairdisplay -g oradb -m cas
Group   PairVol(L/R) (Port#,TID,LU-M),Seq#,LDEV#.P/S,Status, Seq#,P-LDEV# M
oradb1 oradev11(L)  (CL1-D , 3,  2-0) 30053 268..P-VOL PAIR,30053   270  -
oradb2 oradev21(L)  (CL1-D , 3,  2-1) 30053 268..P-VOL PSUS,30053   272  W
oradb   oradev1(L)   (CL1-D , 3,  2)   30053 268..S-VOL PAIR, -----     266 -
oradb   oradev1(R)   (CL1-D , 3,  0-0) 30052 266..SMPL ----,   -----      ---- -
oradb   oradev1(R)   (CL1-D , 3,  0)   30052 266..P-VOL PAIR, 30053   268 -
```
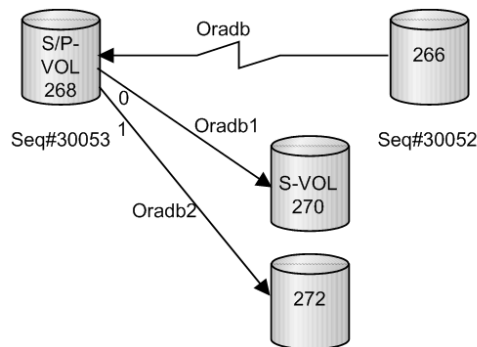
**Pairdisplay for ShadowImage on HOST2 (HORCMINST)**



```
# pairdisplay -g oradb1 -m cas
Group   PairVol(L/R) (Port#,TID,LU-M),Seq#,LDEV#.P/S,Status, Seq#,P-LDEV# M
oradb1  oradev11(L) (CL1-D , 3,  2-0) 30053  268..P-VOL PAIR,30053   270   -
oradb2  oradev21(L) (CL1-D , 3,  2-1) 30053  268..P-VOL PSUS,30053   272   W
oradb   oradev1(L)  (CL1-D , 3,  2)    30053  268..S-VOL PAIR, -----     266   -
oradb   oradev11(R)  (CL1-D , 3,  4-0) 30053  270..S-VOL PAIR, -----     268   -
```

**Pairdisplay for ShadowImage on HOST2 (HORCMINST0)**



```
# pairdisplay -g oradb1 -m cas
Group   PairVol(L/R) (Port#,TID,LU-M),Seq#,LDEV#.P/S,Status, Seq#,P-LDEV# M
oradb1  oradev11(L) (CL1-D , 3,  4-0) 30053  270..S-VOL PAIR,-----     268    -
oradb2  oradev11(R) (CL1-D , 3,  2-0) 30053  268..P-VOL PAIR, 30053   270    -
oradb2  oradev21(R) (CL1-D , 3,  2-1) 30053  268..P-VOL PSUS,30053   272    W
oradb   oradev1  (R) (CL1-D , 3,  2)   30053  268..S-VOL PAIR,  -----     266    -

# pairdisplay -d /dev/rdsk/c0t3d4 -m cas
Group   PairVol(L/R) (Port#,TID,LU-M),Seq#,LDEV#.P/S,Status, Seq#,P-LDEV# M
oradb1  oradev11(L) (CL1-D , 3,  4-0) 30053  270..S-VOL PAIR,-----     268    -
oradb2  oradev11(R) (CL1-D , 3,  2-0) 30053  268..P-VOL PAIR, 30053   270    -
oradb2  oradev21(R) (CL1-D , 3,  2-1) 30053  268..P-VOL PSUS,30053   272    W
oradb   oradev1  (R) (CL1-D , 3,  2)   30053  268..S-VOL PAIR,  -----     266    -
```

# CCI software files

The CCI software consists of files supplied with the software, log files created internally, and files created by the user. These files are stored on the local disk in the server machine.

- CCI files supplied with the software (on page 68)
- CCI log and trace files (on page 76)
- User environment variable (on page 86)

## CCI files supplied with the software

- CCI files for UNIX-based systems (on page 68)
- CCI files for Windows-based systems (on page 71)
- CCI files for OpenVMS-based systems (on page 74)

### CCI files for UNIX-based systems

| Title | File name | Command name | Mode | User[1] | Group |
|---|---|---|---|---|---|
| HORCM | /etc/horcmgr | horcmd | 0544 | root | sys |
| HORCM_CONF | /HORCM/etc/horcm.conf | - | 0444 | root | sys |
| Takeover | /usr/bin/horctakeover | horctakeover | 0544 | root | sys |

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| Title | File name | Command name | Mode | User[1] | Group |
|---|---|---|---|---|---|
| Takeover for 3DC | /usr/bin/horctakeoff | horctakeoff | 0544 | root | sys |
| Accessibility check | /usr/bin/paircurchk | paircurchk | 0544 | root | sys |
| Pair generation | /usr/bin/paircreate | paircreate | 0544 | root | sys |
| Pair splitting | /usr/bin/pairsplit | pairsplit | 0544 | root | sys |
| Pair resynchronization | /usr/bin/pairresync | pairresync | 0544 | root | sys |
| Event waiting | /usr/bin/pairevtwait | pairevtwait | 0544 | root | sys |
| Error notification | /usr/bin/pairmon | pairmon | 0544 | root | sys |
| Volume check | /usr/bin/pairvolchk | pairvolchk | 0544 | root | sys |
| Pair configuration confirmation | /usr/bin/pairdisplay | pairdisplay | 0544 | root | sys |
| RAID scanning | /usr/bin/raidscan | raidscan | 0544 | root | sys |
| RAID activity reporting | /usr/bin/raidar | raidar | 0544 | root | sys |
| Connection confirming | /usr/bin/raidqry | raidqry | 0544 | root | sys |
| Trace control | /usr/bin/horcctl | horcctl | 0544 | root | sys |
| HORCM activation script | /usr/bin/horcmstart.sh | horcmstart.sh | 0544 | root | sys |
| HORCM shutdown script | /usr/bin/horcmshutdown.sh | horcmshutdown.sh | 0544 | root | sys |
| Connection confirming | /HORCM/usr/bin/inqraid | -- | 0544 | root | sys |
| Synchronous waiting | /usr/bin/pairsyncwait | pairsyncwait | 0544 | root | sys |
| Configuration file making | /HORCM/Tool/mkconf.sh | -- | 0544 | root | sys |

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| Title | File name | Command name | Mode | User[1] | Group |
|---|---|---|---|---|---|
| Configuration setting and confirming command | /HORCM/usr/bin/raidcfg | raidcfg | 0544 | root | sys |
| Text filtering | /HORCM/usr/bin/rmawk | -- | 0544 | root | sys |
| Data Retention Utility setting | /usr/bin/raidvchkset | raidvchkset | 0544 | root | sys |
| Data Retention Utility confirmation | /usr/bin/raidvchkdsp | raidvchkdsp | 0544 | root | sys |
| Data Retention Utility confirmation | /usr/bin/raidvchkscan | raidvchkscan | 0544 | root | sys |
| Storage Replication Adapter | /HORCM/usr/bin/rmsra | rmsra | 0544 | root | sys |
| Storage Replication Adapter | /HORCM/usr/bin/rmsra20 | rmsra20 | 0544 | root | sys |
| Configuration setting and confirming command | /usr/bin/raidcom | raidcom | 0544 | root | sys |
| Scriptable command | /HORCM/usr/bin/rmawk | rmawk | 0544 | root | sys |
| A file for management | /HORCM/etc/ Raidcom_Dic_Raid_RM_Patch .txt | - | 0444 | root | sys |
| A file for management | /HORCM/etc/ Raidcom_Help_Raid_RM.txt | - | 0444 | root | sys |
| A file for management | /HORCM/etc/ Raidcom_Dic_Raid_RM.txt | - | 0444 | root | sys |
| A library for GUM communication | /HORCM/etc/libcrypto.so.1.1[2] | - | 0544 | root | sys |

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| Title | File name | Command name | Mode | User[1] | Group |
|---|---|---|---|---|---|
| A library for GUM communication | /HORCM/etc/libssl.so.1.1[2] | - | 0544 | root | sys |

> 📄 **Note:**
> 1. For information and instructions for changing the UNIX user for the CCI software, see the *Command Control Interface Installation and Configuration Guide*.
> 2. This file is included only in the CCI software for x64.

## CCI files for Windows-based systems

| Title | File name | Command name |
|---|---|---|
| HORCM | \HORCM\etc\horcmgr.exe | horcmd |
| HORCM_CONF | \HORCM\etc\horcm.conf | - |
| Takeover | \HORCM\etc\horctakeover.exe | horctakeover |
| Takeover for 3DC | \HORCM\etc\horctakeoff.exe | horctakeoff |
| Accessibility check | \HORCM\etc\paircurchk.exe | paircurchk |
| Pair generation | \HORCM\etc\paircreate.exe | paircreate |
| Pair split | \HORCM\etc\pairsplit.exe | pairsplit |
| Pair re-synchronization | \HORCM\etc\pairresync.exe | pairresync |
| Event waiting | \HORCM\etc\pairevtwait.exe | pairevtwait |
| Error notification | \HORCM\etc\pairmon.exe | pairmon |
| Volume checking | \HORCM\etc\pairvolchk.exe | pairvolchk |
| Pair configuration confirmation | \HORCM\etc\pairdisplay.exe | pairdisplay |
| RAID scanning | \HORCM\etc\raidscan.exe | raidscan |
| RAID activity reporting | \HORCM\etc\raidar.exe | raidar |
| Connection confirmation | \HORCM\etc\raidqry.exe | raidqry |
| Trace control | \HORCM\etc\horcctl.exe | horcctl |

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| Title | File name | Command name |
|---|---|---|
| HORCM activation script | \HORCM\etc\horcmstart.exe | horcmstart |
| HORCM shutdown script | \HORCM\etc\horcmshutdown.exe | horcmshutdown |
| Synchronous waiting | \HORCM\etc\pairsyncwait.exe | pairsyncwait |
| Connection confirmation | \HORCM\etc\inqraid.exe | inqraid |
| Configuration file making | \HORCM\Tool\mkconf.exe | mkconf |
| Text filtering | \HORCM\Tool\rmawk.exe | rmawk |
| Data Retention Utility setting | \HORCM\etc\raidvchkset.exe | raidvchkset |
| Data Retention Utility confirmation | \HORCM\etc\raidvchkdsp.exe | raidvchkdsp |
| Data Retention Utility confirmation | \HORCM\etc\raidvchkscan.exe | raidvchkscan |
| Configuration setting and confirming command | \HORCM\etc\raidcfg.exe | raidcfg |
| Configuration setting and confirming command | \HORCM\etc\raidcom.exe | raidcom |
| Scriptable command | \HORCM\etc\rmawk.exe | rmawk |
| A file for management | \HORCM\etc\Raidcom_Dic_Raid_RM_Patch.txt | - |
| A file for management | \HORCM\etc\Raidcom_Help_Raid_RM.txt | - |
| A file for management | \HORCM\etc\Raidcom_Dic_Raid_RM.txt | - |
| Tool | \HORCM\Tool\chgacl.exe | chgacl |
| Tool | \HORCM\Tool\svcexe.exe | svcexe |
| Sample script for svcexe | \HORCM\Tool\HORCM0_run.txt | - |
| Tool | \HORCM\Tool\TRCLOG.bat | TRCLOG |
| Tool | \HORCM\Tool\RMVersionEdit.bat | RMVersionEdit |
| Storage Replication Adapter | \HORCM\etc\rmsra.exe | rmsra |
| Storage Replication Adapter | \HORCM\etc\rmsra20.exe | rmsra20 |
| Takeover | \HORCM\usr\bin\horctakeover.exe | horctakeover |
| Accessibility check | \HORCM\usr\bin\paircurchk.exe | paircurchk |

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| Title | File name | Command name |
|---|---|---|
| Pair generation | \HORCM\usr\bin\paircreate.exe | paircreate |
| Pair split | \HORCM\usr\bin\pairsplit.exe | pairsplit |
| Pair re-synchronization | \HORCM\usr\bin\pairresync.exe | pairresync |
| Event waiting | \HORCM\usr\bin\pairevtwait.exe | pairevtwait |
| Volume check | \HORCM\usr\bin\pairvolchk.exe | pairvolchk |
| Synchronous waiting | \HORCM\usr\bin\pairsyncwait.exe | pairsyncwait |
| Pair configuration confirmation | \HORCM\usr\bin\pairdisplay.exe | pairdisplay |
| RAID scanning | \HORCM\usr\bin\raidscan.exe | raidscan |
| Connection confirmation | \HORCM\usr\bin\raidqry.exe | raidqry |
| Data Retention Utility setting | \HORCM\usr\bin\raidvchkset.exe | raidvchkset |
| Data Retention Utility confirmation | \HORCM\usr\bin\raidvchkdsp.exe | raidvchkdsp |
| Data Retention Utility confirmation | \HORCM\usr\bin\raidvchkscan.exe | raidvchkscan |
| Configuration setting and confirming command | \HORCM\usr\bin\raidcfg.exe | raidcfg |
| A library for GUM communication | \HORCM\etc\libcripto-1_1-x64.dll[*] | - |
| A library for GUM communication | \HORCM\etc\libssl-1_1-x64.dll[*] | - |
| * This file is included only in the CCI software for x64. | | |

> **Note:**
> - The \HORCM\etc\ commands are used from the console window. If these commands are executed without an argument, the interactive mode will start up.
> - The \HORCM\usr\bin commands have no console window, and can therefore be used from the application.
> - The \HORCM\usr\bin commands do not support the directory mounted volumes in subcommands.
> - \HORCM\Tool\TRCLOG.bat is a troubleshooting tool. This tool is not usually used.
> - \HORCM\Tool\RMVersionEdit.bat is a tool used to correct or delete the CCI version displayed in Programs and Features on Control Panel on Windows. This tool is available on CCI with CCI version 01-68-03/00 or later. This tool is not usually used.
> - \HORCM\etc\rmsra.exe is the binary data used for cooperation with VMware. This is used directly by VMware, not usually used by users.

## CCI files for OpenVMS-based systems

| Title | File name | Command name | User |
|---|---|---|---|
| HORCM | $ROOT:[HORCM.etc]horcmgr.exe | horcmd | sys |
| HORCM_CONF | $ROOT:[HORCM.etc]horcm.conf | - | sys |
| Takeover | $ROOT:[HORCM.usr.bin]horctakeover.exe | horctakeover | sys |
| Volume accessibility check | $ROOT:[HORCM.usr.bin]paircurchk.exe | paircurchk | sys |
| Pair generation | $ROOT:[HORCM.usr.bin]paircreate.exe | paircreate | sys |
| Pair splitting | $ROOT:[HORCM.usr.bin]pairsplit.exe | pairsplit | sys |
| Pair re-synchronization | $ROOT:[HORCM.usr.bin]pairresync.exe | pairresync | sys |
| Event waiting | $ROOT:[HORCM.usr.bin]pairevtwait.exe | pairevtwait | sys |
| Error notification | $ROOT:[HORCM.usr.bin]pairmon.exe | pairmon | sys |
| Volume checking | $ROOT:[HORCM.usr.bin]pairvolchk.exe | pairvolchk | sys |

| Title | File name | Command name | User |
|---|---|---|---|
| Pair config. confirmation | $ROOT: [HORCM.usr.bin]pairdisplay.exe | pairdisplay | sys |
| RAID scan | $ROOT:[HORCM.usr.bin]raidscan.exe | raidscan | sys |
| RAID activity report | $ROOT:[HORCM.usr.bin]raidar.exe | raidar | sys |
| Connection confirmation | $ROOT:[HORCM.usr.bin]raidqry.exe | raidqry | sys |
| Trace control | $ROOT:[HORCM.usr.bin]horcctl.exe | horcctl | sys |
| HORCM activation script | $ROOT: [HORCM.usr.bin]horcmstart.exe | horcmstart.sh | sys |
| HORCM shutdown script | $ROOT: [HORCM.usr.bin]horcmshutdown.exe | horcmshutdown .sh | sys |
| Connection confirmation | $ROOT:[HORCM.usr.bin]inqraid.exe | - | sys |
| Synchronous waiting | $ROOT: [HORCM.usr.bin]pairsyncwait.exe | pairsyncwait | sys |
| Configuration file making | $ROOT:[HORCM.usr.bin]mkconf.exe | - | sys |
| Text filtering | $ROOT:[HORCM.usr.bin]rmawk.exe | - | sys |
| Data Retention Utility setting | $ROOT: [HORCM.usr.bin]raidvchkset.exe | raidvchkset | sys |
| Data Retention Utility confirmation | $ROOT: [HORCM.usr.bin]raidvchkdsp.exe | raidvchkdsp | sys |
| Data Retention Utility confirmation | $ROOT: [HORCM.usr.bin]raidvchkscan.exe | raidvchkscan | sys |
| Storage Replication Adapter | $ROOT:[HORCM.usr.bin]rmsra.exe | rmsra | sys |
| Sample file for horcmstart | $ROOT:[HORCM]loginhorcm*.com | - | sys |
| Sample file for horcmstart | $ROOT:[HORCM]runhorcm*.com | - | sys |

**Note:**

- $ROOT is defined as SYS$POSIX_ROOT. $POSIX_ROOT is necessary when using C RTL.

- The user name for OpenVMS is "System".

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# CCI log and trace files

The CCI software (HORCM) maintains internal startup log files, execution log files, and trace files that can be used to identify the causes of errors and to keep records of the status transition history of the paired volumes.

## CCI log files

HORCM logs are classified into startup logs and execution logs.

- The startup logs contain data on errors that occur before HORCM becomes ready to provide services. Thus, if HORCM fails to start up due to improper environment setting, refer to the startup logs to resolve the problem.

- The HORCM execution logs (error log, trace, and core files) contain data on errors that are caused by software or hardware problems. These logs contain internal error data that does not apply to any user settings, therefore, you do not need to refer to the HORCM execution logs.

- When an error occurs in execution of a command, data on the error is collected in the command log file. Refer to the command log file if a command execution error occurs.

The following figure shows a graphical representation of the CCI log and trace files within the CCI configuration environment.
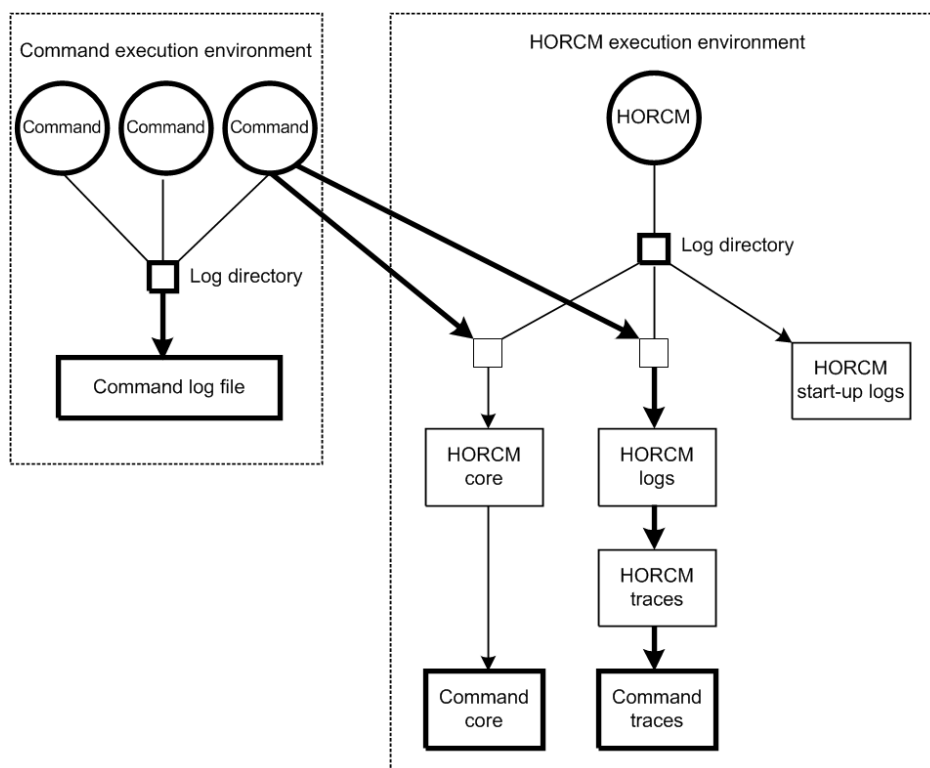
The startup log, error log, trace, and core files are stored as shown in the following table. Specify the directories for the HORCM and command log files using the HORCM_LOG and HORCC_LOG environment variables. If it is not possible to create the log files, or if an error occurs before the log files are created, the error logs are output in the system log file. If the HORCM activation fails, the system administrator should check the system log file and activation log, identify the error cause, and take the proper action. The system log file for UNIX-based systems is the syslog file. The system log file for Windows-based systems is the event log file.

| File | UNIX-based systems | Windows-based systems |
|---|---|---|
| Startup log | HORCM startup log:<br><br>$HORCM_LOG/horcm_HOST.log<br><br>Command log: $HORCC_LOG/ horcc_HOST.log<br><br>$HORCC_LOG/ horcc_HOST.oldlog | HORCM startup log:<br><br>$HORCM_LOG\horcm_HOST_log.txt<br><br>Command log: $HORCC_LOG \horcc_HOST_log.txt<br><br>$HORCC_LOG\horcc_HOST_oldlog.txt |
| Error log | HORCM error log:<br><br>$HORCM_LOG/horcmlog_HOST/ horcm.log | HORCM error log:<br><br>$HORCM_LOG\horcmlog_HOST \horcm_log.txt |
| Trace | HORCM trace:<br><br>$HORCM_LOG/horcmlog_HOST/ horcm_PID.trc | HORCM trace:<br><br>$HORCM_LOG\horcmlog_HOST \horcm_PID_trc.txt |

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| File | UNIX-based systems | Windows-based systems |
|---|---|---|
| Core | HORCM core:<br><br>$HORCM_LOG/core_HOST_PID/core<br><br>Command core:<br><br>$HORCM_LOG/core_HOST_PID/core | HORCM core: $HORCM_LOG \core_HOST_PID\core<br><br>Command core:<br><br>$HORCM_LOG\core_HOST_PID\core |

📄 **Note:** HOST denotes the host name of the corresponding machine. PID denotes the process ID of that machine.

The location of the directory containing the log file depends on your command execution environment and the HORCM execution environment. The command trace file and core file reside together under the directory specified in the HORCM execution environment. A directory specified using the environment variable HORCM_LOG is used as the log directory in the HORCM execution environment. A directory specified using the environment variable HORCC_LOG is used as the log directory in the command execution environment. If no directory is specified, the directory /HORCM/log* is used (* = instance number). A nonexistent directory can be specified as a log directory using the environment variable.

The following table shows the environment variables for log directories.

| Directory name | Definition |
|---|---|
| $HORCM_LOG | A directory specified using the environment variable HORCM_LOG. The HORCM log file, trace file, and core file as well as the command trace file and core file are stored in this directory. If no environment variable is specified, "/HORCM/log/curlog" is used. |
| $HORCC_LOG | A directory specified using the environment variable HORCC_LOG. The command log file is stored in this directory. If no environment variable is specified, the directory "/HORCM/log*" is used (* is the instance number). While the HORCM is running, the log files are stored in the $HORCM_LOG directory shown in (a). When the HORCM starts up, the log files created in the operation are stored automatically in the $HORCM_LOGS directory shown in (b).<br><br>a. HORCM log file directory in operation<br><br>$HORCM_LOG = /HORCM/log*/curlog (* is instance number)<br><br>b. HORCM log file directory for automatic storing<br><br>$HORCM_LOGS = /HORCM/log*/tmplog (* is instance number) |

## CCI trace files

The command trace file is used for maintenance aiming at troubleshooting. It is not created normally. If a cause of an error cannot be identified using the log file, the environment variables or trace control commands with trace control parameters are issued to start tracing and the trace file is created. The trace control parameters include trace level, file size, mode, etc. More detailed tracing is enabled by increasing the trace level. Tracing is made in wraparound within the range of the file size. HORCM makes the trace file according to the trace level specified in the HORCM startup shell script set to activate the HORCM.

## CCI trace control command

The trace control command (one of the HORCM control commands) sets or changes the trace control parameters. This command is used for troubleshooting and maintenance. If no trace control parameters can be specified using the environment variables in your command execution environment, it is possible to change the trace control parameters into the global parameters using this command. The following table lists and describes the parameters of the trace control command.

| Parameter | Function |
|---|---|
| Trace level parameter | Specifies the trace level, range = 0 to 15. |
| Trace size parameter | Specifies the trace file size in KB. |
| Trace mode parameter | Specifies the buffer mode or non-buffer mode for writing data in the trace file. |
| Trace type parameter | Specifies the trace type defined internally. |
| Trace change instruction | Specifies the command or CCI instance for which the trace control parameters are changed. |

## Command logging for audit

- Logging other than raidcom command (on page 79)
- Logging raidcom command (on page 82)

### Logging other than raidcom command

This section explains the logging other than the `raidcom` command described in Logging raidcom command..

CCI supports command logging, this logging function cannot be used for auditing the script issuing the command. Thus, CCI supports the function logging the result of the command executions by expanding the current logging.

This function has the following control parameters.

### *$HORCC_LOGSZ* variable

This variable is used to specify a maximum size (in units of KB) and normal logging for the current command. /HORCM/log*/horcc_HOST.log file is moved to the /HORCM/log*/horcc_HOST.oldlog file when reaching in the specified maximum size. If this variable is not specified or specified as 0, it is same as the current logging for only command error.

This variable is able to define to the environment variable and/or horcc_HOST.conf as discussed below.

For example setting 2MB size: HORCC_LOGSZ=2048 Export HORCC_LOGSZ

### `/HORCM/log*/horcc_HOST.conf` file

This file is used to describe HORCC_LOGSZ variable and the masking variable for logging. If the HORCC_LOGSZ as the environment variable is not specified, then HORCC_LOGSZ variable of this file is used. If both variable is not specified, then it is same as the current logging for only command error.

### *HORCC_LOGSZ* variable

This variable must be described as follows: HORCC_LOGSZ=2048

### Masking variable

This variable is used to mask (disable) the logging by specifying a condition of the command and returned value (except inqraid or EX_*xxx* error code). This variable is valid for NORMAL exit.

If executing the **pairvolchk** command repeatedly at every interval (30 seconds), logging of this command might not be wanted. Therefore, you can mask it by specifying HORCC_LOGSZ=0 as shown below, and you might need to change your scripts if tracing is ON.

Example of masking **pairvolchk** on a script:

```
Export HORCC_LOGSZ=0 Pairvolchk -g xxx -s Unset HORCC_LOGSZ
```

The masking feature is to enable the tracing without changing their scripts. And this feature is available for all CCI commands (except **inqraid** or **EX_xxx error code**).

For example, if you want to mask pairvolchk (returns 22) and raidqry, specify the following:

```
pairvolchk=22 raidqry=0
```

You can track script performance, and then decide to mask by auditing the command logging file, as needed.

### Relationship between an environment variable and horcc_HOST.conf

Logging depends on the $HORCC_LOGSZ environment variable and/or the HORCC_HOST.conf file as shown below.

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| $HORCC_LOGSZ | HORCC_HOST.conf | Performing |
|---|---|---|
| =value | Any (does not matter) | Tracing within this APP |
| =0 | | NO tracing within this APP |
| Unspecified | HORCC_LOGSZ=value | Global tracing within this CCI instance |
| | HORCC_LOGSZ=0 | NO global tracing within this CCI instance |
| | Unspecified or nonexistent | Use the default value (0) The same as the current logging for only command error |

**Examples for execution: /HORCM/log\* directory**

```
[root@raidmanager log9]#  ls  l
total 16
drwxr-xr-x  3 root root    4096 Oct 27 17:33 curlog
-rw-r--r--  1 root root    3936 Oct 27 17:36 horcc_raidmanager.log
-rw-r--r--  1 root root 2097452 Oct 27 17:29 horcc_raidmanager.oldlog
-rw-r--r--  1 root root      46 Oct 27 17:19 horcc_raidmanager.conf
drwxr-xr-x  3 root root    4096 Oct 27 17:19 tmplog
```

**Examples for execution: /HORCM/log\*/horcc_HOST.log file**

```
COMMAND NORMAL : EUserId for HORC : root (0)  Tue Nov  1 12:21:53 2005
CMDLINE : pairvolchk  ss  g URA
12:21:54-2d27f-10090- [pairvolchk][exit(32)]
COMMAND NORMAL : EUserId for HORC : root (0)  Thu Oct 27 17:36:32 2005
CMDLINE : raidqry  l
17:36:32-3d83c-17539- [raidqry][exit(0)]
COMMAND ERROR  : EUserId for HORC : root (0)  Thu Oct 27 17:31:28 2005
CMDLINE : pairdisplay  g UR
17:31:28-9a206-17514- ERROR:cm_sndrcv[rc < 0 from HORCM]
17:31:28-9b0a3-17514- [pairdisplay][exit(239)]
[EX_ENOGRP] No such group
[Cause ]:The group name which was designated or the device name
doesn't exist in the configuration file, or the network address
for remote communication doesn't exist.
[Action]:Please confirm if the group name exists in the
configuration file of the local and remote host
```

**Examples for execution: /HORCM/log\*/horcc_HOST.conf file**

```
# For Example
HORCC_LOGSZ=2048
#The masking variable
#This variable is used to disable the logging by the command and exit code.
#For masking below log pairvolchk returned '32'(status is SVOL_COPY)
```

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```
#COMMAND NORMAL : EUserId for HORC : root (0)  Tue Nov  1 12:21:53 2005
#CMDLINE : pairvolchk  ss  g URA
#12:21:54-2d27f-10090- [pairvolchk][exit(32)]
pairvolchk=32
pairvolchk=22
```

## Logging raidcom command

The history of performing `raidcom` command can be stored in syslog server by outputting it to the syslog file. Since the information of what command was performed by who and when are recorded on the syslog file, this is available to use for audit log.

Output the syslog file by using syslog service on the host OS. For details, refer to the host OS manual.

> ⚠️ **Caution:**
>
> - The packet loss occurs on the syslog because the syslog uses UDP communication. The log is also lost when the server to be received the syslog is down because the server does not have a function to store the data until it recovered. If you want to record the same log at the client side by considering the lost of syslog at the syslog server, refer to the output setting of the syslog file.
>
> - This syslog files are not deleted automatically. Delete unnecessary files accordingly, or make run the log rotation by installing such as the logrotate service separately.

**The conditions to support the output of syslog file**

The conditions to support this function are explained in the following:

**Supported OS**

This function is supported only when the OS of the host is one of the following (Windows is out of support):

- Solaris

- Solaris x86

- HP-UX

- AIX

- RHEL

**Target command**

The following shows the `raidcom` command that is target to be output on the syslog file.

- Setting commands

- raidcom get command status

- Authentication commands (performing the authentication command at the prompt also becomes the target.)

However, if the command is not issued to the DKC by detecting the `raidcom` command execution error beforehand, the command becomes out of target even if it falls under the above items.

**Output setting for the syslog file**

A syslog file is output when "1" is set on the RAIDCOM_SYSLOG of environment variables. The syslog file is not output at the stage of initial setting.

How to set the syslog.conf:

The contents that can be set on the syslog.conf for the environment setting might vary in each OS. However, set basically according to the syslog.conf described in the following:

Setting example (It might vary by the host OS)

- **Client side (extracts)**

```
user.info                              /var/log/
raidcomuser.err                            /var/log/
raidcom.erruser.info
@host1234user.err                             @host1234
```

- **Server side (extracts)**

```
user.info                              /var/log/
raidcomuser.err                            /var/log/raidcom.err
```

You can record the same log at the client side by considering the lost of syslog at the syslog server. In this case, add the following settings.

- facility:user

- level:info/err ("info" for the normal command operation; "err" for the abnormal command operation.)

**Syslog file display information**

Three kinds of information for one `raidcom` command are output on the syslog file.

- Title row (first row)

- Command row (second row)

- Result rows (3 - 132 rows): the number of rows changes depending on the issuing command.

**Display information of the title row**

| Item | Output example |
|---|---|
| Syslog fixed output part (Including the host name) | Jun 27 10:15:13 rmsolx86 raidcom: [ID 702911 user.info]<br><br>*It varies depending on the host OS. |

| Item | Output example |
|---|---|
| Process ID | PID:1234 |
| Command status | COMMAND NORMAL or COMMAND ERROR |
| Separation | : |
| User name Title | EUserId for HORC : |
| User name of the host | root |
| (user ID) | (0) |
| Time that performed raidcom | Wed Jun 27 10:15:13 2012 |

**Display information of the command row**

| Item | Output example |
|---|---|
| Syslog fixed output part (Including the host name) | Jun 27 10:15:13 rmsolx86 raidcom: [ID 702911 user.info]<br><br>*It varies depending on the host OS. |
| Process ID | PID:1234 |
| Title for performed command | CMDLINE: |
| Performed command | raidcom modify ldev -ldev_id 1234 -status nml |

**Display information of the result rows**

| Item | Output example |
|---|---|
| Syslog fixed output part (Including the host name) | Jun 27 10:15:13 rmsolx86 raidcom: [ID 702911 user.info]<br><br>*It varies depending on the host OS. |
| Process ID | PID:1234 |
| [raidcom] | [raidcom] |
| Rows for the error information | [EX_CMDRJE] An order to the control/command device was rejected It was rejected due to SKEY=0x05, ASC=0x26, ASCQ=0x00, SSB=0x2E11,0x2205 on Serial#(64568) |

| Item | Output example |
|---|---|
| Result of get_command_status | HANDLE SSB1 SSB2 ERR_CNT Serial# Description 00c4 - - 0 200414 - |
| Rows for the returned values of a command | [exit(0)] |

See the following display examples (It might vary depending on the host OS):

**Logs: during normal operation**

```
Aug 24 12:24:37 raidmanager raidcom: PID:06864 COMMAND NORMAL : EUserID for HORC :
root(0) Fri Aug 24 12:24:36 2012
Aug 24 12:24:37 raidmanager raidcom: PID:06864 CMDLINE : raidcom get command_status -
ldev_id 0001
Aug 24 12:24:37 raidmanager raidcom: PID:06864 [raidcom] HANDLE   SSB1    SSB2
ERR_CNT      Serial#    Description
Aug 24 12:24:37 raidmanager raidcom: PID:06864 [raidcom] 00c3        -
-       0         64568     -
Aug 24 12:24:37 raidmanager raidcom: PID:06864 [raidcom] [exit(0)]
```

**Logs: during abnormal operation**

```
Aug 24 12:24:27 raidmanager raidcom: PID:06857 COMMAND ERROR : EUserID for HORC :
root(0) Fri Aug 24 12:24:19 2012
Aug 24 12:24:27 raidmanager raidcom: PID:06857 CMDLINE : raidcom get command_status
Aug 24 12:24:27 raidmanager raidcom: PID:06857 [raidcom] User for Serial#[64568] :
user1234
Aug 24 12:24:27 raidmanager raidcom: PID:06857 [raidcom] User authentication has
failed on Serial#(64568).
Aug 24 12:24:27 raidmanager raidcom: PID:06857 [raidcom] [EX_ENAUTH] Authentication
failed with User
Aug 24 12:24:27 raidmanager raidcom: PID:06857 [raidcom] [exit(202)]
```

# User-created files

CCI supports scripting to provide automated and unattended copy operations. A CCI script contains a list of CCI commands that describes a series of TrueCopy and/or ShadowImage operations. The scripted commands for UNIX-based platforms are defined in a shell script file. The scripted commands for Windows-based platforms are defined in a text file. The host reads the script file and sends the commands to the command device to execute the TrueCopy/ShadowImage operations automatically.

The CCI scripts are:

- **HORCM startup script (horcmstart.sh, horcmstart.exe)**: A script that starts HORCM (/etc/horcmgr), sets environment variables as needed (for example, HORCM_CONF, HORCM_LOG, HORCM_LOGS), and starts HORCM.

- **HORCM shutdown script. (horcmshutdown.sh, horcmshutdown.exe)**: A script for stopping the HORCM (/etc/horcmgr).

- **HA control script**: A script for executing takeover processing automatically when the cluster manager (CM) detects a server error.

When constructing the HORCM environment, the system administrator should make a copy of the `horcm.conf` file. It is recommended to back up the copied `horcm.conf` file, in case of a failure in the CCI operating environment. The copied file should be set according to the system environment and registered as the following file (* is the instance number):

UNIX systems: /etc/horcm.conf or /etc/horcm*.conf

Windows systems:%windir%\horcm.conf or %windir%\horcm*.conf

# User environment variable

When HORCM or command is invoked, environment variable can be specified.

# Chapter 3:  CCI functions

This guide describes the CCI functions.

## System configuration using CCI

This section describes system configurations using the in-band method or out-of-band method. In addition, a system configuration for connecting to an in-band CCI server by using the out-of-band method is also described. For an overview of the in-band and out-of-band methods, see Command execution by the in-band and out-of-band methods.

### In-band system configurations and out-of-band system configurations

Values to specify for HORCM_CMD in the configuration definition file are different between in-band and out-of-band method system configurations.

- **In-band method.** This method specifies the device special file of command device in the configuration definition file. For details about contents to specify for HORCM_CMD, see HORCM_CMD (in-band method) topic.

- **Out-of-band method.** This method specifies the SVP for creating virtual command devices or IP addresses of GUM in the command definition file. For details about contents to specify for HORCM_CMD, see HORCM_CMD (out-of-band method) topic.

The location of the virtual command device depends on the type of storage system. The following table lists the storage system types and indicates the allowable locations of the virtual command device.

| Storage system type | Location of virtual command device | | |
|---|---|---|---|
| | **SVP** | **GUM** | **CCI server**[1] |
| VSP E series, VSP Gx00 models, VSP Fx00 models | OK[2] | OK | OK |
| VSP 5000 series, VSP G1x00, VSP F1500 | OK | Not allowed | OK |
| HUS VM | OK | Not allowed | OK |

| | Location of virtual command device | | |
|---|---|---|---|
| **Storage system type** | **SVP** | **GUM** | **CCI server**[1] |
| VSP | OK | Not allowed | OK |
| 1. A CCI server is a remote CCI server connected via LAN. | | | |
| 2. CCI on the SVP must be configured as a CCI server in advance. | | | |

The following figures show a system configuration example and a setting example of a command device and a virtual command device using the in-band and out-of-band methods.

> 📄 **Note:** For the out-of-band method using the maintenance utility (GUM) of VSP Gx00 models and VSP Fx00 models, the command might time out if a controller with GUM is maintained. Before the maintenance, change command devices so that you use a virtual command device of the other GUM. For details about how to switch command devices, see Alternate command device function.

The following figure shows system configuration example of in-band and out-of-band methods (VSP).
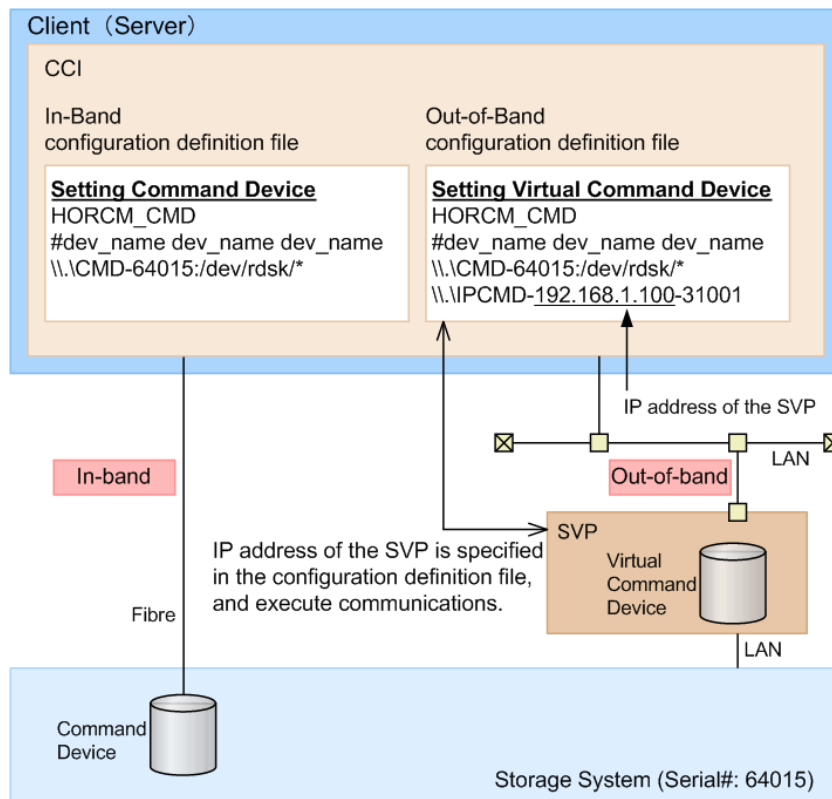


In the following figure, CCI B is the CCI server of CCI A. Users can issue a command from CCI A to a storage system via a virtual command device of CCI B. Commands can also be issued directly from CCI B without using CCI A.

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The following figure shows a system configuration example of in-band and out-of-band methods (VSP G800, VSP F800).
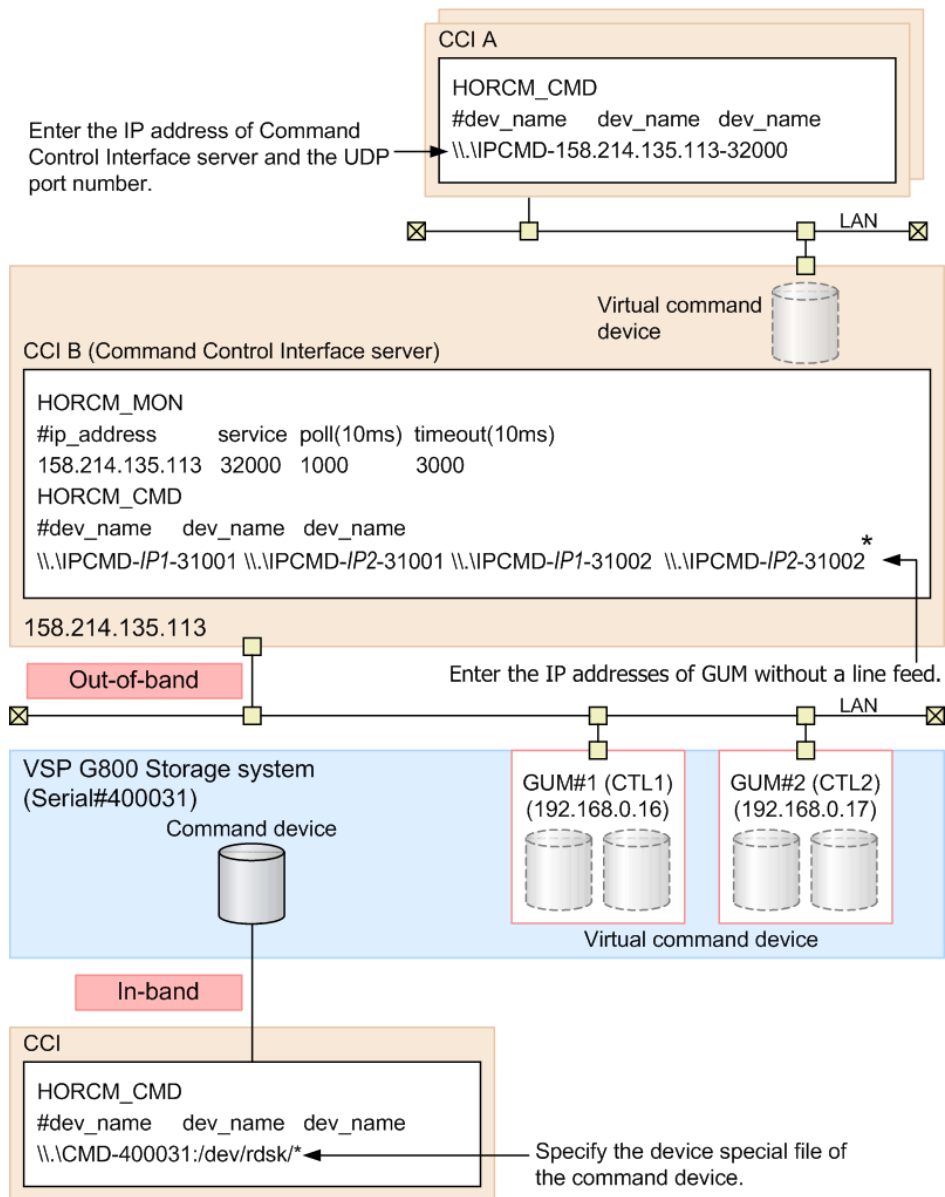


\* When you write the configuration definition file, replace *IP1* with IP address of GUM#1 and *IP2* with IP address of GUM#2.

> 📄 **Note:** In the out-of-band method using the SVP of your storage system, a command times out if the microcode of the SVP is changed. Execute the command again after the microcode change completes.

## System configuration for connecting to a CCI server connected by the in-band method using the out-of-band method

In the out-of-band method, CCI server ports can be specified as virtual command devices. Specifying a CCI server port as a virtual command device allows you to use the out-of-band method to connect to a CCI server connected to a storage system using the in-band method. For details about settings for HORCM_CMD in the configuration definition file of this configuration, see HORCM_CMD (out-of-band method) topic.

> 💡 **Tip:** If you specify a CCI server port as a virtual command device, it achieves better performance than the out-of-band method which specifies SVP or GUM as a virtual command device.

The following figure shows a system configuration example when a CCI server is connected to a storage system using the in-band method.

```
CCI A
  HORCM_CMD
  #dev_name     dev_name     dev_name
  \\.\IPCMD-158.214.135.113-30000
```

Out-of-band   LAN

Virtual
Command
Device

```
CCI B (Command Control Interface server)
  HORCM_CMD
  #dev_name     dev_name     dev_name
  \\.\CMD-64015:/dev/rdsk/*
  158.214.135.113
```

Fibre    In-band

Command
Device       Storage system
             (Serial#: 64015)
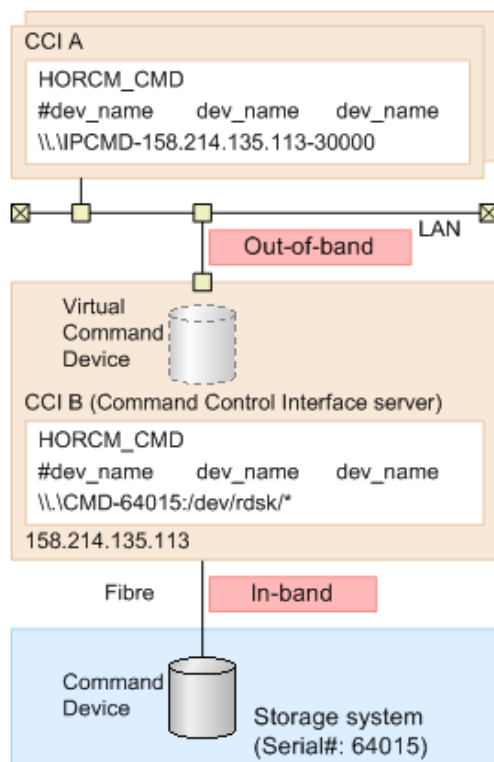
# Connecting to CCI server already connected by In-Band method using Out-of-Band method

In Out-of-Band method, CCI server port can also be specified as a virtual command device. For this reason, CCI server which connected to a storage system in In-Band method can be connected in Out-of-Band method. If a CCI server is specified as a virtual command device, it provides better performance than the Out-of-Band method with specified SVP/GUM as a virtual command device.

## Hardware requirements

CCI uses SCSI path through driver to issue I/O for command device. To use CCI server port as virtual command device, the virtual command device interface needs to be converted to the actual SCSI path through interface. Following is the environment for using CCI server port as a virtual command device.

- CCI server which can set virtual command devices

  CCI support platform except Tru64UNIX and the environment can be used SCSI path through driver

- Client PC which can issue commands to virtual command devices

  It must be CCI support platform.

- Initiator port

  Initiator port is required on the following storage systems: Virtual Storage Platform, Unified Storage VM, Virtual Storage Platform G1000, Virtual Storage Platform G1500, Virtual Storage Platform F1500, and VSP 5000 series.

  Following is the default port number.

  If not specified the instance number: 34000

  If specified instance number (X): 34000 + X + 1

  If you change the default port number, use following environment variables.

  $HORCM_IPSCPORT=<services>*

  * <services>: port number or service name

For details about supported platforms, see the *Command Control Interface Installation and Configuration Guide*.

## I/O Traffic Control

Synchronized I/O is issued from a virtual command device. The queueing time might occur because of the heavy I/O traffic because the virtual command device has to relay the command to the next virtual command device in the cascade configuration using the virtual command device. To improve the response in this environment, define the configuration so that asynchronous I/O is issued using the following environment variables.

```
$HORCM_IPSCPAIO=1
```

# Security setting

Following security can be set.

- Specifying security of IP address and port number

  By defining IP address and port number of the client PC that issues command to virtual command device to HORCM_ALLOW_INST in the configuration definition file, users who can use virtual command device can be restricted. For the details about the settings to HORCM_ALLOW_INST, please refer to "Configuration definition file".

- Security setting for virtual command device

  By using the following environment variable, security can be set to virtual command device.

```
$HORCM_IPCMDSEC=<value>
```

**Security setting for virtual command device**

Specify the number (from 0 to 7) to <value> depending on the contents of the security which you want, in reference with the following table.

| Value specified for <value> | Command device setting | | | |
|---|---|---|---|---|
| | Security setting | User authentication | Device group definition | Security to be set (see Notes) |
| 0 | OFF | OFF | OFF | No security |
| 1 | OFF | OFF | ON | Only HORCM_DEV allowed |
| 2 | OFF | ON | OFF | User authentication required |
| 3 | OFF | ON | ON | User authentication required<br>Only HORCM_DEV allowed |
| 4 | ON | OFF | OFF | CMD security |
| 5 | ON | OFF | ON | CMD security<br>Only HORCM_DEV allowed |
| 6 | ON | ON | OFF | CMD security<br>User authentication required |
| 7 | ON | ON | ON | CMD security |

| Value specified for <value> | Command device setting | | | |
|---|---|---|---|---|
| | Security setting | User authentication | Device group definition | Security to be set (see Notes) |
| | | | | User authentication required<br><br>Only HORCM_DEV allowed |
| **Notes:** <br><br>▪ ON: Enabled <br><br>▪ OFF: Disabled <br><br>▪ Only HORCM_DEV allowed: the operation can be performed only for paired logical volumes described in HORCM_DEV. <br><br>▪ User authentication required: only commands issued by authorized users can be executed. <br><br>▪ CMD security: only devices recognizable from the host can be operated. For details about CMD security, see Data Protection facility (on page 354). | | | | |

# User authentication

CCI allows user authentication by using the operation authority of a user set by:

▪ Storage Navigator

▪ Device Manager - Storage Navigator

▪ Maintenance utility

User authentication is arbitrary in the Replication operation in the in-band method while the operation by user authentication is mandatory in the configuration information operation and in the out-of-band method.

To enable the user authentication function, the user authentication mode of the command device accessed by CCI must be enabled.

The user authentication function inputs a login command from the client (server) and, to authenticate the user ID and password sent from CCI and the same types of information maintained by the storage system, issues an authentication request to the authentication module (SVP/GUM).

If the user ID and password which are sent by CCI are authenticated, the storage system generates the session information. The storage system stores the session information, the user ID, and the client ID, and then sends back the session information to CCI. CCI stores the session information with the storage system ID. After that, the session information is added to all commands which are issued by CCI to the storage system. If the session information which is added to the command is valid, the storage system permits the command execution.

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When the user logs out, the session information which is stored by CCI, and the user ID, the client ID, and the session information which are stored in the storage system are deleted.

A storage system can store only one session information for the same user ID and the same client ID at the same time. If the storage system received the login command with the user ID and client ID, corresponding to the session information which has already been stored, the storage system sends back the stored session information to CCI without authentication. During executing the login command, if another login command is input with the same user ID from the same client, the authentication result of the subsequent login command will be the same as the authentication result of login command being executed.

> **Note:**
>
> - The only function that can be used if the user authentication function is disabled is the Replication function (replication command). If the user authentication function is disabled, the Provisioning function (configuration setting command) cannot be used. If you use the global storage virtualization function, see the table in Controlling user resources. For details about global storage virtualization, see the *Provisioning Guide for Open Systems* or *Provisioning Guide*.
>
> - If the specific user information or authority information is changed, perform the user authentication processing on CCI again.
>
> - CCI stores the session information for each user ID (managed by OS) which is used for login to the client OS. Therefore, if users having the different user ID (managed by OS) use the same client, execute CCI login command for each user ID (managed by OS).
>
> - Windows domain user IDs are case sensitive for CCI. CCI recognizes users with different cases as different users when they log in to the OS. To use a session being maintained by CCI, log in to the OS by using the same user ID (case sensitive) as the ID used for that session. If you log in to the OS by using an ID with different cases, a warning for the session might appear when a CCI command is run.
>
> - If the storage system is turned off or on during user authentication, the user ID, client ID, and session information stored in the storage system are deleted. Perform the user authentication processing on CCI again.
>
> - If a user executes the `logout` command, all users logging in to the same client are logged out. This is because the storage system can store only one session information item for the client and cannot identify the user who logged out.

# Command operation authority and user authentication

When CCI is used with the user authentication function enabled, commands are executed complying with the operation authority of a user set by:

- Storage Navigator

- Device Manager - Storage Navigator

- Maintenance utility (GUM)

## Controlling User Role

CCI verifies whether or not the user executing the command on the host was already authenticated by checking the command device being in the authentication mode. After that, CCI obtains the execution authority of the command that is configured on the user role, and then compares the relevant command and the execution authority.

### Checking the execution authority

If the configuring commands authenticated are compared with the execution authorities of commands configured on the user role and they do not correspond, CCI rejects the command with an error code "EX_EPPERM".

Normally, the user role needs to be the consistent and integrated authority among the large storage systems. In case of HORCM instances that are configured by the multiple large storage systems, the execution authorities are obtained by the serial number of the storage systems. If the user role is for the multiple storage systems and is not consistent among these storage systems, CCI makes the integrated authority by performing the logical AND of the execution authorities among the storage systems.

### Target commands

CCI checks execution authorities on the following commands that use command devices.

- `horctakeover`, `horctakeoff`

- `paircreate`, `pairsplit`, `pairresync`

- `raidvchkset`

## Controlling user resources

CCI verifies the user who executes the command has been authenticated already. After that, CCI obtains the access authority of the resource groups that are configured on the user roles, and then compares the access authority of the user and the specified resources.

### Checking resource authorities

If the access is not permitted by comparing the access authorities of the resource groups configured on the user roles and the specified resource, CCI rejects the command with an error code "EX_EGPERM". If the resource groups are defined among the large storage systems, the specified resource is compared with the resource specified by obtaining the access authority configured to each large storage system.

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**Target commands**

CCI checks resource authorities on the following commands that use command devices.

- `raidcom` commands (commands for setting configurations)

- `horctakeover`, `horctakeoff`, `paircurchk`, `paircreate`, `pairsplit`, `pairresync`, `pairvolchk`, `pairevtwait`, `pairsyncwait`, `pairmon`

- `raidscan` (-find verify, -find inst, -find sync except for [d]), `pairdisplay`, `raidar`, `raidqry` (except for -l and -r)

- `raidvchkset`, `raidvchkscan`, `raidvchkdsp`

**Relation between user authentication and resource groups**

In user authentication mode, CCI verifies the access authority of the target resource based on the user authentication and the role of it. Also, on the user authentication unnecessary mode and the undefined resource groups, CCI checks the access authorities shown in the following table.

| Resources | Commands | | | |
|---|---|---|---|---|
| | pairXX[1] | | raidcom | |
| | Not authenticated user[2] | Authenticated user | Not authenticated user[2] | Authenticated user |
| Undefined resource[3] | Permitted | Permitted by the authority of resource ID 0 | EX_EPPERM[4] | Permitted by the authority of resource ID 0 |
| Defined resource | EX_EGPERM[4] | Permitted by the authority of the target resource ID | EX_EGPERM[4] EX_EPPERM | Permitted by the authority of the target resource ID |
| Virtual storage machine[5] | Permitted[6] | Permitted by the authority of the target resource ID | EX_EGPERM[4] EX_EPPERM | Permitted by the authority of the target resource ID |

**Notes:**

1. Above-described commands except for the `raidcom` command.
2. User who uses the mode without the command authentication.
3. Undefined as the resource group.
4. Command execution is rejected by the relevant error.
5. The resource group that is defined as the virtual storage machine by the global storage virtualization function. For details about global storage virtualization, see the *Provisioning Guide* for the storage system.

| Resources | Commands | | | |
|---|---|---|---|---|
| | pairXX[1] | | raidcom | |
| | Not authenticated user[2] | Authenticated user | Not authenticated user[2] | Authenticated user |
| **6.** When you specify a volume that belongs to meta_resouce or a virtual command device for HORCM_VCMD in the configuration definition file, the resource operation for the entire resource group in the virtual storage machine which specifies HORCM_VCMD is permitted. If you do not specify the virtual storage machine for HORCM_VCMD, EX_EGPERM is returned. When you specify a volume that belongs to the virtual storage machine that you created for HORCM_CMD in the configuration definition file, the resource operation for the entire resource group in the virtual storage machine to which the volume belongs is permitted. For details about specifying the virtual storage machine to HORCM_VCMD, see Configuration definition file settings with global storage virtualization. | | | | |

**Checking the access authority when you operate a pair**

When you use the commands other than `raidcom` commands, which are described in "Target commands" above, whether the user who executes the command has an access authority to the resource is checked. Usually, only one resource in the volumes which configures a pair is checked, the resource is managed by the instance which executes the pair operation command. However, when you operate a pair of a local copy, if the HOMRCF_CHECK_RSGID environment variable is defined, an access authority of the command execution user to both volumes which configure a pair can be checked.

The following figure shows an example of a pair operation when you do not define the HOMRCF_CHECK_RSGID environment variable. The command execution user can create a pair even if one of the volume which configures the pair is a resource to which the user does not have an authority.

Host

Command prompt (Windows)

User executes the command using the instance #0.

c:\HORCM\etc>paircreate -g ora –vl -IM0

LDEV #1 which is managed by the instance #0 is the object of the access authority check.

#horcm file for instance#0
HORCM_LDEV
ora dev1 64568 00:01 0
HORCM_INST
ora localhost 31002

#horcm file for instance#1
HORCM_LDEV
ora dev1 64568 00:02
HORCM_INST
ora localhost 31001

Command Control Interface

Command execution users have an access authority only to the resource group ID=0 because the authentication mode of the command device is off.

Authentication mode : OFF

command device

LDEV #1

Only LDEV #1 is checked.

You can create a pair.

LDEV #2

Resources which are not defined
(resource group ID= 0)

A resource which is defined
(resource group ID= 1)

Storage system (serial #: 64568)

The following figure shows an example of a local copy pair operation when you define the HOMRCF_CHECK_RSGID environment variable. You can avoid creating a pair which includes the volume without authority, therefore whether the both volumes which configure a pair are authenticated or not is checked.

Host

HOMRCF_CHECK_RSGID environment variable is defined.

Command prompt (Windows)

c:\HORCM\etc>set HOMRCF_CHECK_RSGID=1
c:\HORCM\etc>paircreate -g ora –vl -IM0
paircreate: [EX_EGPERM] Permission denied…

#horcm file for instance#0
HORCM_LDEV
ora dev1 64568 00:01 0
HORCM_INST
ora localhost 31002

#horcm file for instance#1
HORCM_LDEV
ora dev1 64568 00:02
HORCM_INST
ora localhost 31001

Command Control Interface

Command execution users have an access authority only to the resource group ID=0 because the authentication mode of the command device is off.

Authentication mode : OFF

command device

LDEV #1

LDEV #2 which is belongs to the resource group ID 1 is also checked.

LDEV #2

You cannot create a pair.

Resources which are not defined (resource group ID= 0)

A resource which is defined (resource group ID= 1)

Storage system (serial #: 64568)

**Target resources**

The following objects are arbitrarily defined as the resource groups by each user.

- LDEV

- Physical port

- Host group

- RAID group

- External connection group

## Commands executed depending on operation authorities

The following table lists the commands executed depending on operation authority of a user set by:

- Storage Navigator

- Device Manager - Storage Navigator

- Maintenance utility

For information about creating user accounts, registering user accounts to user groups, and user group authorities, see the *System Administrator Guide* for the storage system.

The following table shows the executable commands executed depending on operation authority of a user set by Storage Navigator, Device Manager - Storage Navigator, or maintenance utility.

| Operation | Operation target | Authority | Executable command | Operation authority (Role) |
|---|---|---|---|---|
| Initial configuration | Program product | License management authority | • raidcom add license (VSP E series and VSP Fx00 models, VSP Gx00 models)<br>• raidcom delete license (VSP E series and VSP Fx00 models, VSP Gx00 models)<br>• raidcom modify license (VSP 5000 series, VSP E series and VSP Fx00 models, VSP Gx00 models) | Storage Administrator (Initial configuration) |
| | Storage system | Storage initial configuration setting | raidcom modify system (VSP G1x00, VSP F1500, and VSP 5000 series, VSP G130, G/F350, G/F370, G/F700, G/F900) | Storage Administrator (Initial configuration) |
| | Advanced system settings | Storage initial configuration setting | raidcom modify user_system_opt (VSP E590, VSP E790) | Storage Administrator (Initial configuration) |
| Overall setting | MP blade | MP blade setting authority | raidcom modify ldev<br>raidcom modify external_grp | Storage Administrator (System Resource Management), Storage Administrator (Provisioning) |

| Operation | Operation target | Authority | Executable command | Operation authority (Role) |
|---|---|---|---|---|
| | | | raidcom modify journal | Storage Administrator (System Resource Management), Storage Administrator (Remote Copy) |
| | CLPR | Parity group migration authority | raidcom modify clpr | Storage Administrator (System Resource Management) |
| | | CLPR creation authority | raidcom add clpr | Storage Administrator (System Resource Management) |
| | | CLPR deletion authority | raidcom delete clpr | Storage Administrator (System Resource Management) |
| | Resource group | Resource group creation authority | raidcom add resource raidcom modify resource | Storage Administrator (View & Modify) |
| | | Resource group creation authority or virtual ID setting authority | raidcom map resource | Storage Administrator (View & Modify) or Storage Administrator (Provisioning)* |
| | | Resource group deletion authority | raidcom delete resource | Storage Administrator (View & Modify) |
| | | Resource group deletion authority or virtual ID setting authority | raidcom unmap resource | Storage Administrator (View & Modify) or Storage Administrator (Provisioning)* |

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| Operation | Operation target | Authority | Executable command | Operation authority (Role) |
|---|---|---|---|---|
| | LUN | Host reservation release authority | raidcom modify lun -reservation release | Storage Administrator (System Resource Management) |
| Resource creation, deletion | LDEV | LDEV creation authority raidcom add ldev | raidcom add ldev | Storage Administrator (Provisioning) |
| | | LDEV deletion authority | raidcom delete ldev | Storage Administrator (Provisioning) |
| | | LDEV format authority | raidcom initialize ldev -operation fmt<br><br>raidcom initialize ldev -operation qfmt | Storage Administrator (Provisioning) |
| | | LDEV shredding execution authority | raidcom initialize ldev -operation shrd<br><br>raidcom initialize ldev -operation stop | Storage Administrator (Provisioning) |
| | | HAM/GAD Pair creation authority | raidcom modify ldev -quorum_enable<br><br>raidcom add quorum<br><br>paircreate -f never -jq | Storage Administrator (Provisioning) |
| | | | paircreate -f never -jp | Storage Administrator (Remote Copy) |
| | | HAM/GAD Pair deletion authority | raidcom modify ldev -quorum_disable<br><br>raidcom delete quorum | Storage Administrator (Provisioning) |
| | | | pairsplit -S[F[V]] | Storage Administrator (Provisioning) and Storage Administrator (Remote Copy) |

Chapter 3: CCI functions

| Operation | Operation target | Authority | Executable command | Operation authority (Role) |
|---|---|---|---|---|
| | | | pairsplit -R[F[V]] | Storage Administrator (Remote Copy) |
| | Parity group | LDEV shredding execution authority | raidcom initialize parity_grp (VSP 5000 series, VSP Gx00 models, VSP Fx00 models) | Storage Administrator (Provisioning) |
| | | Parity group creation authority | raidcom modify parity_grp | Storage Administrator (Provisioning) |
| | | Parity group creation authority | raidcom add parity_grp (VSP E series and VSP Gx00 models, VSP Fx00 models) | Storage Administrator (Provisioning) |
| | | Parity group creation authority and encryption setting cancellation authority | raidcom add parity_grp – encryption (VSP E series and VSP Gx00 models, VSP Fx00 models) | Storage Administrator (Provisioning) and Security Administrator (View & Modify) |
| | | Parity group creation cancellation authority | raidcom delete parity_grp (VSP 5000 series, VSP E series and VSP Gx00 models, VSP Fx00 models) | Storage Administrator (Provisioning) |
| | | Parity group creation authority or parity group creation cancellation authority | raidcom modify drive -spare enable (VSP E series and VSP Gx00 models, VSP Fx00 models) | Storage Administrator (Provisioning) |
| | | | raidcom modify drive -spare disable (VSP E series and VSP Gx00 models, VSP Fx00 models) | Storage Administrator (Provisioning) |

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| Operation | Operation target | Authority | Executable command | Operation authority (Role) |
|---|---|---|---|---|
| | External volume (Universal Volume Manager) | External volume creation authority | raidcom add external_grp | Storage Administrator (Provisioning) |
| | | External path operation authority | raidcom check_ext_storage path<br><br>raidcom disconnect path | Storage Administrator (Provisioning) |
| | | External volume disconnection authority, and External volume connection check & resumption authority | raidcom check_ext_storage external_grp<br><br>raidcom disconnect external_grp | Storage Administrator (Provisioning) |
| | | External volume mapping release authority | raidcom delete external_grp | Storage Administrator (Provisioning) |
| | | UVM Attribute value setting authority | raidcom modify external_grp<br><br>raidcom add external_iscsi_name<br><br>raidcom delete external_iscsi_name<br><br>raidcom modify external_chap_user<br><br>raidcom modify initiator_chap_user | Storage Administrator (Provisioning) |
| | | UVM path operation authority | raidcom delete path | Storage Administrator (Provisioning) |

| Operation | Operation target | Authority | Executable command | Operation authority (Role) |
|---|---|---|---|---|
| | Pool | Pool creation and capacity change authority | raidcom add dp_pool<br><br>raidcom add snap_pool<br><br>raidcom initialize pool | Storage Administrator (Provisioning) |
| | | Pool deletion authority | raidcom delete pool | Storage Administrator (Provisioning) |
| | Dynamic Provisioning virtual volume | Dynamic Provisioning virtual volume creation authority | raidcom add ldev -pool<br><br>raidcom extend ldev | Storage Administrator (Provisioning) |
| | | Dynamic Provisioning virtual volume deletion authority | raidcom delete ldev | Storage Administrator (Provisioning) |
| | | Dynamic Provisioning virtual volume setting authority | ▪ raidcom modify ldev -ldev_id <ldev#> -compression_acceleration {enable\|disable}<br><br>▪ raidcom modify ldev {-pool <pool ID#> \| <pool naming>} -compression_acceleration {enable \| disable} | Storage Administrator (Provisioning) |
| | Copy-on-Write Snapshot virtual volume | Copy-on-Write Snapshot virtual volume creation authority | raidcom add ldev -pool | Storage Administrator (Provisioning) |

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| Operation | Operation target | Authority | Executable command | Operation authority (Role) |
|---|---|---|---|---|
| | | Copy-on-Write Snapshot virtual volume deletion authority | raidcom delete ldev | Storage Administrator (Provisioning) |
| | Port | LUN security setting authority | raidcom modify port -security_switch | Storage Administrator (Provisioning) |
| | | WWN deletion authority | raidcom modify port -delete_login_host_nqn | Storage Administrator (Provisioning) |
| | Host group | Host group creation authority | raidcom add host_grp | Storage Administrator (Provisioning) |
| | | Host group deletion authority | raidcom delete host_grp | Storage Administrator (Provisioning) |
| | LUN | LU path creation authority | raidcom add lun | Storage Administrator (Provisioning) |
| | | LU path deletion authority | raidcom delete lun | Storage Administrator (Provisioning) |
| | WWN / iSCSI name / CHAP user name | WWN addition authority | raidcom add hba_wwn<br><br>raidcom add hba_iscsi<br><br>raidcom add chap_user | Storage Administrator (Provisioning) |
| | | WWN deletion authority | raidcom delete hba_wwn<br><br>raidcom delete hba_iscsi<br><br>raidcom delete chap_user | Storage Administrator (Provisioning) |

| Operation | Operation target | Authority | Executable command | Operation authority (Role) |
|---|---|---|---|---|
| | LDEV group | Device group creation authority and Copy group creation authority | raidcom add device_grp<br><br>raidcom add copy_grp | Storage Administrator (Provisioning) |
| | | Device group deletion authority and Copy group deletion authority | raidcom delete device_grp<br><br>raidcom delete copy_grp | Storage Administrator (Provisioning) |
| | Local copy | Pair creation authority | paircreate<br><br>raidcom add snapshot | Storage Administrator (Local Copy) |
| | | Pair deletion authority | pairsplit -S<br><br>raidcom delete snapshot | Storage Administrator (Local Copy) |
| | | Volume Migration pair creation authority | paircreate | Storage Administrator (Provisioning) |
| | | Volume Migration pair deletion authority | pairsplit -S | Storage Administrator (Local Copy) |
| | | Local copy environmental setting authority | raidcom modify local_replica_opt | Storage Administrator (Local Copy) |
| | Remote copy | Pair creation authority | paircreate | Storage Administrator (Provisioning) |
| | | Pair deletion authority | pairsplit -S | Storage Administrator (Remote Copy) and Storage Administrator (Provisioning) |

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| Operation | Operation target | Authority | Executable command | Operation authority (Role) |
|---|---|---|---|---|
| | Storage Advisor Embedded server | Host group creation authority | raidcom add server | Storage Administrator (Provisioning) |
| | Storage Advisor Embedded server | Host group deletion authority | raidcom delete server | Storage Administrator (Provisioning) |
| | NVM Subsystem | NVM Subsystem creation authority | raidcom add nvm_subsystem | Storage Administrator (Provisioning) |
| | | NVM Subsystem setting authority | raidcom modify nvm_subsystem | Storage Administrator (Provisioning) |
| | | NVM Subsystem deletion authority | raidcom delete nvm_subsystem | Storage Administrator (Provisioning) |
| | NVM Subsystem port | NVM Subsystem port addition authority | raidcom add nvm_subsystem_por t | Storage Administrator (Provisioning) |
| | | NVM Subsystem port deletion authority | raidcom delete nvm_subsystem_por t | Storage Administrator (Provisioning) |
| | Host NQN | Host NQN addition authority | raidcom add host_nqn | Storage Administrator (Provisioning) |
| | | Host NQN setting authority | raidcom modify host_nqn | Storage Administrator (Provisioning) |
| | | Host NQN deletion authority | raidcom delete host_nqn | Storage Administrator (Provisioning) |

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| Operation | Operation target | Authority | Executable command | Operation authority (Role) |
|---|---|---|---|---|
| | Host-Namespace path | Host-Namespace path addition authority | raidcom add namespace_path | Storage Administrator (Provisioning) |
| | | Host-Namespace path deletion authority | raidcom delete namespace_path | Storage Administrator (Provisioning) |
| | Namespace | Path creation authority | raidcom add namespace | Storage Administrator (Provisioning) |
| | | Path deletion authority | raidcom delete namespace | Storage Administrator (Provisioning) |
| Attribute change | External volume | External path setting authority | raidcom add path | Storage Administrator (Provisioning) |
| | Pool | Pool setting authority | raidcom modify pool raidcom rename pool | Storage Administrator (Provisioning) |
| | | Pool monitoring and reallocation start and stop authority | raidcom reallocate pool raidcom monitor pool | Storage Administrator (Provisioning) |
| | Port | Port attribute setting authority | raidcom modify port -port_attribute | Storage Administrator (System Resource Management) |
| | | Port setting authority | raidcom modify port -loop_id raidcom modify port -topology raidcom modify port -port_speed raidcom modify port -t10pi | Storage Administrator (Provisioning) |

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| Operation | Operation target | Authority | Executable command | Operation authority (Role) |
|---|---|---|---|---|
| | | | raidcom modify port -port <port#> [-mtu <value>]... | |
| | | | raidcom modify port -port <port#> [-isns_mode {enable\|disable}]... | |
| | Host group | Host group setting authority | raidcom modify host_grp | Storage Administrator (Provisioning) |
| | LUN | LDEV setting authority | raidcom modify lun | Storage Administrator (Provisioning) |
| | | | raidcom modify lun -reservation release | Storage Administrator (System Resource Management) |
| | WWN / iSCSI name / CHAP user name | WWN setting authority | raidcom set hba_wwn<br><br>raidcom reset hba_wwn<br><br>raidcom set hba_iscsi<br><br>raidcom reset hba_iscsi<br><br>raidcom set chap_user<br><br>raidcom reset chap_user | Storage Administrator (Provisioning) |
| | LDEV nickname | LDEV nickname setting authority | raidcom modify ldev -ldev_name | Storage Administrator (Provisioning) |
| | SPM information | SPM setting authority | raidcom add spm_wwn<br><br>raidcom add spm_group | Storage Administrator (System Resource Management) |

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| Operation | Operation target | Authority | Executable command | Operation authority (Role) |
|---|---|---|---|---|
| | | | raidcom delete spm_wwn | |
| | | | raidcom delete spm_group | |
| | | | raidcom modify spm_wwn | |
| | | | raidcom modify spm_group | |
| | | | raidcom modify spm_ldev | |
| | | | raidcom delete spm_ldev | |
| | QoS information | QoS setting authority | (VSP 5000 series only)<br><br>raidcom add qos_grp<br><br>raidcom delete qos_grp<br><br>raidcom modify qos_grp<br><br>(VSP 5000 series, VSP E series, VSP G130, G/F350, G/F370, G/F700, G/F900)<br><br>raidcom modify ldev -upper_throughput_io <upper throughput io><br><br>raidcom modify ldev -upper_data_trans_mb <upper data trans mb><br><br>raidcom modify ldev -upper_alert_time <upper alert time> | Storage Administrator (System Resource Management) |

| Operation | Operation target | Authority | Executable command | Operation authority (Role) |
|---|---|---|---|---|
| | | | raidcom modify ldev - lower_throughput_io <lower throughput io> | |
| | | | raidcom modify ldev - lower_data_trans_mb <lower data trans mb> | |
| | | | raidcom modify ldev - lower_alert_time <lower alert time> | |
| | | | raidcom modify ldev - response_priority <#priority> | |
| | | | raidcom modify ldev - response_alert_time <response alert time> | |
| | Local copy | Pairsplit and resync authority | pairresync<br>raidcom modify snapshot<br>raidcom map snapshot<br>raidcom unmap snapshot<br>raidcom replace snapshot | Storage Administrator (Local Copy) |
| | Remote copy | Environment construction authority | raidcom add rcu<br>raidcom delete rcu<br>raidcom modify rcu<br>raidcom add rcu_iscsi_port<br>raidcom delete rcu_iscsi_port<br>raidcom add rcu_path | Storage Administrator (Remote Copy) |

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| Operation | Operation target | Authority | Executable command | Operation authority (Role) |
|---|---|---|---|---|
| | | | raidcom delete rcu_path | |
| | | | raidcom add journal | |
| | | | raidcom delete journal | |
| | | | raidcom modify journal | |
| | | | raidcom add ssid | |
| | | | raidcom delete ssid | |
| | | Pairsplit and resync authority | pairresync | Storage Administrator (Remote Copy) |
| | Quorum disk | LDEV setting authority | raidcom modify quorum | Storage Administrator (Provisioning) |
| | | HAM/GAD pair creation authority and HAM/GAD pair deletion authority | raidcom replace quorum | Storage Administrator (Provisioning) |
| | Namespace | LDEV nickname setting authority | raidcom modify namespace | Storage Administrator (Provisioning) |

| Operation | Operation target | Authority | Executable command | Operation authority (Role) |
|---|---|---|---|---|
| * All of the following requirements must be met in order to map and unmap resources on a storage system as a Storage Administrator (Provisioning). Also, if you log in to the storage system before upgrading to the next microcode version, log out and log in after the upgrade is complete. | | | | |

- CCI version: 01-52-03/01 or later.

- The storage system is one of the following:

  - VSP 5000 series

  - VSP E series

  - VSP G1x00 and VSP F1500

  - VSP G130, G/F350, G/F370, G/F700, G/F900

  - VSP G200, G400, G600, G800 and VSP F400, F600, F800

  - VSP N400, N600, N800

- The version of SVP or GUM is as follows:

  - SVP: 90-01-50/XX or later (VSP 5000 series)

  - SVP: 80-06-69/XX or later (VSP G1x00 and VSP F1500)

  - GUM: 93-01-0X/XX or later (VSP E series)

  - GUM: 88-04-01/XX or later (VSP G130, G/F350, G/F370, G/F700, G/F900)

  - GUM: 83-05-33/XX or later (VSP G200, G400, G600, G800 and VSP F400, F600, F800)

  - GUM: 83-06-05/XX or later (VSP N400, N600, N800)

# Relation between resource groups and command operations

The operation for using resource groups are different by the command devices (the In-Band method) or the Out-of-Band method that are used when you start CCI.

You can create resource groups for each resource. And you can share them with multiple users. When user 10 and user 20 share the port like the following figure, the relation between the command devices and resource groups that user can use is given in the table below.

See the following figure given below for relation among user, command devices, and resource groups. The table given below shows the relation between resource groups and command devices.
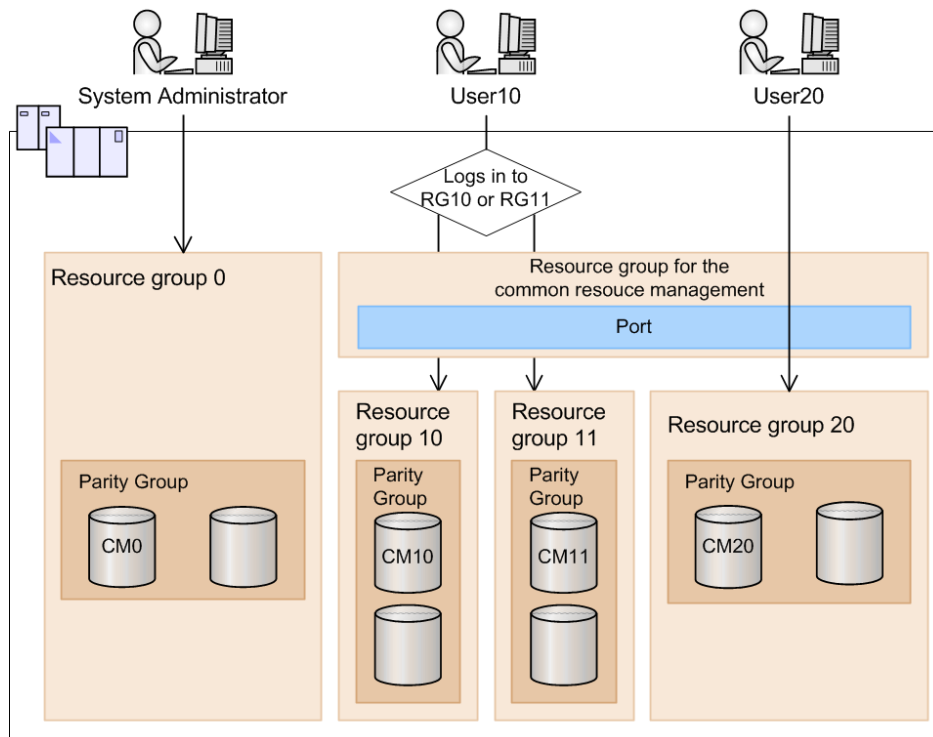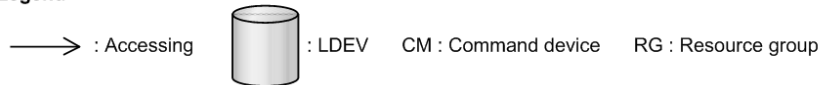
| Login user | Command device | Operating range | Reference | Configuration change | Command operations using the out-of-band method |
|---|---|---|---|---|---|
| System administrator | CM0 | Can operate all resource groups after logging in. | Operable | Operable | Operable |
| | CM10 | Can operate only in the range of resource group 10, and the shared ports after logging in. | Operable | Operable | Inoperable |
| | CM11 | Can operate only in the range of resource group 11, and the shared ports after logging in. | Operable | Operable | Inoperable |
| | CM20 | Can operate only in the range of resource group 20, and the shared ports after logging in. | Operable | Operable | Inoperable |

| Login user | Command device | Operating range | Reference | Configuration change | Command operations using the out-of-band method |
|---|---|---|---|---|---|
| User 10 | CM0 | Can operate only in the range of resource group 10 and 11, and the shared ports after logging in. | Operable | Operable | Operable |
| | CM10 | Can operate only in the range of resource group 10, and the shared ports after logging in.* | Operable | Operable | Inoperable |
| | CM11 | Can operate only in the range of resource group 11, and the shared ports after logging in.* | Operable | Operable | Inoperable |
| | CM20 | Cannot log in. Nothing is displayed or the operation authority error. | | Operation authority error | Inoperable |
| User 20 | CM0 | Can operate only in the range of resource group 20, and the shared ports after logging in. | Operable | Operable | Operable |
| | CM10 | Cannot log in. Nothing is displayed or the operation authority error. | | Operation authority error | Inoperable |
| | CM11 | Cannot log in. Nothing is displayed or the operation authority error. | | Operation authority error | Inoperable |
| | CM20 | Can operate only in the range of resource group 20, and the shared ports after logging in. | Operable | Operable | Inoperable |

* To use each resource group, the user must separately execute `raidcom -login` command. For details about the `raidcom -login` command, see *Command Control Interface Command Reference*.

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As shown in the table above, the relation among users, command devices and operations of resource groups are the following.

- The range that can be operated by command device 0 (CM0) or Out-of-Band is the shared range (AND) of resource groups that are allocated to each user and all resource groups.

- The range that can be operated by command device 10 (CM10) is the shared range (AND) of resource groups that are allocated to each user and resource group 10 that the command devices are allocated.

  Therefore, in the range of resource group 10 can be operated.

The following shows the example of the case that the execution results of the commands change by the case of having or not having the authority of the operated resources, specifies only the objects or specifies to the parameters.

When user has the authority using CL1-A, CL3-A and CL5-A ports, and CL1-A, CL2-A, CL3-A, CL4-A and CL5-A ports are implemented in the system, executes the following command.

When only the objects are specified:

```
# raidcom get port
```

The execution results of CL1-A, CL3-A and CL5-A are displayed. The execution results of CL2-A and CL4-A (the user does not have the authority of the resource) are not displayed (filtered).

When parameters are also specified:

```
# raidcom get port -port CL1-A
```

The execution result of CL1-A is only displayed.

```
# raidcom get port -port CL2-A
```

The error is displayed because the user does not have the execution authority.

The following shows the output example when -cnt that is used in get ldev is used.

The following command is executed when the user has the authorities of LDEV number 10 and 12.

```
# raidcom get ldev -ldev_id 10 -cnt 3
```

Execution results of LDEV number 10 and 12 are displayed. LDEV number 11 is not displayed because the user does not have the authority of the resource.

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# Resource lock function

When configuration changes from multiple user interfaces (CCI, Device Manager - Storage Navigator, or maintenance utility) are performed on the same resource at the same time, configurations are changed unexpectedly, and expected results might not occur. While a command is being executed, if another user changes the configuration, unexpected results can occur even though it is a viewing command.

To prevent users from changing the configuration of the same resource at the same time, the `resource lock` command is provided. When this command is used, the resource group can be locked to prevent other users from using the specified resource group. If the resource is not locked, all configuration change commands are performed. However, conflicting operations might cause an error.

The commands for performing the exclusive control and exclusive control release (lock and unlock) of resource groups are as follows.

- raidcom lock resource -resource_name <resource group name > [-time <time(sec)>] (Locking a specified resource group)

- raidcom unlock resource -resource_name <resource group name > (Unlocking a specified resource group)

If multiple users (IDs) operate the same resource, you can prevent operation conflict for the target resource by using the `raidcom lock resource` command to confirm that no other user is using the resource.

After the configuration change is completed, release the lock status by the `raidcom unlock resource` command.

The user who locks a resource is identified by the session information. When the user logs out and the session information of the user is deleted from the storage system, the resource that has been locked by the user is automatically released. For details about the session information, see User authentication.

# Command execution modes

## Overview

Provisioning operations are performed using a configuration setting command. For details about the configuration setting command, see Overview of the configuration setting command or Command Control Interface Command Reference.

Two modes can be used for executing the configuration setting command:

- Line-by-line mode.

  This mode executes commands input from the command line one at a time.

- Transaction mode.

  Executes a script file specified by the -zt option.

When executing the configuration setting command, the following checks can be done depending on the above two mode types.

- **Syntax check**:

  This function checks if there is no syntax error in the specified command. This is executed every time at the both line-by-line mode and transaction mode.

- **Context check**:

  This function checks the consistency of one specified line in the script and the preceding lines in the order from the top. This function is available only at the Transaction mode. For details about context checking, see Context check topic.

- **Configuration check**:

  Acquire the current configuration information to a configuration file, and then this function checks whether the resources specified in the script (LDEVs, ports, or host groups) are configured in the storage system or not. This function is available only at the transaction mode. For details about context checking, see configuration check topic.

The configuration setting command also has a execution option described in the following.

**Precheck**

Specify the checkmode precheck option. It operates checking only (it does not execute processing even if no error is detected.) This can be specified at the both line-by-line mode and transaction mode.

**Execution modes and options of the configuration setting command (line-by-line mode)**

The following tables show the overview of execution modes and options of the configuration setting command.

| Command syntax | Syntax check | Context check | Configura-tion check | Command execution with no error | Remarks |
|---|---|---|---|---|---|
| raidcom <action> | Executed | Not executed | Not executed | Executed | Default |
| raidcom <action> - checkmode precheck | Executed | Not executed | Not executed | Not executed | Check only |

**Execution modes and options of the configuration setting command (transaction mode)**

| Command syntax | Syntax check | Context check | Configura-tion check | Command execution with no error | Remarks |
|---|---|---|---|---|---|
| raidcom -zt <script file> | Executed | Executed | Not executed | Executed | Default |
| raidcom -zt <script file> -load <work file> | Executed | Executed | Executed | Executed | With configuration check |
| raidcom -zt <script file> -checkmode precheck | Executed | Executed | Not executed | Not executed | Check only |
| raidcom -zt <script file> -load < work file> -checkmode precheck | Executed | Executed | Executed | Not executed | With configuration check<br><br>Check only |

Detailed description are provided in the following sections.

> ⚠️ **Caution:** Observe the following cautions:
> - For <script file>, specify an executable file name.
> - For <script file>, either specify a full path name or store under the c:\HORCM \etc folder.
> - For <work file>, either specify a full path name or store in the current directory.

## Context check

This check can be performed to ensure consistent content of the created script file. For example, it can check if the script refers to an ldev_id that is already deleted in the preceding lines.

The script is executed only when no error is detected by the checking of whole script contents.

The following resources can be the target of the check:

- LDEV
- Port
- Host group

## Checking contents before executing scripts

Checking the contents before executing the script helps reduce debugging after running the script.

Specify the script as follows to execute it.

```
raidcom -zt <created script file name>
```

```
raidcom -zt <created script file name> -load <configuration file>
```

```
raidcom -zt <created script file name> -checkmode precheck
```

```
raidcom -zt <created script file name> -load <configuration file> -checkmode precheck
```

## Details of check contents

Details of Context check is described below. Checking contents before issuing a script can reduce load for the debug operation.

### *LDEV check*

The check is performed from the following perspective. Note that checking for the object information that is related to the LDEV such as pool or device group, or an attribute of LDEV is not executed.

**Check with the additional operation**

The check is performed to ensure no identical LDEV as the existing LDEV is added. If the existing LDEV is attempted to be added, an error is detected.

If it is not clear whether the LDEV to be added exists or not, or if the target LDEV information does not exist in the configuration definition file, the error is not detected. Therefore, the script is executed and the LDEV is added.

The command as the target of the check is shown below.

```
raidcom add ldev {-parity_grp_id <gno-sgno>| -external_grp_id
   <gno-sgno> | -pool {<pool ID#> | <pool naming> | snap}}
   {-ldev_id <ldev#> | -tse_ldev_id <ldev#>} {-capacity <size>
   | -offset_capacity <size> | -cylinder <size>} [-emulation
   <emulation type>][-location <lba>][-mp_blade_id <mp#>]
   [-clpr <clpr#>]
```

**Check with the attribute setting**

The check is performed regardless of whether or not the operation is performed for the existing LDEV. If the operation is attempted to be performed for an LDEV that does not exist, an error is detected.

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If it is not clear whether the LDEV as the target of the operation exists in the configuration definition file, or if the target LDEV information does not exist in the configuration definition file, the error is not detected.

The commands as the target of the check are shown below.

- raidcom add lun -port <port#> [<host group name>] {-ldev_id <ldev#> [-lun_id<lun#>] | -grp_opt <group option> -device_grp_name <device group name> [<device name>]}

- raidcom delete lun -port <port#> [<host group name>] {-lun_id <lun#> | -ldev_id <ldev#> | -grp_opt <group option> -device_grp_name <device group name> [<device name>]}

- raidcom add journal -journal_id <journal ID#> {-ldev_id <ldev#> …[-cnt<count>] | -grp_opt <group option> -device_grp_name <device group name> [<device name>]} [-mp_blade_id <mp#> | -timer_type <timer type>]

- raidcom delete journal -journal_id <journal ID#> [-ldev_id <ldev#> | -grp_opt <group option> -device_grp_name <device group name> [<device name>]]

- raidcom add snap_pool {-pool_id <pool ID#> [-pool_name <pool naming>] | -pool_name <pool naming> [-pool_id <pool ID#>] | -pool_id <pool ID#> -pool_name <pool naming>} {-ldev_id <ldev#> …[-cnt<count>] | -grp_opt <group option> -device_grp_name <device group name> [<device name>]}[-user_threshold <%>]

- raidcom add dp_pool {{-pool_id <pool ID#> [-pool_name <pool naming>] | -pool_name <pool naming> [-pool_id <pool ID#>]} | -pool_id <pool ID#> -pool_name <pool naming>} {-ldev_id <ldev#> …[-cnt <count>] | -grp_opt <group option> -device_grp_name <device group name> [<device name>]}[ -user_threshold <threshold_1> [<threshold_2>]]

- raidcom extend ldev {-ldev_id <ldev#> | -grp_opt <group option> -device_grp_name <device group name> [<device name>]} -capacity <size> | -offset_capacity <size> | -cylinder <size>

- raidcom check_ext_storage external_grp {-external_grp_id <gno-sgno> | -ldev_id <ldev#> | -grp_opt <group option> -device_grp_name <device group name> [<device name>]}

- raidcom add device_grp -device_grp_name <ldev group name> <device name> -ldev_id <ldev#>… [-cnt <count>]

- raidcom delete device_grp -device_grp_name <device group name> -ldev_id<ldev#>… [-cnt <count>]

- raidcom modify ldev -ldev_id <ldev#> {-status <status> [<level>] | -ldev_name <ldev naming> | -mp_blade_id <mp#>| -ssid <value> | -command_device < y/n > [Security value]}

- raidcom initialize ldev {-ldev_id <ldev#> | -grp_opt <group option> -device_grp_name <device group name> [<device name>]} -operation <type>

**Check with the deletion operation**

It is checked to ensure that the operation is not intended to be performed for the LDEV that is already deleted. If it is, an error is detected.

If it is not clear whether the LDEV as the target of the operation exists in the configuration definition file or not (if the target LDEV information does not exist in the configuration definition file), the error is not detected.

The command as the target of the check is shown below.

▪ `raidcom delete ldev {-ldev_id <ldev#> | -grp_opt <group option> -device_grp_name <device group name> [<device name>]}`

The example of the script where the existing LDEV is attempted to be added to the already created LDEV and the execution result of the context check is shown below.

**Example of script**

```
  raidcom add ldev -parity_grp_id 01-01 -ldev_id 1 -capacity 100M
 raidcom add ldev -parity_grp_id 01-01 -ldev_id 2 -capacity 100M
 raidcom add ldev -parity_grp_id 01-01 -ldev_id 3 -capacity 100M
```

**Execution result**

```
  C:\HORCM\etc>raidcom get ldev -ldev_id 1 -cnt 65280 -store ldevconf_65 >
ldevconf_65.txt
 C:\HORCM\etc>raidcom -zt 3_defined_ldev.bat -load ldevconf_65.dat
    -checkmode precheck
 C:\HORCM\etc>raidcom add ldev -parity_grp_id 01-01 -ldev_id 1 -capacity 100M
  C:\HORCM\etc>raidcom add ldev -parity_grp_id 01-01 -ldev_id 2 -capacity 100M
 C:\HORCM\etc>raidcom add ldev -parity_grp_id 01-01 -ldev_id 3 -capacity 100M
```

**Example of script (the text in bold indicates the invalid configuration definition.)**

```
  raidcom add ldev -parity_grp_id 01-01 -ldev_id 1 -capacity 100M
  raidcom add ldev -parity_grp_id 01-01 -ldev_id 2 -capacity 100M
 raidcom add ldev -parity_grp_id 01-01 -ldev_id 3 -capacity 100M
 raidcom add ldev -parity_grp_id 01-01 -ldev_id 1 -capacity 100M
 raidcom add ldev -parity_grp_id 01-01 -ldev_id 2 -capacity 100M
  raidcom add ldev -parity_grp_id 01-01 -ldev_id 3 -capacity 100M
 for /l %%i in (1,1,3) do (raidcom add ldev -parity_grp_id 01-01 -ldev_id %%i -
capacity 100M)

  for /l %%i in (1,1,3) do (
 raidcom add ldev -parity_grp_id 01-01 -ldev_id %%i -capacity 100M)
```

**Execution result (the text in bold indicates the contents of the error accompanying the invalid configuration definition in the script.)**

```
C:\HORCM\etc>raidcom get ldev -ldev_id 1 -cnt 65280 -store ldevconf_65 >
ldevconf_65.txt
C:\HORCM\etc>raidcom -zt 3_defined_ldev.bat -load ldevconf_65.dat
-checkmode precheck
C:\HORCM\etc>raidcom add ldev -parity_grp_id 01-01 -ldev_id 1 -capacity 100M
C:\HORCM\etc>raidcom add ldev -parity_grp_id 01-01 -ldev_id 2 -capacity 100M
```

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```
C:\HORCM\etc>raidcom add ldev -parity_grp_id 01-01 -ldev_id 3 -capacity 100M
C:\HORCM\etc>raidcom add ldev -parity_grp_id 01-01 -ldev_id 1 -capacity 100M
raidcom: LDEV(1) is already existing as status is [1] on UnitID# 0.
raidcom_#5 : [EX_CTXCHK] Context Check error
C:\HORCM\etc>raidcom add ldev -parity_grp_id 01-01 -ldev_id 2 -capacity 100M
raidcom: LDEV(2) is already existing as status is [1] on UnitID# 0.
raidcom_#6 : [EX_CTXCHK] Context Check error
C:\HORCM\etc>raidcom add ldev -parity_grp_id 01-01 -ldev_id 3 -capacity 100M
raidcom: LDEV(3) is already existing as status is [1] on UnitID# 0.
raidcom_#7 : [EX_CTXCHK] Context Check error
```

The number in raidcom # of raidcom_#7: [EX_CTXCHK] Context Check error is the number of times of performing the raidcom command by using <work file>. The number of times is incremented each time the raidcom command is executed.

## *Port check*

The check is performed from the following perspective. Note that checking for object information related to the port, such as external volume group or RCU, or an attribute of port, is not executed.

**Checking for attribute setting**

It is checked whether the operation is performed for the existing port. If the port does not exist, an error is detected.

If it is not clear whether the port as the target of the operation exists in the configuration definition file or not (if the target port information does not exist in the configuration definition file), the error is not detected.

The commands as the target of the check are shown below.

- raidcom modify port -port <port#> {[-port_speed <value>] [-loop_id <value>][-topology <topology>] [-security_switch < y|n >] | -port_attribute <port attribute>}

- raidcom add external_grp -path_grp <path group#> -external_grp_id <gnosgno> -port <port#> -external_wwn <wwn strings> -lun_id <lun#> [-emulation <emulation type>] [-clpr <clpr#>]

- raidcom add path -path_grp <path group#> -port <port#> -external_wwn <wwn strings>

- raidcom delete path -path_grp <path group#> -port <port#> -external_wwn <wwn strings>

- raidcom check_ext_storage path -path_grp <path group#> -port <port#> -external_wwn <wwn strings>

- raidcom disconnect path -path_grp <path group#> -port <port#> -external_wwn <wwn strings>

- raidcom add rcu {-rcu <serial#> <mcu#> <rcu#> <id> -ssid <ssid>| -cu_free <serial#> <id> <pid>} -mcu_port <port#> -rcu_port <port#>

For example, if a path is attempted to be added to a port that does not exist, an error is detected. An example of the script where the error is detected and the execution result of the actual Context check are shown below.

**Example of script (the text in bold indicates the part of incorrect configuration definition.)**

```
 raidcom add path -path_grp 1 -port CL1-C -external_wwn 50060e80,06fc4180
raidcom add path -path_grp 1 -port CL1-D -external_wwn 50060e80,06fc4190
raidcom add path -path_grp 1 -port CL1-E -external_wwn 50060e80,06fc41a0
```

**Execution result (the text in bold indicates the contents of the error accompanying the invalid configuration definition in the script.)**

```
C:\HORCM\etc>raidcom get port -store portcnf_27.dat
PORT   TYPE  ATTR  SPD  LPID  FAB  CONN  SSW  SL   Serial#  WWN
CL1-A  FIBRE TAR   AUT   EF   N    FCAL  N    0    64539    06fc1b000000fc1b
CL1-B  FIBRE TAR   AUT   EF   N    FCAL  N    0    64539    50060e8006fc1b01
CL2-A  FIBRE TAR   AUT   EF   N    FCAL  N    0    64539    50060e8006fc1b10
CL2-B  FIBRE TAR   AUT   EF   N    FCAL  N    0    64539    50060e8006fc1b11
CL3-A  FIBRE TAR   AUT   E8   N    FCAL  N    0    64539    50060e8006fc1b20
CL3-B  FIBRE TAR   AUT   E0   N    FCAL  N    0    64539    50060e8006fc1b21
CL4-A  FIBRE TAR   AUT   D6   N    FCAL  N    0    64539    50060e8006fc1b30
CL4-B  FIBRE TAR   AUT   D2   N    FCAL  N    0    64539    50060e8006fc1b31
CL5-A  FIBRE TAR   AUT   E4   N    FCAL  N    0    64539    50060e8006fc1b40
CL5-B  FIBRE TAR   AUT   DC   N    FCAL  N    0    64539    50060e8006fc1b41
CL6-A  FIBRE TAR   AUT   D5   N    FCAL  N    0    64539    50060e8006fc1b50
CL6-B  FIBRE TAR   AUT   D1   N    FCAL  N    0    64539    50060e8006fc1b51
CL7-A  FIBRE ELUN  AUT   E2   N    FCAL  N    0    64539    50060e8006fc1b60
CL7-B  FIBRE ELUN  AUT   DA   N    FCAL  N    0    64539    50060e8006fc1b61
CL8-A  FIBRE TAR   AUT   D4   N    FCAL  N    0    64539    50060e8006fc1b70
CL8-B  FIBRE TAR   AUT   CE   N    FCAL  N    0    64539    50060e8006fc1b71
C:\HORCM\etc>raidcom -zt 4_no_port.bat -load portcnf_27.dat -checkmode precheck
C:\HORCM\etc>raidcom add path -path_grp 1 -port CL1-C -external_wwn 50060e80,06fc4180
```
**raidcom: PORT(2) does not exist as status is [2] on UnitID# 0.**
**raidcom_#2  : [EX_CTXCHK] Context Check error**
```
C:\HORCM\etc>raidcom add path -path_grp 1 -port CL1-D -external_wwn 50060e80,06fc4190
```
**raidcom: PORT(3) does not exist as status is [2] on UnitID# 0.**
**raidcom_#3  : [EX_CTXCHK] Context Check error**
```
C:\HORCM\etc>raidcom add path -path_grp 1 -port CL1-E -external_wwn 50060e80,06fc41a0
```
**raidcom: PORT(4) does not exist as status is [2] on UnitID# 0.**
**raidcom_#4  : [EX_CTXCHK] Context Check error**

## *Host group check*

The check is performed from the following perspective. Note that checking for an attribute of host group, or for a name of host group is not executed.

**Check with the attribute setting**

Checks whether the operation is performed for an existing host group. If the host group does not exist, an error is detected.

If it is not clear whether the target port or host group exists (if the target port or host group information does not exist in the configuration definition file), the error is not detected.

The commands as the target of the check are shown below.

- raidcom modify host_grp -port <port#> [<host group name>] -host_mode <host mode> [-host_mode_opt <host mode option> … ]

- raidcom add hba_wwn -port <port#> [<host group name>] -hba_wwn <WWN strings>

- raidcom delete hba_wwn -port <port#> [<host group name>] -hba_wwn <WWN strings>

- raidcom set hba_wwn -port <port#> [<host group name>] -hba_wwn <WWN strings> -wwn_nickname <WWN Nickname>

- raidcom reset hba_wwn -port <port#> [<host group name>] -hba_wwn <WWN strings>

- raidcom add lun -port <port#> [<host group name>] {-ldev_id <ldev#> [-lun_id<lun#>] | -grp_opt <group option> -device_grp_name <device group name> [<device name>]}

- raidcom delete lun -port <port#> [<host group name>] {-lun_id <lun#> | -ldev_id <ldev#> | -grp_opt <group option> -device_grp_name <device group name> [<device name>]}

**Check with deletion operation**

It is checked to ensure that the operation is not intended to be performed for the host group that is already deleted. If the host group is already deleted, an error is detected.

If it is not clear whether the target port or host group exists or not (if the target port or host group information does not exist in the configuration definition file), the error is not detected.

The command as the target of the check is shown below.

```
raidcom delete host_grp -port <port#> [<host group name>
```

For example, if the host group that does not exist is attempted to be deleted, an error is detected. An example of the script where the error is detected and the execution result of the actual context check are shown below.

**Example of script (the text in bold indicates the part of incorrect configuration definition.)**

```
raidcom delete host_grp -port CL1-A-0
 raidcom delete host_grp -port CL1-A-1
raidcom delete host_grp -port CL1-A-2
```

**Execution result (the text in bold indicates the contents of the error accompanying the invalid configuration definition in the script.)**

```
C:\HORCM\etc>raidcom get host_grp -port CL1-A -store hostgrpcnf_27_cl1-a.dat
PORT    GID   GROUP_NAME                      Serial# HMD          HMO_BITs
CL1-A    0    1A-G00                                  64539 LINUX/IRIX
C:\HORCM\etc>raidcom -zt 6_no_hstgrp.bat -load hostgrpcnf_27_cl1-a.dat
-checkmode precheck
```

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```
C:\HORCM\etc>raidcom delete host_grp -port CL1-A-0
C:\HORCM\etc>raidcom delete host_grp -port CL1-A-1
raidcom: PORT-HGRP(0-1) does not exist as status is [2] on UnitID# 0.
raidcom_#3: [EX_CTXCHK] Context Check error
C:\HORCM\etc>raidcom delete host_grp -port CL1-A-2
raidcom: PORT-HGRP(0-2) does not exist as status is [2] on UnitID# 0.
raidcom_#4 : [EX_CTXCHK] Context Check error
```

## Configuration check

The contents of a script file can be checked whether the operation is performed for the existing resource or not.

Before performing the configuration check, execute the following command, acquire the current configuration information, and store it in the work file specified by the `-store` option.

Check the operation for LDEV

```
raidcom get ldev {-ldev_id <ldev#> … [-cnt <count>] | -grp_opt
   <group option> -device_grp_name <device group name> [<device name>]}
   -store <work file>
```

Check the operation for Port

```
raidcom get port -port -store <work file>
```

Check the operation for Host group

```
raidcom get host_grp -port <port#> -store <work file>
```

After acquiring the configuration information, execute the script by specifying the configuration file.

```
raidcom -zt <created script file name> -load <work file>
```

# Resource location and parameter

## MP blade location and parameter

To specify MP blade IDs by the **raidcom add ldev** command, specify the following IDs.

**MP blade names and parameters for VSP G1x00 and VSP F1500**

| MP blade name | MP blade number | MP blade ID |
|---|---|---|
| MPB-1MA | 0 | 0 |

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| MP blade name | MP blade number | MP blade ID |
|---|---|---|
| MPB-1MB | 1 | 1 |
| MPB-1PE | 2 | 2 |
| MPB-1PF | 3 | 3 |
| MPB-2MA | 4 | 4 |
| MPB-2MB | 5 | 5 |
| MPB-2PE | 6 | 6 |
| MPB-2PF | 7 | 7 |
| MPB-1MC | 8 | 8 |
| MPB-1MD | 9 | 9 |
| MPB-1PL | 10 | 10 |
| MPB-1PM | 11 | 11 |
| MPB-2MC | 12 | 12 |
| MPB-2MD | 13 | 13 |
| MPB-2PL | 14 | 14 |
| MPB-2PM | 15 | 15 |

**MP blade names and parameters for VSP**

| MP blade name | MP blade number | MP blade ID |
|---|---|---|
| MPB-1MA | 0 | 0 |
| MPB-1MB | 1 | 1 |
| MPB-2MC | 2 | 2 |
| MPB-2MD | 3 | 3 |
| MPB-1ME | 4 | 4 |
| MPB-1MF | 5 | 5 |
| MPB-2MG | 6 | 6 |
| MPB-2MH | 7 | 7 |

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# MP unit names and parameters

**Table 1 MP unit names and parameters for VSP 5000 series**

| MP unit name | MP blade number | MP blade ID |
|---|---|---|
| MPU-010 | 0 | 0 |
| MPU-020 | 1 | 1 |
| MPU-110 | 2 | 2 |
| MPU-120 | 3 | 3 |
| MPU-210 | 4 | 4 |
| MPU-220 | 5 | 5 |
| MPU-310 | 6 | 6 |
| MPU-320 | 7 | 7 |
| MPU-410 | 8 | 8 |
| MPU-420 | 9 | 9 |
| MPU-510 | 10 | 10 |
| MPU-520 | 11 | 11 |

**MP unit names and parameters for VSP E series and VSP G130, G/F350, G/F370, G/F700, G/F900**

| MP unit name | MP blade number | MP blade ID |
|---|---|---|
| MPU-10 | 0 | 0 |
| MPU-20 | 1 | 1 |

**MP unit names and parameters for VSP G200, G400, G600, G800, VSP F400, F600, F800, HUS VM**

| MP unit name | MP blade number | MP blade ID |
|---|---|---|
| MPU-10 | 0 | 0 |
| MPU-11 | 1 | 1 |
| MPU-20 | 2 | 2 |
| MPU-21 | 3 | 3 |

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# LDEV grouping function

The LDEV grouping function enables you to create a group of multiple LDEVs (device group function and copy group function).

## Overview

CCI can be used to create a group of multiple LDEVs by defining copy groups, which are a group of copy pairs. This is accomplished in both the primary and secondary configuration definition files by defining the group names of the combined LDEVs (dev_name of HORCM_DEV or HORCM_LDEV).

To change copy group information, modify the primary and secondary configuration definition files. For example, to change the LDEV configuration of copy group dbA, change the LDEV information in configuration definition files A and B.

See the figure for LDEV grouping for USP V/VM and earlier.

Configuration Definition file A

```
HORCM_LDEV
#dev_group dev_name   Serial#    CU:LDEV(LDEV#) MU#
dbA        oradb01    30095      00:00          0
dbA        oradb02    30095      00:01          0
dbB        oradb03    30095      00:02          0
dbB        oradb04    30095      00:03          0
```

Copy Group: dbA

CCI A

Configuration Definition file B

```
HORCM_LDEV
#dev_group dev_name   Serial#    CU:LDEV(LDEV#) MU#
dbA        oradb01    30096      01:00          0
dbA        oradb02    30096      01:01          0
dbB        oradb03    30096      01:02          0
dbB        oradb04    30096      01:03          0
```

Copy Group: dbB

CCI B

Copy Group: dbA

oradb01

00:00    01:00

oradb02

00:01    01:01

Copy Group: dbB

oradb03

00:02    01:02

oradb04

00:03    01:03

Serial# 30095                                       Serial# 30096

For Virtual Storage Platform and later, CCI can be used to create a group of multiple LDEVs by defining device groups. This is accomplished by defining device groups in either the primary or secondary configuration definition file, but not both. By defining a device group, LDEV information can be changed or defined in one operation. It is not required to modify LDEV information in both configuration definition files. For example, referencing LDEVs or creating pools can be executed at the same time, because all LDEVs in the device group are subjected to the operation.

See the figure for LDEV grouping for VSP and later (device group and copy group).
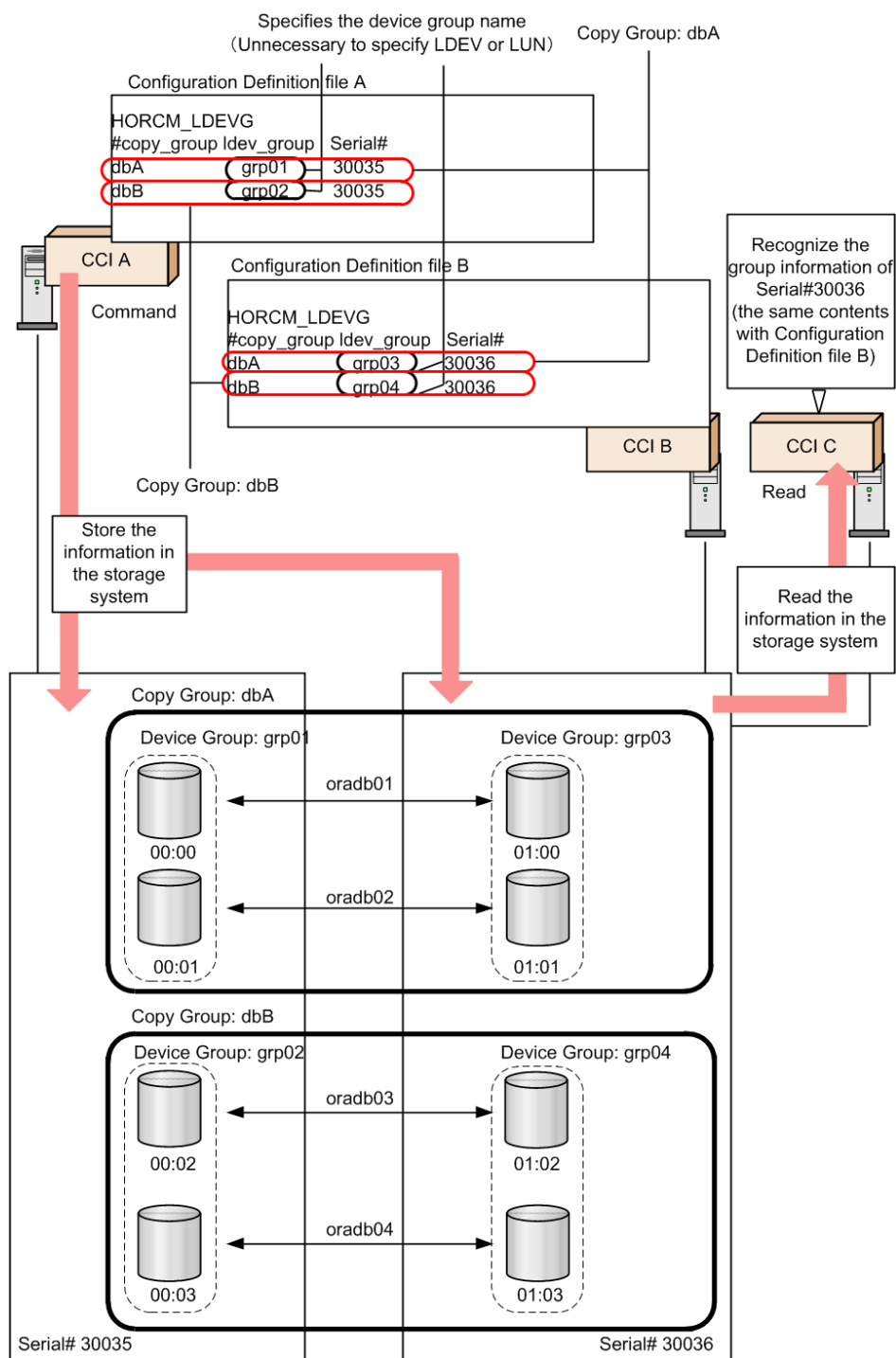
However, for executing replication function commands in CCI, two device groups must be combined and defined as a copy group.

When defining a device group or copy group by a command, the command can be issued from multiple CCI instances because the group information is defined in the storage system.

## Device group definition methods

To define a device group or copy group in the CCI that supports Virtual Storage Platform or later, use one or both of following methods.

- ▪ **Execute a command**:

  Create a device group with the `raidcom add device_grp` command, and execute the `raidcom add copy_grp` command specifying the name of the device group to define a copy group. When the command is executed, a description corresponding to HORCM_LDEV of CCI is defined in the storage system. Then, define HORCM LDEVG in the configuration file to incorporate it into the CCI instance. This can be executed at CCI that supports Virtual Storage Platform or later.

- ▪ **Define a configuration definition file**:

  Define HORCM_LDEV or HORCM_DEV of the configuration definition files of the primary and secondary volumes. For definition details, see Configuration definition file.

A device name is a name given to an LDEV in each device group. This is equivalent to the dev_name definition of HORCM_DEV. A device name is not required, but it is convenient to use to specify device group or device name instead of LDEV number. However, to create a pool or a journal, specifying LDEV number is required.

The LDEVs that have the same device name are recognized as a pair in the primary and secondary device group. Therefore, make match the device name for the LDEV to be a pair. Also, the number of LDEVs in the device group must be the same at the primary and secondary sides. Pairs are operated in the ascending sequence of the LDEV numbers. If there is no corresponding device name of LDEV in the device group to be paired, an error might be occurred on the pair operation.

## Read operations and command device settings

When grouping LDEVs, if HORCM_LDEVG on the primary side and secondary side is not defined, the read operation of CCI is different depending on the command device settings. The following table shows the details.

| HORCM_LDEVG | Command device setting | | | Reading of device group or copy group information | Security to be set |
|---|---|---|---|---|---|
| | Security | User authentication | Group information acquisition | | |
| Not defined | OFF | OFF | OFF | Do not read | No security |
| | | | ON | Do not read | Only HORCM_DEV allowed |

| HORCM_LDE VG | Command device setting | | | Reading of device group or copy group information | Security to be set |
|---|---|---|---|---|---|
| | **Securi ty** | **User authenticati on** | **Group informatio n acquisitio n** | | |
| | OFF | ON | OFF | Read[1] | User authentication required |
| | | | ON | Do not read | User authentication required<br><br>Only HORCM_DEV allowed |
| | ON | OFF | OFF | Read[1] | CMD security |
| | | | ON | Do not read | CMD security<br><br>Only HORCM_DEV allowed |
| | ON | ON | OFF | Read[1] | CMD security<br><br>User authentication required |
| | | | ON | Do not read | CMD security<br><br>User authentication required<br><br>Only HORCM_DEV allowed |
| Defined | - | - | - | Read[2] | - |

**Notes:**

1. Read the entire group information in the storage system.

2. Read the information of device group and copy group from the contents of the configuration definition file regardless of the setting of the command device.

# Defining device groups

A device group is created by specifying a device name and a device group name. Once a device group is created, the device group name, the LDEV number, and the information if there is copy group definition or not are stored in the storage system as configuration information.

The maximum number of device groups is 1,024 in one storage system. The maximum 65,279 LDEVs can be placed under the device group. And one LDEV can be placed in multiple device groups.

**Notes when specifying a device name**

- Multiple device names can be defined in one LDEV (Max: 1,024 names).

- The length of a device name must be up to 32 characters.

- In the device group that does not become an element of copy a group, the same device name can be used in the same device group.

- In the device group that becomes an element of a copy group, a device group name must be unique in the device group. It is because a pair is created between LDEVs that have same device names in respective primary and secondary volumes at the group operation of a replication series command.

**Notes when specifying a device group name**

- The length of a device group name must be up to 32 characters.

- A device group name must be unique within the storage system. The device group name cannot be duplicated in one storage system.

- When a device group name is specified by the `raidcom` command option and an LDEV to operate is specified by the device name, all devices that have the same name with the beginning of the specified name will be operated.

The contents of the following operations that can be executed for a device group are expressed hereafter with its use cases.

1. Device group creation
2. LDEV addition to device group
3. LDEV deletion from device group
4. Device group deletion

> **Note:**
>
> The following symbols are used in the use cases described hereafter.
>
> : symplex volume
>
> : device group            : copy group

## Creating device groups

Specify the LDEV number and the device group name to create a device group.

**Use cases**

The following examples show use cases for creating a device group.

- Creating a device group configured of simplex volumes with different device names.
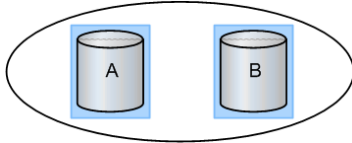


- Creating a device group configured of a simplex volume and a paired volume with different device names.
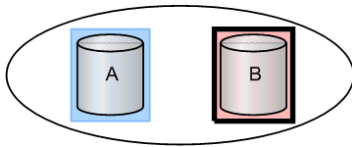


- Creating a device group configured of simplex volumes with same device names.
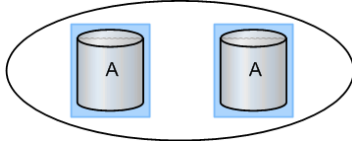


## Adding LDEVs to device groups

Specify the device group name and the LDEV number to add the LDEV to the device group.

**Use Cases**

The following figures show use cases that can be added an LDEV to a device group.

- Adding an LDEV (simplex volume) with a different device name to a device group.
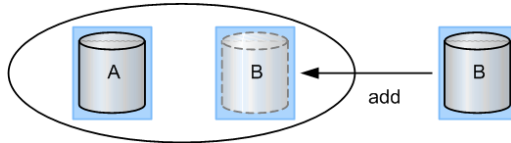


- Adding an LDEV (paired volume) with a different device name to a device group.
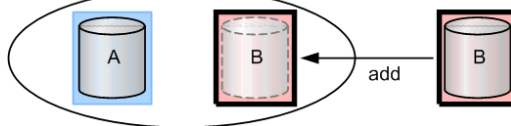


- Adding an LDEV to a device group already including the same device name.
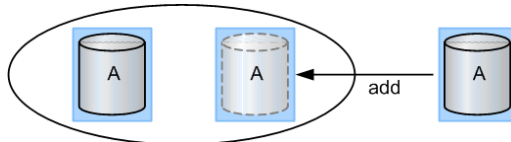


    The device name can be duplicated in the case of not creating the copy group by specifying a device group.

## Deleting LDEVs from device groups

Specify the device group name and the LDEV number to delete the LDEV from the device group.

LDEV can be deleted from the device group associating a copy group. The pair status does not change even if the LDEV is deleted from the device group.

**Use Cases**

The following figures show use cases that can be deleted an LDEV from a device group.

- Deleting an LDEV (simplex volume) not associated with a copy group from a device group.
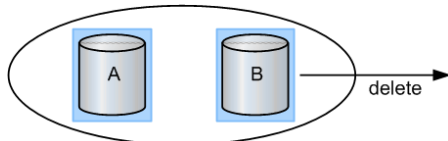


- Deleting an LDEV (paired volume) not associated with a copy group from a device group.
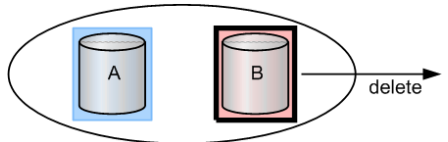
- Deleting an LDEV (simplex volume) associated with a copy group from a device group.
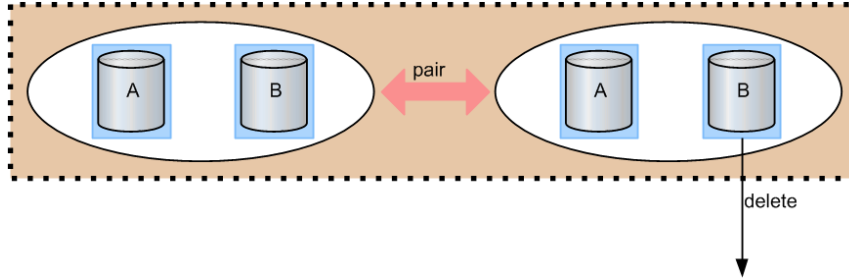


- Deleting an LDEV (paired volume) associated with a copy group from a device group.
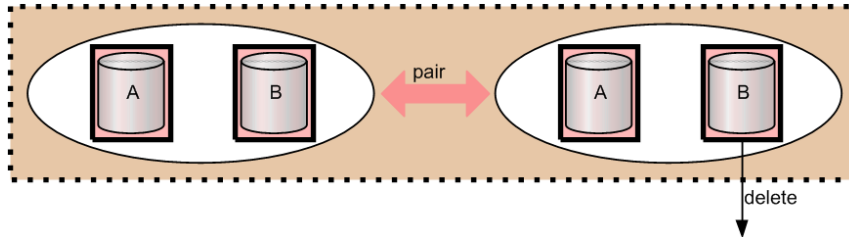


## Deleting device groups

Specify the device group name and the LDEV number to delete the LDEV in the device group. If all of the LDEVs configuring the device group are deleted from the device, the relevant device group is deleted. And, even if a device group is deleted, the pair status of the pair in the device group does not change.

**Use Cases**

The following figures show use cases that can be deleted an LDEV from a device group.

- Deleting a device group configured of simplex volumes and not associated with a copy group.
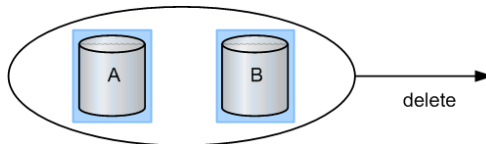


- Deleting a device group configured of a simplex volume and a paired volume and not associated with a copy group.
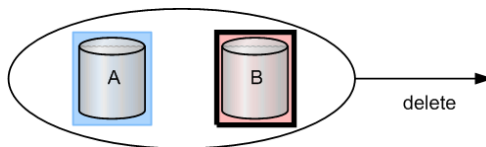
- Deleting a device group configured of simplex volumes and associated with a copy group.
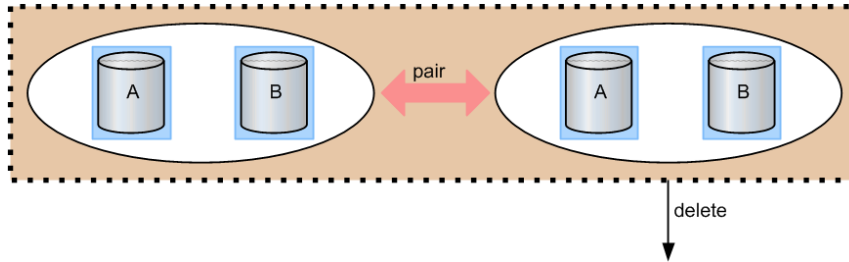


- Deleting a device group configured of paired volumes and associated with a copy group.
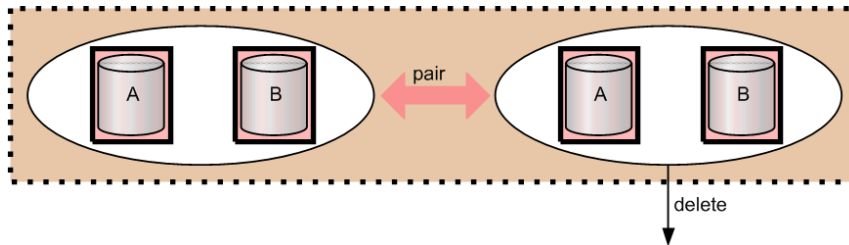


# Copy group function

Defining a copy group by specifying two device groups: one device group from primary side and one device group from secondary side, whether they are inside or outside the storage system. A copy group cannot be defined by specifying more than one device group from just one side of primary or secondary.

When a copy group is created, which device group is primary and which is secondary cannot be specified. Therefore, it is specified at the time of actual pair creation. As configuration information, a copy group name, a device group name (primary and secondary), and an MU# are maintained in the storage system.

The notes when operating copy groups are shown below.

**When creating a copy group**

- In case of creating a copy group by executing a command, a copy group cannot be created through direct specification of multiple LDEVs. Create a copy group by specifying a device group.

- In one device group associated as a copy group, the same device name cannot be defined.

- Copy groups with the same name cannot be defined within the same storage system.

- One device group cannot be defined to multiple copy groups.

- The maximum number of copy groups per storage system is 16,384.

- At the time of consistency group creation (pair creation) and consistency group deletion (pair deletion), the collaboration with the group operations (device group creation/deletion, copy group creation/deletion) is not performed.

**When deleting a copy group**

- If a copy group is deleted, the association of two device groups is deleted. However, the actual pair status, the consistency group ID and others are not changed (not affected). Even if the pair status in the copy group is not single and the copy group is deleted, the copy group deletion processing is performed.

- If an LDEV is deleted from a device group associated as a copy group, the relevant LDEVs are deleted from all the associated copy groups.

- A copy group defines the relationship of device groups. Therefore, it is not possible to specify an LDEV and remove it from the copy group.

- Regardless of the pair status (copy status), it is possible to exclude LDEVs from device groups associated as a copy group.

The contents of the following operations that can be executed for a copy group are expressed hereafter with its use cases.

1. Copy group creation
2. LDEV addition to copy group
3. LDEV deletion from copy group
4. Copy group deletion
5. Pair operation by specifying a copy group

**Note:** The following symbols are used in the use cases described hereafter.

: symplex volume

: device group

: copy group

## Creating copy groups

Specify the names of two device groups to create a copy group. The same device name must not be defined for any LDEVs in a specified device group. A copy group can be created whether the LDEV in the device group is paired status or not.

**Use cases**

The following shows use cases that can be created a copy group.

- Creating a copy group in cases where two device groups are configured of simplex volumes and the device names and the LDEV numbers in the respective device groups are the same.

  In the following example, when a copy group is created, the LDEVs within the device names of A to A and B to B become a subject of pair operation.
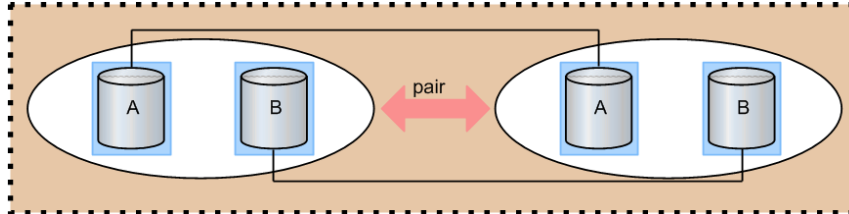


- Creating a copy group in cases where two device groups are configured of paired volumes and the device names and the LDEV numbers in the respective device groups are the same.

  In the following example, although pairs have been created on the device names of A to A and B to B, a copy group can be created.
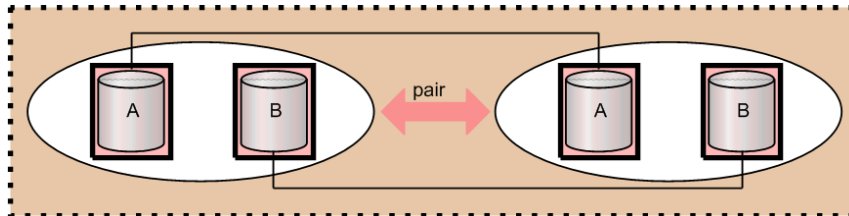


## Adding LDEVS to copy groups

Specify the name of the device group for which you created a copy group to add an LDEV. It is not possible to add LDEVs directly to the copy group.

If the device group you want to specify has the same device name, you cannot add the LDEV.

**Use cases**

The following figures show use cases that can be added an LDEV to the device group associating a copy group.

- Adding an LDEV with a different device name (simplex volume) to a device group forming a copy group.
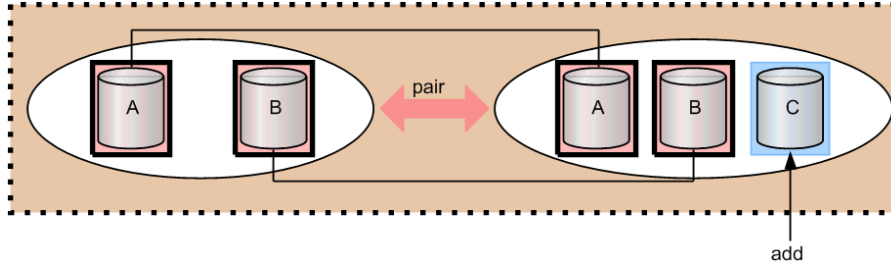


- Adding an LDEV with a different device name (paired volume) to a device group forming a copy group.
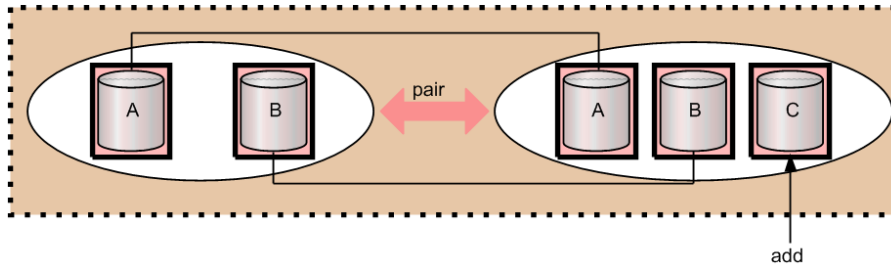


## Deleting LDEVs from copy groups

Specify the device group name for which you created a copy group to delete an LDEV. You can delete either simplex volume or paired volume LDEVs.

It is not possible to delete LDEVs directly from the copy group.

**Use cases**

The following shows use cases that can be deleted LDEVs from the device group forming a copy group.

▪ Deleting an LDEV (simplex volume) from a device group forming a copy group.
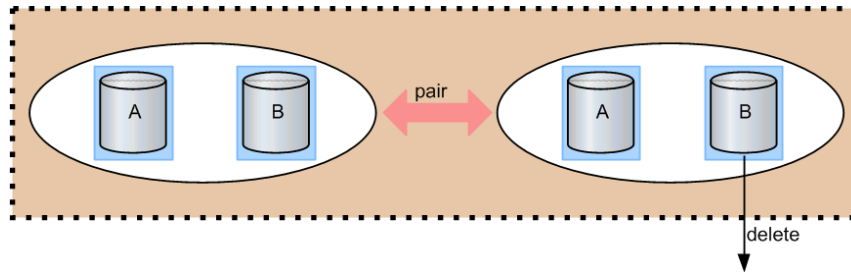


▪ Deleting an LDEV (paired volume) from a device group forming a copy group.
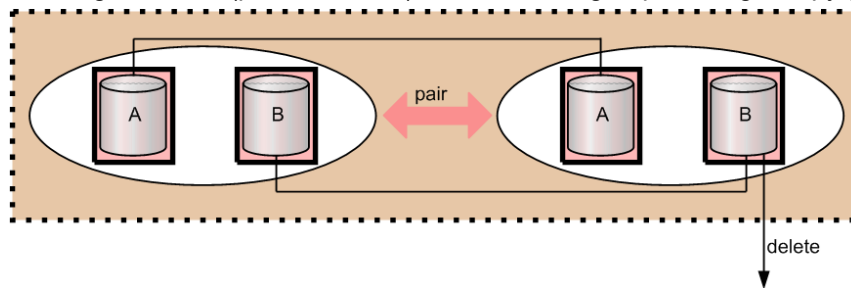


## Deleting copy groups

Specify the defined copy group to delete it.

**Use cases**

A copy group can be deleted even if it is configured of simplex volumes or paired volumes.

The following shows use cases that can be deleted a copy group.

- Deleting a copy group configured of simplex volumes.
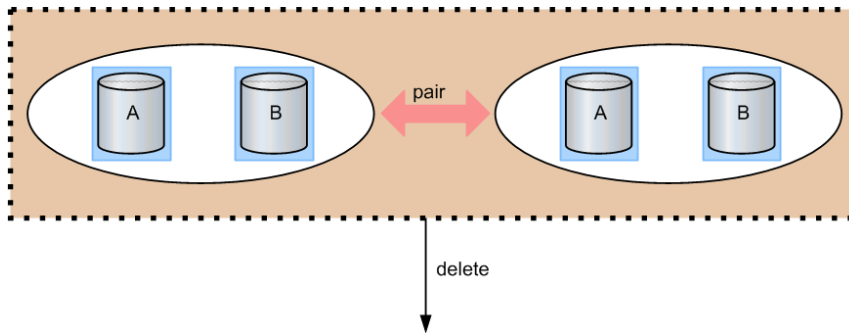


- Deleting a copy group configured of paired volumes.
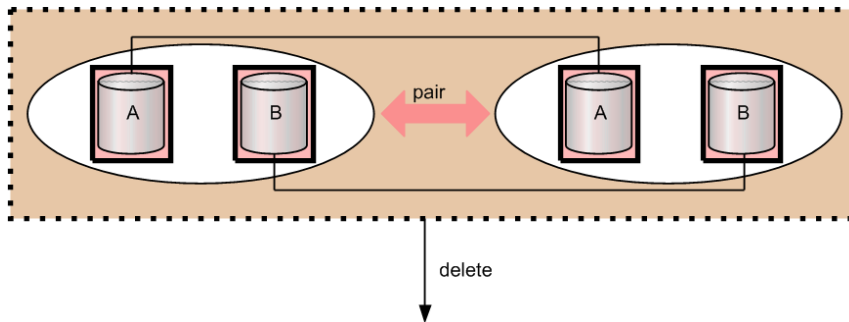


## Pair operation by specifying a copy group

Specifying a copy group and creating a pair. Pairs are created for which the same device names of LDEV defined in respective device groups of the LDEVs. Therefore, it is required to give a same device name for the item to be operated as a pair.

If a consistency group attribute is valid and no consistency group ID is specified, automatically assign a consistency group ID (1 copy group=1 consistency group). If the automatic consistency group assignment is specified and the other pairs in a copy group already have consistency group IDs, assign the same consistency group ID.

If there is no target LDEV to be a pair in the copy group, the process is terminated by detecting an error.

**Use cases**

As an example of pair operation, the following shows use cases that can be created a pair by specifying a copy group.

- Creating a pair in cases where the device names and the numbers of LDEVs in two device groups in a copy group configured of simplex volumes are the same.
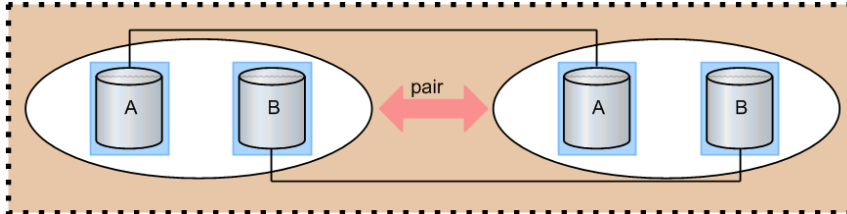


  In the following example, pairs are created with LDEVs that have the same device name, A to A and B to B.

- Creating a pair in cases where the device names and the numbers of LDEVs in two device groups in a copy group configured of simplex volumes and paired volumes are the same.
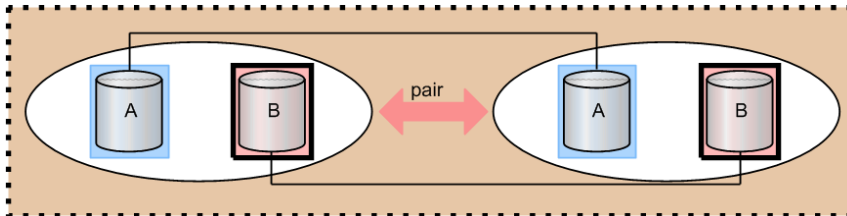


  In the following example, a pair is created with LDEVs for the device name A. And no operation is performed for the volumes of device name B that are already formed into copy pairs.

- Creating a pair in cases where different device names exist in two device groups in a copy group configured of simplex volumes.
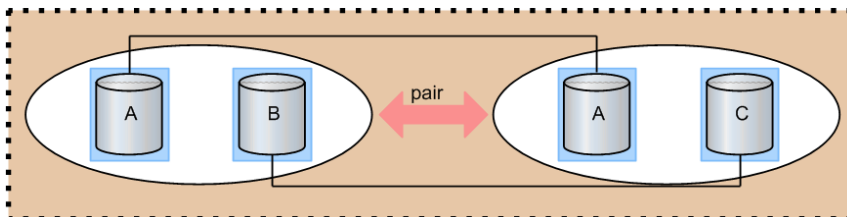


  In the following example, a pair for device name A can be created, but not for device name B and C because they have different names.

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- Creating a pair in cases where the device names in two device groups in a copy group configured of simplex volumes and paired volumes are different.
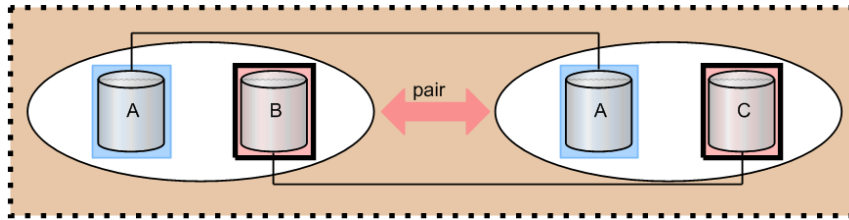


  In the following example, a pair for device name A to A can be created. For the device name B and C, although it does not change the paired status, but an error occurs because they have different device names.

- Creating a pair in cases where the numbers of LDEVs in two device groups in a copy group configured of simplex volumes are different.
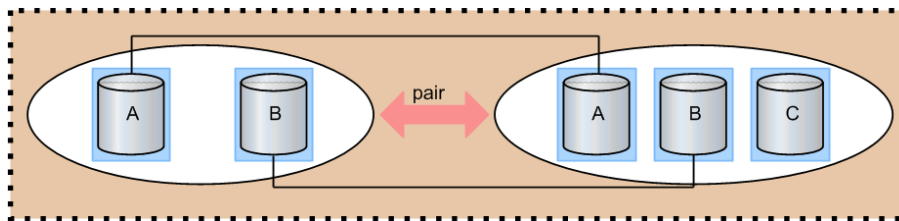


  In the following example, pairs are created for the device name A to A and B to B.

# Pair operations with mainframe volumes

You can create a pair with mainframe LDEVs using CCI. However, some of the replication functions are not available in CCI. For more detailed information, see the user manual for the replication function: *Hitachi TrueCopy® for Mainframe User Guide*, *Hitachi Universal Replicator for Mainframe User Guide*, or *Hitachi ShadowImage® for Mainframe User Guide*.

⚠ **Caution:** Do not use CCI to operate a pair for which Business Continuity Manager or PPRC is used.

⚠ **Caution:** If CCI volumes and PPRC multi-target volumes exist in the same consistency group, the group suspend (Freeze) command from CCI might fail and volumes might be in Suspend failure status.

## Using "dummy" LUs for mainframe LDEVs

Pseudo-LUs called "dummy" LUs are used to access mainframe LDEVs in CCI. The dummy LUs are unconditionally defined for all mainframe device emulation types. Since the dummy LUs are used only by CCI, other user interfaces such as Storage Navigator and host servers do not display the dummy LUs. Two dummy LUs are assigned to each mainframe LDEV. The port IDs of the mainframe PCBs are assigned as the port IDs for the dummy LUs. Host modes cannot be defined for dummy LUs.

```
# pairdisplay -g oradb
Group  Pair Vol(L/R) (Port#,TID,LU-M), Seq#, LDEV#..P/S, Status, Fence,  Seq#, P-LDEV# M
oradb  oradb1(L)     (CL1-A, 1, 0)     30053   18..P-VOL PAIR   Never,  30053   19  -
oradb  oradb1(R)     (CL1-D, 1, 0)     30053   19..S-VOL PAIR   Never,  30053   18  -
```

information on dummy LUs

To determine the port number for dummy LUs, use the following formula:

```
Port#:Installed Port#(*1) (LDEV# / 0x4000) × 32
      Installed Port#(*1) (LDEV# / 0x4000) × 32+1
```

*1: The lowest port number of the installed mainframe ports.

```
TID:                    (LDEV# & 03xFCO)/64

LU-M:                   (LDEV# &0x3F)
```

To perform pair operations on mainframe volumes just like on open-system volumes, include the mainframe LDEV# in the HORCM_LDEV section of the configuration definition file. If you have mainframe pairs that already exist, you can verify their MU # using the **raidscan** command.

```
HORCM_LDEV
#dev_group    dev_name    Serial#    CU:LDEV(LDEV#) MU
oradb         dev1        30095      00:12          0
oradb         dev2        30095      00:14          0
```

Define mainframe LDEV#.

## Pair status and access permission for mainframe LDEVs

The pair status of mainframe LDEVs is displayed in the same way as for open-system LDEVs. However, access permissions to mainframe P-VOLs and S-VOLs are different from those of open volumes. The following tables show the pair status and access permissions for mainframe LDEVs. For more information about displayed pair status of open LDEVs, see TrueCopy/ShadowImage/Universal Replicator pair status.

**Pair status and access permission for TrueCopy/TrueCopy for Mainframe**

| Pair status in Storage Navigator | | Pair status in CCI | | Access to mainframe P-VOL | Access to mainframe S-VOL | Notes |
|---|---|---|---|---|---|---|
| Open | Mainframe | Open | Mainframe | | | |
| SMPL | Simplex | SMPL | SMPL | Read/write enabled | Read/write enabled | not in pair |
| COPY | Pending | COPY | COPY | Read/write enabled | Reject | copying |
| PAIR | Duplex | PAIR | PAIR | Read/write enabled | Reject | pair |

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| Pair status in Storage Navigator | | Pair status in CCI | | Access to mainframe P-VOL | Access to mainframe S-VOL | Notes |
|---|---|---|---|---|---|---|
| **Open** | **Mainframe** | **Open** | **Mainframe** | | | |
| PSUS (pair suspended split) | Suspended | PSUS | PSUS | Read/write enabled | Reject[1] | suspend |
| PSUE (pair suspended error) | Suspended | PSUE | PSUE | Read/write enabled | Reject[1] | suspend by failure |
| PDUB | - | PDUB | -[2] | - | - | inconsistency in LUSE status |
| SSWS | SSWS | SSWS | SSWS | - | Read/write enabled | HAM only/ horctakeover only |

**Notes:**

1. When the system option mode 20 is on, this is a read only volume.
2. PDUB (inconsistency in LUSE status) does not exist in the mainframe system.

**Pair status and access permission for Universal Replicator/Universal Replicator for Mainframe**

| Pair status in Storage Navigator | | Pair status in CCI | | Access to mainframe P-VOL | Access to mainframe S-VOL | Notes |
|---|---|---|---|---|---|---|
| **Open** | **Mainframe** | **Open** | **Mainframe** | | | |
| SMPL | Simplex | SMPL | SMPL | Read/write enabled | Read/write enabled | not in pair |
| COPY | Pending | COPY | COPY | Read/write enabled | Reject | copying |
| PAIR | Duplex | PAIR | PAIR | Read/write enabled | Reject | pair |

| Pair status in Storage Navigator | | Pair status in CCI | | Access to mainframe P-VOL | Access to mainframe S-VOL | Notes |
|---|---|---|---|---|---|---|
| Open | Mainframe | Open | Mainframe | | | |
| PSUS (pair suspended split) | Suspend | PSUS | PSUS | Read/write enabled | Reject* | suspend |
| PSUE (pair suspended error) | Suspend | PSUE | PSUE | Read/write enabled | Reject* | suspend |
| Suspending | Suspending | PAIR | PAIR | Read/write enabled | Reject | pair |
| Deleting | Deleting | PAIR / COPY | PAIR / COPY | Read/write enabled | Reject | pair/copying |
| HOLD | Hold | PSUS | PSUS | Read/write enabled | Reject* | suspend |
| HOLDING | Holding | PSUS | PSUS | Read/write enabled | - | suspend |
| PSUS (HLDE) | Hlde | PSUE | PSUE | Read/write enabled | Reject | suspend |
| PFUL | Suspend | PFUL | PFUL | Read/write enabled | Reject | suspend |
| PFUS | Suspend | PFUS | PFUS | Read/write enabled | Reject | suspend |
| SSWS | Suspend | SSWS | SSWS | - | Read/write enabled | suspend |
| *When system option mode 20 is on, this is a read-only volume. | | | | | | |

**Pair status and access permission for ShadowImage/ShadowImage for Mainframe**

| Pair status in Storage Navigator | | Pair status in CCI | | Access to mainframe P-VOL | Access to mainframe S-VOL | Notes |
|---|---|---|---|---|---|---|
| Open | Mainframe | Open | Mainframe | | | |
| SMPL | Simplex | SMPL | SMPL | Read/write enabled | Read/write enabled | simplex |
| COPY(PD) | Pending | COPY | COPY | Read/write enabled | Reject | copying |
| PAIR | Duplex | PAIR | PAIR | Read/write enabled | Reject | pair |
| COPY (SP) | SP-Pend | COPY | COPY | Read/write enabled | Reject | suspend (in COPY(SP) COPY-COPY) |
| PSUS (SP) | V-split | PSUS | PSUS | Read/write enabled | Read/write enabled | suspend (in Quick Split PSUS-COPY) |
| PSUS (pair suspended split) | Split | PSUS | PSUS | Read/write enabled | Read/write enabled | suspend |
| PSUE (pair suspended error) | Suspend | PSUE | PSUE | Read/write enabled | Reject | suspend by failure |
| COPY (RS) | Resync | COPY | COPY | Read/write enabled | Reject | resynchronizing |
| COPY (RS-R) | Resync-R | RCPY | RCPY | Reject | Reject | restoring |

## Operational differences for multiplatform volumes

The following table shows the operational differences for TrueCopy, Universal Replicator, and ShadowImage multiplatform volumes.

| LU path definition | LU path information reported to CCI | ShadowImage operations | TrueCopy operations | Universal Replicator operations |
|---|---|---|---|---|
| LU path is defined. | Actual LU path information is reported. | ShadowImage for Mainframe operations | Commands are rejected. | Commands are rejected. |
| LU path is not defined. | Dummy LU number is reported. | ShadowImage for Mainframe operations | Commands are rejected. | Commands are rejected. |

## Operational differences for replication commands

The following table shows the differences between open volumes and mainframe volumes in replication commands. For details on the differences, see the manual for each program product.

| Command | Option | Description | Operation in open systems | Operation in mainframe systems | Notes |
|---|---|---|---|---|---|
| paircreate * | -c <size> | Specifies track size when copying. | TrueCopy: You can specify 1 to 15 tracks. | TrueCopy for Mainframe: 3 or 15 tracks When you specify the number 1 to 3, the copy speed is 3 tracks. When you specify the number 4 to 15, the copy speed is 15 tracks. | This option is not supported in Universal Replicator or Universal Replicator for Mainframe. There is no difference between ShadowImage and ShadowImage for Mainframe. |

| Command | Option | Description | Operation in open systems | Operation in mainframe systems | Notes |
|---|---|---|---|---|---|
| | -m grp [CTG ID] | If CTG ID is not specified, CTG ID is automatically assigned and a pair is registered to the consistency group. If CTG ID is specified, a pair is registered to the CTG ID in use. | You can specify this option. | You can specify this option. | ShadowImage pairs and ShadowImage for Mainframe pairs cannot be registered to the same CTG ID. If both ShadowImage pairs and ShadowImage for Mainframe pairs are registered to one group, the command ends abnormally. |
| pairsplit | -r<br>-rw | Specifies access mode to S-VOL after splitting a pair. | -r: Read only<br><br>-rw: Read/write enabled | When the system option mode 20 is off:<br><br>▪ -r: All R/W commands are not accepted.<br><br>▪ -rw: Read/write enabled<br><br>When the system option mode 20 is on:<br><br>▪ -r: Read only. Write is enabled only for VTOC.<br><br>▪ -rw: Read/write enabled | This option is supported only for TrueCopy, TrueCopy for Mainframe, Universal Replicator, and Universal Replicator for Mainframe.<br><br>You cannot specify this option in ShadowImage or ShadowImage for Mainframe, Thin Image, global-active device. |

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| Comman d | Option | Description | Operation in open systems | Operation in mainframe systems | Notes |
|---|---|---|---|---|---|
| | | | | The volume cannot be read regardless of the specified options. | |

*If the capacity of the S-VOL is larger than that of the P-VOL, you cannot create a pair with CCI. To create a TrueCopy for Mainframe pair with volumes that differ in capacity, use Business Continuity Manager or Storage Navigator.

**Notes:**

▪ A mainframe primary volume can also be called a source volume or a main volume.

▪ A mainframe secondary volume can also be called a target volume or a remote volume.

# Pair operations on namespaces for NVMe-oF

You can perform pair operations on the pair volumes that use LDEVs registered as namespaces by using CCI in the NVMe-oF connection environment.

However, an LDEV registered as a namespace can be used as the pair volume only in ShadowImage, Thin Image, Volume Migration, TrueCopy, or Universal Replicator. The LDEV cannot be used in global-active device. For more information about the storage system settings for NVMe-oF and the requirements for an LDEV registered as a namespace, see the *Provisioning Guide for Open Systems*.

## Using a dummy LU

To use an LDEV registered as a namespace for NVMe-oF, define a dummy LU (a pseudo-LU).

The dummy LU is unconditionally defined for a subsystem port on the NVM subsystem to which the namespace belongs. The dummy LU is only used by the CCI replication commands, and therefore other user interfaces such as HDvM - SN or a host server, or the CCI configuration setting commands do not display the dummy LU. The host mode cannot be defined for a dummy LU.

```
# pairdisplay -g oradb
Group  Pair Vol(L/R)  (Port#,TID,LU-M),  Seq#,  LDEV#..P/S,  Status,  Fence,  Seq#,  P-LDEV# M
oradb  oradb1(L)      (CL1-A, 1,0)      30053     18..P-VOL PAIR   Never,   30053    19   -
oradb  oradb1(R)      (CL1-D, 1,0)      30053     19..S-VOL PAIR   Never,   30053    18   -
```
information on dummy LUs

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To perform pair operations on an LDEV registered as a namespace for NVMe-oF just like on an FC-SCSI volume, specify the LDEV# of the namespace in the HORCM_LDEV parameters of the configuration definition file. You can verify the LDEV# of the namespace by using the `raidscan -p` or the `raidscan -nguid`.

```
HORCM_LDEV
#dev_group     dev_name     Serial#    CU:LDEV(LDEV#) MU
oradb          dev1          30095     00:12              0
oradb          dev2          30095     00:14              0
```

Define namespace LDEV#

To perform operations of a pair that is created using an LDEV registered as a namespace with the NVMe-oF connection, one or more NVM subsystem ports must be registered on the NVM subsystem to which the namespace belongs.

> **Note:**
>
> If CCI does not support NVMe-oF, the following CCI configuration setting commands might display a dummy LU:
>
> ```
> raidcom get lun
> raidcom get ldev
> ```
>
> When using the NVMe-oF configuration, use CCI with the version 01-63-03/00 or later that supports the NVMe-oF configuration.

## Pair operation flow of namespace for NVMe-oF

1. Edit the CCI configuration definition file. Specify the paired volume using a dummy LU.
2. Start the CCI instances.

   ```
   horcmstart 100 101
   starting HORCM inst 100
   HORCM inst 100 starts successfully.
   starting HORCM inst 101
   HORCM inst 101 starts successfully.
   ```

3. Operate the pair.

   Example (when creating a TrueCopy pair with a fence level of "none" and a consistency group ID of 2):

   ```
   paircreate -g oraTC -fg never 2 -vl
   ```

   For details about pair operation commands (create, split, resynchronize, delete, and reference), see the chapter of replication commands in the *Command Control Interface Command Reference*.

4. Check the pair status.

# Global storage virtualization function

The global storage virtualization function enables you to minimize rewrites of configuration definition files (horcm*.conf) when you operate volumes migrated from older models to the VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models. You can also minimize the modification of the script file that you used for the older models, when you operate volumes using the script file created by you. For details about the global storage virtualization function, see the *Provisioning Guide* for the storage system. Volume migration (nondisruptive migration) from older models by using the global storage virtualization function is supported only on the VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models.

## System configuration example with the global storage virtualization function

This topic shows a system configuration with the global storage virtualization function. In this configuration, a virtual storage machine is created in two storage systems respectively. Volumes in the virtual storage machine are given virtual LDEV IDs.

- Primary site
  - Storage system: VSP G1000 (S/N: 67000)
  - Virtual storage machine: VSP (S/N: 65000)
  - LDEV ID of VSP G1000: 10:00 and 10:01
  - Virtual LDEV ID: 01:00 and 01:01
- Secondary site
  - Storage system: VSP G1000 (S/N: 68000)
  - Virtual storage machine: VSP (S/N: 66000)
  - LDEV ID of VSP G1000: 10:00 and 10:01
  - Virtual LDEV ID: 02:00 and 02:01

Legends:

: Virtual LDEV ID

: Device group

: Universal Replicator pair

CMD: Command device
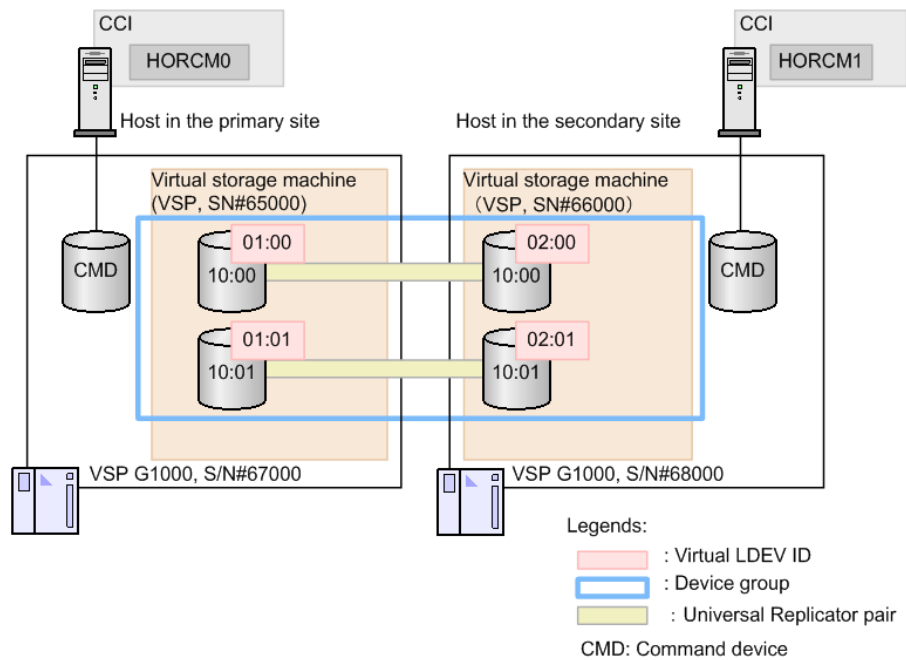
## Using CCI with the global storage virtualization function

To use CCI with the system configuration using the global storage virtualization function, the following two methods can be used.

- Specifying a virtual storage machine to HORCM_VCMD in configuration definition files

- Specifying a virtual storage machine to command options (that is, -s <seq#> or -u <unit id>)

If you specify the virtual storage machine to HORCM_VCMD of the configuration file, the shell scripts can be used continuously, because you do not need to modify their scripts. However, if you define HORCM_VCMD, you cannot operate the virtual storage machine whose the serial number is not specified by HORC_VCMD. If you specify the virtual storage machine to the command options (that is, -s <seq#> or -u <unit id>) instead of specifying with HORCM_VCMD, you can also operate the virtual storage machine of the serial number not specifying to HORCM_VCMD.

After you change the virtual storage machine configuration with the `raidcom add resource` command or the `raidcom delete resource` command, restart HORCM.

## Configuration definition file settings with global storage virtualization

This topic shows configuration definition file settings with the global storage virtualization function. For details on other parameters, see Configuration definition file. The global storage virtualization function is supported on the VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models.

▪ **HORCM_CMD**:

Specify a volume belonging to meta_resource, virtual command device, or a virtual storage machine that you created in the storage system as the command device. CCI obtains the virtual storage machine information defined in the storage system via the specified command device, and configures the virtual storage machine components.

When you specify a volume that belongs to a virtual storage machine that you created, note the following:

- Use the serial number of the virtual storage machine and the virtual LDEV ID for the serial number and LDEV ID which you are specifying for HORCM_CMD.

- You cannot specify HORCM_VCMD to the same configuration definition file.

- You cannot define the volume that does not belong to the virtual storage machine to the HORCM_CMD of the same configuration definition file.

- When you specify multiple volumes of virtual storage machines associated with the same serial number, these volumes must belong to the same storage system.

📄 **Note:** The `mkconf` command lets you create the configuration definition file by importing the special file name from the standard input. When you create a configuration definition file by using the mkconf command, make sure that the special file name of the volume that belongs to the virtual storage machine that you created and the special file name of the volume that does not belong to the virtual storage machine are different.

▪ **HORCM_VCMD**:

In HORCM_VCMD, specify the serial number of the virtual storage machine to be operated by this instance when you specify a volume belonging to meta_resource or a virtual storage machine for HORCM_CMD.

You cannot operate the virtual storage machines whose serial numbers are not specified in HORCM_VCMD. To operate more than one virtual storage machine from a instance, specify each serial number of the virtual storage machines in a new line with HORCM_VCMD. To operate the virtual storage machine specified in the second or later of HORCM_VCMD, use the command options (for example, -s <seq#> or -u <unit id>). If you omit the options of the command, the virtual storage machine of which you first specified serial number is operated. Even if you specify the virtual storage machine of which the serial number is not specified in HORCM_VCMD with the command option (-s <seq#> or -u <Unit ID>), the error (EX_ENOUNT) occurs.

When you specify a serial number* of a storage system as a serial number of a virtual storage machine in HORCM_VCMD, CCI recognizes the storage system specified in HORCM_CMD as a virtual storage machine. In this case, CCI works the same as when you specified a serial number of a virtual storage machine that you created in HORCM_VCMD. Do not specify a serial number of a storage system in order to avoid complicating operations.

(* This serial number is displayed in Serial# column of `raid get resource -key` command.)

When you specify a command device that does not belong to a virtual storage machine that you created in HORCM_CMD, and don't specify HORCM_VCMD, CCI handles the storage system specified in HORCM_CMD as a normal (physical) storage system.

▪ **HORCM_LDEV**:

Specify volumes to be copied. Serial numbers of the virtual storage machine and virtual LDEV IDs must be specified. You cannot specify the volumes with HORCM_DEV in the system configuration with the global storage virtualization function. Specify the volumes with HORCM_LDEV.

▪ **HORCM_INST**:

Specify an IP address and a service name of the remote host as it is for not using the global storage virtualization function.

## Example of the configuration definition files when specifying a virtual storage machine by HORCM_CMD

The following examples show when a volume belonging to meta_resource is specified for HORCM_CMD.

📄 **Note:** The underlined parts indicate the information that needs to modify from the file of the old model.

**Example of the configuration definition files (HORCM0)**

```
#/******** HORCM0 on PHOST *****/
HORCM_MON
```

```
#ip_address service poll(10ms) timeout(10ms)
NONE       horcm0      1000         3000


#/********** For HORCM_CMD ***************/
HORCM_CMD
#dev_name
\\.\CMD-367000:/dev/rdsk
HORCM_VCMD
# redefine Virtual DKC Serial# as unitIDs
65000


HORCM_LDEV
Ora        dev1       65000  01:00  h1
Ora        dev2       65000  01:01  h1


#/********** For HORCM_INST ***************/
HORCM_INST
#dev_group   ip_address     service
Ora          RHOST          horcm1
```

## Example of the configuration definition files (HORCM1)

```
#/******** HORCM1 on RHOST *****/
HORCM_MON
#ip_address service poll(10ms) timeout(10ms)
NONE       horcm1      1000          3000


#/********** For HORCM_CMD ***************/
HORCM_CMD
#dev_name
\\.\CMD-368000:/dev/rdsk
HORCM_VCMD
# redefine Virtual DKC Serial# as unitIDs
66000


HORCM_LDEV
Ora        dev1       66000  02:00  h1
Ora        dev2       66000  02:01  h1


#/********** For HORCM_INST ***************/
HORCM_INST
#dev_group   ip_address     service
Ora          PHOST          horcm0
```

## `raidqry` command display example

```
# raidqry -l
No Group  Hostname    HORCM_ver   Uid Serial# Micro_ver   Cache(MB)
1  ---     raidmanager 01-31-03/00 0   66000   80-01-00/00 81920
```

The following examples show when the storage system is VSP G1000 and a volume belonging to a virtual storage system is specified for HORCM_CMD.

📄 **Note:** It is not necessary to change HORCM_CMD used in the previous model or to add HORCM_VCMD.

**Example of the configuration definition files (HORCM0)**

```
#/******** HORCM0 on PHOST *****/
HORCM_MON
#ip_address service poll(10ms) timeout(10ms)
NONE horcm0 1000 3000
#/********** For HORCM_CMD ***************/
HORCM_CMD
#dev_name
\\ . \ CMD-65000:/dev/rdsk
HORCM_LDEV
Ora dev1 65000 01:00 h1
Ora dev2 65000 01:01 h1
#/********** For HORCM_INST ***************/
HORCM_INST
#dev_group ip_address service
Ora RHOST horcm1
```

**Example of the configuration definition files (HORCM1)**

```
#/******** HORCM1 on RHOST *****/
HORCM_MON
#ip_address service poll(10ms) timeout(10ms)
NONE horcm1 1000 3000
#/********** For HORCM_CMD ***************/
HORCM_CMD
#dev_name
\\ . \ CMD-66000:/dev/rdsk
HORCM_LDEV
Ora dev1 66000 02:00 h1
Ora dev2 66000 02:01 h1
#/********** For HORCM_INST ***************/
HORCM_INST
#dev_group ip_address service
Ora PHOST horcm0
```

# Specifying a virtual storage machine to HORCM_VCMD

This section covers the following topics:

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## Command operations to virtual storage machines

When HORCM starts, CCI obtains the virtual storage machine information from multiple storage systems, and configure each virtual storage machine component. CCI regards commands as the command to the virtual storage machine by the descriptions of the configuration definition file or the command options (i.e., -s <seq#> or -u <unit id>), and use their information. The following table shows how to issue the command to the virtual storage machine for each command.

| Commands | How to issue the command to the virtual storage machine | Remarks |
|---|---|---|
| paircreate | Describe the virtual storage machine information in HORCM_LDEV in the configuration definition file. | --- |
| pairsplit | Describe the virtual storage machine information in HORCM_LDEV in the configuration definition file. | --- |
| pairresync | Describe the virtual storage machine information in HORCM_LDEV in the configuration definition file. | --- |
| pairevtwait | Describe the virtual storage machine information in HORCM_LDEV in the configuration definition file. | --- |
| pairvolchk | Describe the virtual storage machine information in HORCM_LDEV in the configuration definition file. | --- |
| pairdisplay | Describe the virtual storage machine information in HORCM_LDEV in the configuration definition file. | --- |
| paircurchk | Describe the virtual storage machine information in HORCM_LDEV in the configuration definition file. | --- |
| horctakeover | Describe the virtual storage machine information in HORCM_LDEV in the configuration definition file. | --- |
| raidvchkset | Describe the virtual storage machine information in HORCM_LDEV in the configuration definition file. | --- |
| raidvchkdsp | Describe the virtual storage machine information in HORCM_LDEV in the configuration definition file. | --- |

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| Commands | How to issue the command to the virtual storage machine | Remarks |
|---|---|---|
| pairsyncwait | Describe the virtual storage machine information in HORCM_LDEV in the configuration definition file. | --- |
| pairmon | Describe the virtual storage machine information in HORCM_LDEV in the configuration definition file. | --- |
| raidscan | Specify the virtual storage machine by the -s <seq#> or the -p <port#> (to specify the unit ID) option.<br><br>The virtual storage machine can be specified regardless of the description contents of the configuration definition file. | You cannot specify a virtual storage machine by the -u <unit ID> option of the raidscan command. Use the -s <seq#> option, or the -p <port#> to specify as "CL1-A*n*" (*n* is the unit ID). |
| raidar | Specify the virtual storage machine by a unit ID by the command option (-p <port#>). | The raidar command has no option to specify a serial number nor a unit ID. Use the -p <port#> option as "CL1-An" (specify a unit ID in n). |
| raidvchkscan | Specify the virtual storage machine by the command option (-s <seq#> or -u <unit ID>).<br><br>The virtual storage machine can be specified regardless of the description contents of the configuration definition file. | If you are specifying a command device in a virtual storage machine that you created for which user authentication is disabled to the HORCM_CMD, do not specify the `-v jnl` and `-v pid` option. |
| horcctl | Specify VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models information. | If you specify the virtual storage machine information, error (No such control device) occurs. |

| Commands | How to issue the command to the virtual storage machine | Remarks |
|---|---|---|
| | | This command cannot be used if you specify a volume belonging to a virtual storage machine that you created to HORCM_CMD. |
| raidcom | Specify the virtual storage machine by the command option (-s <seq#> or -u <unit ID>).<br><br>The virtual storage machine can be specified regardless of the description contents of the configuration definition file. | When you specify a volume that belongs to meta_resource for HORCM_CMD and also specify HORCM_VCMD, some commands can be executed using the virtual storage machine information (see Operation target for raidcom commands when specifying the virtual storage machine in HORCM_VCMD). |

| Commands | How to issue the command to the virtual storage machine | Remarks |
|---|---|---|
| | | When you specify a volume that belongs to a virtual storage machine that you created for HORCM_CMD, there is a limitation of which command you can use. You can execute by using the virtual storage machine information if the `raidcom` command can be used and if you specify the virtual storage machine for the command option (see raidcom commands for volumes that belong to virtual storage machine for HORCM_CMD). |

## Operation target for `raidcom` commands when specifying the virtual storage machine in HORCM_VCMD

The operational targets according to the definition of HORCM_VCMD are shown in the table below.

- When you specify the virtual storage machine in HORCM_VCMD and the operation target for the `raidcom` command is a virtual storage machine, the operational target is the virtual storage machine of the serial number specified in HORCM_VCMD. You can select a specific virtual storage machine by -s <seq#> (serial number) and -u <unit#> (unit ID) when you specify multiple virtual storage systems.

- When you specify the virtual storage machine in HORCM_VCMD and the operation target for the raidcom command is a physical storage system, the operational target is the physical storage system for which the virtual storage machine of the serial number specified in HORCM_VCMD is defined. You can select a specific virtual storage machine by -s <seq#> (serial number) and -u <unit#> (unit ID) when you specify multiple virtual storage systems.

| Operation type | Commands | Operation targets according to the definition of HORCM_VCMD |
|---|---|---|
| Copy group | raidcom get copy_grp | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom add copy_grp | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom delete copy_grp | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| Device group | raidcom get device_grp | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom add device_grp | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom delete device_grp | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| External volume group | raidcom get external_grp | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom add external_grp | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom delete external_grp | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom modify external_grp | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom disconnect external_grp | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| Host group | raidcom get host_grp | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |

| Operation type | Commands | Operation targets according to the definition of HORCM_VCMD |
|---|---|---|
|  | raidcom add host_grp | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
|  | raidcom delete host_grp | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
|  | raidcom modify host_grp | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| WWN | raidcom get hba_wwn | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
|  | raidcom add hba_wwn | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
|  | raidcom delete hba_wwn | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
|  | raidcom set hba_wwn | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
|  | raidcom reset hba_wwn | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| iSCSI name and CHAP user name | raidcom get hba_iscsi | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
|  | raidcom add hba_iscsi | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
|  | raidcom delete hba_iscsi | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
|  | raidcom set hba_iscsi | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |

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| Operation type | Commands | Operation targets according to the definition of HORCM_VCMD |
|---|---|---|
| | raidcom reset hba_iscsi | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom get chap_user | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom add chap_user | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom delete chap_user | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom set chap_user | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom reset chap_user | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom send ping | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| Journal | raidcom get journal | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom add journal | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom delete journal | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom modify journal | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| LDEV | raidcom get ldev | Virtual storage machine |
| | raidcom add ldev | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |

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| Operation type | Commands | Operation targets according to the definition of HORCM_VCMD |
|---|---|---|
| | raidcom delete ldev | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom modify ldev | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom extend ldev | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom initialize ldev | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| LUN | raidcom get lun | Virtual storage machine |
| | raidcom add lun | Virtual storage machine |
| | raidcom modify lun | Virtual storage machine |
| | raidcom delete lun | Virtual storage machine |
| External path | raidcom get path | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom add path | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom delete path | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom disconnect path | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom check_ext_storage path | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom check_ext_storage external_grp | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |

| Operation type | Commands | Operation targets according to the definition of HORCM_VCMD |
|---|---|---|
| | raidcom discover external_storage | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom discover lun | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom get external_iscsi_name | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom add external_iscsi_name | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom delete external_iscsi_name | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom modify external_chap_user | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom get initiator_iscsi_name | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom modify initiator_chap_user | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom discover external_iscsi_name | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom check external_iscsi_name | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| Pool | raidcom get pool | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom get dp_pool | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |

| Operation type | Commands | Operation targets according to the definition of HORCM_VCMD |
|---|---|---|
| | raidcom get snap_pool | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom add dp_pool | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom add snap_pool | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom delete pool | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom modify pool | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom reallocate pool | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom monitor pool | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom initialize pool | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| Port | raidcom get port | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom modify port | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| RCU | raidcom get rcu | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom add rcu | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |

| Operation type | Commands | Operation targets according to the definition of HORCM_VCMD |
|---|---|---|
| | raidcom delete rcu | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom modify rcu | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| Logical path to RCU | raidcom add rcu_path | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom delete rcu_path | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom add rcu_iscsi_port | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom delete rcu_iscsi_port | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom get rcu_iscsi_port | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| Parity group | raidcom get parity_grp | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom initialize parity_grp | VSP 5000 series, VSP E series, VSP Gx00 models or VSP Fx00 models |
| | raidcom modify parity_grp | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom add parity_grp | VSP E series, VSP Gx00 models or VSP Fx00 models |
| | raidcom delete parity_grp | VSP 5000 series, VSP E series, VSP Gx00 models or VSP Fx00 models |
| Drive | raidcom get drive | VSP 5000 series, VSP E series, VSP Gx00 models or VSP Fx00 models |
| | raidcom modify drive | VSP E series, VSP Gx00 models or VSP Fx00 models |

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| Operation type | Commands | Operation targets according to the definition of HORCM_VCMD |
|---|---|---|
| SSID | raidcom get ssid | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom add ssid | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom delete ssid | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| Resource group | raidcom get resource | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom add resource | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom delete resource | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom lock resource | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom unlock resource | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom map resource | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom unmap resource | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| CLPR | raidcom get clpr | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom modify clpr | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| Thin Image | raidcom get snapshot | Virtual storage machine |

| Operation type | Commands | Operation targets according to the definition of HORCM_VCMD |
|---|---|---|
| | raidcom add snapshot | Virtual storage machine |
| | raidcom delete snapshot | Virtual storage machine |
| | raidcom modify snapshot (other than `-snapshot_data delete_garbage`, `-snapshot_data stop_deleting_garbage`) | Virtual storage machine |
| | raidcom modify snapshot (`-snapshot_data delete_garbage`, `-snapshot_data stop_deleting_garbage`) | VSP 5000 series |
| Server Priority Manager | raidcom get spm_wwn | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom get spm_group | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom add spm_wwn | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom add spm_group | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom delete spm_wwn | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom delete spm_group | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom modify spm_wwn | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom modify spm_group | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom monitor spm_wwn | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |

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| Operation type | Commands | Operation targets according to the definition of HORCM_VCMD |
|---|---|---|
| | raidcom monitor spm_group | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom modify spm_ldev | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom delete spm_ldev | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom monitor spm_ldev | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom get spm_ldev | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| Program product | raidcom add license | VSP 5000 series, VSP E series, VSP Gx00 models or VSP Fx00 models |
| | raidcom delete license | VSP 5000 series, VSP E series, VSP Gx00 models or VSP Fx00 models |
| | raidcom modify license | VSP 5000 series, VSP E series, VSP Gx00 models or VSP Fx00 models |
| | raidcom get license | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| Local replica option | raidcom modify local_replica_opt | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom get local_replica_opt | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| Quorum disk | raidcom get quorum | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom modify quorum | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |

| Operation type | Commands | Operation targets according to the definition of HORCM_VCMD |
|---|---|---|
| | raidcom replace quorum | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| QoS group | raidcom add qos_grp | VSP 5000 series, VSP E1090 |
| | raidcom delete qos_grp | VSP 5000 series |
| | raidcom modify qos_grp | VSP 5000 series |
| | raidcom get qos_grp | VSP 5000 series |
| Performance information collection | raidcom monitor resource | VSP 5000 series |
| Overall storage system | raidcom get apn | VSP 5000 series, VSP G1x00 and VSP F1500, VSP E series, VSP G/F350, G/F370, G/F700, G/F900 |
| Advanced system settings | raidcom modify user_system_opt | VSP E590, VSP E790, VSP E1090 |
| | raidcom get user_system_opt | VSP E590, VSP E790, VSP E1090 |
| NVMe-oF operations | raidcom add nvm_subsystem | VSP 5000 series |
| | raidcom modify nvm_subsystem | |
| | raidcom delete nvm_subsystem | |
| | raidcom get nvm_subsystem | |
| | raidcom add nvm_subsystem_port | |
| | raidcom delete nvm_subsystem_port | |
| | raidcom get nvm_subsystem_port | |
| | raidcom add host_nqn | |
| | raidcom modify host_nqn | |
| | raidcom delete host_nqn | |
| | raidcom get host_nqn | |
| | raidcom add namespace_path | |
| | raidcom delete namespace_path | |

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| Operation type | Commands | Operation targets according to the definition of HORCM_VCMD |
|---|---|---|
| | raidcom get namespace_path | |
| | raidcom add namespace | |
| | raidcom delete namespace | |
| | raidcom modify namespace | |
| | raidcom get namespace | |
| Others | raidcom get command_status | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom reset command_status | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |
| | raidcom get error_message | VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP E series, VSP Gx00 models, and VSP Fx00 models |

## `raidcom` commands for volumes belonging to a virtual storage machine that you created for HORCM_CMD

You can use the following `raidcom` commands when you specify a volume belonging to a virtual storage machine that you created in HORCM_CMD:

| # | raidcom command |
|---|---|
| 1 | raidcom get ldev |
| 2 | raidcom delete ldev |
| 3 | raidcom add lun |
| 4 | raidcom get lun |
| 5 | raidcom modify port |
| 6 | raidcom get port |
| 7 | raidcom add host_grp |
| 8 | raidcom delete host_grp |
| 9 | raidcom get host_grp |
| 10 | raidcom modify host_grp |

| # | raidcom command |
|---|---|
| 11 | raidcom add hba_wwn |
| 12 | raidcom delete hba_wwn |
| 13 | raidcom get hba_wwn |
| 14 | raidcom get resource |

# Chapter 4:  Starting up CCI

This guide helps you to get started with the CCI software. After you have installed the CCI software, you set the command device, create the configuration definition file(s), and (for OpenVMS only) follow the porting requirements and restrictions. One or two instances of CCI can be used simultaneously in the UNIX, Windows, and OpenVMS operating system environments.

## Starting up on UNIX systems

### Starting up one instance of CCI on a UNIX system

**Procedure**

1. Modify **/etc/services** to register the port name/number (service) of each configuration definition file. Make the port name/number the same on all servers:

   `horcm xxxxx/udp`  *xxxxx* = the port name/number for horcm.conf

2. If you want CCI to start automatically each time the system starts up, add **/etc/horcmstart.sh** to the system automatic startup file (for example, **/sbin/rc**).

3. Execute the **horcmstart.sh** script manually to start the CCI instances:

   `# horcmstart.sh`

4. Set the log directory (**HORCC_LOG**) in the command execution environment as needed.

5. If you want to perform TrueCopy operations, do not set the **HORCC_MRCF** environment variable. If you want to perform ShadowImage operations, set the **HORCC_MRCF** environment variable for the CCI execution environment.

   For B shell:`# HORCC_MRCF=1 # export HORCC_MRCF`

   For C shell:`# setenv HORCC_MRCF 1 # pairdisplay -g` *xxxx*

   Where *xxxx* = group name

## Starting up two instances of CCI on a UNIX system

**Procedure**

1. Modify `/etc/services` to register the port name/number (service) of each configuration definition file. The port name/number must be different for each CCI instance.

   `horcm0` *xxxxx*`/udp` *xxxxx* = the port name/number for horcm0.conf `horcm1` *yyyyy*`/udp`*yyyyy* = the port name/number for horcm1.conf

2. If you want CCI to start automatically each time the system starts up, add **/etc/horcmstart.sh 0 1** to the system automatic startup file (for example, **/sbin/rc**).

3. Execute the **horcmstart.sh** script manually to start the CCI instances:

   `# horcmstart.sh 0 1`

4. Set an instance number to the command execution environment:

   For B shell:`# HORCMINST=`*X*` # export HORCMINST`

   *X* = instance number = 0 or 1

   For C shell:`# setenv HORCMINST `*X*

5. Set the log directory (**HORCC_LOG**) in the command execution environment as needed.

6. If you want to perform TrueCopy operations, do not set the **HORCC_MRCF** environment variable. If you want to perform ShadowImage operations, set the **HORCC_MRCF** environment variable for the CCI execution environment.

   For B shell:`# HORCC_MRCF=1 # export HORCC_MRCF`

   For C shell:`# setenv HORCC_MRCF 1 # pairdisplay -g `***xxxx***

   *xxxx* = group name

# Starting up on Windows systems

## Starting up one instance of CCI on a Windows system

**Procedure**

1. Modify **%windir%\system32\drivers\etc\services** to register the port name/number (service) of the configuration definition file. Make the port name/number the same on all servers:

   `horcm `*xxxxx*`/udp`

   Where, *xxxxx* = the port name/number of horcm.conf

2. If you want CCI to start automatically each time the system starts up, add **\HORCM\etc\horcmstart** to the system automatic startup file (for example, **\autoexec.bat**).

3. Execute the **horcmstart** script manually to start CCI:

   `D:\HORCM\etc> horcmstart`

4. Set the log directory (**HORCC_LOG**) in the command execution environment as needed.

5. If you want to perform TrueCopy operations, do not set the **HORCC_MRCF** environment variable. If you want to perform ShadowImage operations, set the **HORCC_MRCF** environment variable for the CCI execution environment:

    ```
    D:\HORCM\etc> set HORCC_MRCF=1
    ```

    ```
    D:\HORCM\etc> pairdisplay -g XXXX
    ```

    *xxxx* = group name

## Starting up two instances of CCI on a Windows system

### Procedure

1. Modify **%windir%\system32\drivers\etc\services** to register the port name/number (service) of the configuration definition files. Make sure that the port name/number is different for each instance:

    ```
    horcm0 xxxxx/udp
    ```

    *xxxxx* = the port name/number of horcm0.conf

    ```
    horcm1 xxxxx/udp
    ```

    *xxxxx* = the port name/number of horcm1.conf

2. If you want CCI to start automatically each time the system starts up, add **\HORCM\etc \horcmstart 0 1** to the system automatic startup file (for example, **\autoexec.bat**).

3. Execute the **horcmstart** script manually to start CCI:

    ```
    D:\HORCM\etc> horcmstart 0 1
    ```

4. Set an instance number to the command execution environment:

    ```
    D:\HORCM\etc> set HORCMINST=X
    ```

    *X* = instance number = 0 or 1

5. Set the log directory (**HORCC_LOG**) in the command execution environment as needed.

6. If you want to perform TrueCopy operations, do not set the **HORCC_MRCF** environment variable. If you want to perform ShadowImage operations, set the **HORCC_MRCF** environment variable for the CCI execution environment:

    ```
    D:\HORCM\etc> set HORCC_MRCF=1
    ```

    ```
    D:\HORCM\etc> pairdisplay -g xxxx
    ```

    *xxxx* = group name

# Starting up on OpenVMS systems

## Starting up one instance of CCI on an OpenVMS system

1. Create the configuration definition file.

   For a new installation, use the configuration definition sample file that is supplied (SYS$POSIX_ROOT:[HORCM.etc]horcm.conf). Make a copy of the file:

   ```
   $ COPY SYS$POSIX_ROOT:[HORCM.etc]horcm.conf SYS$POSIX_ROOT:[etc]
   ```

   Edit this file according to your system configuration using a text editor (for example, eve). Register the port name (service) of the configuration definition file in

   ```
   SYS$SYSROOT:[000000.TCPIP$ETC]SERVICES.DAT.horcm xxxxx/udp
   ```

   *xxxxx* = port number

   Use the same port number in all servers. The port number can be directly specified without registering it in "SYS$SYSROOT:[000000.TCPIP$ETC]SERVICES.DAT".

2. Manually execute the HORCM startup command.

   ```
   $ spawn /nowait /process=horcm horcmstart
   ```

   > **Note:** The subprocess (HORCM) created by SPAWN is terminated when the terminal is LOGOFF or the session is terminated. If you want an independent process to the terminal LOGOFF, use the "RUN /DETACHED" command.

3. Confirm the configuration.

   Set the log directory (HORCC_LOG) in the command execution environment as required.

   > **Note:** If the log directory under SYS$POSIX_ROOT is shared with other nodes, the log directory of Horc Manager must be set for each node. The log directory of Horc Manager can be changed by setting the parameter of horcmstart. See the *Command Control Interface Command Reference* for information about horcmstart parameters.

   If you want to perform ShadowImage operations, set the environment variable (HORCC_MRCF).

   ```
   $ HORCC_MRCF:=1 $ pairdisplay -g xxxx
   ```

   *xxxx* = group name

> **Note:** If a system configuration change or a RAID configuration change causes this file to change, (for example, cache size change or microcode change), these changes will not take effect until you stop HORCM (horcmshutdown) and restart HORCM (horcmstart). Use the "-c" option of the pairdisplay command to verify that there are no configuration errors.

# Starting up two instances of CCI on an OpenVMS system

**Procedure**

1. Create the configuration definition files.

   For a new installation, use the configuration definition sample file that is supplied (SYS
   $POSIX_ROOT:[HORCM.etc]horcm.conf). Copy the file twice, once for each instance.

   ```
   $ COPY SYS$POSIX_ROOT:[HORCM.etc]horcm.conf SYS$POSIX_ROOT:[etc]
   horcm0.conf$ COPY SYS$POSIX_ROOT:[HORCM.etc]horcm.conf SYS
   $POSIX_ROOT:[etc] horcm1.conf
   ```

   Edit these two files according to your system configuration using a text editor (for
   example, eve). Register the port name (service) of the configuration definition file in

   `SYS$SYSROOT:[000000.TCPIP$ETC]SERVICES.DAT.horcm0` *xxxxx*/udp

   *xxxxx* = port number `horcm1` *yyyyy*/udp

   *yyyyy* = port number.

   Each instance should have a unique port number. The port number can be directly
   specified without registering it in "SYS$SYSROOT:[000000.TCPIP
   $ETC]SERVICES.DAT".

2. Execute the HORCM startup command.

   ```
   $ spawn /nowait /process=horcm0 horcmstart 0 $ spawn /nowait /
   process=horcm1 horcmstart 1
   ```

   > **Note:** The subprocess (HORCM) created by SPAWN is terminated when the
   > terminal is LOGOFF or the session is terminated. If you want an
   > independent process to the terminal LOGOFF, use "RUN /DETACHED"
   > command.

3. Set the HORCM instance numbers in the environment in which the command is to be
   executed: `$ HORCMINST:=`*X*

   *X* = instance number (0 or 1)

4. Confirm the configuration using a CCI command.

   Set the log directory (**HORCC_LOG**) in the command execution environment as
   required.

   > **Note:** If the log directory under SYS$POSIX_ROOT is shared with other
   > nodes, the log directory of Horc Manager must be set for each node. The log
   > directory of Horc Manager can be changed by setting the parameter of
   > horcmstart. See the *Command Control Interface Command Reference* for
   > information about horcmstart parameters.

   If you want to perform ShadowImage operations, set the environment variable
   (**HORCC_MRCF**). `$ HORCC_MRCF:=1 $ pairdisplay -g` *xxxx*

   *xxxx* denotes a group name.

**Next steps**

📄 **Note:** If a system configuration change or a RAID configuration change causes this file to change (for example, cache size change, microcode change), these changes will not take effect until you stop HORCM (horcmshutdown 0 1) and restart HORCM (horcmstart 0 and horcmstart 1). Use the "-c" option of the pairdisplay command to verify that there are no configuration errors.

# Starting CCI as a service (Windows systems)

Usually, CCI (HORCM) is started by executing the startup script from the Windows services. However, in the VSS environment, there is no interface to automatically start CCI. CCI provides the `svcexe.exe` command and a sample script file (HORCM0_run.txt) so that CCI can be started automatically as a service.

C:\HORCM\tool\ > svcexe

- Usage for adding [HORCM_START_SVC]: svcexe /A=command_path

  - for deleting [HORCM_START_SVC]: svcexe /D

  - for specifying a service: svcexe /S=service_name

  - for dependent services: svcexe /C=service_name,service_name

This command example uses HORCM0 for registering the service name for HORCM instance#0:

- Example for adding [HORCM0]: svcexe /S=HORCM0 "/A=C:\HORCM\tool\svcexe.exe"

  - for deleting [HORCM0]: svcexe /S=HORCM0 /D

  - for starting [HORCM0]:

:[1] make a C:\HORCM\tool\HORCM0_run.txt file.

:[2] set a user account to this service.

:[3] confirm to start using horcmstart 0.

:[4] confirm to stop using horcmshutdown 0.

:[5] start as a service by net start HORCM0.

The following procedure is about starting CCI as a service.

**Procedure**

1. Register the CCI (HORCM) instance as a service. The system administrator must add the CCI instance using the following command:

   **C:\HORCM\tool\ > svcexe /S=HORCM0 "/A=C:\HORCM\tool\svcexe.exe"**

2. Customize a sample script file. The system administrator must customize the sample script file (HORCM0_run.txt) according to the CCI instance. For details, see the descriptions in the HORCM0_run.txt file.

3. Set the user account. The system administrator must set the user account for the CCI administrator as needed.

When using the GUI, use "Administrative Tools - Services - Select HORCM0 - Logon".When using the CUI, use "sc config" command as follows:`C:\HORCM\tool \>sc config HORCM0 obj=` *AccountName* `password=` *password*If the system administrator uses the default account (LocalSystem), add "HORCM_EVERYCLI=1":

```
#  ****  For INSTANCE# X, change to HORCMINST=X as needed  ****
START:
 set HORCM_EVERYCLI=1
 set HORCMINST=0
 set HORCC_LOG=STDERROUT
 C:\HORCM\etc\horcmstart.exe
 exit 0
```

**4.** Start the CCI instance from the service. After you have confirmed starting and stopping using "horcmstart 0" and "horcmshutdown 0", you must verify that HORCM0 starts from the service and that HORCM0 started automatically from REBOOT, using the following command:

`C:\HORCM\tool\>net start HORCM0`

**5.** Stop CCI instance as a service. Instead of using the "horcmshutdown 0" command, you must use the following command to stop HORCM0:

`C:\HORCM\tool\>net stop HORCM0`(By using the "horcmshutdown 0" command, the script written into HORCM0_run.txt will automatically restart HORCM0).

The sample script file (`\HORCM\Tool\HORCM0_run.txt`) will be overwritten when the CCI version is upgraded. If you edit the sample script directly and use it, back up the sample script file after editing. After upgrading the CCI version, or if a failure occurs in the CCI operating environment, restore the backed up sample script file.

# Chapter 5:  Provisioning operations with CCI

This guide describes storage provisioning operations with CCI.

## About provisioning operations

You can use CCI to perform provisioning operations.

> **Note:** Be aware of the following when performing provisioning operations using CCI:
>
> - When you execute provisioning operations using CCI, the operation of refreshing the window (Device Manager - Storage Navigator, SVP, GUM) might be delayed.
>
> - During maintenance work on the storage system (Device Manager - Storage Navigator, maintenance utility, or Maintenance PC in modify mode), or when the configuration is being changed from the GUI, the CCI provisioning command might be rejected (2E10, 8000).
>
> - When you execute commands for provisioning operations, host I/O performance might deteriorate because of increased working ratio of processor by updating processing of the configuration information of storage system. If you plan to execute many commands, take account of the impact on the I/O performance.

### Overview of the configuration setting command

CCI functions enable provisioning operations such as host setting, LDEV creation, and device group creation. These operations are performed using the `raidcom` configuration setting command.

The configuration setting command is specified using the following syntax:

```
raidcom <action> <resource> <parameter>
```

The operation itself, such as add or delete, is specified in the action, and the resource object, such as LDEV or path, is specified in the resource. The necessary value to operate the resource object is specified in the parameter. For the details about the `raidcom` configuration setting command, see the *Command Control Interface Command Reference*.

Because some provisioning operations can take time to process, CCI provides two ways to execute the configuration setting command: synchronously or asynchronously.

See the figure for synchronous and asynchronous command processing.
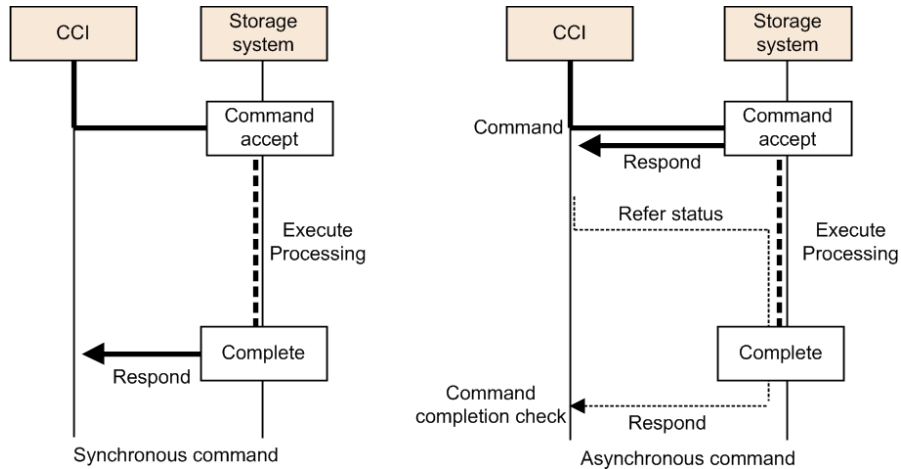


The processing difference between these two command types are described in Synchronous command processing and Asynchronous command processing.

## Synchronous command processing

In addition to the replication commands, the process is executed by synchronizing with a command execution, and then returning a response after the processing is completed. When an error occurs, the error is returned to CCI at each occurrence.

## Asynchronous command processing

When an asynchronous command is executed, the command is received at the storage system, and a response is returned before the processing is executed. The actual processing is executed asynchronously with command input.

The completion of the asynchronous command processing can be checked with the `raidcom get command_status` command. When you execute the `raidcom get command_status` command after executing an asynchronous command, the `raidcom get command_status` command is terminated after all asynchronous command processing has been completed.

## Errors during asynchronous command processing

When an error occurs during asynchronous command processing, the error information, such as the total number of errors or error code (SSB1 and SSB2), is provided. After executing the asynchronous command, execute the `raidcom get command_status` command to check the error information if the asynchronous command processing completed normally.

Error codes SSB1 and SSB2 are stored only at the first error occurrence. For the second and subsequent occurrences, only the number of the error occurrence is stored with no error code. Therefore, before executing an asynchronous command, reset the error information in the storage system using the `raidcom reset command_status` command. You can check the information in SSB1 and SSB2 by using the `raidcom get error_message` command.

In asynchronous command processing, multiple commands received by the host are executed at the same time. Therefore, the total number of errors might not correspond with the unexecuted commands. If an error occurs in asynchronous commands, verify the system configuration using the reference commands. For details about the reference commands, see Available provisioning operations.

## Workflow for executing asynchronous commands

When executing asynchronous commands, execute the command or script using the following procedure:

1.  Execute the `raidcom reset command_status` command.

    The error information of asynchronous command processing in the storage system is reset.

2.  Execute the asynchronous command.

3.  Execute the `raidcom get command_status` command to check if all asynchronous command processing is done or if no error occurred.

    > **Note:** If the next asynchronous command is executed during asynchronous command processing, the later command executed on the storage system might be in a waiting state. The processing of the later command might take a long time, especially during execution of an asynchronous command which takes time to process, such as LDEV format.

> 📄 **Note:** Note the following when you continuously run a large number of asynchronous commands.
>
> A storage system can accept a limited number of asynchronous commands. The maximum number of acceptable asynchronous commands differs depending on the storage system models. (See the *Command Control Interface Command Reference*).
>
> If you run an asynchronous command when the number of running asynchronous commands (including ones run by other users) reaches the maximum number of acceptable asynchronous commands, SSB error code 2E11-9400 or 2E91-FEEC is returned, and execution of the asynchronous command fails. Therefore, when you continuously run a large number of asynchronous commands, make sure that the number of asynchronous commands does not exceed the maximum number of acceptable asynchronous commands.
>
> Run the `raidcom get command_status` command in the middle of successive command execution as shown in the following example to wait for completion of asynchronous commands. Consider execution of asynchronous commands run by other users and decide the timing of running the `raidcom get command_status` command. The following shows an example of command execution (with the `raidcom modify ldev` command):

```
raidcom reset command_status
raidcom modify ldev -ldev_id 0 -upper_throughput_io 20000 -request_id
auto
raidcom modify ldev -ldev_id 0 -upper_data_trans_mb 2000 -request_id
auto
...
raidcom modify ldev -ldev_id 99 -response_alert_time 350 -request_id
auto
raidcom get command_status
raidcom reset command_status
raidcom modify ldev -ldev_id 100 -upper_throughput_io 20000 -
request_id auto
...
raidcom modify ldev -ldev_id 199 -response_alert_time 350 -request_id
auto
raidcom get command_status
```

## Asynchronous commands

The asynchronous commands associated with the `raidcom` configuration setting command provide provisioning functions. The following table lists the provisioning functions performed by asynchronous commands and describes the required syntax. For details about `raidcom` command syntax, see the *Command Control Interface Command Reference*.

| Function | Command syntax |
|---|---|
| Blocking an LDEV | raidcom modify ldev -ldev_id <ldev#> -status blk |
| Adding an LDEV | raidcom add ldev {-parity_grp_id <gno-sgno>| -external_grp_id <gno-sgno> | -pool {<pool ID#> | <pool naming> | snap}} -ldev_id <ldev#> { -capacity <size> | -offset_capacity <size> | -cylinder <size>} [-emulation <emulation type>][-location <lba>][-mp_blade_id <mp#>] |
| Deleting an LDEV | raidcom delete ldev {-ldev_id <ldev#> | -grp_opt <group option> -device_grp_name <device group name> [<device name>] } |
| LDEV Quick Format | raidcom initialize ldev {-ldev_id <ldev#> | -grp_opt <group option> -device_grp_name <device group name> [<device name>]} -operation qfmt |
| Restoring an LDEV | raidcom modify ldev -ldev_id <ldev#> -status nml |
| Creating virtual volume for HDP/, Dynamic Provisioning, Dynamic Provisioning for Mainframe, Dynamic Tiering, active flash, active flash for mainframe, or Copy-on-Write Snapshot | raidcom add ldev -pool {<pool ID#> | <pool naming>| snap} -ldev_id <ldev#> -capacity <size> |
| Deleting virtual volume for Dynamic Provisioning, Dynamic Provisioning for Mainframe, Dynamic Tiering, active flash, active flash for mainframe, or Copy-on-Write Snapshot | raidcom delete ldev {-ldev_id <ldev#> | -grp_opt <group option> -device_grp_name <device group name> [<device name>] } [-operation initialize_capacity_saving] <br><br>Note: The `-operation initialize_capacity_saving` option is available only for DP-VOLs for which capacity saving is enabled. |
| Creating a pool /adding a pool volume for Dynamic Provisioning or Dynamic Provisioning for Mainframe | raidcom add dp_pool {{-pool_id <pool ID#> [-pool_name <pool naming>] | -pool_name <pool naming> [-pool_id <pool ID#>]} | -pool_id <pool ID#> -pool_name <pool naming>} {-ldev_id <ldev#> …[-cnt<count>] | -grp_opt <group option> -device_grp_name <device group name> [<device name>]}[ -user_threshold <threshold_1> [<threshold_2>] ] |
| Creating a pool /adding a pool volume for Copy-on-Write Snapshot | raidcom add snap_pool {{-pool_id <pool ID#> [-pool_name <pool naming>] | -pool_name <pool naming> [-pool_id <pool ID#>]} | -pool_id <pool ID#> -pool_name <pool naming>}} {-ldev_id <ldev#> …[-cnt<count>] | -grp_opt <group option> -device_grp_name <device group name> [<device name>]}[-user_threshold <%> ] |

| Function | Command syntax |
|---|---|
| Deleting or shrinking a pool | raidcom delete pool -pool {<pool ID#> | <pool naming>}[-ldev <ldev#>] |
| Releasing a blocked pool | raidcom modify pool -pool {<pool ID#> | <pool naming>} -status nml |
| RCU registration | raidcom add rcu -cu_free <serial#> <id> <pid> -mcu_port <port#> -rcu_port <port#> |
| RCU logical path addition | raidcom add rcu_path -cu_free <serial#> <id> <pid> -mcu_port <port#> -rcu_port <port#> |
| RCU deletion | raidcom delete rcu -cu_free <serial#> <id> <pid> |
| RCU logical path deletion | raidcom delete rcu_path -cu_free <serial#> <id> <pid> -mcu_port <port#> -rcu_port <port#> |
| Creating journal/ Registering journal volume in the journal | raidcom add journal -journal_id <journal ID#> {-ldev_id <ldev#> …[-cnt <count>] | -grp_opt <group option> -device_grp_name <device group name> [<device name>]} |
| Deleting journal/ Deleting journal volume from the journal | raidcom delete journal -journal_id <journal ID#> [-ldev_id <ldev#> | -grp_opt <group option> -device_grp_name <device group name> [<device name>]] |
| Restoration of path for the external path | raidcom check_ext_storage path -path_grp <path group#> -port <port#> -external_wwn <wwn strings> |
| Setting the external path | raidcom add path -path_grp <path group#> -port <port#> -external_wwn <wwn strings> |
| Mapping the external volume | raidcom add external_grp -path_grp <path group#> -external_grp_id <gno-sgno> -port <port#> -external_wwn <wwn strings> -lun_id <lun#> [-emulation <emulation type>] |
| Deleting the external path | raidcom delete path -path_grp <path group#> -port <port#> -external_wwn <wwn strings> |
| Releasing the mapping of external volume | raidcom delete external_grp -external_grp_id <gno-sgno> [-forcible] |
| Stopping the use of paths to the external volume | raidcom disconnect path -path_grp <path group#> -port <port#> -external_wwn <wwn strings> |

| Function | Command syntax |
|---|---|
| Creating a parity group | raidcom add parity_grp {-parity_grp_id <gno-sgno> \| -concatenated_parity_grp_id <gno-sgno>... } -drive_location <drive location>... -raid_type <raid type> [-encryption {enable\|disable}] [-copy_back {enable\|disable}] [-accelerated_compression {enable\| disable}] [-clpr <clpr#>] |
| Deleting a parity group | raidcom delete parity_grp -parity_grp_id <gno-sgno> |
| Setting a spare drive or cancelling the setting | raidcom modify drive -drive_location <drive location> -spare {enable \|disable} |

## Help on configuration setting commands

To see the configuration setting command help, execute any command using the -h option, for example, raidcom - h.

```
raidcom -h
```

## How drive types are displayed in Device Manager - Storage Navigator and CCI

For VSP 5000 series, the drive types displayed are different from the drive types denoted in this manual. In the configuration report on Device Manager - Storage Navigator, CCI, or a storage system, SCM drives are displayed as "SSD" (when the DKCMAIN firmware version is earlier than 90-04-04-xx/xx). In the configuration report on Device Manager - Storage Navigator, CCI, or a storage system, SCM drives and other SSDs are distinguished from each other by the drive type code.

| Drive type | On HDvM - SN | | On CCI | | In this manual |
|---|---|---|---|---|---|
| | Drive type/ Interface | Drive type code | TYPE | CODE | |
| SSD | SSD/SAS | SLx5x-MxxxSS | SSD(MLC) | SLx5x-MxxxSS | SSD[1] |
| SSD(1DWPD) | SSD(RI)/SAS | SLx5x-MxxxSS | SSD(RI) | SLx5x-MxxxSS | |
| SSD(NVMe) | SSD/NVMe | SNx5x-RxxxNC | SSD | SNx5x-RxxxNC | |
| SCM | SSD/NVMe[2] SCM/NVMe[3] | SPx5x-YxxxNC | SSD | SPx5x-YxxxNC | SCM |

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| FMD or FMD DC[1] | FMD DC2/SAS | NFxxx-QxxxSS | SSD(FMC) | NFxxx-QxxxSS | FMD |
|---|---|---|---|---|---|
| HDD | HDD/SAS | DKxxx-xxxxSS | SAS | DKxxx-xxxxSS | HDD |

Notes:

1. The SSD drive types might be displayed, for example, as "SSD(NVMe)" and "SSD(RI)" in the manual if the operations or specifications are different.

2. When DKCMAIN firmware version is earlier than 90-04-04- xx/xx.

3. When DKCMAIN firmware version is 90-04-04-xx/xx or later.

## LDEV nickname function

As a function of configuration setting command, a nickname can be set for each LDEV.

The details of the definition for the LDEV nickname function are shown below.

The maximum length of a name is 32 characters. For one LDEV, one nickname can be defined.

A nickname can be defined as follows:

```
raidcom modify ldev -ldev_id <ldev#> -ldev_name <ldev naming>
```

# Available provisioning operations

The following provisioning operations can be performed using CCI.

| Operation type | Description | Corresponding command |
|---|---|---|
| Login and logout | Log in. | raidcom -login <user_name> <password> |
| | Log out. | raidcom -logout |
| Resource | Lock resource. | raidcom lock resource -resource_name <resource group name > [-time <time(sec)>] |
| | Unlock resource. | raidcom unlock resource -resource_name <resource group name > |
| | Display resource group information. | raidcom get resource |

| Operation type | Description | Corresponding command |
|---|---|---|
| | Add resource group. | raidcom add resource -resource_name <resource group name> [-resource_id <resource group_id > \|-ldev_id <ldev#> \| -port <port#> \| -port <port#> <host group name> \| -parity_grp_id <gno-sgno> \| -external_grp_id <gno-sgno>] |
| | Delete resource group. | raidcom delete resource -resource_name <resource group name> [-ldev_id <ldev#> \| -port <port#> \| -port <port#> <host group name> \| -parity_grp_id <gno-sgno> \| -external_grp_id <gno-sgno>] |
| Host (see the *Provisioning Guide*) | Create host group. | raidcom add host_grp -port <port#> -host_grp_name <host group name> |
| | Set host mode. | raidcom modify host_grp -port <port#> [<host group name>] -host_mode < host mode> [-host_mode_opt <host mode option> … ] |
| | Register a host to host group. | raidcom add hba_wwn -port <port#> [<host group name>] -hba_wwn <WWN strings> |
| | Delete host group. | raidcom delete host_grp -port <port#> [<host group name>] |
| | Display host group information. | raidcom get host_grp -port <port#> [<host group name>] |
| Port (see the *Provisioning Guide*) | Set port. | raidcom modify port -port <port#> {[-port_speed <value>] [-loop_id<value>] [-topology <topology>] [-security_switch < y/n >]} |
| | Set port attribute. | raidcom modify port -port <port#> -port_attribute <port attribute> |
| | Display port information. | raidcom get port [-port <port#>] |
| Internal volume (see the *Provisioning Guide*) | Create LDEV. | raidcom add ldev {-parity_grp_id <gno-sgno> \| - external_grp_id <gno-sgno> \| -pool {<pool ID#> \| <pool naming> \| snap}} -ldev_id <ldev#> {-capacity <size> \| -offset_capacity <size> \| -cylinder <size>} [-emulation <emulation type>][-location <lba>] [-mp_blade_id <mp#>] |

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| Operation type | Description | Corresponding command |
|---|---|---|
| | Display LDEV information. | raidcom get ldev {-ldev_id <ldev#> ... [-cnt <count>] | -grp_opt <group option> -device_grp_name <device group name> [<device name>]} [-key <keyword>] |
| | Display parity group information. | raidcom get parity_grp [-parity_grp_id <gno-sgno>] |
| | Create a parity group. | raidcom add parity_grp {-parity_grp_id <gnosgno> | -concatenated_parity_grp_id <gnosgno>... } -drive_location <drive location>... -raid_type <raid type> [-encryption {enable| disable}] [-copy_back {enable| disable}] [- accelerated_compression {enable| disable}] [- clpr <clpr#>] |
| | Delete a parity group. | raidcom delete parity_grp -parity_grp_id <gnosgno> |
| | Define SSID. | raidcom add ssid -rcu <serial#> <mcu#> <rcu#> <id> -ssid <ssid><br><br>raidcom delete ssid -rcu <serial#> <mcu#> <rcu#> -ssid <ssid> |
| | Display drive information. | raidcom get drive [-parity_grp_id <gno-sgno> | -usage <usage>] |
| | Set a spare drive, or cancel the setting. | raidcom modify drive -drive_location <drive location> -spare {enable | disable} |
| Virtual volume<br><br>(HDP, HDPz, HDT, HDTz, active flash, active flash for mainframe, or SS)<br><br>(see the *Provisioning Guide*) | Create pool for HDP or HDPz. | raidcom add dp_pool {{-pool_id <pool ID#> [-pool_name <pool naming>] | -pool_name <pool naming> [-pool_id <pool ID#>]} | -pool_id <pool ID#> -pool_name <pool naming>}} {-ldev_id <ldev#> ...[-cnt<count>] | -grp_opt <group option> -device_grp_name <device group name> [<device name>]}[-user_threshold <threshold_1> [<threshold_2>] ] |
| | Create pool for SS. | raidcom add snap_pool {{-pool_id <pool ID#> [-pool_name <pool naming>] | -pool_name <pool naming> [-pool_id <pool ID#>]} | -pool_id <pool ID#> -pool_name <pool naming>}} {-ldev_id <ldev#> ...[-cnt<count>] | -grp_opt <group option> -device_grp_name <device group name> [<device name>]}[-user_threshold <%> ] |

| Operation type | Description | Corresponding command |
|---|---|---|
| | Display pool information for HDP, HDPz, HDT, HDTz, active flash, active flash for mainframe, or SS. | raidcom get pool [-key <keyword>] |
| | Delete pool for HDP, HDPz, HDT, HDTz, active flash, active flash for mainframe, or SS. | raidcom delete pool -pool {<pool ID#> \| <pool naming>} |
| | Change the threshold value of a pool for HDP, HDPz, HDT, HDTz, active flash, active flash for mainframe, or SS. | raidcom modify pool -pool {<pool ID#> \| <pool naming>} -user_threshold <threshold_1> [<threshold_2>] |
| | Restore a pool for HDP, HDPz, HDT, HDTz, active flash, active flash for mainframe, or SS. | raidcom modify pool -pool {<pool ID#> \| <pool naming>} -status nml |
| | Set the subscription limit of a pool for HDP, HDPz, HDT, HDTz, active flash, or active flash for mainframe. | raidcom modify pool -pool {<pool ID#> \| <pool naming>} -subscription <%> |
| | Change the pool for HDP to the pool for HDT. | raidcom modify pool -pool {<pool ID#> \| <pool naming>} -pool_attribute dt_manual |
| | Change the pool for HDT to the pool for HDP. | raidcom modify pool -pool {<pool ID#> \| <pool naming>} -pool_attribute dp |
| | Set the newly allocation free space percentage of the pool for HDT, HDTz, active flash, or active flash for mainframe. | raidcom modify pool -pool {<pool ID#> \| <pool naming>} -tier <Tier number><ratio> |

| Operation type | Description | Corresponding command |
|---|---|---|
| | Create virtual volume for HDP, HDPz, HDT, HDTz, active flash, active flash for mainframe, or SS. | raidcom add ldev -pool {<pool ID#> | <pool naming> | snap} -ldev_id <ldev#> -capacity <size> [-emulation <emulation type>] [-location <lba>][-mp_blade_id <mp#>] |
| | Extend capacity of virtual volume for HDP, HDPz, HDT, HDTz, active flash, or active flash for mainframe. | raidcom extend ldev{-ldev_id <ldev#> | -grp_opt <group option> -device_grp_name <device group name> [<device name>]} -capacity <size> |
| | Set enabled or disabled of virtual volume tier reallocation for HDT, HDTz, active flash, or active flash for mainframe. | raidcom modify ldev -ldev_id <ldev#> -status {enable_reallocation | disable_reallocation} |
| | Discard a page of virtual volume for HDP, HDPz, HDT, HDTz, active flash, or active flash for mainframe. | raidcom modify ldev -ldev_id <ldev#> -status discard_zero_page |
| | Display the information of a pool for HDP, HDPz, HDT, HDTz, active flash, or active flash for mainframe. | raidcom get dp_pool [ -key <keyword>] |
| | Display the information of a pool for SS. | raidcom get snap_pool |
| | Extend the capacity of a pool for HDP, HDPz, HDT, HDTz, active flash, or active flash for mainframe. | raidcom add dp_pool {{-pool_id <pool ID#> [-pool_name <pool naming>] | -pool_name <pool naming> [-pool_id <pool ID#>]} | -pool_id <pool ID#> -pool_name <pool naming>}} {-ldev_id <ldev#> … [-cnt<count>] | -grp_opt <group option> -device_grp_name <device group name> [<device name>]}[-user_threshold <threshold_1> [<threshold_2>] ] |

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| Operation type | Description | Corresponding command |
|---|---|---|
| | Extend the capacity of a pool for SS. | raidcom add snap_pool {{-pool_id <pool ID#> [-pool_name <pool naming>] \| -pool_name <pool naming> [-pool_id <pool ID#>]} \| -pool_id <pool ID#> -pool_name <pool naming>}} {-ldev_id <ldev#> …[-cnt<count>] \| -grp_opt <group option> -device_grp_name <device group name> [<device name>]}[-user_threshold <%> ] |
| | Start or stop the performance monitor for HDT, HDTz, active flash, or active flash for mainframe. | raidcom monitor pool -pool {<pool ID#> \| <pool naming>} -operation <type> |
| | Start or stop the tier reallocation of a pool for HDT, HDTz, active flash, or active flash for mainframe. | raidcom reallocate pool -pool {<pool ID#> \| <pool naming>} -operation <type> |
| LU path (see the *Provisioning Guide*) | Set LU path. | raidcom add lun -port <port#> [<host group name>] {-ldev_id <ldev#> [-lun_id<lun#>] \| -grp_opt <group option> -device_grp_name <device group name> [<device name>]} |
| | Delete LU path. | raidcom delete lun -port <port#> [<host group name>] {-lun_id <lun#> \| -ldev_id <ldev#> \| -grp_opt <group option> -device_grp_name <device group name> [<device name>]} |
| | Display LU path information. | raidcom get lun -port <port#> [<host group name>] |
| External volume (UVM) (see the *Universal Volume Manager User Guide*) | Search external storage. | raidcom discover external_storage -port <port#> |
| | Search external volume. | raidcom discover lun -port <port#> -external_wwn <wwn strings> |
| | Map external volume. | raidcom add external_grp -path_grp <path group#> -external_grp_id <gno-sgno> -port <port#> -external_wwn <wwn strings> -lun_id <lun#> [-emulation <emulation type>] |
| | Disconnect the connection for external volume. | raidcom disconnect external_grp {-external_grp_id <gno-sgno> \| -ldev_id <ldev#>} |

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| Operation type | Description | Corresponding command |
|---|---|---|
| | Check the connection for external volume and restore it. | raidcom check_ext_storage external_grp {-external_grp_id <gno-sgno> \| -ldev_id <ldev#>} |
| | Unmap external volume. | raidcom delete external_grp -external_grp_id <gno-sgno> [-forcible] |
| | Display mapped external volume information. | raidcom get external_grp [-external_grp_id <gno-sgno>] |
| | Create LDEV in external volume. | raidcom add ldev - external_grp_id <gno-sgno> -ldev_id <ldev#> -capacity <size> [-emulation <emulation type>][-location <lba>] [-mp_blade_id <mp#>] |
| | Display LDEV information created in external volume. | raidcom get ldev {-ldev_id <ldev#> … [-cnt <count>] \| -grp_opt <group option> -device_grp_name <device group name> [<device name>]} [-key <keyword>] |
| | Change cache mode of external volume. | raidcom modify external_grp -external_grp_id <gno-sgno> -cache_mode < y\|n > |
| | Control cache write of external volume. | raidcom modify external_grp -external_grp_id <gno-sgno> -cache_inflow < y\|n > |
| | Modify ownership MP Blade of external volume. | raidcom modify external_grp -external_grp_id <gno-sgno> -mp_blade_id <mp#> |
| | Add external path. | raidcom add path -path_grp <path group#> -port <port#> -external_wwn <wwn strings> |
| | Delete external path. | raidcom delete path -path_grp <path group#> -port <port#> -external_wwn <wwn strings> |
| | Display external path information. | raidcom get path [-path_grp <path group#>] |
| | Stop the usage of external path. | raidcom disconnect path -path_grp <path group#> -port <port#> -external_wwn <wwn strings> |
| | Restore the external path. | raidcom check_ext_storage path -path_grp <path group#> -port <port#> -external_wwn <wwn strings> |
| | Define SSID. | raidcom add ssid -rcu <serial#> <mcu#> <rcu#> <id> -ssid <ssid> |

| Operation type | | Description | Corresponding command |
|---|---|---|---|
| | | | raidcom delete ssid -rcu <serial#> <mcu#> <rcu#> -ssid <ssid> |
| Mainte nance | Host | Add WWN of host path adapter. | raidcom add hba_wwn -port <port#> [<host group name>] -hba_wwn <WWN strings> |
| | | Delete WWN of host path adapter. | raidcom delete hba_wwn -port <port#> [<host group name>] -hba_wwn <WWN strings> |
| | | Set nickname for WWN of host path adapter. | raidcom set hba_wwn -port <port#> [<host group name>] -hba_wwn <WWN strings> -wwn_nickname <WWN Nickname> |
| | | Delete nickname from WWN of host path adapter. | raidcom reset hba_wwn -port <port#> [<host group name>] -hba_wwn <WWN strings> |
| | | Display registered WWN information of host path adapter. | raidcom get host_grp -port <port#> [<host group name>] |
| | LDEV | Blockade or restore LDEV. | raidcom modify ldev -ldev_id <ldev#> -status discard_zero_page |
| | | Create nickname for LDEV. | raidcom modify ldev -ldev_id <ldev#> -ldev_name <ldev naming> |
| | | Modify allocated MP Blade to LDEV. | raidcom modify ldev -ldev_id <ldev#> -mp_blade_id <mp#> |
| | | Format LDEV. | raidcom initialize ldev {-ldev_id <ldev#> \| -grp_opt <group option> -device_grp_name <device group name> [<device name>]} -operation <type> |
| | Device group | Create device group. | raidcom add device_grp -device_grp_name <ldev group name> <device name> -ldev_id <ldev#>… [-cnt <count>] |
| | | Delete LDEV from device group. | raidcom delete device_grp -device_grp_name <device group name> -ldev_id <ldev#>… [-cnt <count>] |
| | | Display device group information. | raidcom get device_grp [-device_grp_name <device group name>] |
| | Copy group | Create copy group. | raidcom add copy_grp -copy_grp_name <copy group name> <device group name> [device group name] [-mirror_id <mu#> -journal_id <journal ID#>] |

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| Operation type | | Description | Corresponding command |
|---|---|---|---|
| | | Delete copy group. | raidcom delete copy_grp -copy_grp_name <copy group name> |
| | | Display copy group information. | raidcom get copy_grp |
| | CLPR | View CLPR configuration. | raidcom get clpr |
| | | Modify CLPR (migrate LDEV, parity group, external group). | raidcom modify clpr |
| Remote copy environment | RCU<br><br>(see the manuals for TC, TCz, UR, and URz) | Register RCU. | raidcom add rcu -cu_free <serial#> <id> <pid> -mcu_port <port#> -rcu_port <port#> |
| | | Delete RCU. | raidcom delete rcu -cu_free <serial#> <id> <pid> |
| | | Set RCU attribute. | raidcom modify rcu -cu_free <serial#> <id> <pid> -rcu_option <mpth> <rto> <rtt> |
| | | Display RCU information. | raidcom get rcu [-cu_free <serial#> <id> <pid>] |
| | RCU path<br><br>(see the manuals for TC, TCz, UR, and URz) | Add RCU logical path. | raidcom add rcu_path -cu_free <serial#> <id> <pid> -mcu_port <port#> -rcu_port <port#> |
| | | Delete RCU logical path. | raidcom delete rcu_path -cu_free <serial#> <id> <pid> -mcu_port <port#> -rcu_port <port#> |
| | Journal<br><br>(see the manuals for UR and URz) | Register journal volume to Journal. | raidcom add journal -journal_id <journal ID#> {-ldev_id <ldev#> …[-cnt <count>] | -grp_opt <group option> -device_grp_name <device group name> [<device name>]} [-mp_blade_id <mp#> | -timer_type <timer type> ] |
| | | Delete journal volume from Journal/ Delete journal. | raidcom delete journal -journal_id <journal ID#> [-ldev_id <ldev#> | -grp_opt <group option> -device_grp_name <device group name> [<device name>]] |
| | | Change the UR option to be used at Journal. | raidcom modify journal -journal_id <journal ID#> {[-data_overflow_watch<time>][-cache_mode <y/n>][-timer_type <type>]} | -path_blocked_watch <time> [-mirror_id <mu#>] | -mp_blade_id <mp#> |

| Operation type | | Description | Corresponding command |
|---|---|---|---|
| | | Display journal information. | raidcom get journal [ -key <keyword>]raidcom get journal[t] |

# Provisioning operations that can be performed on device groups

You can use CCI to perform provisioning operations on device groups. When you specify a device group, you can perform operations on all LDEVs in the device group at the same time. For details about device groups, see LDEV grouping function.

The following table lists the provisioning operations that can be executed by specifying a device group.

| Contents of operation | Command |
|---|---|
| Register a journal group to a journal | raidcom add journal |
| Delete a journal group from a journal/delete a journal | raidcom delete journal |
| Delete an LDEV/V-VOL | raidcom delete ldev |
| Extend the capacity of V-VOL for Dynamic Provisioning, Dynamic Provisioning for Mainframe, Dynamic Tiering, active flash, Dynamic Tiering for Mainframe, or active flash for mainframe | raidcom extend ldev |
| Display the LDEV information | raidcom get ldev |
| Format an LDEV | raidcom initialize ldev |
| Create an LU path | raidcom add lun |
| Delete an LU path | raidcom delete lun |
| Create a pool for Copy-on-Write Snapshot | raidcom add snap_pool |
| Extend the capacity of a pool for Copy-on-Write Snapshot | raidcom add snap_pool |
| Create a pool for Dynamic Provisioning, Dynamic Provisioning for Mainframe | raidcom add dp_pool |
| Extend the capacity of a pool for Dynamic Provisioning, Dynamic Provisioning for Mainframe, Dynamic Tiering, active flash, Dynamic Tiering for Mainframe, or active flash for mainframe | raidcom add dp_pool |
| Create a resource group | raidcom add resource |

| Contents of operation | Command |
|---|---|
| Delete a resource group | raidcom delete resource |

## Operation method

To execute a command on a device group, specify the name of the device group (max: 32 characters) and the device name in the device group (max: 32 characters).

The following shows an example of mapping the LDEVs in a device group to LUNs. When you specify both the device group name and the device name, the operation is executed for the LDEV that matches the specified device name in the specified device group. If you do not specify the device name, the operation is executed for all LDEVs in the device group.

### Information of the device group

```
C:\HORCM\etc>raidcom get device_grp -device_grp_name grp1
LDEV_GROUP          LDEV_NAME          LDEV#     Serial#
grp1                data0              17000      64577
grp1                data0              17001      64577
grp1                data1              17002      64577
grp1                data1              17003      64577
```

### Result of executing `raidcom add lun` command

The following shows the result of executing the `raidcom add lun` command and specifying device group name: grp1 and device name: data0.

```
C:\HORCM\etc>raidcom add lun -port CL8-A -grp_opt ldev -device_grp_name
grp1 data0
GROUP = grp1, DEVICE = data0, UnitID = 0, LDEV = 17000(0x4268)[1], PORT =
CL8-A, LUN = none:
raidcom: LUN 0(0x0) will be used for adding.
done
GROUP = grp1, DEVICE = data0, UnitID = 0, LDEV = 17001(0x4269)[1], PORT =
CL8-A, LUN = none:
raidcom: LUN 1(0x1) will be used for adding.
done
C:\HORCM\etc>raidcom get lun -port CL8-A-0
PORT   GID  HMD             LUN  NUM     LDEV  CM    Serial#   HMO_BITs
CL8-A   0   LINUX/IRIX        0    1     17000  -      64577
CL8-A   0   LINUX/IRIX        1    1     17001  -      64577
```

The following shows the result of executing the `raidcom add lun` command and specifying device group name: grp1 (omitting device name).

```
C:\HORCM\etc>>raidcom add lun -port CL8-A -grp_opt ldev -device_grp_name grp1
GROUP = grp1 , DEVICE = data0 , UnitID = 0 , LDEV = 17000(0x4268)[1] , PORT
```

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```
= CL8-A  , LUN = none :
raidcom: LUN 0(0x0) will be used for adding.
done
GROUP = grp1 , DEVICE = data0 , UnitID = 0 , LDEV = 17001(0x4269)[1] , PORT
= CL8-A  , LUN = none :
raidcom: LUN 1(0x1) will be used for adding.
done
GROUP = grp1 , DEVICE = data1 , UnitID = 0 , LDEV = 17002(0x426A)[1] , PORT
= CL8-A  , LUN = none :
raidcom: LUN 2(0x2) will be used for adding.
done
GROUP = grp1 , DEVICE = data1 , UnitID = 0 , LDEV = 17003(0x426B)[1] , PORT
= CL8-A  , LUN = none :
raidcom: LUN 3(0x3) will be used for adding.
done
C:\HORCM\etc>>raidcom get lun -port CL8-A-0
PORT    GID  HMD         LUN  NUM  LDEV   CM    Serial#   HMO_BITs
CL8-A   0    LINUX/IRIX    0    1  17000  -     64577
CL8-A   0    LINUX/IRIX    1    1  17001  -     64577
CL8-A   0    LINUX/IRIX    2    1  17002  -     64577
CL8-A   0    LINUX/IRIX    3    1  17003  -     64577
```

The following shows examples of specifying device groups and creating journal.

**Examples**

```
C:\HORCM\etc>raidcom add device_grp -device_grp_name dg_jnl1 data1 -ldev_id 512 513
514 515
```

```
  C:\HORCM\etc>raidcom get device_grp
```

```
LDEV_GROUP                  Serial#
dg_jnl1                       64539
```

```
C:\HORCM\etc>raidcom get device_grp -device_grp_name dg_jnl1
```

```
LDEV_GROUP                 LDEV_NAME                LDEV#    Serial#
dg_jnl1                    data1                      512    64539
dg_jnl1                    data1                      513    64539
```

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```
dg_jnl1                         data1                           514       64539
dg_jnl1                         data1                           515       64539
```

```
C:\HORCM\etc>raidcom add journal -journal_id 2 -grp_opt ldev -device_grp_name dg_jnl1
```

```
GROUP = dg_jnl1 , DEVICE = data1 , UnitID = 0 , LDEV = 512(0x0200)[1] ,
PORT = none , LUN = none :done
GROUP = dg_jnl1 , DEVICE = data1 , UnitID = 0 , LDEV = 513(0x0201)[1] , PORT
= none , LUN = none :done
GROUP = dg_jnl1 , DEVICE = data1 , UnitID = 0 , LDEV = 514(0x0202)[1] , PORT
= none , LUN = none :done
GROUP = dg_jnl1 , DEVICE = data1 , UnitID = 0 , LDEV = 515(0x0203)[1] , PORT
= none , LUN = none :done
```

# Workflow for performing provisioning operations

When you execute provisioning operations, perform the operations in the following order to log in and lock resources first and then unlock resources and view resource group information after performing operations.

| Step | Operation | Description | Command |
|------|-----------|-------------|---------|
| 1 | Login | Logs in. | `raidcom -login <user_name> <password>` |
| 2 | Locking resources | Locks the resource group. | `raidcom lock resource -resource_name`<br>`   <resource group name> [-time`<br>`   <time(sec)>]` |
| 3 | Provisioning | Performs the desired provisioning operations. | -- |
| 4 | Unlocking resources | Unlocks the resource group. | `raidcom unlock resource -resource_name`<br>`   <resource group name>` |
| 5 | Displaying resource group information | Displays the resource group information to confirm the operations and lock information. | `raidcom get resource` |
| 6 | Logout | Logs out. | `raidcom -logout` |

# Resource group operations

## Creating resource groups

To create resource groups, perform the following provisioning operations.

| Step | Operation | Description | Command |
|---|---|---|---|
| 1 | Creating resource groups | Creates resource groups. | ```raidcom add resource -resource_name <resource group name>``` |
| 2 | Allocating resources to resource groups | Specifies resources that are allocated to meta_resource (resource group), and allocates resources to created resource groups. | ```raidcom add resource -resource_name <resource group name> [-ldev_id <ldev#> | -port <port#> | -port <port#> <host group name> | -parity_grp_id <gno-sgno> | -external_grp_id <gno-sgno>]``` |
| 3 | Displaying resource group information | Displays a resource group information, and confirms execution results of commands. | ```raidcom get resource``` |

## Deleting resource groups

To delete resource groups, perform the following provisioning operations.

| Step | Operation | Description | Command |
|---|---|---|---|
| 1 | Deleting resources that are allocated to resource groups | Deletes resources that are allocated to resource groups. In other words, this operation allocates resources to resource group: meta_resource. | ```raidcom delete resource -resource_name <resource group name> [-ldev_id <ldev#> | -port <port#> | -port <port#> <host group name> | -parity_grp_id <gno-sgno> | -external_grp_id <gno-sgno>]``` |

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| Step | Operation | Description | Command |
|------|-----------|-------------|---------|
| 2 | Confirming resource deletions | Confirms that resources are not allocated to resource groups that you want to delete. At that time, allocation of resources to the resource group: meta_resource must be finished. | `raidcom get resource` |
| 3 | Deleting resource groups | Deletes resource groups. | `raidcom delete resource`<br>`  -resource_name <resource`<br>`  group name>` |
| 4 | Displaying resource group information | Displays resource group information and confirms results of command executions. | `raidcom get resource` |

## Allocating resources to other resource groups

When you want to allocate resources that are already allocated to resource groups to other resource groups, resources must be once allocated to resource group: meta_resource. After that, allocate resources to the resource groups that you want to allocate. LDEVs that configure journals, pools, LUSEs or device groups must be allocated to resource groups particularly. The following shows the necessary provisioning operations.

| Step | Operation | Description | Command |
|------|-----------|-------------|---------|
| 1 | Deleting resources that are allocated to resource groups | Deletes resources that are allocated to resource groups. In other words, this operation allocates resources to resource group: meta_resource. | `raidcom delete resource`<br>`  -resource_name <resource`<br>`  group name> [-ldev_id`<br>`  <ldev#> | -port <port#> |`<br>`  -port <port#> <host group`<br>`  name> | -parity_grp_id`<br>`  <gno-sgno> |`<br>`  -external_grp_id`<br>`  <gno-sgno>]` |
| 2 | Confirming resource deletions | Confirms that resources are not allocated to resource groups that you want to delete. At that time, allocation of resources to the resource group: meta_resource must be finished. | `raidcom get resource` |

| Step | Operation | Description | Command |
|------|-----------|-------------|---------|
| 3 | Allocating resources to resource groups | Specifies resources that are allocated to meta_resource (resource group), and allocates resources to resource groups. | ```raidcom add resource -resource_name <resource group name> [-ldev_id <ldev#> | -port <port#> | -port <port#> <host group name> | -parity_grp_id <gno-sgno> | -external_grp_id <gno-sgno>]``` |
| 4 | Displaying resource group information | Displays resource group information and confirms results of command executions. | ```raidcom get resource``` |

LDEVs that are allocated to journals or pools must be migrated by users. We recommend that you register LDEVs that are allocated to journals or pools as device groups, and then operate after specifying them by the device groups.

## Execution example for registering LDEVS to the pools as device groups

The following shows the execution example of registering LDEVs to the pool as device groups, creating resource groups in the device group unit and migrating created resource groups.

**Example 1**

```
C:\HORCM\etc>raidcom add device_grp -device_grp_name dg_jnl1 data1 -ldev_id 512 513
514 515
```

```
C:\HORCM\etc>raidcom get device_grp
```

```
LDEV_GROUP                Serial#
dg_jnl1                    64539
```

**Example 2**

```
C:\HORCM\etc>raidcom get device_grp -device_grp_name dg_jnl1
```

```
LDEV_GROUP                    LDEV_NAME                    LDEV#    Serial#
dg_jnl1                       data1                         512      64539
dg_jnl1                       data1                         513      64539
dg_jnl1                       data1                         514      64539
```

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```
dg_jnl1                        data1                      515      64539
```

**Example 3**

```
C:\HORCM\etc>raidcom add resource -resource_name rsg002 -grp_opt ldev -
device_grp_name dg_jnl1
```

```
GROUP = dg_jnl1 , DEVICE = data1 , UnitID = 0 , LDEV = 512(0x0200)[1] ,
PORT = none , LUN = none :done
GROUP = dg_jnl1 , DEVICE = data1 , UnitID = 0 , LDEV = 513(0x0201)[1] , PORT
= none , LUN = none :done
GROUP = dg_jnl1 , DEVICE = data1 , UnitID = 0 , LDEV = 514(0x0202)[1] , PORT
= none , LUN = none :done
GROUP = dg_jnl1 , DEVICE = data1 , UnitID = 0 , LDEV = 515(0x0203)[1] , PORT
= none , LUN = none :done
```

**Example 4**

```
C:\HORCM\etc>raidcom delete resource -resource_name rsg002 -grp_opt ldev -
device_grp_name dg_jnl1
```

```
GROUP = dg_jnl1 , DEVICE = data1 , UnitID = 0 , LDEV = 512(0x0200)[1] ,
PORT = none , LUN = none :done
GROUP = dg_jnl1 , DEVICE = data1 , UnitID = 0 , LDEV = 513(0x0201)[1] , PORT
= none , LUN = none :done
GROUP = dg_jnl1 , DEVICE = data1 , UnitID = 0 , LDEV = 514(0x0202)[1] , PORT
= none , LUN = none :done
GROUP = dg_jnl1 , DEVICE = data1 , UnitID = 0 , LDEV = 515(0x0203)[1] , PORT
= none , LUN = none :done
```

# Internal volume operations

## Creating internal volumes (open volumes)

To create LDEVs of internal volumes (open volumes) and make the LDEVs available to the host, perform the following provisioning operations.

| Step | Operation | Description | Command |
|------|-----------|-------------|---------|
| 1 | Setting port | Enables LUN security of the port. Modify settings such as port topology and data transfer speed as needed. | `raidcom modify port -port`<br>`  <port#> -security_switch y` |

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| Step | Operation | Description | Command |
|---|---|---|---|
| 2 | Creating host group | Specifies port and create host group. | `raidcom add host_grp -port`<br>`  <port#> -host_grp_name`<br>`  <host group name>` |
| 3 | Setting host mode | Specifies port and set host mode for host group. | `raidcom modify host_grp`<br>`  -port <port#>`<br>`  [<host group name>]`<br>`  -host_mode < host mode>`<br>`  [-host_mode_opt`<br>`  <host mode option> … ]` |
| 4 | Displaying host group information | Displays host group information and confirm result of executing command. | `raidcom get host_grp`<br>`  -port <port#> [<host group`<br>`  name>]` |
| 5 | Adding host to host group | Registers host to host group of the port. | `raidcom add hba_wwn`<br>`  -port <port#> [<host group`<br>`  name>] -hba_wwn`<br>`  <WWN strings>` |
| 6 | Displaying WWN information | Displays WWN of connection host registered to the host group and confirm the result of executing the command. | `raidcom get hba_wwn -port`<br>`  <port#> [<host group`<br>`  name>]` |
| 7 | Creating LDEV | Specifies a parity group and create LDEV. | `raidcom add ldev`<br>`  -parity_grp_id <gno-sgno>`<br>`  -ldev_id <ldev#>`<br>`  -capacity <size>`<br>`  [-emulation <emulation`<br>`  type>]`<br>`  [-location <lba>]`<br>`  [-mp_blade_id <mp#>]` |
| 8 | Formatting LDEV * | Formats created LDEV. | `raidcom initialize ldev`<br>`  -ldev_id <ldev#>`<br>`  -operation <type>` |
| 9 | Creating LDEV nickname (arbitrary) | Creates nickname for created LDEV. This operation is arbitrary. | `raidcom modify ldev`<br>`  -ldev_id <ldev#>`<br>`  -ldev_name <ldev naming>` |

| Step | Operation | Description | Command |
|------|-----------|-------------|---------|
| 10 | Setting MP blade of LDEV | Sets MP blade of created LDEV. | ```raidcom modify ldev   -ldev_id <ldev#>   -mp_blade_id <mp#>``` |
| 11 | Displaying LDEV information | Displays information of created LDEV and confirm the result of executing the command. | ```raidcom get ldev -ldev_id   <ldev#> … [-cnt <count>]   [-key <keyword>]``` |
| 12 | Creating LU path | Specifies port, map LDEV to LUN and create an LU path. | ```raidcom add lun -port   <port#> [<host group   name>] -ldev_id <ldev#>   [-lun_id<lun#>]``` |
| 13 | Displaying LU path information | Displays LU path information and confirm the result of executing the command. | ```raidcom get lun   -port <port#>   [<host group name>]``` |

\* If the drive type code of the installed drive is NFHAx-QxxxSS (x is alphanumeric), formatting by the parity group format is recommended.

Execute the parity group format using the following command.

```
raidcom initialize parity_grp -parity_grp_id <gno-sgno> -operation <type>
```

You can check the drive type of the installed drive of the parity group using the following command: **raidcom get parity_grp**.

## Script examples for internal volume operation (open volumes)

The following shows script examples of internal volume (open volume) operation.

**Script examples of internal volume operation (open volume) (1/3)**

```
raidcom -login USER01 PASS01                    ;Log in with the user ID : USER01 and the
                                                ;password : PASS01.
raidcom lock resource -resource_grp_name        ;Lock the resource group: meta_resource.
meta_resource                                   ;
                                                ;
                                                ;
raidcom modify port -port CL1-A -security       ;Turn ON the security switch of PortCL1-A and
_switch y                                       ;PortCL2-A.
raidcom modify port -port CL2-A -security       ;
_switch y                                       ;
                                                ;
                                                ;
raidcom add host_grp -port CL1-A-0 -            ;Set the host group #0 to PortCL1-A, host
host_grp_name HP-UX-P                           ;group name: HP-UX-P, and the host group #0 to
raidcom add host_grp -port CL2-A-0 -            ;PortCL2-A, host group name: HP-UX-S.
host_grp_name HP-UX-S                            ;
                                                ;
raidcom modify host_grp -port CL1-A-0 -         ;Set the host mode: HP-UX to the host group#0
host_mode HP-UX                                 ;of PortCL1-A and PortCL2-A.
raidcom modify host_grp -port CL2-A-0 -         ;
host_mode HP-UX                                 ;
                                                ;Display the host group information that is
raidcom get host_grp -port CL1-A               ;set to PortCL1-A and PortCL2-A.
raidcom get host_grp -port CL2-A               ;
                                                ;Set the connection host WWN:210000e0,8b0256f8
raidcom add hba_wwn -port CL1-A HP-UX-P -       ;to the PortCL1-A, host group HP-UX-P, and
hba_wwn 210000e0,8b0256f8                       ;the connection host WWN: 210000e0,8b0256f9 to
raidcom add hba_wwn -port CL2-A HP-UX-S -       ;the PortCL2-A, host group HP-UX-S.
hba_wwn 210000e0,8b0256f9                       ;
                                                ;Display the connection host WWN that is set
raidcom get hba_wwn -port CL1-A HP-UX-P         ;to PortCL1-A, host group HP-UX-P, and the
raidcom get hba_wwn -port CL2-A HP-UX-S         ;connection host WWN that is set to PortCL2-A,
                                                ;host group HP-UX-S.
for /l %%i in (0,1,9) do (raidcom add ldev -    ;Create each 10 of 10G Ldev to the
ldev_id %%i -capacity 10g -parity_grp_id 1-1    ;Parity_grp_id 1-1 (LDEV: 0 to 9).
)                                               ;
raidcom get command_status                      ;
raidcom reset command_status                    ;
                                                ;
for /l %%i in (0,1,9) do (                       ;Execute the quick format to LDEV:0 to 9.
raidcom initialize ldev -ldev_id %%i -operation ;
qfmt                                            ;
)                                               ;
raidcom get command_status                      ;
raidcom reset command_status                    ;
                                                ;
for /l %%i in (0,1,9) do (                      ;Give a nickname to LDEV:0 to 9.
raidcom modify ldev -ldev_id %%i -device_name   ;(my_volume 0 to 9)
my_volume_%%i                                   ;
)
```

### Script examples of internal volume operation (open volume) (2/3)

```
for /l %%i in (0,1,9) do (              ;Set the LDEV MP Blade ID of LDEV: 0 to 9 to
raidcom modify ldev -ldev_id %%i -mp_blade_id 2  ;2.
)                                        ;
                                         ;Display the information of LDEV: 0 to
raidcom get ldev -ldev_id 0 -cnt 10      ;9(Internal VOL).
                                         ;
raidcom add dp_pool -pool_id 1 -ldev_id 0 -cnt  ;Create Pool:1 by using LDEV: 0 to 9.
10                                       ;
raidcom get command_status              ;
raidcom reset command_status            ;
                                         ;
for /l %%i in (10,1,19) do (             ;Create each 10 of 10G VVOL to Pool_id 1.
raidcom add ldev -ldev_id %%i           ;(LDEV: 10 to 19, 20 to 29)
-capacity 10g -pool 1                    ;
)                                        ;
                                         ;
for /l %%i in (20,1,29) do (             ;
raidcom add ldev -ldev_id %%i           ;
-capacity 10g -pool 1                    ;
)                                        ;
raidcom get command_status              ;
raidcom reset command_status            ;
                                         ;
for /l %%i in (10,1,29) do (             ;Give a nickname to VVOL: 10 to 29.
raidcom modify ldev -ldev_id %%i -device_name  ;(my_virtual_volume 10 to 29)
my_virtual_volume_%%i                    ;
)                                        ;
                                         ;
for /l %%i in (10,1,29) do (             ;Set the VVOL MP Blade ID of VVOL:10 to 29 to
raidcom modify ldev -ldev_id %%i -mp_blade_id 2  ;2.
)                                        ;
                                         ;Display the information of VVOL: 10 to
raidcom get ldev -ldev_id 10 -cnt 20     ;29(virtual VOL).
                                         ;
for /l %%i in (10,1,19) do (             ;Give the device name: data 10 to 29 to VVOL:
raidcom add device_grp -device_grp_name grp1  ;10 to 29, and add it to the device group name
data%%i -ldev_id %%i                     ;grp1(data10 to 19) and grp2(data20 to 29).
)                                        ;
for /l %%i in (20,1,29) do (             ;
raidcom add device_grp -device_grp_name grp2  ;
data%%i -ldev_id %%i                     ;
)                                        ;
raidcom get command_status              ;
raidcom reset command_status            ;
                                         ;
raidcom get device_grp -device_grp_name grp1  ;Display the device group information:grp1 and
raidcom get device_grp -device_grp_name grp2  ;grp2.
                                         ;
raidcom add copy_grp -copy_grp_name ora grp1  ;Create a copy group (ora) with the device
grp2                                     ;group (grp1 and grp2).
                                         ;
raidcom get command_status              ;
raidcom reset command_status            ;
```

**Script examples of internal volume operation (open volume) (3/3)**

```
raidcom get copy_grp                            ;Display the copy group information
                                                ;
for /l %%i in (10,1,19) do (                    ;Define a path of VVOL: 10 to 19 to Port: CL1-
raidcom add lun -port CL1-A HP-UX-P -ldev_id    ;A host group HP-UX-P.
%%i                                             ;Define a path of VVOL: 20 to 29 to Port: CL2-
)                                               ;A host group HP-UX-S.
for /l %%i in (20,1,29) do (                     ;Given an LU number automatically.
raidcom add lun -port CL2-A HP-UX-S -ldev_id    ;
%%i                                             ;
)                                               ;Display the path information that is set to
                                                ;PortCL1-A, host group HP-UX-P, and the path
raidcom get lun -port CL1-A HP-UX-P             ;information that is set to PortCL2-A, host
raidcom get lun -port CL2-A HP-UX-S             ;group HP-UX-S.
                                                ;
                                                ;
raidcom unlock resource -resource_grp_name      ;Unlock the resource group: meta_resource.
meta_resource                                   ;
                                                ;
raidcom get resource                            ;Display the resource group information.
                                                ;
raidcom -logout                                 ;
                                                ;Log out.
```

# Creating internal volumes (mainframe volumes)

To create LDEVs of internal volumes (mainframe volumes) and make the LDEVs available to the host, perform the following provisioning operations.

| Step | Operation | Description | Command |
|---|---|---|---|
| 1 | Setting SSID (arbitrarily) | Configures the SSID unless it is configured. Set (register) the SSID by specifying undefined LDEV numbers in the area in which SSIDs are not defined. | `raidcom modify ldev`<br>`  -ldev_id <ldev#> -ssid<value>` |
| 2 | Creating LDEVs | Creates LDEVs by specifying parity groups. | `raidcom add ldev -parity_grp_id`<br>`  <gno-sgno> -ldev_id <ldev#>`<br>`  {-capacity <size> |`<br>`  -offset_capacity <size> |`<br>`  -cylinder <size>} [-emulation`<br>`  <emulation type>][-location`<br>`  <lba>][-mp_blade_id <mp#>]` |
| 3 | Formatting LDEVs * | Formats created LDEVs. | `raidcom initialize ldev`<br>`  -ldev_id <ldev#>`<br>`  -operation <type>` |
| 4 | Creating LDEV nicknames (arbitrarily) | Creates LDEV nicknames. This operation is optional. | `raidcom modify ldev -ldev_id`<br>`  <ldev#> -ldev_name <ldev`<br>`  naming>` |

| Step | Operation | Description | Command |
|------|-----------|-------------|---------|
| 5 | Configuring MP blades of LDEVs | Configures MP blades of created LDEVs. | `raidcom modify ldev -ldev_id`<br>`  <ldev#> -mp_blade_id <mp#>` |
| 6 | Displaying a LDEV information | Displays an information of created LDEV, and confirms an execution result of the command. | `raidcom get ldev -ldev_id`<br>`  <ldev#> … [-cnt <count>]`<br>`  [-key <keyword>]` |

\* If the drive type code of the installed drive is NFHAx-QxxxSS (x is alphanumeric), formatting by the parity group format is recommended.

Execute the parity group format using the following command.

```
raidcom initialize parity_grp -parity_grp_id <gno-sgno> -operation <type>
```

You can check the drive type of the installed drive of the parity group using the following command:
**raidcom get parity_grp**.

## Script examples of internal volume (mainframe volumes) operations

The following shows the script examples of internal volume (mainframe volume) operations.

```
raidcom -login USER01 PASS01              ;Log in with the User ID: USER01 and
                                          ;Password: PASS01.
raidcom lock resource -resource_grp_name  ;Lock the resource group: meta_resource
meta_resource                             ;
                                          ;
for /l %%i in (0,1,9) do (                ;Create each 10 of 483078 cylinder LDEV to
raidcom add ldev -parity_grp_id 1-1 -emulation  ;Parity_grp_id 1-1 (LDEV: 0 to 9)
3390-A -cylinder 483078 -ldev_id %%i      ;
)                                         ;
raidcom get command_status               ;
raidcom reset command_status             ;
                                          ;
for /l %%i in (0,1,9) do (                ;Execute Quick format to LDEV: 0 to 9
raidcom initialize ldev -ldev_id %%i -operation ;
qfmt                                      ;
)                                         ;
raidcom get command_status               ;
raidcom reset command_status             ;
                                          ;
for /l %%i in (0,1,9) do (                ;Give a nickname to LDEV: 0 to 9
raidcom modify ldev -ldev_id %%i -device_name  ;(my_volume 0 to 9)
my_volume_%%i                             ;
)                                         ;
                                          ;
for /l %%i in (0,1,9) do (                ;Set to 2 the MP blade ID of LDEV: 0 to 9
raidcom modify ldev -ldev_id %%i -mp_blade_id 2 ;
)                                         ;
                                          ;
raidcom get ldev -ldev_id 0 -cnt 10      ;Display the information of LDEV:0 to
                                          ;9(Internal VOL).
for /l %%i in (0,1,9) do (                ;
raidcom add device_grp -device_grp_name grp1  ;Give the device name: data 0 to 9 to the
data%%i -ldev_id %%i                      ;LDEV:0 to 9, and add it to Device group name
)                                         ;grp1(data0 to 9).
                                          ;
raidcom get command_status               ;
raidcom reset command_status             ;
                                          ;
raidcom get device_grp -device_grp_name grp1  ;Display the device group information: grp1.
                                          ;
raidcom add copy_grp -copy_grp_name ora grp1  ;Create a copy group (ora) by the device group
                                          ;(grp1).
raidcom get command_status               ;
raidcom reset command_status             ;
                                          ;
raidcom get copy_grp                     ;Display the copy group information.
                                          ;
for /l %%i in (0,1,9) do (                ;Defining paths of LDEV: 0 to 9 to Port: CL1-A
raidcom add lun -port CL1-A HP-UX-P -ldev_id %%i ;host group HP-UX-P
)                                         ;LU number is given automatically.
                                          ;
raidcom get lun -port CL1-A HP-UX-P      ;Display the path information that is set to
                                          ;PortCL1-A, host group HP-UX-P.
                                          ;
raidcom unlock resource -resource_grp_name  ;Unlock the resource group: meta_resource.
meta_resource                             ;
                                          ;
raidcom get resource                     ;Display the resource group information.
                                          ;
raidcom -logout                          ;Log out.
```

# Virtual volume (Dynamic Provisioning) operations

## Creating virtual volumes (Dynamic Provisioning)

Use the following provisioning operations to create LDEVs of virtual volumes (Dynamic Provisioning) and make the LDEVs available to the host.

**Table 2 Operations for VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP Gx00 models, and VSP Fx00 models**

| Step | Operation overview | Description | Executed command |
|---|---|---|---|
| 1 | Setting port | Enable LUN security for the port. Modify settings such as port topology and data transfer speed as needed. | raidcom modify port -port <port#> -security_switch y |
| 2 | Creating host group | Specify port and create host group. | raidcom add host_grp -port <port#> -host_grp_name <host group name> |
| 3 | Setting host mode | Specify port and set host mode for host group. | raidcom modify host_grp -port <port#> [<host group name>] -host_mode <host mode> [-host_mode_opt <host mode option> … ] |
| 4 | Displaying host group information | Display host group information and confirm result of executing command. | raidcom get host_grp -port <port#> [<host group name>] |
| 5 | Adding host to host group | Register host to host group of the port. | raidcom add hba_wwn -port <port#> [<host group name>] -hba_wwn <WWN strings> |
| 6 | Displaying WWN information | Display WWN of connection host registered to the host group and confirm the result of executing the command. | raidcom get hba_wwn -port <port#> [<host group name>] |
| 7 | Creating LDEV | Specify a parity group and create LDEV. | raidcom add ldev -parity_grp_id <gno-sgno> -ldev_id <ldev#> {-capacity <size> | -offset_capacity <size> | -cylinder <size>} [-emulation <emulation type>][-location <lba>] [-mp_blade_id <mp#>] |
| 8 | Formatting LDEV * | Format created LDEV. | raidcom initialize ldev -ldev_id <ldev#> -operation <type> |
| 9 | Creating LDEV nickname (arbitrary) | Create nickname for LDEV. This operation is arbitrary. | raidcom modify ldev -ldev_id <ldev#> -ldev_name <ldev naming> |
| 10 | Setting MP blade of LDEV | Set MP blade of created LDEV. | raidcom modify ldev -ldev_id <ldev#> -mp_blade_id <mp#> |

| Step | Operation overview | Description | Executed command |
|------|--------------------|-------------|------------------|
| 11 | Displaying LDEV information | Display information of created LDEV and confirm the result of executing the command. | raidcom get ldev -ldev_id <ldev#> … [-cnt <count>] [-key <keyword>] |
| 12 | Creating pool (for Dynamic Provisioning) | Create pool (for Dynamic Provisioning). | raidcom add dp_pool {{-pool_id <pool ID#> [-pool_name <pool naming>] | -pool_name <pool naming> [-pool_id <pool ID#>]} | -pool_id <pool ID#> -pool_name <pool naming>}} -ldev_id <ldev#> … [-cnt <count>] [-user_threshold <threshold_1> [<threshold_2>]] |
| 13 | Creating LDEV (V-VOL) | Specify pool and create an LDEV(V-VOL). | raidcom add ldev -pool {<pool ID#> | <pool naming> | snap} -ldev_id <ldev#> {-capacity <size> | -offset_capacity <size> | -cylinder <size>} [-emulation <emulation type>][-location <lba>] [-mp_blade_id <mp#>] |
| 14 | Creating LDEV (V-VOL) nickname (arbitrary) | (Optional) Create nickname for the created LDEV. | raidcom modify ldev -ldev_id <ldev#> -ldev_name <ldev naming> |
| 15 | Setting MP blade of LDEV (V-VOL) | Set MP blade of created LDEV (V-VOL). | raidcom modify ldev -ldev_id <ldev#> -mp_blade_id <mp#> |
| 16 | Displaying LDEV information (V-VOL) | Display information of created LDEV (V-VOL) and confirm the result of executing the command. | raidcom get ldev -ldev_id <ldev#> … [-cnt <count>] [-key <keyword>] |
| 17 | Creating LU path | Specify port, map LDEV to LUN and create an LU path. | raidcom add lun -port <port#> [host group name] -ldev_id <ldev#> [-lun_id <lun#>] |
| 18 | Displaying LU path information | Display LU path information and confirm the result of executing the command. | raidcom get lun -port <port#> [<host group name>] |

\* If the drive type code of the installed drive is NFHAx-QxxxSS (x is alphanumeric), formatting by the parity group format is recommended.

Execute the parity group format using the following command.

```
raidcom initialize parity_grp -parity_grp_id <gno-sgno> -operation <type>
```

| Step | Operation overview | Description | Executed command |
|------|--------------------|-------------|------------------|
| You can check the drive type of the installed drive of the parity group using the following command: `raidcom get parity_grp`. | | | |

**Table 3 Operations for VSP E series and VSP G130, G/F350, G/F370, G/F700, G/F900**

| Step | Operation overview | Description | Executed command |
|------|--------------------|-------------|------------------|
| 1 | Setting port | Enable LUN security for the port. Modify settings such as port topology and data transfer speed as needed. | raidcom modify port -port <port#> -security_switch y |
| 2 | Creating host group | Specify port and create host group. | raidcom add host_grp -port <port#> -host_grp_name <host group name> |
| 3 | Setting host mode | Specify port and set host mode for host group. | raidcom modify host_grp -port <port#> [<host group name>] -host_mode <host mode> [-host_mode_opt <host mode option> … ] |
| 4 | Displaying host group information | Display host group information and confirm result of executing command. | raidcom get host_grp -port <port#> [<host group name>] |
| 5 | Adding host to host group | Register host to host group of the port. | raidcom add hba_wwn -port <port#> [<host group name>] -hba_wwn <WWN strings> |
| 6 | Displaying WWN information | Display WWN of connection host registered to the host group and confirm the result of executing the command. | raidcom get hba_wwn -port <port#> [<host group name>] |
| 7 | Creating a pool for Dynamic Provisioning using parity groups* | Create pool for Dynamic Provisioning using parity groups. | raidcom add dp_pool {-pool_id <pool ID#> [-pool_name <pool naming>] | -pool_name <pool naming> [-pool_id <pool ID#>] | -pool_id <pool ID#> -pool_name <pool naming>} -parity_grp_id <gno-sgno> [-resource_id <resource group_id>][-user_threshold <threshold_1> [<threshold_2>]] |

| Step | Operation overview | Description | Executed command |
|---|---|---|---|
| | Creating a pool for Dynamic Provisioning using an external volume group | Create an LDEV by specifying an external volume group. | raidcom add ldev -external_grp_id <gno-sgno> -ldev_id <ldev#> {-capacity <size> \| -offset_capacity<size> \| -cylinder <size>} [-emulation <emulation type>] [-location <lba>] [-mp_blade_id <mp#>] |
| | | Format the LDEV you created. | raidcom initialize ldev -ldev_id <ldev#> -operation <type> |
| | | (Optional) Create a nickname for the LDEV you created. | raidcom modify ldev -ldev_id <ldev#> -ldev_name <ldev naming> |
| | | Set the MP blade of the LDEV you created. | raidcom modify ldev -ldev_id <ldev#> -mp_blade_id <mp#> |
| | | Display the information of the LDEV you created to check the command execution result. | raidcom get ldev -ldev_id <ldev#> … [-cnt <count>] [-key <keyword>] |
| | | Create a pool. | raidcom add dp_pool {-pool_id <pool ID#> [-pool_name <pool naming>] \| -pool_name <pool naming> [-pool_id <pool ID#>] \| -pool_id <pool ID#> -pool_name <pool naming>} -ldev_id <ldev#> … [-cnt <count>][-user_threshold<threshold_1> [<threshold_2>]] |
| 8 | Creating LDEV (V-VOL) | Specify pool and create an LDEV(V-VOL). | raidcom add ldev -pool {<pool ID#> \| <pool naming> \| snap} -ldev_id <ldev#> {-capacity <size> \| -offset_capacity <size> \| -cylinder <size>} [-emulation <emulation type>][-location <lba>] [-mp_blade_id <mp#>] |
| 9 | Creating LDEV (V-VOL) nickname (arbitrary) | (Optional) Create nickname for the created LDEV. | raidcom modify ldev -ldev_id <ldev#> -ldev_name <ldev naming> |
| 10 | Setting MP blade of LDEV (V-VOL) | Set MP blade of created LDEV (V-VOL). | raidcom modify ldev -ldev_id <ldev#> -mp_blade_id <mp#> |

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| Step | Operation overview | Description | Executed command |
|---|---|---|---|
| 11 | Displaying LDEV information (V-VOL) | Display information of created LDEV (V-VOL) and confirm the result of executing the command. | raidcom get ldev -ldev_id <ldev#> … [-cnt <count>] [-key <keyword>] |
| 12 | Creating LU path | Specify port, map LDEV to LUN and create an LU path. | raidcom add lun -port <port#> [host group name] -ldev_id <ldev#> [-lun_id <lun#>] |
| 13 | Displaying LU path information | Display LU path information and confirm the result of executing the command. | raidcom get lun -port <port#> [<host group name>] |
| \*To change the MP blade or MP unit of a pool volume, use the following command:<br><br>`raidcom modify ldev -ldev_id <ldev#> -mp_blade_id <mp#>` | | | |

## Script examples of virtual volume (Dynamic Provisioning) operation

The following shows script examples of virtual volume (Dynamic Provisioning) operation.

**Script examples of virtual volume operation (Dynamic Provisioning) for VSP Gx00 models, VSP Fx00 models, VSP 5000 series, VSP G1x00, VSP F1500 (1/3)**

```
raidcom -login USER01 PASS01              ;Log in with the user ID : USER01 and the
                                          ;password : PASS01.
raidcom lock resource -resource_grp_name  ;Lock the resource group: meta_resource.
meta_resource                             ;
                                          ;
                                          ;
raidcom modify port -port CL1-A -security ;Turn ON the security switch of PortCL1-A and
_switch y                                 ;PortCL2-A.
raidcom modify port -port CL2-A -security ;
_switch y                                 ;
                                          ;
raidcom add host_grp -port CL1-A-0 -      ;Set the host group #0 to PortCL1-A, host
host_grp_name HP-UX-P                     ;group name: HP-UX-P, and the host group #0 to
raidcom add host_grp -port CL2-A-0 -      ;PortCL2-A, host group name: HP-UX-S.
host_grp_name HP-UX-S                     ;
                                          ;
raidcom modify host_grp -port CL1-A-0 -   ;Set the host mode: HP-UX to the host group#0
host_mode HP-UX                           ;of PortCL1-A and PortCL2-A.
raidcom modify host_grp -port CL2-A-0 -   ;
host_mode HP-UX                           ;
                                          ;Display the host group information that is
raidcom get host_grp -port CL1-A          ;set to PortCL1-A and PortCL2-A.
raidcom get host_grp -port CL2-A          ;
                                          ;Set the connection host WWN:210000e0,8b0256f8
raidcom add hba_wwn -port CL1-A HP-UX-P - ;to the PortCL1-A, host group HP-UX-P, and
hba_wwn 210000e0,8b0256f8                 ;the connection host WWN: 210000e0,8b0256f9 to
raidcom add hba_wwn -port CL2-A HP-UX-S - ;the PortCL2-A, host group HP-UX-S.
hba_wwn 210000e0,8b0256f9                 ;
                                          ;Display the connection host WWN that is set
raidcom get hba_wwn -port CL1-A HP-UX-P   ;to PortCL1-A, host group HP-UX-P, and the
raidcom get hba_wwn -port CL2-A HP-UX-S   ;connection host WWN that is set to PortCL2-A,
                                          ;host group HP-UX-S.
for /l %%i in (0,1,9) do (raidcom add ldev - ;Create each 10 of 10G Ldev to the
ldev_id %%i -capacity 10g -parity_grp_id 1-1  ;Parity_grp_id 1-1 (LDEV: 0 to 9).
)                                         ;
raidcom get command_status               ;
raidcom reset command_status             ;
                                          ;
for /l %%i in (0,1,9) do (               ;Execute the quick format to LDEV:0 to 9.
raidcom initialize ldev -ldev_id %%i -operation ;
qfmt                                      ;
)                                         ;
raidcom get command_status               ;
raidcom reset command_status             ;
                                          ;Give a nickname to LDEV:0 to 9.
for /l %%i in (0,1,9) do (               ;(my_volume 0 to 9)
raidcom modify ldev -ldev_id %%i -device_name ;
my_volume_%%i                             ;
)
```

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**Script examples of virtual volume operation (Dynamic Provisioning for VSP Gx00 models, VSP Fx00 models, VSP 5000 series, VSP G1x00, VSP F1500 (2/3)**

```
for /l %%i in (0,1,9) do (                    ;Set the LDEV MP Blade ID of LDEV: 0 to 9 to
raidcom modify ldev -ldev_id %%i -mp_blade_id 2 ;2.
)                                             ;
                                              ;
                                              ;Display the information of LDEV: 0 to
raidcom get ldev -ldev_id 0 -cnt 10           ;9(Internal VOL).
                                              ;
raidcom add dp_pool -pool_id 1 -ldev_id 0 -cnt ;Create Pool:1 by using LDEV: 0 to 9.
10                                            ;
raidcom get command_status                    ;
raidcom reset command_status                  ;
                                              ;
for /l %%i in (10,1,19) do (                  ;Create each 10 of 10G VVOL to Pool_id 1.
raidcom add ldev -ldev_id %%i                 ;(LDEV: 10 to 19, 20 to 29)
-capacity 10g -pool 1                         ;
)                                             ;
                                              ;
for /l %%i in (20,1,29) do (                  ;
raidcom add ldev -ldev_id %%i                 ;
-capacity 10g -pool 1                         ;
)                                             ;
raidcom get command_status                    ;
raidcom reset command_status                  ;
                                              ;
for /l %%i in (10,1,29) do (                  ;Give a nickname to VVOL: 10 to 29.
raidcom modify ldev -ldev_id %%i -device_name ;(my_virtual_volume 10 to 29)
my_virtual_volume_%%i                         ;
)                                             ;
                                              ;
for /l %%i in (10,1,29) do (                  ;Set the VVOL MP Blade ID of VVOL:10 to 29 to
raidcom modify ldev -ldev_id %%i -mp_blade_id 2 ;2.
)                                             ;
                                              ;Display the information of VVOL: 10 to
raidcom get ldev -ldev_id 10 -cnt 20          ;29(virtual VOL).
                                              ;
for /l %%i in (10,1,19) do (                  ;Give the device name: data 10 to 29 to VVOL:
raidcom add device_grp -device_grp_name grp1  ;10 to 29, and add it to the device group name
data%%i -ldev_id %%i                          ;grp1(data10 to 19) and grp2(data20 to 29).
)                                             ;
for /l %%i in (20,1,29) do (                  ;
raidcom add device_grp -device_grp_name grp2  ;
data%%i -ldev_id %%i                          ;
)                                             ;
raidcom get command_status                    ;
raidcom reset command_status                  ;
                                              ;
raidcom get device_grp -device_grp_name grp1  ;Display the device group information:grp1 and
raidcom get device_grp -device_grp_name grp2  ;grp2.
                                              ;
raidcom add copy_grp -copy_grp_name ora grp1  ;Create a copy group (ora) with the device
grp2                                          ;group (grp1 and grp2).
                                              ;
raidcom get command_status                    ;
raidcom reset command_status                  ;
```

Chapter 5: Provisioning operations with CCI

## Script examples of virtual volume operation (Dynamic Provisioning) for VSP Gx00 models, VSP Fx00 models, VSP 5000 series, VSP G1x00, VSP F1500 (3/3)

```
raidcom get copy_grp                          ;Display the copy group information
                                              ;
for /l %%i in (10,1,19) do (                  ;Define a path of VVOL: 10 to 19 to Port: CL1-
raidcom add lun -port CL1-A HP-UX-P -ldev_id  ;A host group HP-UX-P.
%%i                                           ;Define a path of VVOL: 20 to 29 to Port: CL2-
)                                             ;A host group HP-UX-S.
for /l %%i in (20,1,29) do (                  ;Given an LU number automatically.
raidcom add lun -port CL2-A HP-UX-S -ldev_id  ;
%%i                                           ;
)                                             ;Display the path information that is set to
                                              ;PortCL1-A, host group HP-UX-P, and the path
raidcom get lun -port CL1-A HP-UX-P           ;information that is set to PortCL2-A, host
raidcom get lun -port CL2-A HP-UX-S           ;group HP-UX-S.
                                              ;
                                              ;
                                              ;
raidcom unlock resource -resource_grp_name    ;Unlock the resource group: meta_resource.
meta_resource                                 ;
                                              ;
raidcom get resource                          ;Display the resource group information.
                                              ;
raidcom -logout                               ;
                                              ;Log out.
```

## Script examples of virtual volume operation (Dynamic Provisioning) for VSP E series and VSP G/F350, G/F370, G/F700, G/F900 (1/3)

```
raidcom -login USER01 PASS01                  ;Log in with the user ID : USER01 and the
                                              ;password : PASS01.
raidcom lock resource -resource_grp_name      ;Lock the resource group: meta_resource.
meta_resource                                 ;
                                              ;
raidcom modify port -port CL1-A -security     ;Turn ON the security switch of PortCL1-A and
_switch y                                     ;PortCL2-A.
raidcom modify port -port CL2-A -security     ;
_switch y                                     ;
                                              ;
raidcom add host_grp -port CL1-A-0 -          ;Set the host group #0 to PortCL1-A, host
host_grp_name HP-UX-P                         ;group name: HP-UX-P, and the host group #0 to
raidcom add host_grp -port CL2-A-0 -          ;PortCL2-A, host group name: HP-UX-S.
host_grp_name HP-UX-S                         ;
                                              ;
raidcom modify host_grp -port CL1-A-0 -       ;Set the host mode: HP-UX to the host group#0
host_mode HP-UX                               ;of PortCL1-A and PortCL2-A.
raidcom modify host_grp -port CL2-A-0 -       ;
host_mode HP-UX                               ;
                                              ;Display the host group information that is
raidcom get host_grp -port CL1-A             ;set to PortCL1-A and PortCL2-A.
raidcom get host_grp -port CL2-A             ;
                                              ;Set the connection host WWN:210000e0,8b0256f8
raidcom add hba_wwn -port CL1-A HP-UX-P -     ;to the PortCL1-A, host group HP-UX-P, and
hba_wwn 210000e0,8b0256f8                     ;the connection host WWN: 210000e0,8b0256f9 to
raidcom add hba_wwn -port CL2-A HP-UX-S -     ;the PortCL2-A, host group HP-UX-S.
hba_wwn 210000e0,8b0256f9                     ;
                                              ;Display the connection host WWN that is set
raidcom get hba_wwn -port CL1-A HP-UX-P       ;to PortCL1-A, host group HP-UX-P, and the
raidcom get hba_wwn -port CL2-A HP-UX-S       ;connection host WWN that is set to PortCL2-A,
                                              ;host group HP-UX-S.
for /l %%i in (0,1,9) do (raidcom add ldev -  ;Create each 10 of 10G Ldev to the
ldev_id %%i -capacity 10g -parity_grp_id 1-1  ;Parity_grp_id 1-1 (LDEV: 0 to 9).
)                                             ;
raidcom get command_status                    ;
raidcom reset command_status                  ;
                                              ;
for /l %%i in (0,1,9) do (                     ;Execute the quick format to LDEV:0 to 9.
raidcom initialize ldev -ldev_id %%i -operation ;
qfmt                                          ;
)                                             ;
raidcom get command_status                    ;
raidcom reset command_status                  ;
                                              ;Give a nickname to LDEV:0 to 9.
for /l %%i in (0,1,9) do (                     ;(my_volume 0 to 9)
raidcom modify ldev -ldev_id %%i -device_name ;
my_volume_%%i                                 ;
)
```

**Script examples of virtual volume operation (Dynamic Provisioning) for VSP E series and VSP G/F350, G/F370, G/F700, G/F900 (2/3)**

```
raidcom add dp_pool -pool_id 1 -parity_grp_id 1-1 ;Create an LDEV in resource group ID 0 using
-resource_id 0                                    ;parity_grp_id 1-1, and then create pool: 1.
raidcom get command_status                        ;
raidcom reset command_status                      ;
                                                  ;
for /l %%i in (10,1,19) do (                      ;Create 10 10G V-VOLs in pool: 1.
raidcom add ldev -ldev_id %%i                     ;(LDEVs: 10 to 19, 20 to 29)
-capacity 10g -pool 1                             ;
)                                                 ;
                                                  ;
for /l %%i in (20,1,29) do (                      ;
raidcom add ldev -ldev_id %%i                     ;
-capacity 10g -pool 1                             ;
)                                                 ;
raidcom get command_status                        ;
raidcom reset command_status                      ;
                                                  ;
for /l %%i in (10,1,29) do (                      ;
raidcom modify ldev -ldev_id %%i -device_name     ;Assign a nickname to V-VOLs 10 to 29.
my_virtual_volume_%%i                             ;(my_virtual_volume 10 to 29)
)                                                 ;
                                                  ;
for /l %%i in (10,1,29) do (                      ;
raidcom modify ldev -ldev_id %%i -mp_blade_id 2   ;Set the MP blade ID of V-VOLs 10 to 29 to 2.
)                                                 ;
                                                  ;Display information on V-VOLs 10 to 29.
raidcom get ldev -ldev_id 10 -cnt 20              ;
                                                  ;
for /l %%i in (10,1,19) do (                      ;Assign device names data10 to data29 to
raidcom add device_grp -device_grp_name grp1      ;V-VOLs 10 to 29, and to device group names
data%%i -ldev_id %%i                              ;grp1 (data10 to 19) and grp2 (data20 to 29).
)                                                 ;
for /l %%i in (20,1,29) do (                      ;
raidcom add device_grp -device_grp_name grp2      ;
data%%i -ldev_id %%i                              ;
)                                                 ;
raidcom get command_status                        ;
raidcom reset command_status                      ;
                                                  ;Display device group information, grp1,
raidcom get device_grp -device_grp_name grp1      ;grp2.
raidcom get device_grp -device_grp_name grp2      ;
                                                  ;
raidcom add copy_grp -copy_grp_name ora grp1      ;Create a copy group (ora) in device groups
grp2                                              ;(grp1, grp2).
raidcom get command_status                        ;
raidcom reset command_status
```

**Script examples of virtual volume operation (Dynamic Provisioning) for VSP E series and VSP G/F350, G/F370, G/F700, G/F900 (3/3)**

```
raidcom get copy_grp                              ;Display copy group information.
                                                  ;
for /l %%i in (10,1,19) do (                      ;Define a path for V-VOLs 10 to 19, port
raidcom add lun -port CL1-A HP-UX-P -ldev_id      ;CL1-A, and host group HP-UX-P.
%%i                                               ;Define a path for V-VOLs 20 to 29,
)                                                 ;port CL2-A, and host group HP-UX-S.
for /l %%i in (20,1,29) do (                       ;LU numbers are assigned automatically.
raidcom add lun -port CL2-A HP-UX-S -ldev_id      ;
%%i                                               ;
)                                                 ;
                                                  ;Display path information set for PortCL1-A,
raidcom get lun -port CL1-A HP-UX-P               ;host group HP-UX-P.
raidcom get lun -port CL2-A HP-UX-S               ;Display path information set for PortCL2-A,
                                                  ;host group HP-UX-S.
                                                  ;
raidcom unlock resource -resource_grp_name        ;Unlock the resource group: meta_resource.
meta_resource                                     ;
                                                  ;Display the resource group and resource
raidcom get resource                              ;lock information.
                                                  ;
raidcom -logout                                   ;Log out.
```

# Deleting a virtual volume for which capacity saving is enabled

You can use either of the following methods to delete virtual volume for which the capacity saving setting is enabled:

- Execute the **raidcom delete ldev** command with the `-operation initialize_capacity_saving` option. This command option is supported by CCI version 01-40-03/xx and later.

- Execute the commands for blocking the LDEV, initializing the LDEV, and then deleting the LDEV. You can use this method regardless of the CCI version.

## Using the `-operation initialize_capacity_saving` option of the `raidcom delete ldev` command to delete a virtual volume

Use the following procedure to delete a virtual volume by executing the **raidcom delete ldev** command with the `-operation initialize_capacity_saving` option. The command examples in this procedure use LDEV number 200 for the virtual volume being deleted.

### Procedure

1. Delete the volume by executing the **raidcom delete ldev** command with the `-operation initialize_capacity_saving` option.

   ```
   # raidcom delete ldev -operation initialize_capacity_saving -ldev_id 200
   ```

2. Verify that the delete LDEV command completed normally by executing the **raidcom get command_status** command. If the command completed normally, the value "0" is returned.

   ```
   # raidcom get command_status
   ```

3. Check the status of the volume by executing the `raidcom get ldev` command.

```
# raidcom get ldev -ldev_id 200
```

While the delete LDEV operation is in process, the VOL_TYPE is REMOVING. When the volume is deleted correctly, the VOL_TYPE changes from REMOVING to NOT DEFINED.If VOL_TYPE is other than REMOVING or NOT DEFINED, the deletion ended abnormally. Check CSV_Status to take either of the following actions:

- When CSV_Status shows FAILED, see the Troubleshooting Dynamic Provisioning section in the Provisioning Guide for your system.

- When CSV_Status shows a status other than FAILED or does not show any status, execute the raidcom delete ldev command again without specifying the -operation `initialize_capacity_saving` option.

## Deleting a virtual volume by blocking, initializing, and then deleting the volume

Use the following procedure to delete a virtual volume by blocking, initializing, and then deleting the volume. The command examples in this procedure use LDEV number 200 for the virtual volume being deleted.

### Procedure

1. Block the volume by executing the `raidcom modify ldev` command.

```
# raidcom modify ldev -status blk -ldev_id 200
```

2. Verify that the block LDEV command completed normally by executing the `raidcom get command_status` command. If the command completed normally, the value "0" is returned.

```
# raidcom get command_status
```

3. Initialize the volume by executing the `raidcom initialize ldev` command.

```
# raidcom initialize ldev -operation fmt -ldev_id 200
```

4. Verify that the initialize LDEV command completed normally by executing the `raidcom get command_status` command. If the command completed normally, the value "0" is returned.

```
# raidcom get command_status
```

5. Check the status of the volume by executing the `raidcom get ldev` command.

```
# raidcom get ldev -ldev_id 200
```

When the volume is initialized correctly, the VOL_TYPE is OPEN-V-CVS and the CSV_Status is DISABLED.

6. Delete the volume by executing the **raidcom delete ldev** command.

```
# raidcom delete ldev -ldev_id 200
```

7. Verify that the delete LDEV command completed normally by executing the **raidcom get command_status** command. If the command completed normally, the value "0" is returned.

```
# raidcom get command_status
```

# Virtual volume (Dynamic Provisioning for Mainframe) operations

## Creating virtual volumes (Dynamic Provisioning for Mainframe)

To create LDEVs of virtual volumes (Dynamic Provisioning for Mainframe) and make the LDEVs available to the host, perform the following Provisioning operations.

| Step | Operation overview | Description | Executed command |
|------|--------------------|-------------|------------------|
| 1 | Setting SSID (arbitrarily) | Configures the SSID unless it is configured. Set (register) the SSID by specifying undefined LDEV numbers in the area in which SSIDs are not defined. | `raidcom modify ldev`<br>`  -ldev_id<ldev#>`<br>`  -ssid<value>` |
| 2 | Creating LDEVs | Creates LDEVs by specifying parity groups. Specifies only 3390-V for the emulation type. | `raidcom add ldev`<br>`  -parity_grp_id <gno-sgno>`<br>`  -ldev_id <ldev#>`<br>`  {-capacity <size> |`<br>`  -offset_capacity <size> |`<br>`  -cylinder <size>}`<br>`  -emulation 3390-V`<br>`  -location <lba>]`<br>`  [-mp_blade_id <mp#>]` |
| 3 | Formatting LDEVs * | Formats created LDEVs. | `raidcom initialize ldev`<br>`  -ldev_id <ldev#>`<br>`  -operation <type>` |
| 4 | Creating LDEV nicknames (arbitrarily) | Creates LDEV nicknames. This operation is optional. | `raidcom modify ldev`<br>`  -ldev_id <ldev#>`<br>`  -ldev_name <ldev naming>` |

| Step | Operation overview | Description | Executed command |
|---|---|---|---|
| 5 | Configuring MP blades of LDEVs | Configures MP blades of created LDEVs. | ```raidcom modify ldev -ldev_id <ldev#> -mp_blade_id <mp#>``` |
| 6 | Displaying a LDEV information | Displays an information of created LDEV, and confirms an execution result of the command. | ```raidcom get ldev -ldev_id <ldev#> … [-cnt <count>] [-key <keyword>]``` |
| 7 | Creating the pool (for the Hitachi Dynamic Provisioning for mainframe) | Creates the pool for the Hitachi Dynamic Provisioning for mainframe. | ```raidcom add dp_pool {{-pool_id <pool ID#> [-pool_name <pool naming>] | -pool_name <pool naming> [-pool_id <pool ID#>]} | -pool_id <pool ID#> -pool_name <pool naming>} {-ldev_id <ldev#> …[-cnt <count>] | -grp_opt <group option> -device_grp_name <device group name> [<device name>]}[ -user_threshold <threshold_1> [<threshold_2>] ]``` |
| 8 | Creating LDEV (V-VOL) | Specifies the pool and creates LDEV (V-VOL). | ```raidcom add ldev -pool {<pool ID#> | <pool naming> | snap} -ldev_id <ldev#> {-capacity <size> | -offset_capacity <size> | -cylinder <size>} [-emulation <emulation type>][-location <lba>] [-mp_blade_id <mp#>]``` |
| 9 | Creating LDEV (V-VOL) nicknames (arbitrarily) | Creates LDEV (V-VOL) nicknames. This operation is optional. | ```raidcom modify ldev -ldev_id <ldev#> -ldev_name <ldev naming>``` |
| 10 | Configuring MP blades of LDEVs (V-VOL) | Configures MP blades of created LDEVs (V-VOL). | ```raidcom modify ldev -ldev_id <ldev#> -mp_blade_id <mp#>``` |

| Step | Operation overview | Description | Executed command |
|------|--------------------|-------------|------------------|
| 11 | Displaying a LDEV (V-VOL) information | Displays an information of created LDEV (V-VOL), and confirms an execution result of the command. | `raidcom get ldev -ldev_id`<br>`  <ldev#>  [-cnt <count>]`<br>`  [-key <keyword>]` |

* If the drive type code of the installed drive is NFHAx-QxxxSS (x is alphanumeric), formatting by the parity group format is recommended.

Execute the parity group format using the following command.

```
raidcom initialize parity_grp -parity_grp_id <gno-sgno> -operation <type>
```

You can check the drive type of the installed drive of the parity group using the following command: **raidcom get parity_grp**.

## Script examples of virtual volume (Dynamic Provisioning for Mainframe) operation

The following shows the script examples of virtual volume (Dynamic Provisioning for Mainframe) operation.

**Script examples of virtual volume operation (Dynamic Provisioning for Mainframe) (1/2)**

```
raidcom -login USER01 PASS01                       ;Log in with the user ID: USER01 and the
                                                   ;password: PASS01.
raidcom lock resource -resource_grp_name           ;Lock the resource group: meta_resource.
meta_resource                                      ;
                                                   ;
for /I %%i in (0,1,9) do (                          ;Create each 10 of 483078 cylinder LDEV to
raidcom add ldev -parity_grp_id 1-1 -emulation     ;Parity_grp_id 1-1 (LDEV: 0 to 9)
3390-V -cylinder 483078 -ldev_id %%i                ;
)                                                  ;
raidcom get command_status                         ;
raidcom reset command_statu                        ;
                                                   ;
for /I %%i in (0,1,9) do (                          ;Execute the quick format to LDEV:0 to 9.
raidcom initialize ldev -ldev_id %%i -operation    ;
qfmt                                               ;
)                                                  ;
raidcom get command_status                         ;
raidcom reset command_status                       ;
                                                   ;
for /I %%i in (0,1,9) do (                          ;Give a nickname to LDEV:0 to 9.
raidcom modify ldev -ldev_id %%i -device_name      ;(my_volume 0 to 9)
my_volume_%%i                                      ;
)                                                  ;
                                                   ;
for /I %%i in (0,1,9) do (                          ;Set the LDEV MP Blade ID of LDEV: 0 to 9 to
raidcom modify ldev -ldev_id %%i -mp_blade_id 2    ;2.
)                                                  ;
                                                   ;
raidcom get ldev -ldev_id 0 -cnt 10                ;Display the information of LDEV: 0 to
                                                   ;9(Internal VOL).
                                                   ;
raidcom add dp_pool -pool_id 1 -ldev_id 0 -cnt     ;Create Pool:1 by using LDEV: 0 to 9.
10                                                 ;
raidcom get command_status                         ;
raidcom reset command_status                       ;
                                                   ;
for /I %%i in (10,1,19) do(                         ;Create 10 of 5420 cylinder VVOL to
raidcom add lcev -ldev_id %%i -emulation 3390-A    ;Pool 1.(LDEV: 10 to 19)
-cylinder 5420 -pool 1                             ;
)                                                  ;
                                                   ;
raidcom get command_status                         ;
raidcom reset command_status                       ;
                                                   ;
for /I %%i in (10,1,29) do (                        ;Give a nickname to VVOL: 10 to 29.
raidcom modify ldev -ldev_id %%i -device_name      ;(my_virtual_volume 10 to 29)
my_virtual_volume_%%i                              ;
)
```

**Script examples of virtual volume operation (Dynamic Provisioning for Mainframe) (2/2)**

```
for /I %%i in (10,1,29) do (          ;Set the VVOL MP Blade ID of VVOL:10 to 29 to
raidcom modify ldev -ldev_id %%i -mp_blade_id 2 ;2.
)                                     ;
                                      ;
raidcom get ldev -ldev_id 10 -cnt 20  ;Display the information of VVOL: 10 to
                                      ;29(virtual VOL).
                                      ;
raidcom unlock resource -resource_grp_name ;Unlock the resource group: meta_resource.
meta_resource                         ;
                                      ;
raidcom get resource                  ;Display the resource group information.
                                      ;
raidcom -logout                       ;Log out.
```

# Virtual volume (Dynamic Tiering) operations

## Operational flow

When using the V-VOL (Dynamic Tiering), tiers of pools must be created after creating pools, and then the performance of pools must be monitored before the operation. If the performance of pools are insufficient, extend the capacity of pool volumes (addition of pool volumes) and of the V-VOL.

The following diagram shows the workflow for configuring a virtual volume (Dynamic Tiering) and the corresponding GUI (Device Manager - Storage Navigator) and CLI (CCI) tasks.

**Workflow for VSP 5000 series, VSP G1000, VSP G1500, VSP F1500, VSP Gx00 models, and VSP Fx00 models**

| Preparation / Operation / Ending | GUI | CCI |
|---|---|---|
| **1. Preparation** | | |
| Expand cache memory | | |
| Create pool-VOLs and format LDEVs | Create LDEVs / Format LDEVs | raidcom add ldev / raidcom initialize ldev |
| Create pools and add pool-VOLs (Tier reallocation: disabled)[1] | Create Pools | raidcom add dp_pool |
| Enable multi-tier pool[3] | | raidcom modify pool |
| Create V-VOLs | Create LDEVs | raidcom add ldev |
| Define LU paths to V-VOLs | Add LUN Paths | raidcom add lun |
| Monitor pool performance | Edit Pools / View Tier Properties | raidcom monitor pool |
| Add pool-VOLs (tiered) | Create Pools | raidcom add dp_pool / raidcom modify pool |
| **2. Operation** | | |
| Monitor pool performance | Edit Pools / View Tier Properties | raidcom monitor pool |
| Insufficient → Reallocate tiers of pools | | raidcom reallocate pool |
| Monitor available pool space | Pools | raidcom get pool / raidcom get dp_pool |
| Need expansion → Expand pool capacity (by adding pool-VOLs) / Expand V-VOL capacity | Expand Pool / Expand V-VOLs | raidcom add dp_pool / raidcom extend ldev |
| **3. Ending operation** | | |
| Delete LU paths to V-VOLs | Delete LUN paths | raidcom delete lun |
| Delete V-VOLs | Delete LDEVs | raidcom delete ldev |
| Delete Dynamic Tiering pools | Delete Pools | raidcom delete pool |
| Delete Dynamic Tiering pool-VOLs | Delete LDEVs | raidcom delete ldev |

**Notes:**

1. The multi-tier pool is disabled when a pool is created by CCI.
2. When the multi-tier pool is enabled, the tiering control is set to "Manual" automatically. To change the setting to "Auto," you must use Device Manager - Storage Navigator.

> 📄 **Note:** Before creating a pool, you must create a virtual volume management area on the cache memory. The virtual volume management area is created automatically when cache memory is added. For information about adding cache memory, please contact customer support.

> ⚠️ **Caution:** The operations explained here are executable by the storage administrator only.

**Workflow for VSP E series and VSP G/F350, G/F370, G/F700, G/F900**
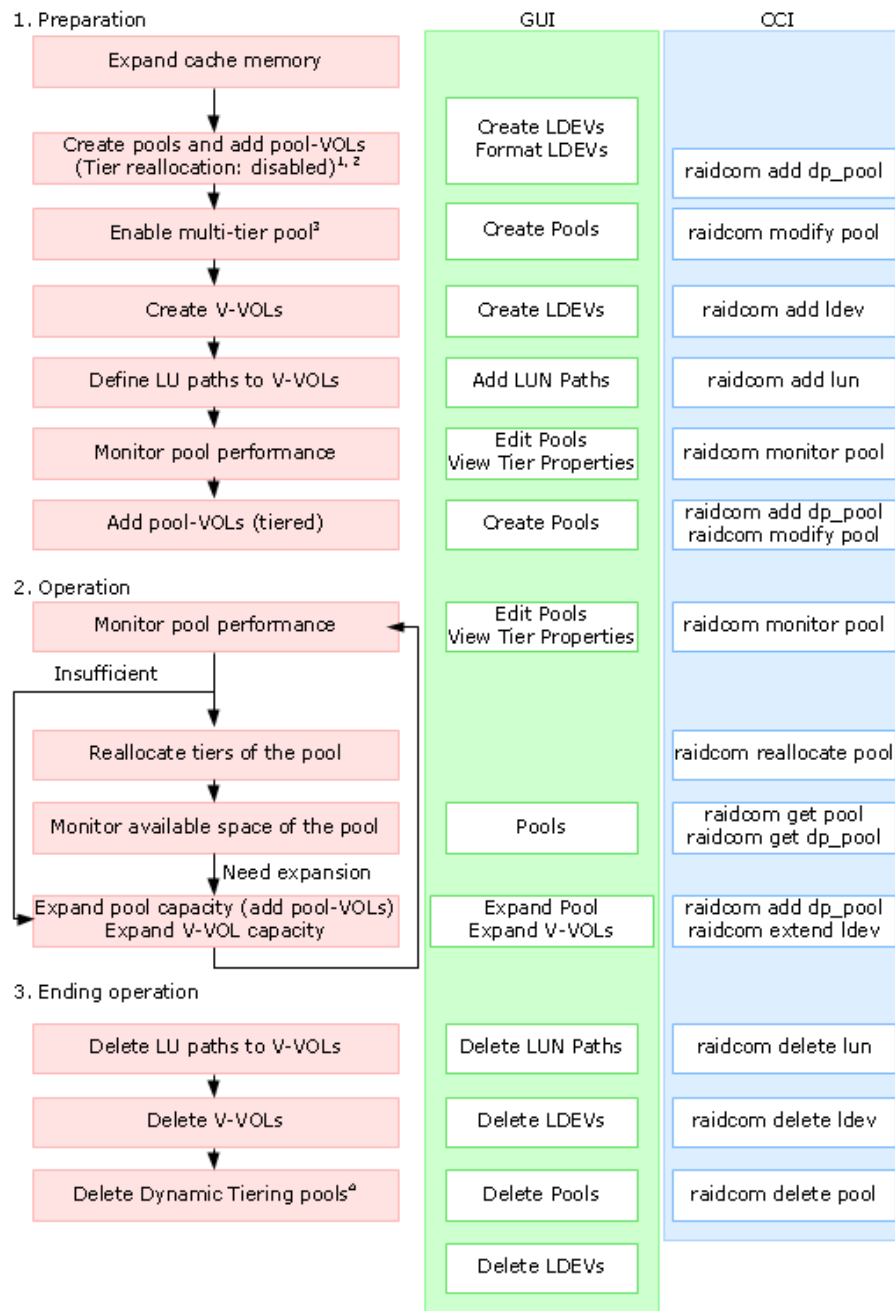
**Notes:**

1.  The multi-tier pool is disabled when a pool is created by CCI. Multiple media cannot be registered as a pool volume when a pool is created. Execute tiering after changing the multi-tier pool to the enabled status.

2.  If you use the GUI, you need to create a pool volume and format LDEVs before creating a pool. Perform this step from the Create LDEV wizard or the Format LDEVs wizard.

    In addition, if you create a pool using an external volume, you need to create a pool volume and format the LDEVs before performing this step.

3.  When the multi-tier pool is enabled, the tiering control is set to "Manual" automatically. To change the setting to "Auto", it is required to use.

4.  If you use Device Manager - Storage Navigator for this operation, you need to delete pool volumes after deleting a pool from the Delete LDEVs window.

📄 **Note:** Before creating a pool, it is required to create a virtual volume management area on the cache memory. The virtual volume management area is created automatically when cache memory is added. For information about adding cache memory, please contact customer support.

⚠️ **Caution:** The operations explained here are executable by the storage administrator only.

## Creating virtual volumes (Dynamic Tiering)

Use the following operations to create LDEVs of virtual volumes (Dynamic Tiering) and making the LDEVs available to the host.

**Table 4 Operations for VSP Fx00 models and VSP Gx00 models, G1x00, F1500, and VSP 5000 series**

| Step | Operation overview | Description | Executed command |
|------|---------------------|-------------|-------------------|
| 1 | Setting port | Make enabled the LUN security of port. Modify setting such as port topology and data transfer speed as needed. | raidcom modify port -port <port#> -security_switch y |
| 2 | Creating host group | Specify port and create host group. | raidcom add host_grp -port <port#> -host_grp_name <host group name> |
| 3 | Setting host mode | Specify port and set host mode for host group. | raidcom modify host_grp -port <port#> [<host group name>] -host_mode <host mode> [-host_mode_opt <host mode option> ... ] |

| Step | Operation overview | Description | Executed command |
|------|-------------------|-------------|------------------|
| 4 | Displaying host group information | Display host group information and confirm result of executing command. | raidcom get host_grp -port <port#> [<host group name>] |
| 5 | Adding host to host group | Register host to host group of the port. | raidcom add hba_wwn -port <port#> [<host group name>] -hba_wwn <WWN strings> |
| 6 | Displaying WWN information | Display WWN of connection host registered to the host group and confirm the result of executing the command. | raidcom get hba_wwn {-port <port#> [<host group name>]} |
| 7 | Creating LDEV | Specify a parity group and create LDEV. | raidcom add ldev {-parity_grp_id <gno-sgno> -ldev_id <ldev#> {-capacity <size> \| -offset_capacity <size> \| -cylinder <size>} [-emulation <emulation type>][-location <lba>] [-mp_blade_id <mp#>] |
| 8 | Formatting LDEV * | Format created LDEV. | raidcom initialize ldev -ldev_id <ldev#> -operation <type> |
| 9 | Creating LDEV nickname (arbitrary) | Create LDEV nickname.<br><br>This operation is arbitrary. | raidcom modify ldev -ldev_id <ldev#> -ldev_name <ldev naming> |
| 10 | Setting MP blade of LDEV | Set MP blade of created LDEV. | raidcom modify ldev -ldev_id <ldev#> -mp_blade_id <mp#> |
| 11 | Displaying LDEV information | Display information of created LDEV and confirm the result of executing the command. | raidcom get ldev -ldev_id <ldev#> … [-cnt <count>] [-key <keyword>] |
| 12 | Creating pool (for Dynamic Provisioning) | Create pool (for Dynamic Provisioning). | raidcom add dp_pool {{-pool_id <pool ID#> [-pool_name <pool naming>] \| -pool_name <pool naming> [-pool_id <pool ID#>]} \| -pool_id <pool ID#> -pool_name <pool naming>}} -ldev_id <ldev#> … [-cnt count>] [-user_threshold <%> ] |
| 13 | Setting pool option | Modify pool for Dynamic Provisioning to pool for Dynamic Tiering. | raidcom modify pool -pool {<pool ID#> \| <pool naming>} -pool_attribute dt_manual |

| Step | Operation overview | Description | Executed command |
|---|---|---|---|
| 14 | Adding different media to pool volume | Add a pool volume of different media to a pool for Dynamic Tiering. | raidcom add dp_pool {{-pool_id <pool ID#> [-pool_name <pool naming>] | -pool_name <pool naming> [-pool_id <pool ID#>]} | -pool_id <pool ID#> -pool_name <pool naming>} -ldev_id <ldev#> … [-cnt <count>] [ -user_threshold <threshold_1> [<threshold_2>] ] |
| 15 | Creating LDEV (V-VOL) | Specify pool and create LDEV (V-VOL). | raidcom add ldev -pool {<pool ID#> | <pool naming> | snap} -ldev_id <ldev#> -capacity <size> [-emulation <emulation type>][-location <lba>] [-mp_blade_id <mp#>] |
| 16 | Creating LDEV (V-VOL) nickname (arbitrary) | Create nickname for created LDEV (V-VOL). This operation is arbitrary. | raidcom modify ldev -ldev_id <ldev#> -ldev_name <ldev naming> |
| 17 | Setting MP blade of LDEV (V-VOL) | Set MP blade of created LDEV (V-VOL). | raidcom modify ldev -ldev_id <ldev#> -mp_blade_id <mp#> |
| 18 | Displaying LDEV (V-VOL) information | Display information of created LDEV (V-VOL) and confirm the result of executing the command. | raidcom get ldev -ldev_id <ldev#> … [-cnt <count>] [-key <keyword>] |
| 19 | Creating LU path | Specify port, map LDEV to LUN and create an LU path. | raidcom add lun -port <port#> [host group name] -ldev_id <ldev#> [-lun_id <lun#>] |
| 20 | Displaying LU path information | Display LU path information and confirm the result of executing the command. | raidcom get lun -port <port#> [<host group name>] |
| 21 | Starting performance monitoring of a pool for Dynamic Tiering | Start the performance monitoring of a pool for Dynamic Tiering. | raidcom monitor pool -pool {<pool ID#> | <pool naming>} -operation start |
| 22 | Stopping performance monitoring of a pool for Dynamic Tiering | Stop the performance monitoring of a pool for Dynamic Tiering. | raidcom monitor pool -pool {<pool ID#> | <pool naming>} -operation stop |

| Step | Operation overview | Description | Executed command |
|------|--------------------|-------------|------------------|
| 23 | Instructing reallocation of pool for Dynamic Tiering | Perform instruction of reallocation of pool for Dynamic Tiering. | raidcom reallocate pool -pool {<pool ID#> \| <pool naming>} -operation <type> |

* If the drive type code of the installed drive is NFHAx-QxxxSS (x is alphanumeric), formatting by the parity group format is recommended.

Execute the parity group format using the following command.

```
raidcom initialize parity_grp -parity_grp_id <gno-sgno> -operation <type>
```

You can check the drive type of the installed drive of the parity group using the following command: **raidcom get parity_grp**.

**Table 5 Operations for VSP E series and VSP G/F350, G/F370, G/F700, G/F900**

| Step | Operation overview | Description | Executed command |
|------|--------------------|-------------|------------------|
| 1 | Setting port | Make enabled the LUN security of port. Modify setting such as port topology and data transfer speed as needed. | raidcom modify port -port <port#> -security_switch y |
| 2 | Creating host group | Specify port and create host group. | raidcom add host_grp -port <port#> -host_grp_name <host group name> |
| 3 | Setting host mode | Specify port and set host mode for host group. | raidcom modify host_grp -port <port#> [<host group name>] -host_mode <host mode> [-host_mode_opt <host mode option> … ] |
| 4 | Displaying host group information | Display host group information and confirm result of executing command. | raidcom get host_grp -port <port#> [<host group name>] |
| 5 | Adding host to host group | Register host to host group of the port. | raidcom add hba_wwn -port <port#> [<host group name>] -hba_wwn <WWN strings> |
| 6 | Displaying WWN information | Display WWN of connection host registered to the host group and confirm the result of executing the command. | raidcom get hba_wwn {-port <port#> [<host group name>]} |

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| Step | Operation overview | Description | Executed command |
|---|---|---|---|
| 7 | Creating a pool for Dynamic Provisioning using parity groups* | Create pool for Dynamic Provisioning using parity groups. | raidcom add dp_pool {-pool_id <pool ID#> [-pool_name <pool naming>] \| -pool_name <pool naming> [-pool_id <pool ID#>] \| -pool_id <pool ID#> -pool_name <pool naming>} -parity_grp_id <gno-sgno> [-resource_id <resource group_id>][-user_threshold <%>] |
|  | Creating a pool for Dynamic Provisioning using an external volume group | Create an LDEV by specifying an external volume group. | raidcom add ldev -external_grp_id <gno-sgno> -ldev_id <ldev#> {-capacity <size> \| -offset_capacity<size> \| -cylinder <size>} [-emulation <emulation type>] [-location <lba>] [-mp_blade_id <mp#>] |
|  |  | Format the LDEV you created. | raidcom initialize ldev -ldev_id <ldev#> -operation <type> |
|  |  | (Optional) Create a nickname for the LDEV you created. | raidcom modify ldev -ldev_id <ldev#> -ldev_name <ldev naming> |
|  |  | Set the MP blade of the LDEV you created. | raidcom modify ldev -ldev_id <ldev#> -mp_blade_id <mp#> |
|  |  | Display the information of the LDEV you created to check the command execution result. | raidcom get ldev -ldev_id <ldev#> … [-cnt <count>] [-key <keyword>] |
|  |  | Create a pool. | raidcom add dp_pool {-pool_id <pool ID#> [-pool_name <pool naming>] \| -pool_name <pool naming> [-pool_id <pool ID#>] \| -pool_id <pool ID#> -pool_name <pool naming>} -ldev_id <ldev#> … [-cnt <count>][-user_threshold<threshold_1> [<threshold_2>]] |
| 8 | Setting pool option | Modify pool for Dynamic Provisioning to pool for Dynamic Tiering. | raidcom modify pool -pool {<pool ID#> \| <pool naming>} -pool_attribute dt_manual |

| Step | Operation overview | Description | Executed command |
|---|---|---|---|
| 9 | Adding different media to pool volumes using a parity group | Use a parity group to add a pool volume of different media to a pool for Dynamic Tiering. | raidcom add dp_pool {-pool_id <pool ID#> [-pool_name <pool naming>] \| -pool_name <pool naming> [-pool_id <pool ID#>] \| -pool_id <pool ID#> -pool_name <pool naming>} -parity_grp_id <gno-sgno> [-resource_id <resource group id>] |
| | Adding different media to pool volumes using an external volume group | Specify an external volume group to create an LDEV. | raidcom add ldev -external_grp_id <gno-sgno> -ldev_id <ldev#> {-capacity <size> \| -offset_capacity <size> \| -cylinder <size>} [-emulation <emulation type>] [-location <lba>] [-mp_blade_id <mp#>] |
| | | Format the LDEV you created. | raidcom initialize ldev -ldev_id <ldev#> -operation <type> |
| | | Create a nickname to the LDEV you created. This operation is optional. | raidcom modify ldev -ldev_id <ldev#> -ldev_name <ldev naming> |
| | | Set the MP blade of the LDEV you created. | raidcom modify ldev -ldev_id <ldev#> -mp_blade_id <mp#> |
| | | Display the information of the LDEV you created to check the execution result. | raidcom get ldev -ldev_id <ldev#> … [-cnt <count>] [-key <keyword>] |
| | | Add a pool volume. | raidcom add dp_pool {-pool_id <pool ID#> [-pool_name <pool naming>] \| -pool_name <pool naming> [-pool_id <pool ID#>] \| -pool_id <pool ID#> -pool_name <pool naming>} -ldev_id <ldev#> … [-cnt <count>]] |
| 10 | Creating LDEV (V-VOL) | Specify pool and create LDEV (V-VOL). | raidcom add ldev -pool {<pool ID#> \| <pool naming> \| snap} -ldev_id <ldev#> -capacity <size> [-emulation <emulation type>][-location <lba>] [-mp_blade_id <mp#>] |
| 11 | Creating LDEV (V-VOL) nickname (arbitrary) | Create nickname for created LDEV (V-VOL). This operation is arbitrary. | raidcom modify ldev -ldev_id <ldev#> -ldev_name <ldev naming> |
| 12 | Setting MP blade of LDEV (V-VOL) | Set MP blade of created LDEV (V-VOL). | raidcom modify ldev -ldev_id <ldev#> -mp_blade_id <mp#> |

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| Step | Operation overview | Description | Executed command |
|------|-------------------|-------------|------------------|
| 13 | Displaying LDEV (V-VOL) information | Display information of created LDEV (V-VOL) and confirm the result of executing the command. | raidcom get ldev -ldev_id <ldev#> … [-cnt <count>] [-key <keyword>] |
| 14 | Creating LU path | Specify port, map LDEV to LUN and create an LU path. | raidcom add lun -port <port#> [host group name] -ldev_id <ldev#> [-lun_id <lun#>] |
| 15 | Displaying LU path information | Display LU path information and confirm the result of executing the command. | raidcom get lun -port <port#> [<host group name>] |
| 16 | Starting performance monitoring of a pool for Dynamic Tiering | Start the performance monitoring of a pool for Dynamic Tiering. | raidcom monitor pool -pool {<pool ID#> | <pool naming>} -operation start |
| 17 | Stopping performance monitoring of a pool for Dynamic Tiering | Stop the performance monitoring of a pool for Dynamic Tiering. | raidcom monitor pool -pool {<pool ID#> | <pool naming>} -operation stop |
| 18 | Instructing reallocation of pool for Dynamic Tiering | Perform instruction of reallocation of pool for Dynamic Tiering. | raidcom reallocate pool -pool {<pool ID#> | <pool naming>} -operation <type> |

*To change the MP blade or MP unit of a pool volume, use the following command:

```
raidcom modify ldev -ldev_id <ldev#> -mp_blade_id <mp#>
```

## Script examples of virtual volume (Dynamic Tiering) operation

The following shows the script examples of virtual volume (Dynamic Tiering) operation.

**Script examples of virtual volume operation (Dynamic Tiering) for VSP Gx00 models, VSP Fx00 models, VSP G1x00, VSP F1500 or VSP 5000 series (1/3)**

```
raidcom -login USER01 PASS01              ;Log on with the user ID : USER01
                                          and ;password: PASS01.
raidcom lock resource -resource_grp_name  ;Lock the resource group:meta_resource.
meta_resource                             ;
                                          ;
raidcom modify port -port CL1-A -security ;Turn ON the security switch of PortCL1-A
_switch y                                 ;and PortCL2-A.
raidcom modify port -port CL2-A -security ;
_switch y                                 ;
                                          ;
raidcom add host_grp -port CL1-A-0 -      ;Set the host group #0, host group name: HP-
host_grp_name HP-UX-P                     ;UX-P to the PortCL1-A, and the host group
raidcom add host_grp -port CL2-A-0 -      ;#0, host group name: HP-UX-S to the
host_grp_name HP-UX-S                     ;PortCL2-A.
                                          ;
raidcom modify host_grp -port CL1-A-0 -   ;Set the host mode: HP-UX to the host group
host_mode HP-UX                           ;#0 of PortCL1-A and PortCL2-A.
raidcom modify host_grp -port CL2-A-0 -   ;
host_mode HP-UX                           ;
                                          ;
raidcom get host_grp -port CL1-A          ;Display the host group information that is
raidcom get host_grp -port CL2-A          ;set to the PortCL1-A and the PortCL2-A.
                                          ;
raidcom add hba_wwn -port CL1-A HP-UX-P - ;Set the connection host
hba_wwn 210000e0, 8b0256f8                ;WWN:210000e0, 8b0256f8 to the PortCL1-A,
raidcom add hba_wwn -port CL2-A HP-UX-S - ;host group HP-UX-P, and the connection host
hba_wwn 210000e0, 8b0256f9                ;WWN:210000e0, 8b0256f9 to the PortCL2-A,
                                          ;host group HP-UX-S.
                                          ;
raidcom get hba_wwn -port CL1-A HP-UX-P   ;Display the connection host WWN that is set
raidcom get hba_wwn -port CL2-A HP-UX-S   ;to the PortCL1-A, host group HP-UX-P, and
                                          ;the connection host WWN that is set to the
                                          ;PortCL2-A, host group HP-UX-S.
```

**Script examples of virtual volume operation (Dynamic Tiering) for VSP Gx00 models, VSP Fx00 models, VSP G1x00, VSP F1500 or VSP 5000 series (2/3)**

```
for /I %%i in (0,1,4) do (                          :Create 5 of 10G LDEV to Parity_grp_id 1-1
raidcom add ldev -ldev_id %%i -capacity 10g         :(LDEV:0 to 4) Low speed media
-parity_grp_id 1-1                                  :
)                                                   :
for /I %%i in (5,1,9) do (                           :Create 5 of 10G LDEV to Parity_grp_id 1-2
raidcom add ldev -ldev_id %%i -capacity 10g         :(LDEV: 5 to 9) High speed media
-parity_grp_id 1-2                                  :
)                                                   :
raidcom get command_status                          :
raidcom reset command_status                        :
                                                    :
for /I %%i in (0,1,9) do (                           :
raidcom initialize ldev -ldev_id %%i -operation     :LDEV: Execute Quick format to 0 to 9
qfmt                                                :
)                                                   :
raidcom get command_status                          :
raidcom reset command_status                        :
                                                    :
for /I %%i in (0,1,9) do (                           :Give an nickname to LDEV: 0 to 9
raidcom modify ldev -ldev_id %%i -device_name       :(my_volume 0 ot 9)
my_volume_%%i                                       :
)                                                   :
                                                    :
for /I %%i in (0,1,9) do (                           :Set to 2 the LDEV owner MP blade of LDEV:
raidcom modify ldev -ldev_id %%i -mp_blade_id 2     :0 to 9
)                                                   :
raidcom get ldev -ldev_id 0 -cnt 10                 :Display the information of LDEV: 0 to 9
                                                    :(Internal VOL)
raidcom add dp_pool -pool_id 1 -ldev_id 0 -cnt 5    :Use LDEV: 0 to 4, then create pool:1
raidcom get command_status                          :
raidcom reset command_status                        :
                                                    :
raidcom modify pool -pool 1 -pool_attribute         :
dt_manual                                           :Change the setting of pool:1,
                                                    :from Dynamic Provisioning pool to
raidcom add dp_pool -pool_id 1 -ldev_id 5 -cnt      :Dynamic Tiering pool.
5                                                   :
for /I %%i in (10,1,19) do (                         :Add a pool volume of different  media to
raidcom add ldev -ldev_id %%i -capacity 10g -       : pool:1 (LDEV: 5 to 9)
pool 1                                              :
)                                                   :Create each 10 of 10G VVOL to Pool_id 1
for /I %%i in (20,1,29) do (                         :(LDEV:10 to 19, 20 to 29)
raidcom add ldev -ldev_id %%i -capacity 10g -       :
pool 1                                              :
)                                                   :
raidcom get command_status                          :
raidcom reset command_status                        :
                                                    :
for /I %%i in (10,1,29) do (                         :Give a nickname to VVOL: 10 to 29
raidcom modify ldev -ldev_id %%i -device_name       :(my_virtual_volume 10 to 29)
my_virtual_volume_%%i                               :
)                                                   :
                                                    :
for /I %%i in (10,1,29) do (                         :Set to 2 the VVOL owner MP blade of
raidcom modify ldev -ldev_id %%i -mp_blade_id 2     :VVOL:10 to 29
)                                                   :
```

## Script examples of virtual volume operation (Dynamic Tiering) for VSP Gx00 models, VSP Fx00 models, VSP G1x00, VSP F1500 or VSP 5000 series (3/3)

```
raidcom get ldev -ldev_id 10 -cnt 20            ;Display the information of VVOL:10 to
                                                ;29(virtual VOL)
for /l %%i in (10,1,19) do (                    ;
raidcom add device_grp -device_grp_name grp1    ;Give the device name: data0 to 19 to VVOL:
data%%i -ldev_id %%i                            ;10 to 29, and add it to Device group name
)                                               ;grp1(data0 to 9) and grp2(data10 to 19).
for /l %%i in (20,1,29) do (                     ;
raidcom add device_grp -device_grp_name grp2    ;
data%%i -ldev_id %%i                            ;
)                                               ;
raidcom get command_status                      ;
raidcom reset command_status                    ;
                                                ;
raidcom get device_grp -device_grp_name grp1    ;Display the device group information: grp1
raidcom get device_grp -device_grp_name grp2    ;and grp2.
                                                ;
raidcom add copy_grp -copy_grp_name ora grp1    ;Create a copy group (ora) at the device
grp2                                            ;group (grp1 and grp2).
                                                ;
raidcom get command_status                      ;
raidcom reset command_status                    ;
                                                ;
raidcom get copy_grp                            ;Display the copy group information.
                                                ;
for /l %%i in (10,1,19) do (                     ;Execute the path definition of VVOL:10 to
raidcom add lun -port CL1-A HP-UX-P -ldev_id    ;19 to Port CL1-A host group HP-UX-P.
%%i                                             ;Execute the path definition of VVOL:20 to
)                                               ;29 to Port CL2-A host group HP-UX-S.
for /l %%i in (20,1,29) do (                     ;Give an LU number automatically.
raidcom add lun -port CL2-A HP-UX-S -ldev_id    ;
%%i                                             ;
)                                               ;
                                                ;Display the path information that is set to
raidcom get lun -port CL1-A HP-UX-P             ;PortCL1-A, host group HP-UX-P, and
raidcom get lun -port CL2-A HP-UX-S             ;the path information that is set to
                                                ;PortCL2-A, host group HP-UX-S.
                                                ;
raidcom unlock resource -resource_grp_name      ;Unlock the resource group:meta_resource.
meta_resource                                   ;
                                                ;
raidcom get resource                            ;Display the resource group information.
                                                ;
raidcom monitor pool -pool 1 -operation start   ;
                                                ;Start monitoring of Pool:1
raidcom monitor pool -pool 1 -operation stop    ;Stop monitoring of Pool:1
                                                ;
raidcom reallocate pool -pool 1 -operation      ;Start reallocation processing of Pool:1
start                                           ;
                                                ;
raidcom -logout                                 ;Log out
```

## Script examples of virtual volume operation (Dynamic Tiering) for VSP E series and VSP G/F350, G/F370, G/F700, G/F900 (1/3)

```
raidcom -login USER01 PASS01              ;Log in with the user ID: USER01 and the
                                          ;password: PASS01.
raidcom lock resource -resource_grp_name  ;Lock the resource group: meta_resource.
meta_resource                             ;
                                          ;
raidcom modify port -port CL1-A -security ;Turn on the security switch of PortCL1-A
_switch y                                 ;and PortCL2-A.
raidcom modify port -port CL2-A -security ;
_switch y                                 ;
                                          ;
raidcom add host_grp -port CL1-A-0 -      ;Set host group 0, host group name:
host_grp_name HP-UX-P                     ;HP-UX-P to PortCL1-A.
raidcom add host_grp -port CL2-A-0 -      ;Set host group 0, the host group name:
host_grp_name HP-UX-S                     ;HP-UX-S to PortCL2-A.
                                          ;
raidcom modify host_grp -port CL1-A-0 -   ;Set the host mode: HP-UX to host group 0 of
host_mode HP-UX                           ;PortCL1-A and PortCL2-A.
raidcom modify host_grp -port CL2-A-0 -   ;
host_mode HP-UX                           ;
                                          ;
raidcom get host_grp -port CL1-A          ;Display host group information set for
raidcom get host_grp -port CL2-A          ;PortCL1-A and PortCL2-A.
                                          ;
raidcom add hba_wwn -port CL1-A HP-UX-P - ;Set the connection host WWN: 210000e0,8b0256f8
hba_wwn 210000e0,8b0256f8                 ;to PortCL1-A, host group: HP-UX-P, and the
raidcom add hba_wwn -port CL2-A HP-UX-S - ;connection host WWN: 210000e0,8b0256f9 to
hba_wwn 210000e0,8b0256f9                 ;PortCL2-A, host group: HP-UX-S.
                                          ;
raidcom get hba_wwn -port CL1-A HP-UX-P   ;Display the connection host WWN PortCL2-A
raidcom get hba_wwn -port CL2-A HP-UX-S   ;set for PortCL1-A, host group: HP-UX-P, and
                                          ;the connection host WWN set for PortCL2-A,
                                          ;host group: HP-UX-S.
```

## Script examples of virtual volume operation (Dynamic Tiering) for VSP E series and VSP G/F350, G/F370, G/F700, G/F900 (2/3)

```
raidcom add dp_pool -pool_id 1 -parity_grp_id 1- ;Create an LDEV for resource group ID 0
1 -resource_id 0                                 ;using parity_grp_id 1-1 (high-speed media)
raidcom get command_status                       ;to create pool 1.
raidcom reset command_status                     ;
                                                 ;
raidcom modify pool -pool 1 -pool_attribute      ;Change pool 1 (DP-pool) to a Dynamic
dt_manual                                        ;Tiering pool.
                                                 ;
raidcom add dp_pool -pool_id 1 -parity_grp_id 1-2 ;Add a pool volume in a different media to
raidcom get command_status                       ;pool 1 using parity_grp_id 1-2
raidcom reset command_status                     ;(low-speed media).

for /l %%i in (10,1,19) do (                     ;In pool 1, create 10 V-VOLs of 10G.
raidcom add ldev -ldev_id %%i -capacity 10g -    ;(LDEV: 10 to 19, 20 to 29)
pool_id 1                                        ;
)                                                ;
for /l %%i in (20,1,29) do (                     ;
raidcom add ldev -ldev_id %%i -capacity 10g -    ;
pool_id 1                                        ;
)                                                ;
raidcom get command_status                       ;
raidcom reset command_status                     ;
                                                 ;
for /l %%i in (10,1,29) do (                     ;Assign a nickname to V-VOLs 10 to 29
raidcom modify ldev -ldev_id %%i -device_name    ;(my_virtual_volume 10 to 29)
my_virtual_volume_%%i                            ;
)                                                ;
                                                 ;
for /l %%i in (10,1,29) do (                     ;Set the MP blade ID for V-VOLs 10 to 29
raidcom modify ldev -ldev_id %%i -mp_blade_id 2  ;to 2.
)                                                ;
```

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**Script examples of virtual volume operation (Dynamic Tiering) for VSP E series and VSP G/F350, G/F370, G/F700, G/F900 (3/3)**

```
raidcom get ldev -ldev_id 10 -cnt 20          ;Display information of V-VOLs 10 to 29
                                              ;
for /l %%i in (10,1,19) do (                  ;Assign device names data0 to 19 to V-VOLs
raidcom add device_grp -device_grp_name grp1  ;10 to 29, and add them to device group
data%%i -ldev_id %%i                          ;names, grp1 (data0 to 9) and grp2 (data10
)                                             ;to 19).
for /l %%i in (20,1,29) do (                  ;
raidcom add device_grp -device_grp_name grp2  ;
data%%i -ldev_id %%i                          ;
)                                             ;
raidcom get command_status                    ;
raidcom reset command_status                  ;
                                              ;
raidcom get device_grp -device_grp_name grp1  ;Display information of device groups grp1
raidcom get device_grp -device_grp_name grp2  ;and grp2.
                                              ;
raidcom add copy_grp -copy_grp_name ora grp1  ;Use device groups (grp1, grp2) to create a
grp2                                          ;copy group (ora).
                                              ;
                                              ;
raidcom get command_status                    ;
raidcom reset command_status                  ;
                                              ;
raidcom get copy_grp                          ;
                                              ;
for /l %%i in (10,1,19) do (                  ;Display copy group information.
raidcom add lun -port CL1-A HP-UX-P -ldev_id %%i  ;Define paths of V-VOLs 10 to 19 for port:
)                                             ;CL1-A, host group: HP-UX-P.
for /l %%i in (20,1,29) do (                  ;Define paths of V-VOLs 20 to 29 for port:
raidcom add lun -port CL2-A HP-UX-S -ldev_id %%i  ;CL2-A, host group: HP-UX-S.
)                                             ;LU numbers are assigned automatically.
                                              ;
raidcom get lun -port CL1-A HP-UX-P           ;Display path information set for
raidcom get lun -port CL2-A HP-UX-S           ;PortCL1-A, host group: HP-UX-P, and for
                                              ;PortCL2-A, host group: HP-UX-S.
raidcom unlock resource -resource_grp_name    ;Unlock resource group: meta_resource.
meta_resource                                 ;
                                              ;
raidcom get resource                          ;Display the resource group and resource
                                              ;lock information.
raidcom monitor pool -pool 1 -operation start ;Start monitoring pool 1.
                                              ;
raidcom monitor pool -pool 1 -operation stop  ;Stop monitoring pool 1.
                                              ;
raidcom reallocate pool -pool 1 -operation start  ;Start reallocating pool 1.
                                              ;
raidcom -logout                               ;Log out.
```

# Configuring iSCSI virtual ports

You can use CCI to enable and disable the iSCSI virtual port mode and set and delete virtual port numbers for iSCSI ports.

## Setting an iSCSI virtual port

The following procedure describes how to enable the virtual port mode for the iSCSI port (CL4-E) and then set the virtual port number (15) and IPv4 address for the port.

**Procedure**

1. Check the current status of the iSCSI port (CL4-E).

```
# raidcom get port -port CL4-E -key opt
PORT : CL4-E
TCP_OPT : IPV6_D : SACK_E : DACK_E : INS_D : VTAG_D
:
IPV4_ADDR : 192.168.0.181
IPV4_SMSK : 255.255.255.0
:
VLAN_ID : -
ISCSI_VP_MODE : D
```

2. Enable the virtual port mode for the iSCSI port (CL4-E).

```
# raidcom modify port -port CL4-E -iscsi_virtual_port_mode enable
```

3. Set the virtual port number (15) and IPv4 address (192.168.4.100) for the iSCSI port (CL4-E).

```
# raidcom modify port -port CL4-E -add_iscsi_virtual_port 15 -ipv6_mode disable -
ipv4_address 192.168.4.100 -ipv4_subnetmask 255.255.255.0
```

4. Confirm that the virtual port mode is enabled ( ISCSI_VP_MODE : E) , then make sure that the information for the virtual port number (15) is set correctly.

```
# raidcom get port -port CL4-E -key opt
PORT : CL4-E
TCP_OPT : IPV6_D : SACK_E : DACK_E : INS_D : VTAG_D
:
IPV4_ADDR : 192.168.0.181
IPV4_SMSK : 255.255.255.0
:
ISCSI_VP_MODE : E
ISCSI_VP_ID : 0 15
```

5. Confirm that the IPv4 address (192.168.4.100) is set for the virtual port.

```
# raidcom get port -port CL4-E -key opt -iscsi_virtual_port_id 15
PORT : CL4-E
ISCSI_VP_ID : 15
TCP_OPT : IPV6_D : SACK_E : DACK_E : INS_D : VTAG_D
:
IPV4_ADDR : 192.168.4.100
IPV4_SMSK : 255.255.255.0
```

## Deleting an iSCSI virtual port

The following procedure describes how to delete the virtual port number (15) and then disable the virtual port mode for the iSCSI port (CL4-E).

**Procedure**

1. Check the current status of the iSCSI port (CL4-E).

```
#raidcom get port -port CL4-E -key opt
PORT : CL4-E
TCP_OPT : IPV6_D : SACK_E : DACK_E : INS_D : VTAG_D
:
ISCSI_VP_MODE : E
ISCSI_VP_ID : 0 15
```

2. Delete the virtual port number (15) set for the iSCSI port (CL4-E).

```
# raidcom modify port -port CL4-E -delete_iscsi_virtual_port 15
```

3. Confirm that the virtual port number (15) is deleted.

```
# raidcom get port -port CL4-E -key opt
PORT : CL4-E
TCP_OPT : IPV6_D : SACK_E : DACK_E : INS_D : VTAG_D
:
IPV4_ADDR : 192.168.0.181
IPV4_SMSK : 255.255.255.0
:
ISCSI_VP_MODE : E
ISCSI_VP_ID : 0
```

4. Disable the virtual port mode for the iSCSI port (CL4-E).

```
# raidcom modify port -port CL4-E -iscsi_virtual_port_mode disable
```

5. Confirm that the virtual port mode is disabled ( ISCSI_VP_MODE : D).

```
# raidcom get port -port CL4-E -key opt
TCP_OPT : IPV6_D : SACK_E : DACK_E : INS_D : VTAG_D
:
IPV4_ADDR : 192.168.0.181
IPV4_SMSK : 255.255.255.0
:
ISCSI_VP_MODE : D
```

# Using Storage Advisor Embedded servers

CCI provides operations for registering host groups or iSCSI targets created by using CCI or HDvM - SN on the Storage Advisor Embedded server, and for deleting them from the server.

In the following procedure, server3 is the server nickname, 2 is the server ID, and CL4-E-1 is the host group name.

After registering the host group or iSCSI target on the Storage Advisor Embedded server, use Storage Advisor Embedded to perform operations and detailed settings of the server.

# Registering host groups or iSCSI targets on the Storage Advisor Embedded server

See the following steps for registering host groups or iSCSI targets on the Storage Advisor Embedded server.

**Procedure**

1. Check the current setting statuses of the server.

```
#raidcom get server
SRVID NAME
0 "server0"
1 "server1"
155 "server2"
```

2. If there is no Storage Advisor Embedded server on which you want to register the host group or iSCSI target, create the server. For the server you create in this procedure, the protocol, OS type, and OS type options are not set. They are set automatically when you register the first host group or iSCSI target on the server. For the -request_id option, specify the request ID (REQID) displayed by the **raidcom add server** command.

```
#raidcom add server -server_name server3
REQID : 0
#raidcom get command_status -request_id 0
REQID R SSB1 SSB2 Serial# ID Description
00000000 - - - 400001 2 -
#raidcom reset command_status -request_id 0
```

3. If you created the server in step 2, make sure that the server is created correctly.

```
#raidcom get server
SRVID NAME
0 "server0"
1 "server1"
2 "server3"
155 "server2"
```

4. Check the host group to be registered on the server.

```
# raidcom get host_grp -port CL4-A
PORT GID GROUP_NAME Serial# HMD HMO_BITs
CL4-E 0 Linux_x86 63528 LINUX／IRIX 2 13
CL4-E 1 Solaris 63528 SOLARIS 2 22
CL4-E 2 HP-UX 63528 HP-UX 40
```

5. Register the host group on the server. The protocol, OS type, and OS type options are set on the server automatically. For the -request_id option, specify the request ID ( REQID) displayed by the **raidcom modify server** command.

```
# raidcom modify server -server_name server3 -request_id auto -
server_operation add_host_grp -port CL4-E-1
```

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```
REQID : 0
#raidcom get command_status -request_id 0
REQID R SSB1 SSB2 Serial# ID Description
00000000 - - - 400001 2 -
#raidcom reset command_status -request_id 0
```

6. Make sure that the host group was registered on the server. If it is registered correctly, 2 is displayed for SRVID of CL4-E-1.

```
# raidcom get host_grp -port CL4-E -key server
PORT GID GROUP_NAME Serial# SRVID
CL4-E 0 Linux_x86 400001 N
CL4-E 1 Solaris 400001 2
CL4-E 2 HP-UX 400001 N
```

7. Check the protocol, OS type, and OS type options of the server.

```
#raidcom get server -key opt -server_name server3
SRVID : 2
NAME : "server3"
STS : DGG
PROTOCOL : FIBRE
OS : SOLALIS
OS_OPT : 2 22
```

# Deleting host groups or iSCSI targets from the Storage Advisor Embedded server

See the following steps for deleting host groups or iSCSI targets on the Storage Advisor Embedded server.

**Procedure**

1. Check the current setting statuses of the server.

```
#raidcom get server
SRVID NAME
0 "server0"
1 "server1"
2 "server3"
155 "server2"
```

2. Check the host group registered on the server.

```
#raidcom get host_grp -allports -key server | rmawk @5-eq:2
CL4-E    1    Solaris    63528    2
```

3. Delete the host group from the server. For the -request_id option, specify the request ID (REQID) displayed by the **raidcom modify server** command.

```
# raidcom modify server -server_name server3 -request_id auto -
server_operation delete_host_grp -port CL4-E-1
REQID : 0
#raidcom get command_status -request_id 0
REQID R SSB1 SSB2 Serial# ID Description
00000000 - - - 400001 2 -
#raidcom reset command_status -request_id 0
```

4. Make sure that the host group is deleted from the server. If it is deleted correctly, N is displayed for SRVID of CL4-E-1.

```
# raidcom get host_grp -port CL4-E -key server
PORT GID GROUP_NAME Serial# SRVID
CL4-E 0 Linux_x86 400001 N
CL4-E 1 Solaris 400001 N
CL4-E 2 HP-UX 400001 N
```

5. If the server is not needed, delete the server. For the -request_id option, specify the request ID (REQID) displayed by the **raidcom delete server** command.

```
#raidcom delete server -server_name server3
REQID : 0
#raidcom get command_status -request_id 0
REQID R SSB1 SSB2 Serial# ID Description
00000000 - - - 400001 2 -
#raidcom reset command_status -request_id 0
```

6. Confirm that the server is deleted.

```
#raidcom get server
SRVID NAME
0 "server0"
1 "server1"
155 "server2"
```

# External volume operations

## Creating external volumes (Fibre Channel)

Use the following provisioning operations to create LDEVs of external volumes and make the LDEVs available from the host.

| Step | Operation overview | Description | Executed command |
|------|--------------------|-------------|------------------|
| 1 | Setting port attribute of local storage system | Set port attribute of local storage system to<br><br>External (ELUN) port | ```raidcom modify port -port<br>  <port#> -port_attribute<br>  ELUN``` |
| 2 | Searching external storage | Display port information on the external storage connected to the External port.<br><br>For the following DKCMAIN program version, execute the command in the right column with the `-safety_check enable` option when the local storage system port is a Fiber Channel bidirectional port.<br><br>VSP 5000 series: 90-06-01-XX or later<br><br>VSP E series: 93-04-01-x0 or later<br><br>VSP G130, G/F350, G/F370, G/F700, G/F900: 88-08-01-x0<br><br>VSP G200, G400, G600, G800, and VSP F400, F600, F800: 83-05-40-x0 or later and 83-06-12-x0 or later<br><br>"Unknown" is displayed for VENDOR_ID and PRODUCT_ID of the external storage port you want to connect to, when the information acquisition has been suppressed to prevent the troubles shown in the Note below this table. | ```raidcom discover<br>  external_storage<br>  -port <port#> [-safety_check<br>enable] [-discovery_external_wwn<br><wwn strings>]``` |

| Step | Operation overview | Description | Executed command |
|------|--------------------|-------------|------------------|
| | | Follow the steps below.<br><br>▪ If you use the Hitachi external storage system:<br><br>After confirming that there is no temporary performance degradation, execute the command in the right column with specifying the `-discovery_external_wwn` option for the WWN that you want to connect to, without specifying the `-safety_check enable` option.<br><br>Alternatively, use a route that is not used as the external (Hitachi storage system connects to the local storage system as an external storage system) or remote path.<br><br>▪ If you use the non-Hitachi external storage system:<br><br>Use a route that is not used as the I/O path from the third party external storage system to the local storage system. | |
| 3 | Searching external volume | Display a list of external volumes that can be mapped from External port.<br><br>If the local storage system port is a Fiber Channel bidirectional port, be sure to perform step 2. If you performed step 2, you do not need to specify the `-safety_check enable` option in the command in the right column. | ```raidcom discover lun -port <port#> -external_wwn <wwn strings>[-safety_check enable]``` |
| 4 | Creating external volume | Create external volume. | ```raidcom add ldev - external_grp_id <gno-sgno> -ldev_id <ldev#> -capacity <size> [-emulation <emulation type>][-location <lba>]``` |

| Step | Operation overview | Description | Executed command |
|---|---|---|---|
| | | If the local storage system port is a Fiber Channel bidirectional port, be sure to perform step 2. If you performed step 2, you do not need to specify the `-safety_check enable` option in the command in the right column. | `[-mp_blade_id <mp#>][-safety_check enable]` |
| 5 | Modifying external volume option | Modify external volume option (cache mode, inflow mode, and MP blade setting). | `raidcom modify external_grp -external_grp_id <gno-sgno> {-cache_mode < y|n > | -cache_inflow < y|n > | -mp_blade_id <mp#>}` |
| 6 | Checking external volume information | Display external volume information and confirm result of executing command. | `raidcom get external_grp [-external_grp_id <gno-sgno>]` |
| 7 | Setting external path | Set external path. Execute the required number of commands.<br><br>If the local storage system port is a Fiber Channel bidirectional port, be sure to perform step 2. If you performed step 2, you do not need to specify the `-safety_check enable` option in the command in the right column. | `raidcom add path -path_grp <path group#> -port <port#> -external_wwn <wwn strings>[-safety_check enable]` |
| 8 | Displaying external path information | Display external path information for and confirm the result of executing the command. | `raidcom get path [-path_grp <path group#>]` |
| 9 | Setting port of external storage system | Make enabled the LUN security of port. Modify setting such as port topology and data transfer speed as needed. | `raidcom modify port -port <port#> -security_switch y` |
| 10 | Creating host group | Specify port, map LDEV to LUN and create an LU path. | `raidcom add host_grp -port <port#> -host_grp_name <host group name>` |
| 11 | Setting host mode and host mode option | Specify port and set host mode and host mode option for host group. | `raidcom modify host_grp -port <port#> [<host group` |

| Step | Operation overview | Description | Executed command |
|------|--------------------|-------------|------------------|
| | | | ```
name>] -host_mode
<host mode>
[-host_mode_opt
<host mode option> … ]
``` |
| 12 | Displaying host group information | Display host group information and confirm result of executing command. | ```
raidcom get host_grp
 -port <port#> [<host group
name>]
``` |
| 13 | Adding host to host group | Register host to host group of the port. | ```
raidcom add hba_wwn
 -port <port#> [<host group
name>] -hba_wwn
<WWN strings>
``` |
| 14 | Displaying WWN information | Display WWN of connection host registered to the host group and confirm the result of executing the command. | ```
raidcom get hba_wwn
 -port <port#> [<host group
name>]
``` |
| 15 | Creating LDEV | Specify external volume group and create LDEV. | ```
raidcom add ldev
 - external_grp_id
<gno-sgno> -ldev_id
<ldev#> {-capacity <size>
| -offset_capacity <size>
| -cylinder <size>}
[-emulation <emulation
type>][-location <lba>]
[-mp_blade_id <mp#>]
``` |
| 16 | Creating LDEV nickname (arbitrary) | Create nickname of created LDEV.<br><br>This operation is arbitrary. | ```
raidcom modify ldev
 -ldev_id <ldev#>
 -ldev_name <ldev naming>
``` |
| 17 | Setting MP blade of LDEV | Set MP blade of created LDEV. | ```
raidcom modify ldev
 -ldev_id <ldev#>
 -mp_blade_id <mp#>
``` |
| 18 | Displaying LDEV information | Display information of created LDEV and confirm the result of executing the command. | ```
raidcom get ldev -ldev_id
 <ldev#> … [-cnt <count>]
 [-key <keyword>]
``` |

| Step | Operation overview | Description | Executed command |
|---|---|---|---|
| 19 | Creating LU path | Specify port, map LDEV to LUN and create an LU path. | `raidcom add lun -port`<br>`  <port#>`<br>`  [<host group name>]`<br>`  -ldev_id <ldev#>`<br>`  [-lun_id<lun#>]` |
| 20 | Displaying LU path information | Display LU path information and confirm the result of executing the command. | `raidcom get lun -port`<br>`  <port#>`<br>`  [<host group name>]` |

📄 **Note:** When the `-safety_check enable` option is specified, the processing that might cause the following troubles is suppressed.

- If the external storage system is made by Hitachi:

  An external or remote path connection that uses the route between the specified local storage system port and the external storage system port might be temporarily disconnected (the external or remote path will be reconnected immediately and no blockage occurs). This might temporarily degrade the host I/O performance or remote copy performance for external volumes.

- If the external storage system is made by third party:

  The I/O path from the external storage system to the local storage system that uses the route between the specified local storage system port and the external storage system port might be disconnected.

## Creating external volumes (iSCSI)

Use the following provisioning operations to create LDEVs of external volumes using iSCSI and make the LDEVs available from the host.

| Step | Operation overview | Description | Executed command |
|---|---|---|---|
| 1 | Setting the port attribute of the local storage system | Set the port attribute of the local storage system to the External (ELUN) port. | `raidcom modify port -port`<br>`  <port#> -port_attribute ELUN` |

| Step | Operation overview | Description | Executed command |
|---|---|---|---|
| 2 | Searching the iSCSI target of an external storage system | Display information about the iSCSI target of the external storage system that has the specified IP address and is connected to the External (ELUN) port. | `raidcom discover`<br>`  external_iscsi_name`<br>`  -port <port#>`<br>`  -address <external IP address>` |
| 3 | Registering the iSCSI name of the iSCSI target for an external storage system | Register the iSCSI target to connect as an external storage system.* | `raidcom add external_iscsi_name`<br>`  -port <port#>`<br>`  -iscsi_name <external iscsi name>`<br>`  -address <external IP address>` |
| 4 | Setting CHAP authentication information for connecting to the iSCSI target of an external storage system | When CHAP authentication is used for connection to external storage systems, set the CHAP user name and a password (secret) used by the iSCSI target of an external storage system for authenticating the External (ELUN) port of the local storage system. | `raidcom modify initiator_chap_user`<br>`  -port <port#>`<br>`  [-chap_user <username> ]`<br>`  [-secret]` |
| 5 | Setting CHAP authentication information for connecting to the iSCSI target of an external storage system (for CHAP two-way authentication) | When CHAP authentication is used for connection to external storage systems, set the CHAP user name and a password (secret) used by the External (ELUN) port of the local storage system for authenticating the iSCSI target of an external storage system. | `raidcom modify external_chap_user`<br>`  -port <port#>`<br>`  -iscsi_name <external iscsi name>`<br>`  -address <external IP address>`<br>`  [-chap_user <user name> ]`<br>`  [-secret]` |
| 6 | Testing login to the iSCSI target | Attempt to log in to the iSCSI target of the external storage system registered in the local storage system, and display the result.* | `raidcom check external_iscsi_name`<br>`  [-port <port#>]` |
| 7 | Searching external storage systems | Display information of the port on the external storage system connected to the External (ELUN) port. | `raidcom discover external_storage`<br>`  -port <port#>` |
| 8 | Searching external volumes | List the external volumes that can be mapped from the External (ELUN) port. | `raidcom discover lun -port <port#>`<br>`  -external_iscsi_name <external` |

| Step | Operation overview | Description | Executed command |
|------|--------------------|-------------|------------------|
| | | | `iscsi name>`<br>`  -external_address  <IP address>` |
| 9 | Mapping external volume groups | Map the volume in the external storage system to the external volume group. | `raidcom add external_grp`<br>`  -path_grp <path group#>`<br>`  -external_grp_id <gno-sgno>`<br>`  -port <port#>`<br>`  -external_iscsi_name`<br>`<externaliscsi name>`<br>`  -external_address <IP address>`<br>`  -lun_id <lun#>`<br>`  [-emulation <emulation type>]`<br>`  [-clpr <clpr#>]`<br>`  [-external_attribute migration]`<br>`  [-data_direct_mapping enable]` |
| 10 | Creating external volumes | Create an external volume. | `raidcom add ldev`<br>`  -external_grp_id <gno-sgno>`<br>`  -ldev_id <ldev#>`<br>`  -capacity <size>`<br>`  [-emulation <emulation type>]`<br>`  [-location <lba>]`<br>`  [-mp_blade_id <mp#>]` |
| 11 | Modifying external volume options | Modify external volume options (cache mode, inflow mode, and MP blade settings). | `raidcom modify external_grp`<br>`  -external_grp_id <gno-sgno>`<br>`  {-cache_mode { y|n } |`<br>`  -cache_inflow {y|n } |`<br>`  -mp_blade_id <mp#>}` |
| 12 | Checking external volume information | Display external volume information and confirm the result of executing the command. | `raidcom get external_grp`<br>`  [-external_grp_id <gno-sgno>]` |
| 13 | Setting external path | Set external path. Execute the required number of commands. | `raidcom add path`<br>`  -path_grp <path group#>`<br>`  -port <port#>`<br>`  -external_iscsi_name <external`<br>`iscsi name>`<br>`  -external_address <IP address>` |
| 14 | Displaying external path information | Display external path information and confirm the result of executing the command. | `raidcom get path`<br>`  [-path_grp <path group#>]` |

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| Step | Operation overview | Description | Executed command |
|---|---|---|---|
| 15 | Setting the local storage system port | Enable LUN security settings of the port.<br><br>Change the IP address or the MTU size of the port if necessary. | `raidcom modify port`<br>`  -port <port#>`<br>`  -security_switch y` |
| 16 | Creating host groups | Specify the port to create a host group (iSCSI target). | `raidcom add host_grp`<br>`  -port <port#>`<br>`  -host_grp_name <host group name>`<br>`  [-iscsi_name <target iscsi name>]` |
| 17 | Setting the host mode and host mode option | Specify the port to set the host mode and host mode option for the host group. | `raidcom modify host_grp`<br>`  -port <port#>`<br>`  [<host group name>]`<br>`  -host_mode < host mode>`<br>`  [-host_mode_opt <host mode option> … ]` |
| 18 | Displaying host group information | Display host group information and confirm the result of executing the command. | `raidcom get host_grp`<br>`  -port <port#>`<br>`  [<host group name>]` |
| 19 | Adding a host to a host group | Register the host to the host group of the port. | `raidcom add hba_iscsi`<br>`  -port <port#>`<br>`  [<host group name>]`<br>`  -hba_iscsi_name <initiator iscsi name>` |
| 20 | Displaying iSCSI name information | Display the iSCSI name of the connected host registered in the host group, and confirm the result of executing the command. | `raidcom get hba_iscsi`<br>`  -port <port#>`<br>`  [<host group name>]` |
| 21 | Creating LDEVs | Specify the external volume group to create an LDEV. | `raidcom add ldev`<br>`  -external_grp_id <gno-sgno>`<br>`  -ldev_id <ldev#>`<br>`  {-capacity <size> |`<br>`  -offset_capacity <size> |`<br>`  -cylinder <size>}`<br>`  [-emulation <emulation type>]` |

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| Step | Operation overview | Description | Executed command |
|---|---|---|---|
| | | | ```[-location <lba>] [-mp_blade_id <mp#>]``` |
| 22 | Setting LDEV nicknames (arbitrary) | Set a nickname of the created LDEV. This operation is arbitrary. | ```raidcom modify ldev -ldev_id <ldev#> -ldev_name <ldev naming>``` |
| 23 | Setting the MP blade of an LDEV | Set the MP blade of the created LDEV. | ```raidcom modify ldev -ldev_id <ldev#> -mp_blade_id <mp#>``` |
| 24 | Displaying LDEV information | Display information of the created LDEV and confirm the result of executing the command. | ```raidcom get ldev -ldev_id <ldev#> … [-cnt <count>] [-key <keyword>]``` |
| 25 | Creating an LU path | Specify the port, map the LDEV to the LUN, and create an LU path. | ```raidcom add lun -port <port#> [<host group name>] -ldev_id <ldev#> [-lun_id<lun#>]``` |
| 26 | Displaying LU path information | Display LU path information, and confirm the result of executing the command. | ```raidcom get lun -port <port#> [<host group name>]``` |

*After registering the iSCSI name of the iSCSI target for an external storage system, perform the login test to check if you can log in to the iSCSI target correctly. If iSCSI targets to which you cannot log in correctly due to a security setting error are registered, attempts to check connections are made while external volumes are being searched. As a result, external volumes and networks are loaded, and recognizing an external volume might fail. For all iSCSI targets for which login test fails, change the CHAP authentication information for connecting to the iSCSI target of the external storage system, or check external storage system settings. After that, perform the login test again to make sure that the test is successful. In addition, delete unnecessary iSCSI targets using **raidcom delete external_iscsi_name**.

## Script examples of external volume operations

The following shows the script examples of external volume operations.

**Script Examples of External Volume Operation (1/3)**

```
raidcom -login USER01 PASS01                      ;Log in with user ID: USER01, and password:
                                                  ;PASS01.
raidcom lock resource -resource_grp_name          ;Lock the resource group: meta_resource
meta_resource                                     ;
                                                  ;
raidcom modify port -port CL3-A -port_attribute   ;Change the attribute of Port CL3-A to Port
ELUN                                              ;External (ELUN) and of Port CL4-A to
raidcom modify port -port CL4-A -port_attribute   ;External (ELUN)
ELUN                                              ;
                                                  ;
raidcom discover external_storage -port CL3-A     ;Display the port on the external storage
                                                  ;from port:CL3-A.
raidcom discover lun -port CL3-A -external_wwn    ;Display LU that is defined to the port on
50060e80,1611a870                                 ;the external port: 50060e80,1611a870 and
                                                  ;connected to the port:CL3-A(External port)
                                                  ;
                                                  ;
raidcom add external_grp -path_grp 1 -            ;Map LU:0 that is defined to the port on the
external_grp_id 1-1 -port CL3-A -external_wwn     ;external port: 50060e80,1611a80 and
50060e80, 1611a870 -lun_id 0                       ;connected to the port:CL3-A (External  port)
                                                  ;with the external volume group #1-1, path
raidcom get command_status                        ;group #1.
raidcom reset command_status
```

**Script Examples of External Volume Operation (2/3)**

```
raidcom modify external_grp -external_grp_id 1-    ;Turn ON the cache mode of External volume
1 -cache_mode y                                    ;group #1-1.
                                                   ;
raidcom get external_grp -external_grp_id 1-1      ;Specify the external volume group and
                                                   ;display the external volume information.
raidcom add path -path_grp 1 -port CL4-A -         ;Add paths of External port CL4-A and the
external_wwn 50060e80,05fa0f36                      ;port 50060e80 and 05fa0f36 on the side of
raidcom get command_status                         ;External storage ;to the path group:1.
raidcom reset command_status                       ;
                                                   ;Display the information of Path Group: 1.
raidcom get path -path_grp 1                        ;
                                                   ;
raidcom modify port -port CL1-A -security          ;
_switch y                                          ;Turn ON the security switches of PortCL1-A
raidcom modify port -port CL2-A -security          ;and PortCL2-A.
_switch y                                          ;
                                                   ;
raidcom add host_grp -port CL1-A-0 -               ;Set the host group#0, host group name:
host_grp_name HP-UX-P                               ;HP-UX-P to PortCL1-A and host group#0,
raidcom add host_grp -port CL2-A-0 -               ;host group name: HP-UX-S to PortCL2-A.
host_grp_name HP-UX-S                               ;
                                                   ;
raidcom modify host_grp -port CL1-A-0 -            ;Set the host mode: HP-UX to host group #0
host_mode HP-UX                                     ;of PortCL1-A and PortCL2-A.
raidcom modify host_grp -port CL2-A-0 -            ;
host_mode HP-UX                                     ;
                                                   ;
raidcom get host_grp -port CL1-A                    ;Display the host group information set to
raidcom get host_grp -port CL2-A                    ;PortCL1-A and PortCL2-A.
                                                   ;
raidcom add hba_wwn -port CL1-A HP-UX-P -          ;Set the connection host WWN:210000e0,
hba_wwn 210000e0,8b0256f8                           ;8b0256f8 to PortCL1-A, host group ;HP-UX-P
raidcom add hba_wwn -port CL2-A HP-UX-S -          ;and the connection host WWN:210000e0,
hba_wwn 210000e0,8b0256f9                           ;8b0256f9 to PortCL2-A, host group HP-UX-S.
                                                   ;
raidcom get hba_wwn -port CL1-A HP-UX-P             ;Display the connection host WWNs set to
raidcom get hba_wwn -port CL2-A HP-UX-S             ;PortCL1-A, host group HP-UX-P and to
                                                   ;PortCL2-A, host group HP-UX-S.
for /l %%i in (0,1,19) do (                         ;Create each 10 of 10G Ldev to
        raidcom add ldev -ldev_id %%i -capacity    ;external_grp_id 1-1 (LDEV:0 to 9, 10 to
10g -external_grp_id  1-1                            ;19).
)                                                  ;
raidcom get command_status                         ;
raidcom reset command_status                       ;
                                                   ;Give a nickname to LDEV: 0 to 19
for /l %%i in (0,1,19) do (                         ;(my_volume 0 to 19)
raidcom modify ldev -ldev_id %%i -device_name      ;
my_volume_%%i                                       ;
)                                                  ;Set the LDEV MP Blade ID of LDEV: 0 to 19
                                                   ;to 2.
for /l %%i in (0,1,19) do (                         ;
raidcom modify ldev -ldev_id %%i -mp_blade_id 2    ;
)                                                  ;
                                                   ;Display the information of LDEV: 0 to 19
raidcom get ldev -ldev_id 0 -cnt 20                 ;(internal VOL).
                                                   ;
for /l %%i in (0,1,9) do (                          ;Give a device name: data 0 to 19 to LDEV:
raidcom add device_grp -device_grp_name grp1       ;0 to 19, and add it to device group name:
data%%i -ldev_id %%i                                ;grp1(data0 to 9) and grp2(data10 to 19).
)                                                  ;
```

Chapter 5: Provisioning operations with CCI

**Script Examples of External Volume Operation (3/3)**

```
for /l %%i in (10,1,19) do (             ;
raidcom add device_grp -device_grp_name grp2   ;
data%%i -ldev_id %%i                     ;
)                                         ;
raidcom get command_status               ;
raidcom reset command_status             ;
                                          ;
raidcom get device_grp -device_grp_name grp1   ;Display the device group information:
raidcom get device_grp -device_grp_name grp2   ;grp1, grp2.
                                          ;
raidcom add copy_grp -copy_grp_name ora grp1   ;
grp2                                      ;Create copy group (ora) with the device
raidcom get command_status               ;group (grp1, grp2).
raidcom reset command_status             ;
                                          ;
raidcom get copy_grp                     ;Display the copy group information.
                                          ;
for /l %%i in (0,1,9) do (               ;Defining paths of LDEV: 0 to 9 to Port:
raidcom add lun -port CL1-A HP-UX-P -ldev_id   ;CL1-A host group HP-UX-P.
%%i                                       ;Defining path of LDEV: 10 to 19 to Port:
)                                         ;CL2-A host group HP-UX-S.
for /l %%i in (10,1,19) do (             ;Give an LU number automatically.
raidcom add lun -port CL2-A HP-UX-S -ldev_id   ;
%%i                                       ;
)                                         ;
                                          ;
raidcom get lun -port CL1-A HP-UX-P      ;Display the path information that is set
raidcom get lun -port CL2-A HP-UX-S      ;to PortCL1-A, host group HP-UX-P and
                                          ;PortCL2-A, host group HP-UX-S.
                                          ;
raidcom unlock resource -resource_grp_name   ;Unlock the resource group: meta_resource.
meta_resource                             ;
                                          ;
raidcom get resource                     ;Display the resource group information.
                                          ;
raidcom -logout                          ;
                                          ;Log out.
```

# Virtual Partition Manager operations

Virtual Partition Manager operations using CCI include migrating LDEVs, parity groups, and external volume groups to other CLPRs.

- For information about Virtual Partition Manager operations, including important warnings and restrictions, see the *Hitachi Virtual Partition Manager User Guide* for USP V/VM or the *Hitachi Virtual Partition Manager User Guide* for VSP.

- For details about the CCI commands for Virtual Partition Manager operations, see the *Command Control Interface Command Reference*.

## Performing Virtual Partition Manager operations

The following table shows the procedure for migrating LDEVs, parity groups, and external volume groups to other CLPRs.

| Step | Operation overview | Description | Command |
|------|-------------------|-------------|---------|
| 1 | Confirming the CLPR configuration. | Check the status of the CLPRs. | `raidcom get clpr` |

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| Step | Operation overview | Description | Command |
|------|--------------------|-------------|---------|
| 2 | Migrating one of the following to other CLPRs:<br>▪ LDEV<br>▪ parity group<br>▪ external volume group | Specify the LDEV number, parity group number, or external volume group number. | `raidcom modify clpr -clpr <clpr#> { -ldev_id <ldev#> | -parity_grp_id <gno-sgno> | -external_grp_id <gnosgno>}` |
| 3 | Verifying the CLPR migration. | For parity group migration, check the status of the parity group. | `raidcom get parity_grp` |

## Displaying CLPR information

The **`raidcom get clpr`** command lists and displays the status of the CLPRs in the storage system. If no CLPRs have been created, CLPR0 is displayed as entire cache.

**Display example:**

```
# raidcom get clpr
```

```
CLPR CLPR_NAME     TC_CAP(MB) TU_CAP(MB) WP_CAP(MB) SF_CAP(MB) U(%)  W(%)S(%)
 000  Oracle_DB        40000      20000       4000          0   50   30    0
 001  Oracle_DB_PROD   20000      10000       2000          0   50   10    0
 003  Oracle_DB_BACK   10000       5000        500          0   50    5    0
```

## Migrating parity groups in a CLPR

This section explains operations from checking the parity group information to moving the parity group.

### Displaying parity group information

The raidcom check the status, display the information about the parity group. See the following example.

**Display example:**

```
# raidcom get parity_grp
```

```
T GROUP Num_LDEV U(%) AV_CAP(GB) R_LVL R_TYPE SL CL  DRIVE_TYPE
```

```
R  32-16       4  45     140000  RAID1  2D+2D  0  0  DKS2C-K072FC
R  32-17       4  45     140000  RAID1  2D+2D  0  0  DKS2C-K072FC
R  33-16       4  45     140000  RAID1  2D+2D  0  0  DKS2C-K072FC
R  33-17       4  45     140000  RAID1  2D+2D  0  3  DKS2C-K072FC
```

## Moving parity groups

If you change the allocation of parity groups, parity groups are moved from another CLPR. In this case, plural parity groups which configure the distributed parity group have to be allocated the same CLPR. Parity groups including LDEVs where cache area of Cache Residency is defined cannot be moved to another CLPR. For the restrictions on the CLPR's transfer, see the *Performance Guide*. The following shows examples of parity groups transfer in CLPR.

**Example for moving parity group 32-17 to the CLPR number 1**

```
# raidcom modify clpr -clpr 1 -parity_grp_id 32-17
```

When you move parity groups by specifying their LDEV numbers, use LDEV numbers for virtual volumes of Dynamic Provisioning, Copy-on-Write Snapshot, or Thin Image. When you move other volumes, specify a parity group number or external volume group number. The following shows an example of moving a virtual volume of Dynamic Provisioning, Copy-on-Write Snapshot, or Thin Image.

**Example for moving the virtual volume of LDEV number: 02:00 to CLPR ID: 2**

```
# raidcom modify clpr -clpr 2 -ldev_id 0x0200
```

## Checking result of CLPR transfer

By displaying the information about parity groups, check the result of CLPR transfer. See the following example.

**Display example:**

```
# raidcom get parity_grp
```

```
T GROUP Num_LDEV U(%) AV_CAP(GB) R_LVL R_TYPE SL CL DRIVE_TYPE
R  32-16       4  45     140000  RAID1  2D+2D  0  0 DKS2C-K072FC
R  32-17       4  45     140000  RAID1  2D+2D  0  1 DKS2C-K072FC
R  33-16       4  45     140000  RAID1  2D+2D  0  3 DKS2C-K072FC
R  33-17       4  45     140000  RAID1  2D+2D  0  3 DKS2C-K072FC
```

# Server Priority Manager operations

Server Priority Manager enables you to prioritize host I/O operations to provide high-speed processing for specified hosts. The host is identified by the WWN or iSCSI name of the host bus adapter. Server Priority Manager has two settings: prioritized and non-prioritized. Set the prioritized option for hosts that require high-speed processing, and the non-prioritized option for the other hosts.

The following methods are used to set the priority level, but only one of them can be used in a single storage system:

> 📄 **Note:** The WWN of a host bus adapter connected to a port is required when specifying the port with CCI and setting SPM. Since the WWN of an HBA connected to a NAS Platform port cannot be obtained, the SPM setting with specifying these port types is not available.

- **Specifying ports and WWNs of host bus adapters**:

  - Using SPM without registering host groups to the SPM group

  - Using SPM by registering host groups in the SPM group (VSP only)

  For details, see Configuring Server Priority Manager by specifying ports and WWNs of HBAs (on page 265).

- **Specifying an LDEV and a WWN of the host bus adapter**:

  For details, see Configuring Server Priority Manager by specifying LDEVs and WWNs or iSCSI names of HBAs (on page 278).

- **Specifying an LDEV and an iSCSI name of a host bus adapter**:

  For details, see Configuring Server Priority Manager by specifying LDEVs and WWNs or iSCSI names of HBAs (on page 278).

## Configuring Server Priority Manager by specifying ports and WWNs of HBAs

This section describes operations for configuring Server Priority Manager by specifying a port and a WWN of a host bus adapter.

- Controlling the priority of I/O operations in storage systems on servers (on page 266)

- Using and managing Server Priority Manager (on page 266)

- Setting SPM names for WWNs and registering them to the SPM group (on page 267)

- Configuring Server Priority Manager by specifying ports and WWNs of HBAs (on page 268)

- Cautions about using Server Priority Manager (on page 274)

- Cautions when using host groups after registering them in SPM groups (VSP and VSP G1x00 and VSP F1500 only) (on page 277)

## Controlling the priority of I/O operations in storage systems on servers

To control server performance, specify the I/O operation priority (prioritized or non-prioritized), the threshold (one value for each storage system), and the upper limit (one value for each non-prioritized WWN) for host bus adapters on a host. Set a host bus adapter with higher priority as a prioritized WWN, and set a host bus adapter with lower priority as a non-prioritized WWN. By adjusting the upper limit or threshold to an appropriate value, you can maintain the number of accesses or the amount of data to be transferred to a storage system at a higher level on a prioritized server.

**Priority to be set by specifying a port and a WWN of an HBA, and control of server performance**

| Priority | Server performance |
|---|---|
| Non-prioritized | Controls server performance based on the upper limit. The upper limit is set for each non-prioritized WWN.<br><br>The upper limit suppresses the number of accesses to a storage system, or the amount of data to be transferred. Monitoring information can be displayed according to the combination of a port and a WWN of a host bus adapter. |
| Prioritized | Controls server performance based on the threshold. One threshold is set for each storage system, but it cannot be set for each prioritized WWN.<br><br>If the amount of traffic goes down to the threshold, the control of the upper limit is disabled automatically.<br><br>Monitoring information can be displayed according to the combination of a port and a WWN of a host bus adapter. |

## Using and managing Server Priority Manager

You can give a nickname (SPM name) to each host WWN to assist in managing the hosts. You can also manage WWN and the SPM name per group. The groups to which WWN and the SPM name are registered are managed uniquely. The following table lists the details for the Server Priority Manager operations and the management unit.

| SPM Operation | Management per port | Management per system |
|---|---|---|
| raidcom modify spm_wwn | prioritized or non-prioritized<br><br>upper limit<br><br>WWN or SPM name | threshold |
| raidcom modify spm_group | prioritized or non-prioritized<br><br>upper limit | threshold |

| SPM Operation | Management per port | Management per system |
|---|---|---|
| | SPM group name | |
| raidcom add spm_wwn | - | SPM name |
| raidcom add spm_group | - | SPM group name |
| raidcom delete spm_wwn | - | SPM name (SPM information per port is also deleted.) |
| raidcom delete spm_group | - | SPM group name (SPM information per port is also deleted.) |
| raidcom get spm_wwn | prioritized or non-prioritized upper limit WWN or SPM name SPM group name | threshold |
| raidcom get spm_group | prioritized or non-prioritized upper limit SPM group name | threshold |
| raidcom monitor spm_wwn | performance of server (IOps/KBps) | control mode of SPM |
| raidcom monitor spm_group | performance of server (IOps/KBps) | control mode of SPM |

## Setting SPM names for WWNs and registering them to the SPM group

The following figure shows the workflow of setting SPM names for WWNs and registering them in the SPM group.

Host group (defined) #1

Register a host group to the SPM group

Host group #2

SPM target without an SPM name

Delete a host group from the SPM target #3

Host group/ WWN

Not registered

Setting the SPM information for WWN

SPM group (not defined)

WWN

SPM target without an SPM name

Give an SPM name

WWN

SPM target with an SPM name

Delete WWN from SPM targets by specifying the WWN or SPM group name

Register a group by specifying WWN

Register a group by specifying an SPM name

WWN

SPM target without an SPM name

Give an SPM name

WWN

SPM target with an SPM name

Delete WWN from SPM targets by specifying the SPM group name

SPM group (defined)

#1: Associated with the host group.
#2: All WWNs belonging to the host group are the SPM target.
#3: Migrated if all WWNs are deleted from the host group.

## Configuring Server Priority Manager by specifying ports and WWNs of HBAs

This section describes how to use Server Priority Manager when setting a port and a WWN of a host bus adapter. For VSP and VSP G1x00 and VSP F1500 models, the procedure varies depending on whether the host group is registered in the SPM group. Only VSP and VSP G1x00 and VSP F1500 models can register host groups to the SPM group.

## Controlling server performance when the host group is not registered in the SPM group

The following table shows the procedure when the host group is not registered in the SPM group.

| Step | Operation overview | Description | Executed command |
|---|---|---|---|
| 1 | Setting the SPM information for WWN | Set the priority (prioritized or non-prioritized option) for the SPM controlling by specifying the number of port to which the host bus adapter is connected and WWN of the host bus adapter. | `raidcom modify spm_wwn -port <port#>`<br>`[-spm_priority <y/n>] {-limit_io |`<br>`-limit_kb | -limit_mb } <value> {-hba_wwn`<br>`<wwn_strings> | -spm_name <nick_name>}` |
| 2 | Giving a nickname (SPM name). | Give a nickname to WWN for the SPM controlling to make the host bus adapter distinguishable. | `raidcom add spm_wwn -port <port#>`<br>`-spm_name <nick_name> -hba_wwn <wwn_strings>` |
| 3 | Registering WWN for SPM to SPM group | Specifying WWN: To operate per group, group multiple WWNs for SPM control into one group. | `raidcom add spm_group -port <port#>`<br>`-spm_group <group_name> -hba_wwn <wwn_strings>` |
| | | Specifying nickname: To operate per group, group multiple WWNs for SPM control into one group. | `raidcom add spm_group -port <port#>`<br>`-spm_group <group_name> <nick_name>` |
| 4 | Checking the SPM information | Display the setting state of SPM by specifying WWN or the SPM name. | `raidcom get spm_wwn -port <port#>`<br>`[ -hba_wwn <wwn_strings> | -spm_name`<br>`<nick_name> ]` |
| | | Display the SPM information by specifying the SPM group name. | `raidcom get spm_group -port <port#>`<br>`-spm_group <group_name>` |
| 5 | Displaying the monitoring information of the prioritized WWN or the non-prioritized WWN | Display the monitoring information by specifying WWN or the SPM name. | `raidcom monitor spm_wwn {-hba_wwn <wwn_strings>`<br>`| -spm_name <nick_name>}` |
| | | Display the monitoring information by specifying the SPM group name. | `raidcom monitor spm_group -spm_group`<br>`<group_name>` |

| Step | Operation overview | Description | Executed command |
|------|--------------------|-------------|------------------|
| 6 | Changing the threshold or the upper limit value of the non-prioritized WWN | Change the threshold or the upper limit value of the non-prioritized WWN by specifying WWN or the SPM name. | `raidcom modify spm_wwn -port <port#> [-spm_priority <y/n>] {-limit_io | -limit_kb | -limit_mb } <value> {-hba_wwn <wwn_strings> | -spm_name <nick_name>}` |
| | | Change the threshold or the upper limit value of the non-prioritized WWN by specifying the SPM group name. | `raidcom modify spm_group -port <port#> [-spm_priority <y/n>] {-limit_io | -limit_kb | -limit_mb } <value> -spm_group <group_name>` |
| 7 | Deleting WWN from the SPM targets | Delete WWN from the SPM targets by specifying WWN or the SPM name. | `raidcom delete spm_wwn -port <port#> [-hba_wwn <wwn_strings> | -spm_name <nick_name> ]` |
| | | Delete WWN from the SPM targets by specifying the SPM group name. | `raidcom delete spm_group -port <port#> -spm_group <group_name>` |

## Controlling server performance when the host group is registered in the SPM group (VSP and VSP G1x00 and VSP F1500 only)

The following table shows the procedure when the host group is registered in the SPM group.

📄 **Note:** For cautions when registering host groups to the SPM group and operating them (VSP and VSP G1x00 and VSP F1500 only), see Cautions when using host groups after registering them in SPM groups (VSP only). (on page 277).

| Step | Operation overview | Description | Executed command |
|------|--------------------|-------------|------------------|
| 1 | Registering the host group that contains WWN controlled by SPM to the SPM group | Specify the host group to which WWN of the host bus adapter is registered and register the host group to the SPM. | `raidcom add spm_group -spm_group <group name> -port <port#> [<host group name>] -spm_host_grp` |

| Step | Operation overview | Description | Executed command |
|---|---|---|---|
| 2 | Changing the threshold or the maximum value of nonpreferred WWN. | Specify the host group to change the threshold or the maximum value of the nonpreferred WWN. | ```raidcom modify spm_group -port <port#>   [<host group name>] -spm_host_grp   [ -spm_priority <y/n> ] { -limit_io |   -limit_kb |  -limit_mb } <value>``` |
| 3 | Checking the SPM information | Specify the WWN name to display the SPM setting status. | ```raidcom get spm_wwn -port <port#>   [ -hba_wwn <wwn_strings> ]``` |
| 4 | | Specify the host group to display the SPM setting status. | ```raidcom get spm_group -port <port#>   [<host group name>] -spm_host_grp``` |
| 5 | | Specify the SPM group name to display the SPM setting status. | ```raidcom get spm_group -port <port#>   -spm_group <group_name>``` |
| 6 | Displaying monitoring information of preferred or nonpreferred WWN | Specify the WWN name to display monitoring information. | ```raidcom monitor spm_wwn {-hba_wwn <wwn_strings> }``` |
| 7 | | Specify the SPM group name to display monitoring information. | ```raidcom monitor spm_group -spm_group <group_name>``` |
| 8 | Registering WWN to the host group registered in the SPM group, and setting the WWN as the SPM target | Register the WWN to the host group registered in the SPM group to set the WWN as the SPM target. | ```raidcom add hba_wwn -port <port#>   [<host group name>] -hba_wwn <WWN strings>``` |
| 9 | Deleting from the SPM targets | Specify the host group to delete it from the SPM target. | ```raidcom delete spm_group -port <port#>   [<host group name>] -spm_host_grp``` |
| 10 | | Delete the host group to delete it from the SPM target. | ```raidcom delete host_grp -port <port#>   [<host group name>]``` |
| 11 | | Delete WWN from the host group to delete it from the SPM target. | ```raidcom delete hba_wwn -port <port#>   [<host group name>] -hba_wwn <WWN strings>``` |

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## Displaying the WWN of host bus adapters

Displays the WWN of the host bus adapters that are registered in host groups.

**Display example:**

```
# raidcom get hba_wwn -port CL4-E-0
PORT  GID  GROUP_NAME HWWN           Serial#  NICK_NAME
CL4-E   0  Linux_x86  210000e08b0256f8  63528  ORA_NODE0_CTL_0
CL4-E   0  Linux_x86  210000e08b039c15  63528  ORA_NODE1_CTL_1
```

## Setting the priority on host bus adapters

**Display example: Set the host bus adapter (WWN: 210000e0,8b0256f8) to the non-prioritized WWN, and set 5000 [IOPS] as the upper limit.**

```
# raidcom modify spm_wwn -port CL4-E -spm_priority
n -limit_io 5000 -hba_wwn 210000e0,8b0256f8
```

**Display example: Set the host bus adapter (WWN: 210000e0,8b039c15) to the prioritized WWN, and set 3000 [IOPS] as the threshold.**

```
# raidcom modify spm_wwn -port CL4-E -spm_priority
y -limit_io 3000 -hba_wwn 210000e0,8b039c15
```

-limit_io 3000 shown in the example of the priority setting is the threshold value of the entire system.

## Displaying the status of the prioritized WWN and the non-prioritized WWN settings

Display the status of the prioritized WWN and the non-prioritized WWN settings and check it. Display examples of the status of the prioritized WWN and the non-prioritized WWN settings are shown below.

**Example for displaying the status of settings of the prioritized WWN and the non-prioritized WWN assigned under the specified port (CL4-E)**

```
 # raidcom get spm_wwn -port CL4-E


PORT  SPM_MD SPM_WWN         NICK_NAME GRP_NAME Serial#
CL4-E WWN      210000e08b0256f8   -         -       63528
CL4-E WWN      210000e08b039c15   -         -       63528
```

**Example for displaying the status of setting to specify the WWN (210000e08b0256f8)**

```
# raidcom get spm_wwn -port CL4-E -hba_wwn 210000e0,8b0256f8
```

```
PORT  SPM_MD  PRI  IOps  KBps  Serial#
CL4-E WWN       N    5000   -     63528
```

**Example for displaying the status of setting to specify the WWN (210000e08b039c15)**

```
# raidcom get spm_wwn -port CL4-E -hba_wwn 210000e0,8b039c15
```

```
PORT  SPM_MD  FRI  IOps  KBps  Serial#
CL4-E WWN       Y    3000   -     63528
```

The threshold value displayed for the prioritized WWN by using the get spm_wwn command is set for the entire system.

## Setting SPM names for host bus adapters

The host bus adapters can be identified by checking the WWNs, but using SPM names might make it easier to identify the host bus adapters. Display examples of setting the SPM name of the host bus adapter are shown below.

**Display example: Set the SPM name (ORA_NODE0_CTL_0) for the WWN (210000e08b0256f8)**

```
# raidcom add spm_wwn -port CL4-E -spm_name
ORA_NODE0_CTL_0 -hba_wwn 210000e0,8b0256f8
```

**Display example: Set the SPM name (ORA_NODE1_CTL_1) for the WWN (210000e08b039c15)**

```
# raidcom add spm_wwn -port CL4-E -spm_name
ORA_NODE1_CTL_1 -hba_wwn 210000e0,8b039c15
```

SPM names are managed uniquely in the entire system.

## Grouping multiple host bus adapters into one group

You can group the host bus adapters into SPM groups, and then use the SPM groups to change the priorities of multiple host bus adapters at the same time. You can also set the same upper limit value for all host bus adapters in anSPM group at the same time.

Examples of setting the SPM group:

**Display example: Set the SPM name (ORA_NODE0_CTL_0) for the SPM gropup name (WWN_GRP_LINUX0)**

```
# raidcom add spm_group -port CL4-E -spm_group WWN_GRP_LINUX0 ORA_NODE0_CTL_0
```

**Display example: Set the WWN (210000e08b039c15) for the SPM gropup name (WWN_GRP_LINUX1)**

```
# raidcom add spm_group -port CL4-E -spm_group
WWN_GRP_LINUX1 -hba_wwn 210000e0,8b039c15
```

SPM group names are managed uniquely in the entire system.

## Obtaining monitoring information of the prioritized WWN and the non-prioritized WWN

You can use the monitoring function to check whether the performance of the prioritized WWN can be secured by setting the upper limit. Example of acquiring the monitoring information:

Acquires the monitoring information by specifying the WWN (210000e08b039c15).

**Display example:**

```
# raidcom monitor spm_wwn -hba_wwn 210000e0,8b039c15
PORT   SPM_MD  IOps  KBps    Serial#
CL4-E  WWN        5000  5000000 63528
```

## Stopping performance control of server by using SPM function

To stop controlling the performance of the server by using the SPM function, delete the SPM name from the SPM targets.

Example of deleting from the SPM targets:

Delete the SPM name ("ORA_NODE0_CTL_0") from the SPM targets.

**Display example:**

```
# raidcom delete spm_wwn -port CL4-E -spm_name ORA_NODE0_CTL_0
```

## Cautions about using Server Priority Manager

The following table describes the cautions about using Server Priority Manager.

| Caution | Description |
|---|---|
| Exclusive access control with Storage Navigator | Server Priority Manager settings are exclusive for CCI operations and Storage Navigator operations:<br><br>▪ If you set Server Priority Manager using CCI, you cannot set Server Priority Manager from Storage Navigator. You need to delete all Server Priority Manager settings made using CCI, and then use Server Priority Manager on Storage Navigator to make the Server Priority Manager settings.<br><br>▪ If you set Server Priority Manager using Storage Navigator, you cannot set Server Priority Manager using CCI. You need to delete all Server Priority Manager settings made using Storage Navigator (for instructions see the *Performance Guide*), and then use Server Priority Manager from CCI to make the Server Priority Manager settings. |
| Performance Monitor of Device Manager - Storage Navigator | If you set Server Priority Manager using CCI, you cannot use a part of Performance Monitor of Device Manager - Storage Navigator. For details, see the *Performance Guide*. |
| Maintenance | When you perform the following operations, the upper limit value control might be disabled for about two minutes:<br><br>▪ Adding, replacing, or removing cache memory<br><br>▪ Changing the system configuration<br><br>▪ Updating the firmware<br><br>▪ VSP 5000 series, VSP E series, VSP Gx00 models, VSP Fx00 models: Replacing the controller (CTL)<br><br>▪ VSP 5000 series, VSP E series, VSP Gx00 models, VSP Fx00 models: Adding, replacing, or removing front-end module (CHB)<br><br>▪ VSP G1x00 and VSP F1500: Replacing MP blades<br><br>▪ VSP G1x00 and VSP F1500: Adding, replacing, or removing front-end directors (CHAs)<br><br>▪ Powering on and off the storage system<br><br>**Note:**<br>The upper limit value control might be disabled when an abnormal condition that causes the login or logout of the host occurs, such as a network failure or damage on the HBA or Fibre cable. Resolve the cause of the unexpected login/logout behavior, and then enable the upper limit value control. |

| Caution | Description |
|---|---|
| When specifying ports and WWNs of HBAs: Deleting SPM names or SPM group names | If you delete a combination of the specified port and the WWN of the HBA from the SPM targets by using the SPM name, the SPM setting and SPM name under the specified port are deleted. If the same SPM name is set to another port, only the SPM setting of the specified port is deleted.<br><br>If you delete a combination of the specified port and the WWN of the HBA from the SPM targets by using the SPM group name, the SPM setting and the group under the specified port are deleted. If the same SPM group name is set to another port, only the SPM setting of the specified port is deleted. |
| When specifying ports and WWNs of HBAs: Resource group function and restrictions for Server Priority Manager | When you use the resource group function, the range of operation is limited per port of resource group by Server Priority Manager. The threshold value, the SPM name, and the SPM group name, which are managed in the entire system, are common among the resource groups.<br><br>When you perform Server Priority Manager operations using the resource group function, share the threshold value that the storage administrator determines among users of resource groups. Determine rules for SPM names and SPM group names including port names to avoid redundant names between ports. |
| When specifying WWN or iSCSI name of LDEVs and HBAs: DKCMAIN microcode version and storage models | For microcode 80-04-xx-xx/00 or earlier in VSP G1x00 and VSP F1500 or firmware 83-03-0x-xx/00 or earlier in VSP Gx00 models and VSP Fx00 models, if SPM information is set or referenced, behavior is not guaranteed.<br><br>The following errors might occur:<br><br>▪ Server performance cannot be controlled according to the specified upper limit value.<br><br>▪ No detailed error message appears when an error occurs.<br><br>▪ No error message appears if an invalid upper limit value is set.<br><br>▪ The same error as when an invalid WWN is specified occurs. For details about the errors, see the row below.<br><br>Behavior when SPM information is set for or referenced by VSP or HUS VM models cannot be guaranteed. If SPM information is set or referenced, the following errors might occur:<br><br>▪ Server performance cannot be controlled according to the specified upper limit value.<br><br>▪ No detailed error message appears when an error occurs.<br><br>▪ No error message appears if an invalid upper limit value is set. |

| Caution | Description |
|---|---|
| When specifying WWN or iSCSI name of LDEVs and HBAs: Invalid WWNs | Behavior is not guaranteed when an invalid WWN (not in the format defined by IEEE) is specified.<br><br>In VSP G1x00 and VSP F1500, if you specify SPM information for an invalid WWN, you might not be able to set SPM information with an iSCSI name specified.<br><br>In VSP Gx00 models and VSP Fx00 models with DKCMAIN firmware 83-03-0*x* or earlier, if you specify SPM information for an invalid WWN and then update the firmware to 83-03-2*x* or later, the following errors might occur:<br><br>▪ Invalid WWNs with SPM information specified are deleted from the SPM target.<br><br>▪ SPM information is set for the iSCSI name of which SPM information is not specified. |
| When specifying WWN or iSCSI name of LDEVs and HBAs: I/Os issued to non-prioritized LDEVs | When the number of I/Os issued to a non-prioritized LDEV reaches the upper limit, I/Os exceeding the upper limit are retained in the storage system. By this method, host process might be consumed, and I/O performance of prioritized LDEVs or non-prioritized LDEVs that have I/Os below the upper limit might be affected. If I/O performance of other LDEVs becomes lower than expected due to the host process number limit, review the queue depth settings or alternate path policy settings of the host. |

## Cautions when using host groups after registering them in SPM groups (VSP and VSP G1x00 and VSP F1500 only)

The following limitations apply when you register host groups in SPM groups (VSP and VSP G1x00 and VSP F1500 only):

1. You cannot register host groups that contain WWNs for which SPM information is set in step 1 of Controlling server performance when the host group is not registered in the SPM group (on page 268).

2. You cannot register host groups in SPM groups in which WWNs (SPM targets) are registered in step 3 of Controlling server performance when the host group is not registered in the SPM group (on page 268).

You can register host groups described in limitation 1 above in SPM groups that were not specified in step 3 of Controlling the priority of I/O operations in storage systems on servers (on page 266) if the WWNs that belong to the host group meet the following requirements:

▪ The WWNs are not already registered as SPM targets using another port number by performing step 1 of Controlling the priority of I/O operations in storage systems on servers (on page 266).

▪ The WWNs belong to SPM groups that were specified in step 3 of Controlling server performance when the host group is not registered in the SPM group (on page 268).

After registering a host group in an SPM group, Server Priority Manager sets the SPM information as follows:

- When the SPM group is associated with the host group, Server Priority Manager sets the same priority (prioritized or non-prioritized) as the SPM group. Then, for the prioritized host group Server Priority Manager sets the threshold, or for the non-prioritized host group Server Priority Manager sets the upper limit of non-prioritized WWNs.

- When the SPM group is not associated with the host group, Server Priority Manager sets the priority setting to prioritized without changing the threshold.

For how to register host groups in SPM groups, see .

## Configuring Server Priority Manager by specifying LDEVs and WWNs or iSCSI names of HBAs

To control the I/O priority for volumes in a storage system on the server, you can configure Server Priority Manager by specifying an LDEV and a WWN or iSCSI name of a host bus adapter.

For the combination of a volume (LDEV) and a host (WWN or iSCSI name), specify the I/O priority (prioritized or non-prioritized). When the priority is non-prioritized, set the upper limit value to control the server performance. Set the prioritized priority to the host with higher priority, and the non-prioritized priority to the host with lower priority. By adjusting the upper limit value to an appropriate value, you can maintain the number of accesses and the amount of data to be transferred from a prioritized host to a storage system at a higher level.

**Requirements for using Server Priority Manager by specifying the LDEV, the WWN or iSCSI name of the host bus adapter**

| Item | Range |
|---|---|
| Number of LDEVs that can be registered for each storage system | 1 to 16,384[1] |
| Number of WWNs that can be registered for each storage system | 1 to 2,048[2] |
| Number of iSCSI names that can be registered for each storage system | 1 to 2,048[2] |
| Number of WWNs that can be registered for each LDEV | 1 to 32[3] |
| Number of iSCSI names that can be registered for each LDEV | 1 to 32[3] |
| Notes: | |
| 1. When the maximum number of LDEVs for a storage system is less than 16,384, the maximum number of LDEVs that can be registered is the maximum number of total LDEVs for a storage system. | |

| Item | Range |
|---|---|
| 2. The sum of the number of WWNs and the number of iSCSI names. This sum should be a maximum of 2,048 for each storage system. | |
| 3. The sum of the number of WWNs and the number of iSCSI names. This sum should be a maximum of 32 for each LDEV. | |

> **Note:**
>
> - When there are 4,096 or more LDEVs with SPM configured, if you configure SPM in another LDEV, host I/O response in the LDEV is slower than the existing LDEVs with SPM configured. To improve the host I/O response, delete the SPM information in the new LDEV with SPM configured, then delete the existing SPM information to decrease the number of LDEVs with SPM configured to 4,095 or fewer, and then configure SPM in the new LDEV again.

**Priority to be set by specifying a port and a WWN or iSCSI name of an HBA, and control of server performance**

| Priority | Server performance |
|---|---|
| Non-prioritized | Controls server performance based on the upper limit. The upper limit is set for each non-prioritized WWN or non-prioritized iSCSI name.<br><br>The upper limit suppresses the number of accesses from a host bus adapter to an LDEV, or the amount of data to be transferred.<br><br>Monitoring information can be displayed according to the combination of an LDEV and a WWN or iSCSI name of a host bus adapter. |
| Prioritized | Does not control server performance of a prioritized WWN or prioritized iSCSI name.<br><br>Monitoring information can be displayed according to the combination of an LDEV and a WWN or iSCSI name of a host bus adapter. |

> **Note:** Unlike the case of configuring Server Priority Manager by specifying a port and a WWN of a host bus adapter, the function for enabling or disabling control of the upper limit automatically according to the traffic amount is not supported.

**Server Priority Manager operations when an LDEV and a WWN or iSCSI name of an HBA is specified**

| Ste p | Operation overview | Description | Executed command |
|---|---|---|---|
| 1 | Setting SPM information for an LDEV and a WWN or iSCSI name | Specify the LDEV number, and the WWN or iSCSI name of the host bus adapter to set the priority (prioritized or non-prioritized) as the SPM target.<br><br>To set the non-prioritized option, set the upper limit as well.<br><br>Normally, set the prioritized option in step 1, and check the monitoring information in step 3. And then, if necessary, change the priority to non-priority in step 4, and set the upper limit. | `raidcom modify spm_ldev -ldev_id <ldev#> {-hba_wwn <wwn strings> | -hba_iscsi_name <initiator iscsi name>} [ -spm_priority <y/n>] [{-limit_io | -limit_kb | -limit_mb} <value> ]` |
| 2 | Checking SPM information | Display the setting status of SPM. | `raidcom get spm_ldev [-ldev_id <ldev#> | -hba_wwn <wwn strings> | -hba_iscsi_name <initiator iscsi name> ]` |
| 3 | Displaying monitoring information of the prioritized or non-prioritized WWN | Display monitoring information. | `raidcom monitor spm_ldev -ldev_id <ldev#> {-hba_wwn <wwn strings> | -hba_iscsi_name <initiator iscsi name>}` |
| 4 | Changing the upper limit of the prioritized and non-prioritized WWNs | If necessary, determine the priority and the upper limit based on the monitoring information, and then change the priority.<br><br>When the non-prioritized option is set, set the upper limit as well. | `raidcom modify spm_ldev -ldev_id <ldev#>  {-hba_wwn <wwn strings> | -hba_iscsi_name <initiator iscsi name>} [-spm_priority <y/n>] [{-limit_io | -limit_kb | -limit_mb} <value>]` |
| 5 | Deleting from the SPM target | Specify the LDEV number and the WWN or iSCSI name of the host bus adapter to delete them from the SPM target. | `raidcom delete spm_ldev -ldev_id <ldev#> {-hba_wwn <wwn strings> | -hba_iscsi_name <initiator iscsi name>}` |

# Virtual storage machine operations

## Creating host groups in a virtual storage machine

Use the following provisioning operations to create host groups in a virtual storage machine and to assign virtualized LDEV to LU.

| Step | Operation overview | Description | Executed command |
|------|--------------------|-------------|------------------|
| 1 | Reserving host group IDs | Reserve ports and host group IDs to the resource groups in the virtual storage machine. Be sure to execute the command before creating host groups. | `raidcom add resource -resource_name <resource group name> -port <port#> -<HG#>` |
| 2 | Creating host groups | Create host groups by specifying the reserved port and host group ID to the resource group. | `raidcom add host_grp -port <port#> -<HG#> -host_grp_name <host group name>` |
| 3 | Specifying the host mode and host mode options | Specify the host mode to the created host group. Also, specify the host mode options if necessary. | `raidcom modify host_grp -port <port#> [<host group name>] - host_mode < host mode> [- host_mode_opt <host mode option> … ]` |
| 4 | Adding hosts to the host group | Register hosts to the host group. | `raidcom add hba_wwn -port <port#> [<host group name>] - hba_wwn <WWN strings>` |

## Adding LDEVs to a virtual storage machine

Use the following provisioning operations to add LDEVs to a virtual storage machine and to use LDEVs from hosts.

Chapter 5: Provisioning operations with CCI

| Step | Operation overview | Description | Executed command |
|------|--------------------|-------------|------------------|
| 1 | Delete the virtual LDEV ID set by default | Specify an LDEV ID to delete the virtual LDEV ID set by default. By default, the virtual LDEV ID is the same as the real LDEV ID. | `raidcom unmap resource -ldev_id <ldev#> -virtual_ldev_id <ldev#>` |
| 2 | Add the LDEV to the resource group | Add the LDEV of which the virtual LDEV ID was deleted to the resource group in the virtual storage machine. | `raidcom add resource -resource_name <resource group name> -ldev_id <ldev#>` |
| 3 | Virtualize LDEVs | Set a virtual LDEV ID to the specified LDEV. Also, specify the product ID and SSID if necessary. | `raidcom map resource -ldev_id <ldev#> -virtual_ldev_id <ldev#> [-ssid<ssid> -emulation <emulation type>]` |
| 4 | Create LU path | To create LU path, assign LDEVs to the host group that belongs to the resource group in the virtual storage machine. | `raidcom add lun -port <port#> [<host group name>] -ldev_id <ldev#> [-lun_id<lun#>]` |

## Removing the virtual storage machine

Use the following provisioning operations to remove resources from the virtual storage machine and to remove the virtual storage machine.

| Step | Operation overview | Description | Executed command |
|------|--------------------|-------------|------------------|
| 1 | Remove the LU path | Remove the LU path from the LDEV in the virtual storage machine. | `raidcom delete lun -port <port#> [<host group name>] {-lun_id <lun#> | -ldev_id <ldev#> | -grp_opt <group option> -device_grp_name <device group name> [<device name>]}` |
| 2 | Remove the virtual LDEV ID | Remove the virtual LDEV ID from the LDEV in the virtual storage machine. | `raidcom unmap resource -ldev_id <ldev#> -virtual_ldev_id <ldev#>` |

| Step | Operation overview | Description | Executed command |
|------|-------------------|-------------|------------------|
| 3 | Remove the LDEV from the resource group | Remove the LDEV from the resource group in the virtual storage machine | `raidcom delete resource -resource_name <resource group name> -ldev_id <ldev#>` |
| 4 | Invalidate the LDEV virtualization | Specify the virtual LDEV ID that is the same as the real LDEV ID in order to invalidate the LDEV virtualization. | `raidcom map resource -ldev_id <ldev#> -virtual_ldev_id <ldev#>` |
| 5 | Delete the host group | Delete the host group in the virtual storage machine. | `raidcom delete host_grp -port <port#> [<host group name>]` |
| 6 | Remove the host group ID from the resource group | Remove the host group ID that belongs to the resource group in the virtual storage machine | `raidcom delete resource -resource_name <resource group name> -port <port#> -<HG#>` |
| 7 | Remove the resource from the resource group | Remove the resource from the resource group in the virtual storage machine. | `raidcom delete resource -resource_name <resource group name> [-ldev_id <ldev#> | -port <port#> [<host group name>] | -parity_grp <gno-sgno> | -external_grp_id <gno-sgno> | -grp_opt <group option> -device_grp_name <device group name> [<device name>]]` |
| 8 | Remove the virtual storage machine | Delete all resource groups in the virtual storage machine in order to remove the virtual storage machine. | `raidcom delete resource -resource_name <resource group name>` |

# Chapter 6:  Data replication operations with CCI

This guide describes CCI data replication operations.

## About data replication operations

The data replication features of the RAID storage systems include:

- Local replication:
  - ShadowImage
  - ShadowImage for Mainframe
  - Thin Image
  - Copy-on-Write Snapshot
- Remote replication:
  - TrueCopy
  - TrueCopy for Mainframe
  - TrueCopy Async
  - Universal Replicator
  - Universal Replicator for Mainframe
  - global-active device
- Mainframe replication:
  - Compatible XRC
  - Compatible FlashCopy® V2
  - Business Continuity Manager

For detailed information about any of these features, see the applicable user guide (for example, *Hitachi ShadowImage® User Guide*).

# Features of paired volumes

Paired logical volumes are often handled independently by servers. When CCI is used, the paired volumes can be managed by the replication functions (for example, ShadowImage, TrueCopy, Universal Replicator, global-active device) as combined or separated pairs. The replication functions regard the two volumes being combined or separated as a uniquely paired logical volume used by the servers. Paired volumes can also be handled as groups, grouping them by units of server software or units of databases and their attributes.

For detailed information about volume pairs (for example, maximum number of pairs per storage system, maximum P-VOL size), see the user guide for your storage system and copy function (for example, *Hitachi ShadowImage® User Guide*).

Some replication commands cannot be executed using CCI. Therefore, if you use CCI to create Universal Replicator or Universal Replicator for Mainframe pairs, use CCI to perform the subsequent pair operations. If you use Device Manager - Storage Navigator to create Universal Replicator or Universal Replicator for Mainframe pairs, use Device Manager - Storage Navigator to perform the subsequent pair operations.

See the following figure depicting the concept of paired volume.

Addressing paired logical volumes: The correspondence of paired logical volumes to their physical volumes is defined by describing the paired logical volume names and group names in the configuration definition files of each server. It is possible to define a server for the paired logical volumes in units of group name. Each paired logical volume must belong to a group in order to determine the corresponding server.

Specification of volumes by commands: Volume names to be used by the CCI commands must be referenced via the paired logical volume names or the group names.

# Using CCI with ShadowImage and TrueCopy

CCI allows you to perform ShadowImage and TrueCopy operations by issuing ShadowImage and TrueCopy commands from the UNIX/PC server host to the RAID storage system. ShadowImage and TrueCopy operations are nondisruptive and allow the primary volume of each volume pair to remain online to all hosts for both read and write operations. Once established, ShadowImage and TrueCopy operations continue unattended to provide continuous data backup.

There are specific requirements for using ShadowImage and TrueCopy in high-availability (HA) configurations. UNIX/PC servers in HA configurations normally support disk duplication functions to enhance disk reliability (for example, mirroring provided by the LVM or device driver, RAID5 or an equivalent function provided by the LVM). UNIX/PC servers also feature hot standby and mutual hot standby functions in case of failures on the server side. However, mutual hot standby for disaster recovery has not yet been achieved since it requires the remote mirroring function.

ShadowImage provides the mirroring function within the storage system. For detailed information about ShadowImage operations, please see the *Hitachi ShadowImage® User Guide* for your storage system.

TrueCopy provides remote mirroring functionality, linkage functionality with failover switching, and remote backup operations among servers, all of which are required by UNIX/PC servers in HA configurations for disaster recovery. For detailed information about TrueCopy operations, please see the *Hitachi TrueCopy® User Guide* for your storage system.

# Using CCI with Thin Image

CCI allows you to perform Hitachi Thin Image operations by issuing raidcom commands (for example, `raidcom add snapshot`) to the RAID storage system. Hitachi Thin Image stores snapshots in storage system. Creating a Thin Image pair changes the status to "PAIR" and stores snapshot data as a copy of the data on the Thin Image P-VOL. A Thin Image pair consists of a P-VOL, one or more S-VOLs that are virtual volumes (V-VOLs), and one or more pool-VOLs that are LDEVs. P-VOL differential data is stored as snapshot data in the pool-VOLs. If your storage system experiences a data storage failure, you can restore the data using the snapshot data in the pool. Splitting a Thin Image pair saves a snapshot and stops the copying of replaced data in the pool.

Consistency groups and snapshot groups are groups of pairs for which you can simultaneously perform pair tasks on all pairs within the group. You can use CCI raidcom commands to create consistency groups and snapshot groups and to split pairs to store the snapshot data for the groups.

- A consistency group can include HTI, SI, and SIz pairs. Splitting the pairs using the group assures data consistency at the time the storage system receives the request.

- A snapshot group is a group of only Thin Image pairs. Use consistency or snapshot groups to perform Thin Image tasks on all of the pairs within the group. You define Thin Image pairs to a snapshot group when you create the pairs.

📄 **Note:** When you use the CCI to define multiple Thin Image pairs in a consistency group, you can only specify one consistency group for a group defined in the CCI configuration definition file.

The configuration definition file for CCI is a group that is not a consistency group.

Creating a new pair and defining the pairs in a consistency group for a group you defined using the CCI configuration definition file and the pair is already defined in a consistency group defines the pair in the same consistency group, even if you try to create a new pair and assign it to a different consistency group.

For details about Hitachi Thin Image, see the *Hitachi Thin Image User Guide* for your storage system.

# Using CCI with global-active device

The CCI software is installed on the host servers and used for global-active device operations. The CCI command devices and CCI configuration definition files are required for global-active device operations. You can execute CCI commands for global-active device using the in-band or out-of-band method of CCI command execution.

For details about global-active device, see the *Global-Active Device User Guide*. For details about the CCI command options and display results for global-active device operations (for example, PHY_LDEV, VIR_LDEV), see the *Command Control Interface Command Reference*.

📄 **Note:** If you set the S-VOL Disable attribute of Data Retention Utility to a GAD secondary volume, GAD pair operations from CCI are restricted. Release the S-VOL Disable attribute of the GAD secondary volume, and then perform the GAD pair operations.

# ShadowImage operations

The ShadowImage commands also support the functionality that links the system operation for the purpose of volume backup among UNIX servers managed by the operating system. For detailed information about the operational requirements and specifications for ShadowImage, see the *Hitachi ShadowImage® User Guide* for your storage system.

Following is a list of sample ShadowImage functions that can be executed using CCI commands:

- **Pair creation**: Creates a new volume pair. Volume pairs can be created in units of volumes or groups.

- **Pair splitting**: Splits a volume pair and allows read and write access to the secondary volume.

- **Pair resynchronization**: Resynchronizes a split volume pair based on the primary volume. The primary volume remains accessible during resynchronization.

- **Pair resynchronization with restore option**: Resynchronizes a split pair based on the secondary volume (reverse resync). The primary volume is not accessible during resync with restore option.

- **Event waiting**: Used for waiting for the completion of a volume pair creation or resynchronization to check the pair status.

- **Pair status display and configuration confirmation**: Displays the pair status and configuration of the volume pairs; this can also be used for checking the completion of a pair creation or pair resynchronization. The figure given below illustrates a ShadowImage system configuration.

## ShadowImage duplicated mirroring

Duplicated mirroring of a single primary volume is possible when the ShadowImage feature is used. Duplicated mirror volumes can be specified up tp the maximum quantity 3. The duplicated mirror volumes of the P-VOL are expressed as virtual volumes using the mirror descriptors (MU#0-2) in the configuration diagram as shown below.

## ShadowImage cascading pairs

ShadowImage provides a cascading function for the ShadowImage S-VOL. Cascading mirror volumes can be specified up to the maximum quantity 2. The cascading mirrors of the S-VOL are expressed as virtual volumes using the mirror descriptors (MU#1-2) in the configuration diagram as shown below. The MU#0 of a mirror descriptor is used for connection of the S-VOL.

## Restrictions for ShadowImage cascading volumes

**Pair Creation:**

Pair creation of S-VOL (oradb1) can only be performed after the pair creation of S/P-VOL (oradb). If you create the oradb1 pair first without creating the oradb, the subsequent oradb creation will be rejected with EX_CMDRJE or EX_CMDIOE.



**Pair splitting:**

Pair splitting of S-VOL (oradb1) can only be performed after the S/P-VOL (oradb) is in a SMPL or PSUS state, since ShadowImage copies are asynchronous. If pair splitting of the S-VOL (oradb1) is attempted while the S/P-VOL (oradb) is in a COPY or PAIR state, the `pairsplit` command is rejected with EX_CMDRJE or EX_CMDIOE.

**Pair restore:**

Pair restore (resync from S-VOL (oradb1) to S/P-VOL) can only be performed when the S-VOL (oradb) and the P-VOL (oradb2) on the S/P-VOL are in the SMPL and PSUS states. If the pair restore of S-VOL (oradb1) is performed while either the S-VOL (oradb) or P-VOL (oradb2) on the S/P-VOL are in a COPY, PAIR or PSUS state, the `pairresync -restore` command is rejected with EX_CMDRJE or EX_CMDIOE.



## Restriction for TrueCopy/ShadowImage cascading volumes

Pair restore (resynchronization from S-VOL (oradb1) to S/P-VOL) can only be performed when the TrueCopy S-VOL (oradb) and the P-VOL (oradb2) on the S/P-VOL are in the SMPL or PSUS(SSUS) state. If pairresync of S-VOL (oradb1) is performed when the S/P-VOL (oradb or oradb2) is in any other state, the `pairresync -restore` option command is rejected with EX_CMDRJE or EX_CMDIOE.



# TrueCopy operations

CCI TrueCopy commands operate in conjunction with the software on the UNIX/PC servers and the TrueCopy functions of the RAID storage systems. The CCI software provides failover and other functions such as backup commands to allow mutual hot standby in cooperation with the failover product on the UNIX/PC server (for example, MC/ServiceGuard, FirstWatch, HACMP).

> **Note:** For proper maintenance of TrueCopy operations, it is important to determine if there are any faults in paired volumes, recover the volumes from the failures as soon as possible, and continue operation in the original system.

> **Note:** For information about the operational requirements and specifications for TrueCopy, please see the *Hitachi TrueCopy® User Guide* for your storage system.

## TrueCopy takeover commands

The figure given below illustrates a high-availability (HA) environment. When a server software error or a node error is detected, the HA failover software causes the cluster manager (CM) to monitor server programs and causes the CM of the standby node to automatically activate the HA control script of the corresponding server program. The HA control script usually contains database recovery procedures, server program activation procedures, and other related recovery procedures. The TrueCopyCCI takeover commands are also activated by the HA control script.



Legend

- CM (Cluster Manager): Demon process that keeps the consistency of the cluster by monitoring the node and server program in the cluster.

- Script: Shell script that automatically performs takeover process when CM detects the server failure.

In an HA environment, a package is a group of applications that are scripted to run on the secondary host in the event of a primary host failure. When using the HA software (for example, MC/ServiceGuard), the package can be transferred to the standby node as an operation executed by the system administrator (see the figure given below for package transfer on high availability (HA) software).

> 📄 **Note:** If the operation is performed when CCI and TrueCopy are being used, the volume is switched from primary to secondary as if an error had occurred, even though data consistency is assured. When restoral of the original node occurs along with its original package (group of applications), it is necessary to copy the data on the secondary volume onto the primary volume; this operation can take as much time as the initial copy operation for the pair. In actual operation, no package can be transferred when TrueCopy is being used. The secondary package is switched to the primary package, and vice versa, when the primary volume is switched to the secondary volume. Therefore, the primary and secondary TrueCopy volumes should be switched depending on the package state.



Legend
S: Standby
A: Active

The swap option of the takeover command allows swapping of the primary and secondary volume designations, so if the primary and secondary volume are switched due to a server error or package transfer, pair operation can be continued using the reversed volumes. When control is handed back over to the original node, swapping the volume designations again eliminates the need of copying them. In addition, the takeover command has the option to allow the secondary volume to be logically separated (for the purpose of recovery from a disaster at the original operating site). The takeover command has four functions designed for HA software operation: Takeoverswitch, swap-takeover, SVOL-takeover, and PVOL-takeover. This command is not available for ShadowImage.

## Takeover-switch function

The control scripts activated by HA software are used by all nodes of a cluster in exactly the same manner so they have no discrimination between primary and secondary pair volumes (they just know the near and far disk in a pair). Thus, the takeover command, when activated by a control script, must check the combination of attributes of volumes possessed by the local and remote nodes and determine the proper takeover action. The table below shows the takeover actions, like Near/Local and Far/Remote Volume Attributes and Takeover ActionsNear/Local and Far/Remote Volume Attributes and Takeover Actions.

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| Local node (Takeover node) | | Remote node | | |
|---|---|---|---|---|
| **Volume attribute** | **Fence and status** | **Volume attribute** | **P-VOL status** | **Takeover action** |
| SMPL | - | SMPL | - | Reject |
| | | P-VOL | - | Nop-takeover[1] |
| | | S-VOL | - | Unconformable |
| | | Unknown | - | Reject |
| P-VOL (primary) | Fence == Data or Status && pair status == PSUE or PDUB or MINAP == 0 | SMPL | - | Reject |
| | | P-VOL | - | Unconformable |
| | | S-VOL | - | PVOL-Takeover[2] |
| | | Unknown | - | PVOL-Takeover[2] |
| | Others | SMPL | - | Reject |
| | | P-VOL | - | Unconformable |
| | | S-VOL | - | Nop-takeover[1] |
| | | Unknown | - | Nop-takeover[1] |
| S-VOL (secondary) | Status == SSWS (After SVOL_SSUStakeover) | - | - | Nop-takeover[1] |
| | Other than SSWS | SMPL | - | Unconformable |
| | | P-VOL | PAIR or PFUL | Swap-takeover[2] |
| | | | Others | SVOL-takeover[2] |
| | | S-VOL | - | Unconformable |
| | | Unknown | - | SVOL-takeover[2] |

**Notes:**

1. No action needed to allow local writes.
2. Required to allow local writes.

**Nop-takeover**

No operation is done to allow local writes, though the takeover command is accepted. Personality swaps must be accomplished in another way.

**Unconformable**

A pair of volumes are not conformable to each other as a pair (that is, one P-VOL, one S-VOL). The takeover command execution terminates abnormally.

**Reject**

The takeover command is rejected, and the operation terminates abnormally.

**Unknown**

The attribute of the remote node is unknown and cannot be identified. This means that the remote node system has gone down or cannot communicate over the LAN.

**SSWS**

Since the SSWS state is referring to a Suspend for Swapping with S-VOL Side only, the SSWS state is displayed as SSUS (SVOL_PSUS) by all commands except the -fc option of the **pairdisplay** command.

## Swap-takeover function

The P-VOL status at the remote node is PAIR or PFUL (TrueCopy Async and over high-water mark) and the S-VOL has mirroring consistency. In such a state, it is possible to swap the primary and secondary volume designations to continue operation. The takeover command internally executes the operating commands (explained later) step by step, to swap the primary and secondary volume designations. Swapping can be specified at the granularity of volume pair, consistency group, or volume group.

The swap-takeover function does not use Simplex and No Copy mode for Swapping in order to guarantee mirror consistence more surely, and it is included as a function of SVOL-takeover.

1. As the preliminary step of swap-takeover, the command orders a Suspend for Swapping (SSWS) for the local volume (S-VOL). If this step fails, the swap-takeover function is disabled and it will be returned at an error.

2. The command orders a Resync for Swapping for switch to the primary volume that the local volume (S-VOL) is swapped as the NEW_PVOL and re-synchronizes the NEW_SVOL based on the NEW_PVOL. As for the number of simultaneous copy tracks, if the remote host is known then the command will use the value of P-VOL specified at paircreate time, else (remote host is Unknown) the command will use a default of 3 as the number of tracks for Resync for Swapping.

   If this step fails, the swap-takeover function will be returned at SVOL-SSUS-takeover, and the local volume (S-VOL) is maintained in SSUS(PSUS) state which permits WRITE and maintaining delta data (BITMAP) for the secondary volume. Also this special state is displayed as SSWS state using -fc option of pairdisplay command.

**TrueCopy Async/Universal Replicator specific behavior for swap-takeover:**

The S-VOL side CCI will issue a Suspend for Swapping to the S-VOL side storage system. Non-transmitted data which remains in the FIFO queue (sidefile) of the primary volume will be copied to the S-VOL side and a Resync for Swapping operation will be performed (after the copy process). The Swap operation is required to copy Nontransmitted P-VOL data within a given timeout value (specified by the -t <timeout> option).

## SVOL-takeover function

The function makes it so the takeover node alone can use the secondary volume (except in COPY state) in SSUS(PSUS) state (i.e., reading and writing are enabled), on the assumption that the remote node (possessing the primary volume) cannot be used.

The data consistency of the secondary volume is judged by its status and fence level. If this check proves that data is not consistent, the SVOL-takeover function fails. If this check proves that data is consistent then this function will try to switch the S-VOL to a primary volume using a Resync for Swapping, and if it succeeds then this function will return Swap-takeover, else this function will return SVOL-SSUS-takeover as the return value of horctakeover command. In case of a Host failure, this function will be returned as Swap-takeover. In case of a FICON® or P-VOL site failure, this function will be returned as SVOL-SSUS-takeover. A SVOL-takeover can be specified by the granularity of a paired logical volume, consistency group, or volume group. If a SVOL-takeover is specified for a volume group, a data consistency check is executed for all volumes in the group. Inconsistent volumes are picked out and displayed in the execution log file as shown below:

**Example**

```
Group Pair vol Port targ# lun# LDEV#...Volstat Status Fence To be...
oradb1 ora001 CL1-A 1 5 145...S-VOL PAIR NEVER Analyzed
oradb1 ora002 CL1-A 1 6 146...S-VOL PSUS STATUS Suspected
```

Even so, the SVOL-takeover function enables the secondary volume to be used (i.e., reading and writing are enabled) since it assumes that the remote node (possessing the primary volume) cannot be used.

**TrueCopy Async/Universal Replicator specific behavior for SVOL-takeover:**

The S-VOL side CCI will issue a Suspend for Swapping to the S-VOL side storage system. Non-transmitted P-VOL data will be copied to the S-VOL and a Resync for Swapping operation will be performed (after the copy process).

In case of a Host failure, this data synchronize operation will be accomplished and the SVOL-takeover function will return as Swaptakeover after attempting a Resync for Swapping.

In case of a FICON® or P-VOL site failure, this data synchronization operation might fail. Even so, the SVOL-takeover function will do Suspend for Swapping, and enable the secondary volume to be used.

As a result, this function will return as SVOL-SSUS-takeover. Through this behavior, you will be able to judge that non-transmitted data of the primary volume was not transmitted completely when a SVOL-takeover returns SVOL-SSUS-takeover.

> ⚠️ **Caution:** The SVOL-takeover operation is required to copy Nontransmitted P-VOL data within a given timeout value (specified by the -t <timeout> option).
>
> If the timeout occurs (before the SVOL-takeover operation has completed all S-VOL changes to a SSWS state), the horctakeover command will fail with EX_EWSTOT. If the horctakeover has failed due to a timeout then you need to try for a recovery as shown below.
>
> - Wait until the S-VOL state becomes SSWS' via pairdisplay -g <group> -l -fc command, and try to the start-up again for the HA Control Script.
>
> - Make an attempt to re-synchronize the original P-VOL based on the S-VOL using pairresync -g <group> -swaps -c <size> for a Fast Failback operation.
>
>   If this operation fails with [EX_CMDRJE] or [EX_CMDIOE], this is due to a FICON® link down or site failure. After a recovery from the failure, perform the operation again.
>
> Therefore this timeout value should be a greater than (or equal) to the start-up timeout value for the MC & CC Control Script.

## PVOL-takeover function

A PVOL-takeover relinquishes the pair state for a volume or group in order to make the P-VOL writable following some type of error (for example, link down with DATA fence). This function makes it so the takeover node alone can use the primary volume (that is, reading and writing are enabled), on the assumption that the remote node (possessing the secondary volume) cannot be used.

The PVOL-takeover function has two functions: PVOL-PSUE-takeover, and PVOL-SMPL-takeover. A PVOL-PSUE-takeover forces the primary volume to suspend (PSUE, PSUS) state which permits WRITEs to all primary volumes of the group (even if the fence level is data). Therefore PSUE and/or PSUS are intermingled in the volume group through the action of this PVOL-PSUE-takeover. This intermingled pair status creates PSUE as the group status, therefore the pairvolchk command results give precedence to PSUE (PDUB) status over PSUS for the group.

This special state returns back to its original state by issuing the pairresync command. A PVOL-SMPL-takeover forces the primary volume to simplex (SMPL) state so the pair is destroyed. At first, PVOL-takeover executes PVOL-PSUE-takeover. If PVOL-PSUE-takeover fails, it then executes PVOL-SMPL-takeover. PVOL-takeover can be specified per paired logical volume or per volume group.

**TrueCopy Async/Universal Replicator specific behavior for PVOL-takeover:**

PVOL-takeover will not be executed. It will become a Nop-Takeover, since the fence level will be Async which is equal to Never so it is not needed to allow P-VOL writes.

# TrueCopy remote commands

The CCI TrueCopy remote commands assist the system operation with volume backups among UNIX servers and their operating system management functions. The TrueCopy remote pair commands are also used to copy volumes in server failover configurations and to restore the volumes to their original state after a server failover has been recovered.

- **Pair creation command**: Creates a new volume pair. Volume pairs can be created in units of volume or group.

- **Pair splitting command**: Splits a volume pair and allows read and write access to the secondary volume.

- **Pair resynchronization command**: Resynchronizes a split volume pair based on the primary volume. The primary volume remains accessible during resynchronization.

  - Swaps(p) option (TrueCopy only). Swaps volume from the S-VOL(P-VOL) to the P-VOL(S-VOL) when the S-VOL(P-VOL) is in the suspended state and resynchronizes the NEW_SVOL based on the NEW_PVOL. At the result of this operation, the volume attributes of the host of reference (local host) are used as the attributes for the NEW_PVOL(SVOL).

- **Event waiting command**: Used to wait for the completion of volume pair creation or resynchronization and to check the pair status.

- **Pair status display and configuration confirmation command**: Displays the pair status and configuration of the volume pairs and is used for checking the completion of pair creation or pair resynchronization.

The following figure illustrates a TrueCopy remote system configuration.

Legend

- HORCM: The manager is a demon process, executes multiple commands, charges to a storage system through itself. Among the managers are connected by UDP, remotely execute a command among the servers mutually.

- Command: A command provisioned by CCI.

## TrueCopy local commands

The CCI TrueCopy local commands assist the system operation with volume backups among UNIX servers and their operating system management functions. The TrueCopy local commands perform the same functions as the remote commands but within the same RAID storage system instead of between two RAID storage systems.

The following figure illustrates a TrueCopy local system configuration.



# TrueCopy, ShadowImage, and Universal Replicator operations

## TrueCopy/ShadowImage volumes

TrueCopy commands allow you to create volume pairs consisting of one primary volume (P-VOL) and one secondary volume (S-VOL). The TrueCopy P-VOL and S-VOL can be in different storage systems. TrueCopy provides synchronous and asynchronous copy modes. TrueCopy Async can only be used between separate storage systems (not within one storage system). For details on TrueCopy specifications, volumes and operations, please see the *Hitachi TrueCopy® User Guide* for your storage system.

ShadowImage commands allow you to create volume pairs consisting of one P-VOL and up to nine S-VOLs using the ShadowImage cascade function. ShadowImage pairs are contained within the same storage system and are maintained using asynchronous update copy operations. For details on ShadowImage specifications volumes and operations, please see the *Hitachi ShadowImage® User Guide* for your storage system.

Each volume pair that you want to create must be registered in the CCI configuration file. ShadowImage volume pairs must include a MU (mirrored unit) number assigned to the S-VOL. The MU number indicates that the pair is a ShadowImage pair and not a TrueCopy pair. Once the correspondence between the paired logical volumes has been defined in the HORCM_DEV section of the configuration file, you can use the configuration file to group the paired volumes into volume groups that can be managed by the host operating system's LVM (logical volume manager).

The host's LVM allows you to manage the TrueCopy/ShadowImage volumes as individual volumes or by volume group. TrueCopy/ShadowImage commands can specify individual logical volumes or group names. For LUSE volumes, you must enter commands for each volume (LDEV) within the expanded LU. If you define volume groups and you want to issue commands to those volume groups, you must register the volume groups in the configuration file. For further information about the server LVM, see the user documentation for your corresponding operating system.

## TrueCopy/ShadowImage/Universal Replicator pair status

Each TrueCopy pair consists of one P-VOL and one S-VOL, and each ShadowImage pair consists of one P-VOL and up to nine S-VOLs when the cascade function is used. The P-VOL controls the pair status for the primary and secondary volumes. The major pair statuses are SMPL, PAIR, PSUS/PSUE, and COPY/RCPY. Read and write requests from the host are accepted or rejected depending on the pair status of the volume.

The pair status can change when a CCI command is executed. The validity of the specified operation is checked according to the status of the volume (primary volume).

See the tables below for the relationship between pair status and TrueCopy/Universal Replicator command acceptance, pair status and ShadowImage command acceptance and pair status and Copy-on-Write Snapshot command acceptance.

For details on pair status of TrueCopy for Mainframe, ShadowImage for Mainframe, and Universal Replicator for Mainframe, see Pair operations with mainframe volumes.

**TrueCopy and ShadowImage pair status**

| Status | TrueCopy pair status | ShadowImage pair status | Primary | Secondary |
|---|---|---|---|---|
| SMPL | Unpaired volume | Unpaired volume | R/W enabled | R/W enabled |
| PAIR | Paired volume. Initial copy is complete. Updates are processed synchronously or asynchronously. | Paired volume. Initial copy is complete. Updates are processed asynchronously. | R/W enabled | R enabled |

| Status | TrueCopy pair status | ShadowImage pair status | Primary | Secondary |
|---|---|---|---|---|
| COPY | In paired state, but initial copy, pairsplit, or resync operation is not complete. Includes COPY(PD), COPY(SP), and COPY(RS) status. | In paired state, but initial copy, pairsplit, or resync operation is not complete. Includes COPY(PD), COPY(SP), and COPY(RS) status. | R/W enabled | R enabled |
| RCPY | Not used for TrueCopy | In paired state, but reverse resync operation is not complete. Includes COPY(RS-R) status. | R enabled | R enabled |
| PSUS (split) SSUS (split) | In paired state, but updates to the S-VOL data are suspended due to user-requested pairsplit. The RAID storage system keeps track of P-VOL and S-VOL updates while the pair is split. | In paired state, but updates to the S-VOL data are suspended due to user-requested pairsplit. The RAID storage system keeps track of P-VOL and S-VOL updates while the pair is split. | R/W enabled | R/W enabled when using write enable pairsplit option |
| PSUE (error) or PFUS | In paired state, but updates to the S-VOL data are suspended due to an error condition. (PSUE is PSUS due to internal error. PFUS is PSUS due to sidefile full.) | In paired state, but updates to the S-VOL volume data are suspended due to an error condition. When a PSUE pair is resynchronized, the RAID storage system copies the entire P-VOL to the S-VOL (same as initial copy). | R/W enabled if no error occurs in the primary volume | R enabled |
| PDUB | Used only for TrueCopy LUSE pairs. In paired state, but updates to one or more LDEVs within the LUSE pair are suspended due to an error condition. | Not used for ShadowImage | R/W enabled if no error occurs in the primary volume | R enabled |

**Universal Replicator pair status**

| Status | Universal Replicator pair status | Primary | Secondary |
|---|---|---|---|
| SMPL | Unpaired volume | R/W enabled | R/W enabled |
| PAIR | The pair is synchronized. Updates to the P-VOL are duplicated on the S-VOL. | R/W enabled | R enabled |

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| Status | Universal Replicator pair status | Primary | Secondary |
|---|---|---|---|
| COPY | In paired state, but initial copy, pairsplit, or resync operation is not complete. Includes COPY(PD), COPY(SP), and COPY(RS) status. | R/W enabled | R enabled |
| PSUS (split) SSUS (split) | The user has split the pair or released the pair; the pair is no longer synchronized.<br><br>▪ The primary and secondary systems keep track of journal data discarded during the pairsplit operation.<br><br>▪ When the operation is performed at the primary system, the status of both the P-VOL and S-VOL changes to PSUS.<br><br>▪ When the operation is performed at the secondary system, the status of the S-VOL changes to PSUS; the primary system detects this (if path status is normal) and changes P-VOL status to PSUS.<br><br>▪ When a pair is released from the secondary system, the secondary system changes the status of the S-VOL to SMPL. The primary system detects this (if path status is normal and changes P-VOL status to PSUS. (The pair must be released from the primary system to change P-VOL status to SMPL.) | R/W enabled | R/W enabled when using write enable pairsplit option |
| PSUE | The pair is suspended due to an error; the pair is not synchronized.<br><br>▪ The primary and secondary systems keep track of any journal data that are discarded during the suspension operation.<br><br>▪ The primary system keeps track of P-VOL tracks that are updated while the pair is suspended.<br><br>▪ When a UR suspension condition is detected, the primary system changes P-VOL and S-VOL status to PSUE. If the secondary system detects the condition, it changes the S-VOL status to PSUE; the primary system detects this and changes P-VOL status to PSUS. | R/W enabled if no error occurs in the primary volume | R enabled |

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| Status | Universal Replicator pair status | Primary | Secondary |
|---|---|---|---|
| PFUS | If the Data Overflow Watch period is exceeded, pair status changes from PFUL to PFUS, and the pair is suspended.<br><br>▪ The PFUS status is displayed by CCI and Storage Navigator as PSUS.<br><br>▪ If a virtual volume of Dynamic Provisioning (DP-VOL) is used as a UR S-VOL, and the capacity of a pool-VOL is nearly full, UR status becomes PFUS and the pair is suspended. | R/W enabled | Read Only, unless write option is enabled. |
| SSWS | After Takeover, SSWS is the status of the S-VOL. With this status, data can be written to the S-VOL.<br><br>▪ SSWS is displayed by CCI, from which the horctakover command is issued.<br><br>▪ Storage Navigator displays this status as PSUS or PSUE. | R enabled | R/W enabled |
| PFUL | If data in the journal volume exceeds 80%, pair status changes to PFUL. The write data that inflows then is monitored during the Data Overflow Watch.<br><br>PFUL status is displayed by CCI. Storage Navigator displays this status as PAIR. | R/W enabled | R enabled |

**Pair status versus TrueCopy/Universal Replicator commands**

| | | TrueCopy/Universal Replicator command | | | | | |
|---|---|---|---|---|---|---|---|
| **-** | | **paircreate** | | **pairsplit** | | | **pairresync** |
| **#** | **Status** | **Copy** | **Nocopy** | **-r or -rw option** | **-P option** | **-S option** | **Resync** |
| 1 | SMPL | Accepted (#2) | Accepted (#3) | Rejected | Rejected | Acceptable | Rejected |
| 2 | COPY | Acceptable | Acceptable | Accepted (#4) | Rejected | Accepted (#1) | Acceptable |
| 3 | PAIR | Acceptable | Acceptable | Accepted (#4) | Accepted (#4) | Accepted (#1) | Acceptable |
| 4 | PSUS | Rejected | Rejected | Acceptable | Acceptable | Accepted (#1) | Accepted (#2, see Note) |

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| | | TrueCopy/Universal Replicator command | | | | | |
|---|---|---|---|---|---|---|---|
| **-** | | **paircreate** | | **pairsplit** | | | **pairresync** |
| **#** | **Status** | **Copy** | **Nocopy** | **-r or -rw option** | **-P option** | **-S option** | **Resync** |
| 5 | PSUE | Rejected | Rejected | Acceptable | Acceptable | Accepted (#1) | Accepted (#2, see Note) |
| 6 | PDUB | Rejected | Rejected | Rejected | Rejected | Accepted (#1) | Accepted (#2, see Note) |

**Legend:**

Accepted = The command is accepted and executed. When the operation terminates normally, the status changes to that of the indicated number.

Acceptable = The command is accepted but no operation is executed.

Rejected = The command is rejected and the operation terminates abnormally.

`Pairsplit` of a TrueCopy Async volume is returned after verification of state transition that waits until delta data is synchronized from P-VOL to S-VOL.

> 📄 **Note:** In the case of the SSWS status after SVOL-SSUS-takeover execution, the `pairresync` command (from P-VOL to S-VOL) is rejected because the delta data for S-VOL becomes dominant, and its status is expected to be using the `-swaps(p)` option of `pairresync`. If the `pairresync` command (from P-VOL to S-VOL) is rejected, confirm this special status using the `-fc` option of the `pairdisplay` command.

**P-VOL pair status versus ShadowImage commands**

In most cases, you can operate on ShadowImage pair volumes by issuing CCI commands (pair creation, pair splitting, pair resynchronization). To determine whether you can operate on a volume pair, check the status of the P-VOL of the target paired volumes.

The following table shows the relationship between P-VOL pair status and ShadowImage command acceptance.

| # | P-VOL pair status | ShadowImage command | | | | | |
|---|---|---|---|---|---|---|---|
| | | paircreate | | pairsplit | | | pairresync |
| | | No -split | -split | -E option | -C option | -S option | |
| 1 | SMPL | Accepted (#2) | Accepted[4] (#2 and then #4) | Rejected | Rejected | Acceptable | Rejected |
| 2 | COPY RCPY | Acceptable | Accepted[3] (#4) | Accepted (#5) | Accepted[3] (#4) | Accepted (#1) | Acceptable |
| 3 | PAIR [1] | Acceptable | Accepted[4] (#2 and then #4) | Accepted (#5) | Accepted[4] (#2 and then #4) | Accepted (#1) | Acceptable |
| 4 | PSUS | Rejected | Acceptable | Accepted (#5) | Acceptable | Accepted (#1) | Accepted (#2) |
| 5 | PSUE [2] | Rejected | Acceptable | Acceptable | Acceptable | Accepted (#1) | Accepted (#2) |

**Legend**:

Accepted = The command is accepted and executed. When the operation terminates normally, the pair status changes to that of the indicated number.

Acceptable = The command is accepted but no operation is executed.

Rejected = The command is rejected and the operation terminates abnormally.

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| # | P-VOL pair status | ShadowImage command | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | paircreate | | pairsplit | | | | pairresync |
| | | No -split | -split | -E option | -C option | -S option | | |

> **Note:**
>
> 1. When the P-VOL is in PAIR status, unless there is any write operation to the P-VOL, it is guaranteed that the data in the S-VOL matches the data in the P-VOL. If you want to use the S-VOL in SMPL status, stop the write operation to the P-VOL, pair the P-VOL and S-VOL, check that the P-VOL is in PAIR status, and then split the pair. This way, you can be sure that the S-VOL has data that is identical to that of the P-VOL.
>
> 2. When the P-VOL is in PSUE status, the difference between the P-VOL data and S-VOL data is not managed. If you perform pair resynchronization in this status, all data is copied. Note that the copy progress percentage displayed by the `-fc` option of the **pairdisplay** command shows 0%.
>
> 3. In quick mode, status transition from #2 to #4 occurs only when the command is executed for paired volumes immediately after the pair is created by using the **paircreate** command with the P-VOL of the pair in COPY status. Status transition from #2 to #4 does not occur when the command is executed for a pair with the P-VOL in COPY status after pair splitting or pair resynchronization.
>
> 4. When status transition from #2 to #4 occurs for a pair in quick mode, the P-VOL appears to be in PSUS status and the S-VOL appears to be in COPY status as shown in the following example. Read and write operations can be performed for the S-VOL because the pair is split. The following display example shows the case when status transition from #2 to #4 occurred for paired volumes in quick mode.

```
# pairsplit -g oradb
# pairdisplay -g oradb -fc
Group   PairVol(L/R) (Port#,TID,LU-M), Seq#, LDEV#.P/S, Status, % , P-LDEV# M
oradb   oradev3(R)    (CL2-N , 3,  5-0) 8071   29..S-VOL COPY,    97     28   -
oradb   oradev3(L)    (CL2-N , 3,  4-0) 8071   28..P-VOL PSUS,   100     29   W
```

As shown in the display example, when P-VOL PSUS is displayed for the P-VOL and S-VOL COPY is displayed for the S-VOL, the pair appears to be split but some data in the P-VOL is still not copied to the S-VOL. Although you can read from and write to the S-VOL in this status, the read and write performances are reduced as follows:

- If you attempt to read the data that is not yet incorporated in the S-VOL from the S-VOL, ShadowImage first completes copying of the non-incorporated data from the P-VOL to the S-VOL, and then returns the correct data. For this reason, the performance of reading from the S-VOL degrades to approximately 1/6 to 1/15 of the IOPS number for normal reading.

- If you attempt to write additional data, from the S-VOL, to the data that is not yet incorporated in the S-VOL, ShadowImage first completes copying of the non-incorporated data from the P-VOL to the S-VOL, and then manages the additionally written data as differential data of the S-VOL. For this reason, the performance of writing from the S-VOL degrades to approximately 1/6 to 1/8 of the IOPS number for normal writing.

- If you attempt to write additional data, from the P-VOL, to the data that is not yet incorporated in the S-VOL, ShadowImage first completes copying of the non-incorporated data from the P-VOL to the S-VOL, and then manages the additionally written data as differential data of the P-VOL. For this reason, the performance of writing from the P-VOL degrades to approximately 1/6 to 1/8 of the IOPS number for normal writing.

The following tables show the changes of pair status caused by the `pairsplit` and `paircreate -split` commands in normal and quick modes (WD = Write Disabled, WE = Write Enabled).

**Table 6 Pair status changes caused by the `pairsplit` command (the paired volumes are initially in PAIR status and some data is not yet copied from the P-VOL to the S-VOL)**

| # | Normal mode | | Quick mode | |
|---|---|---|---|---|
| | **P-VOL** | **S-VOL** | **P-VOL** | **S-VOL** |
| 1 | PAIR | PAIR (WD) | PAIR | PAIR (WD) |
| 2 | COPY | COPY (WD) | PSUS[1,2] | COPY (WE)[1,2] |
| 3 | PSUS | SSUS (WE) | PSUS | SSUS (WE) |

**Table 7 Pair status changes caused by the `pairsplit` command (the paired volumes are initially in PAIR status and all data is already copied from the P-VOL to the S-VOL)**

| # | Normal mode | | Quick mode | |
|---|---|---|---|---|
| | **P-VOL** | **S-VOL** | **P-VOL** | **S-VOL** |
| 1 | PAIR | PAIR (WD) | PAIR | PAIR (WD) |
| 2 | PSUS | SSUS (WE) | PSUS | SSUS (WE) |

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**Table 8 Pair status changes caused by the `paircreate -split` command**

| # | Normal mode | | Quick mode | |
|---|---|---|---|---|
| | **P-VOL** | **S-VOL** | **P-VOL** | **S-VOL** |
| 1 | SMPL | SMPL | SMPL | SMPL |
| 2 | COPY | COPY (WD) | PSUS[1,2] | COPY (WE)[1,2] |
| 3 | PSUS | SSUS (WE) | PSUS | SSUS (WE) |

**Note:**

1. If you execute the `pairevtwait -s psus` command while the P-VOL is in PSUS status and the S-VOL is in COPY status, the command immediately returns a response. To check whether the status of the S-VOL has transitioned to SSUS, execute the `pairvolchk -ss` command for the S-VOL or execute the `pairvolchk -ss -c` command for the P-VOL, and check the return code. You can also check whether the status of the S-VOL has transitioned to SSUS by executing the `pairevtwait -ss ssus` command for both the P-VOL and S-VOL, or by locally executing the `pairevtwait -ss ssus -l` command for the S-VOL.

2. If you execute the `pairresync -restore` command or the `pairsplit -s` command while the P-VOL is in PSUS status and the S-VOL is in COPY status, ShadowImage rejects execution of the command. In this case, you need to wait until the S-VOL enters SSUS status.

**Pair status versus Copy-on-Write Snapshot commands**

| | | Copy-on-Write Snapshot command | | | | | |
|---|---|---|---|---|---|---|---|
| | | paircreate | | pairsplit | | | pairresync |
| | **Pair status** | **No -split** | **-split** | **-E option** | **-C option** | **-S option** | **Resync** |
| 1 | SMPL | Accepted* (2) | Rejected | Rejected | Rejected | Acceptable | Rejected |
| 2 | COPY RCPY | Acceptable | Rejected | Rejected | Rejected | Rejected | Acceptable |
| 3 | PAIR | Acceptable | Accepted (4) | Rejected | Accepted (4) | Accepted (1) | Acceptable |
| 4 | PSUS (PFUS) | Rejected | Acceptable | Rejected | Acceptable | Accepted (1) | Accepted (2) |
| 5 | PSUE | Rejected | Rejected | Acceptable | Rejected | Accepted (1) | Accepted (2) |

Chapter 6: Data replication operations with CCI

| | Copy-on-Write Snapshot command | | | | | |
|---|---|---|---|---|---|---|
| | paircreate | | pairsplit | | | pairresync |
| Pair status | No -split | -split | -E option | -C option | -S option | Resync |
| Accepted: The command is accepted and executed. When the operation ends normally, the status changes to that of the shown number. | | | | | | |
| Accepted*: The command is accepted and issued. Whether this command is executed or not is determined by the microcode version of the storage system. | | | | | | |
| Acceptable: The command is accepted, but not executed. | | | | | | |
| Rejected: The command is rejected and the operation terminates abnormally. | | | | | | |

> **Note:**
>
> - pairsplit ("simplex -S") of Copy-on-Write Snapshot volume is returned without verification of state transition that waits until SMPL state. In SMPL state, the volume that was S-VOL becomes R/W disable and data is discarded.
>
> - In the "PSUE" state, Copy-on-Write Snapshot does not manage for differential data between the primary volume and secondary volume.

## TrueCopy Async, TrueCopy Sync, Universal Replicator, and global-active device volumes

TrueCopy Async and Universal Replicator provide paired volumes that use asynchronous transfer to ensure the sequence of writing data between the primary volume and secondary volume. The sequence of writing data between the primary and secondary volumes is guaranteed within each consistency group (CTG). The following figure illustrates TrueCopy Async consistency group.

**Restrictions**

▪ **Group definition of TrueCopy Async/Universal Replicator/TrueCopy Sync/global-active device volume**: All volumes in a group must be contained within the same storage system. If two or more groups of CCI include the same consistency group (CTG), then pair operation of the group is applied to the entire CTG.

▪ **Registration of CTG ID number and limitations**: CCI registers CTG IDs to the RAID disk array automatically when paired volumes are created by the `paircreate` command, and groups of configuration definition files are mapped to CTG ID. The maximum number of consistency groups is as follows:

- HUS VM, VSP, USP V/VM: 256 (CTG ID 0 - CTG ID 255)

- VSP G1x00 and VSP F1500: 256 (CTG ID 0 - CTG ID 255)

- VSP G800, VSP F800, and 9900V: 128 (CTG ID 0 - CTG ID 127)

- VSP G400, G600 and VSP F400, F600: 64 (CTG ID 0 - CTG ID 63)

- VSP G200: 16 (CTG ID 0 - CTG ID 15)

- VSP G350, VSP F350, VSP G370, VSP F370, VSP G700, and VSP F700: 128 （CTG ID 0 -CTG ID 127）

- VSP G900 and VSP F900: 256 (CTG ID 0 - CTG ID 255)

- VSP E590 and VSP E790: 128 (CTG ID 0 - CTG ID 127)

- VSP E990 and VSP E1090: 256 (CTG ID 0 - CTG ID 255)

- VSP 5000 series (other than global-active device): 256 (CTG ID 0 - CTG ID 255)

- VSP 5000 series (global-active device):1024 (CTG ID 0 - CTG ID 1023)

TrueCopy Async/Universal Replicator/global-active device pair command is terminated with EX_ENOCTG when the maximum number of consistency groups is exceeded.

> 📄 **Note:** The CCI versions of the primary and secondary site must be 01-50-03/*xx* or later. If the version of the primary or secondary site is 01-49-03/*xx* or earlier, EX_ENOCTG error occurs.

▪ **Relationships between CTG ID and Journal ID**: For the range of consistency group ID (CTG ID) assignments at TrueCopy Async, TrueCopy Sync, Universal Replicator, and global-active device, see the applicable user guide for each program product. The consistency group numbers for Universal Replicator are mapped to the journal.

▪ **Pair split with the TrueCopy Sync CTG specified**: The operation for making data consistency is only supported by the following option:

```
pairsplit -g <group> ... [-r]
pairsplit -g <group> ... -rw
```

## TrueCopy Async and Universal Replicator volume characteristics

TrueCopy Async/Universal Replicator volumes have the following characteristics:

- **PAIR state**: A TrueCopy Async pair changes to the PAIR status as soon as all pending recordsets have been placed in the queue at the primary volume, without waiting for the updates to complete in the secondary volume.

- **Pair splitting**: When a TrueCopy Async pair is split or deleted, all pending recordsets at the primary volume are sent to the secondary volume, then the pair status changes to PSUS or SMPL. With the `pairsplit` command only, updates for the primary volume that occur during and after the pairsplit operation are marked on the bitmap of the primary volume.

- **Pair resynchronization**: The `pairresync` command resynchronizes the secondary volume based on the primary volume. This resynchronization does not guarantee the sequenced data transfer.

- **Error suspension**: Pending recordsets that have not yet been sent to the secondary volume are marked on the bitmap of the primary volume, then deleted from the queue, and then the pair status changes to PSUE.

- **Group operations**: TrueCopy Async automatically registers the CTG IDs with the storage system when paired volumes are created using the `paircreate` command, and groups in the configuration file are mapped to their corresponding CTG IDs. If more than one group, defined in the configuration definition file, is assigned to the same CTG ID, then pair operations on the group specificity apply to the entire consistency group.

## Sidefile cache for TrueCopy Async

The first-in-first-out (FIFO) queue of each consistency group is placed in an area of cache called the sidefile. The sidefile is used for transferring TrueCopy Async recordsets to the RCU. The sidefile is not a fixed area in cache but has variable capacity for write I/Os for the primary volume. If the host write I/O rate is high and the MCU cannot transfer the TrueCopy Async recordsets to the RCU fast enough, then the sidefile capacity expands gradually. The sidefile has a threshold to control the quantity of data transfer of host side write I/O. Host side write I/Os are controlled by delaying response when the sidefile exceeds the constant quantity limit on cache in the storage system. See the figure below for sidefile quantity limit.

**Legend**

- **Sidefile area**: Sidefile area = 30% to 70% of cache as set on Storage Navigator.

- **Write I/O control via the high-water mark (HWM)**: When the quantity of data in the sidefile reaches 30% of cache, the TrueCopy Async pair status is HWM of PAIR state, and the host write I/Os receive a delayed response in the range of 0.5 seconds to 4 seconds. Following is an arithmetic expression of the HWM at 100% of a sidefile space:

  HWM(%) = High water mark(%) / Sidefile threshold (30 to 70) * 100

- **Write I/O control via the sidefile threshold**: When the quantity of data in the sidefile occupies the maximum defined sidefile area, host write I/Os are delayed until there is enough sidefile space to store the next new write data. The copy pending timeout group option is defined using Storage Navigator and specifies the maximum delay between the M-VOL update and the corresponding R-VOL update. The range for the copy pending timeout option is 1-255 seconds (600 seconds for Universal Replicator), and default value is 90 seconds (60 seconds for UR). If the timeout occurs during this wait state, the pair status changes from PAIR to PSUS (sidefile full), and host write I/Os continue with updates being managed by the cylinder bitmap.

  > 🛈 **Important:** The copy pending timeout value should be less than the I/O timeout value of the host system.

## TrueCopy Async transition states and sidefile control

TrueCopy Async volumes have special states for sidefile control during status transitions. The table below shows the transition states for TrueCopy and TrueCopy Async volumes.

The suspending and deleting states are temporary internal states within the RAID storage system. CCI cannot detect these transition states, because these states are reported on the previous state of the storage system. These states are therefore concealed inside the `pairsplit` command. After the `pairsplit` command is accepted, host write I/Os for the P-VOL are managed by the cylinder bitmap (normal), non-transmitted data remaining in the P-VOL's FIFO queue is transferred to the S-VOL's FIFO queue, and the pair status is then set to PSUS [SMPL] state when all data in the P-VOL's FIFO queue has been transmitted.

**PFUL** If the quantity of data in sidefile cache exceeds 30% of cache storage, the internal status of the RAID storage system is PFUL, and host write I/Os receive delayed response in the range of 0.5 seconds (minimum) to 4 seconds (maximum).

**PFUS** If the quantity of data in sidefile cache exceeds the user-defined sidefile area (30%-70%), then host write I/Os must wait for enough sidefile space to become available for storing the next new write data. If a copy pending timeout occurs during this waiting state, then the pair status changes from PAIR to PFUS, host write I/Os are accepted, and write data is managed by bitmap.

The CCI software can detect and report the PFUL and PFUS states as follows:

- As a return code of the `pairvolchk` command

- As the status code displayed to code item by the `pairmon` command

- As the paired status displayed to status item using -fc option of `pairdisplay` command

**State table for TrueCopy Sync vs. TrueCopy Async**

The following table describes pair statuses of TrueCopy Sync and TrueCopy Async volumes.

| CCI state | Storage system internal state | Description TrueCopy Sync | Description TrueCopy Async | | Writing control on TC Async volume Writing data | Writing control on TC Async volume Response | Transfer data via ESCON |
|---|---|---|---|---|---|---|---|
| SMPL | SMPL | SMPL | Same | | Normal | Usual | None |
| COPY | COPY | COPY | Same | | Via Sidefile | Usual* | Sidefile & bitmap |
| | Deleting | N/A | Deleting from COPY using [pairsplit -S] | | Normal | Usual | Sidefile |
| | Suspending | N/A | Suspending from COPY by using [pairsplit] | | Via Bitmap | Usual | Sidefile |
| PAIR | PAIR | Synchronized | Async sidefile in use | Less than HWM | Via Sidefile | Usual | Sidefile |
| | PFUL | N/A | | HWM to Threshold | Via Sidefile | Delayed | Sidefile |
| | | | | Over Threshold | Via Sidefile | Wait until under threshold | Sidefile |
| | Deleting | N/A | Deleting from PAIR using [pairsplit -S] | | Normal | Usual | Sidefile |
| | Suspending | N/A | Suspending from PAIR | Using [pairsplit ] | Via Bitmap | Usual | Sidefile |
| | | | | Timeout of over threshold | | | |
| PSUS | PSUS | PSUS | Same | | Via Bitmap | Usual | None |
| | PFUS | None | Timeout Over Threshold | | Via Bitmap | Usual | None |
| PSUE | PSUE | PSUE | Same (link down, etc.) | | Via Bitmap | Usual | None |
| PDUB | PDUB | PDUB | Same | | Via Bitmap | Usual | None |

\* If the host has more write I/Os in COPY state, then host write I/Os are delayed until there is enough space in the sidefile.

**Legend**:

| CCI state | Storage system internal state | Description | | Writing control on TC Async volume | | Transfer data via ESCON |
|---|---|---|---|---|---|---|
| | | TrueCopy Sync | TrueCopy Async | Writing data | Response | |
| Bitmap: Host write data is managed via a cylinder BITMAP of delta data. | | | | | | |
| Normal: Host write data is not managed by BITMAP or sidefile. | | | | | | |
| Usual: Host side writing response is not delayed. | | | | | | |
| HWM (High Water Mark): Sidefile quantity is over 30% of cache storage. | | | | | | |

## TrueCopy Async/Universal Replicator error state

In the case of an ESCON or fibre-channel (FC) failure, the S-VOL FIFO queue is missing a data block that was transferred from the P-VOL FIFO queue. The RCU waits to store the next sequenced data block in the S-VOL FIFO queue until the TrueCopy Async copy pending timeout occurs (defined using TrueCopy). In addition, the timeout value can be specified at Device Manager - Storage Navigator. The default value is set to 5 minutes. If the timeout occurs during this waiting state, the pair status changes from PAIR to PSUE, and non-sequenced data blocks are managed by the S-VOL bitmap. The missing data block can be recovered using the `pairresync` command, which merges the S-VOL bitmap with the P-VOL bitmap. The figure below shows this situation on the secondary side.

# TrueCopy Sync/TrueCopy Async and Universal Replicator/global-active device fence level settings

TrueCopy volume pairs are assigned a fence level for write I/Os to ensure mirroring consistency of critical volumes. When the secondary volume takes over from the primary volume, the takeover action is determined according to the pair status and fence level of the corresponding secondary volume. The table below shows the relationship between TrueCopy pair statuses and fence levels.

The fence level for TrueCopy is Data, Status, Never. The fence level for TrueCopy Async and Universal Replicator is always Async. The fence level for global-active device is always Never.

▪ Mirror consistency = Identity and sequence of data is assured via error notification after an I/O completion.

▪ Data consistency = Sequence of data is assured in I/O order based on host.

**Relationship between TrueCopy pair statuses and fence levels**

| TrueCopy pair status of volume | Fence level and write response | | | |
|---|---|---|---|---|
| | Data [1] | Status [2] | Never [3] | Async [4] |
| Write response — Valid P (Primary volume) → Valid P (Secondary volume) | OK | OK | OK | OK |
| | Mirroring consistency assured | Mirroring consistency assured | Mirroring consistency assured | Data consistency assured |
| Write response — Valid E (Primary volume) → Not Valid E (Secondary volume) | ERROR | OK | OK | OK |
| | Mirroring consistency assured | Mirroring consistency not assured | Mirroring consistency not assured | Data consistency assured |
| Write response — Valid E (Primary volume) → Not Valid P (Secondary volume) | ERROR | ERROR | OK | OK |
| | Mirroring consistency assured | Mirroring consistency assured | Mirroring consistency not assured | Data consistency assured |

**Notes:**

1.  When the fence level is data: Mirroring consistency is assured, since a write error is returned if mirror consistency with the remote S-VOL is lost. The secondary volume can continue operation, regardless of the status. Note: A P-VOL write that discovers a link down situation will, in addition to returning an error to the host, likely be recorded on [only] the P-VOL side.

| | Fence level and write response | | | |
|---|---|---|---|---|
| **TrueCopy pair status of volume** | **Data** [1] | **Status** [2] | **Never** [3] | **Async** [4] |

2.  When the fence level is status: If there is a mirror consistency problem (that is, PSUE) and it is possible to set the S-VOL to PSUE, the P-VOL write completes OK. If the S-VOL cannot be set to PSUE for any reason, the P-VOL write completes with an error. The mirror consistency of the S-VOL depends on its status:

    **PSUE**: The secondary volume is dubious.

    **PAIR**: The secondary volume can continue operation.

3.  When the fence level is never: Writing to the P-VOL is still enabled in the state where mirror consistency to the S-VOL is lost, regardless of whether the secondary volume status is updated or not. Thus, the secondary could have these states:

    **PSUE**: The secondary volume is dubious.

    **PAIR**: The secondary volume is substantially dubious, since it can continue operation and is also dubious. The P-VOL status must be checked to confirm the mirroring consistency.

4.  When the fence level is async: TrueCopy Async/UR uses asynchronous transfers to ensure the sequence of write data between the P-VOL and S-VOL. Writing to the P-VOL is enabled, regardless of whether the S-VOL status is updated or not. Thus the mirror consistency of the secondary volume is dubious (similar to the "Never" fence):

    ▪ **PSUE**: The S-VOL mirroring consistency is not assured, but the PSUE suspended state ensures the sequence of data for the consistency group; thus, data consistency is also assured during a PSUE state. At a PSUE state, the P-VOL writes still complete and are also noted in a bitmap for future transfer. Due to the use of a bitmap in the suspend state, data consistency is not assured during a copy state resync.

    ▪ **PAIR**: If the P-VOL and S-VOL are both in a PAIR state, mirror consistency is not assured (might be behind) but data consistency is assured (what has reached the S-VOL is in the proper order).

## Setting the fence level

### Data fence level

The figure below shows the relationship between redo log files (journal) and data files. If the S-VOL takes over from the P-VOL in the status shown in the figure (where two errors have occurred), the secondary host leaves data (V) unprocessed in the roll-back processing and cannot be recovered completely. Therefore, the fence level of a redo log file must be defined as data. Once the fence level is set to data, the P-VOL returns an error if data might possibly be inconsistent when a write request is issued by the host. Since writing to the data file is not executed due to a write error of the redo log file, the log file stays consistent with the data file. However, when the fence level is set to data, a write I/O error occurs even in the case where operation is suspended due to an error in the S-VOL. Accordingly, duplication becomes meaningless when the S-VOL takes over. Thus, applications using paired volumes with the data fence level should be able to handle write I/O errors properly. For example, the Oracle application creates multiple redo log files by itself (three by default). The fence level can be set to data in this case in which disk errors are permissible by creating multiple files.

**Never fence level**

Because most UNIX file systems (excluding JFS and VxFS) have no journal files, the fence level should be defined as Never. When a takeover by the S-VOL occurs, fsck is executed on the volume and the file system is cleaned up, even if the S-VOL is undefined at the secondary host. The data that is lost depends on how much differential data is contained in the P-VOL when the S-VOL is suspended. During operation, error recovery should be performed when the suspended status (PSUE or PDUB) is detected (when one error occurs).

# Copy-on-Write Snapshot operations

Copy-on-Write Snapshot normally creates virtual volumes for copying on write without specifying LUNs as S-VOLs. However, to use a Copy-on-Write Snapshot volume via the host, it is necessary to map the Copy-on-Write Snapshot S-VOL to a LUN. Therefore, CCI provides a combined command to enable the user or application to use the same CCI command in order to maintain ShadowImage compatibility.

Copy-on-Write Snapshot uses two techniques, one called "V-VOL mapping" (or virtual volume mapping) and the other is "Snapshot using copy on write" or "Copy-on-write snapshot." Copy-on-Write Snapshot volumes are also put into pooling volumes called a "Snapshot pool," and a Snapshot pool is specified as a pool ID when a Snapshot is made. Copy-on-Write Snapshot and volume mapping is illustrated in the figure given below.

The following figure illustrates Copy-on-Write Snapshot volume mapping.

## Copy-on-Write Snapshot volumes

The specifications for Copy-on-Write Snapshot volumes are:

- Allowable type of paired volume: The supported volume type is OPEN-V only for P-VOL, and OPEN-0V for S-VOL.

- Number of volumes (Copy-on-Write Snapshot) can be paired: This depends on P-VOL capacity, Copy-on-Write Snapshot pool capacity, and shared memory capacity on the RAID storage system.

- Duplicated writing mode: Copying on write.

- Number of mirror volumes:

  - Thin Image: Up to 1,024 secondary volumes can be defined for each P-VOL.

  - Copy-on-Write Snapshot: Up to 64 secondary volumes can be defined for each P-VOL.

For details on Thin Image or Copy-on-Write Snapshot specifications such as maximum number of mirrored volumes, volumes and operations, please see the *Hitachi Thin Image User Guide* or *Hiitachi Copy-on-Write Snapshot User Guide* for your storage system.

## Pair operations and commands for Copy-on-Write Snapshot and Thin Image

The following table shows the pair operations and commands that can be used for Copy-on-Write Snapshot and Thin Image pairs.

| Command | Copy-on-Write Snapshot | Thin Image (HTI only) | Thin Image Advanced (cascade pairs, pairs with the clone attribute) |
|---|---|---|---|
| paircreate | Yes | Yes* | No |
| pairsplit | Yes | Yes* | No |
| pairresync | Yes | Yes* | No |
| paireventwait | Yes | Yes* | No |
| pairmon | Yes | Yes* | No |
| pairvolchk | Yes | Yes* | No |
| pairdisplay | Yes | Yes* | No |
| raidscan | Yes | Yes* | No |
| raidcom | No | Yes | Yes |
| *The MU numbers that can be used and referenced are from 0 to 63. | | | |

## Creating a Copy-on-Write Snapshot pair

The Thin Image pair and Copy-on-Write Snapshot pair operations are performed using the same replication commands as the ShadowImage commands, such as paircreate, pairsplit, and pairresync. However, a Thin Image pair can only operate up to 64 S-VOLs with the replication commands. Therefore, use the configuration setting command (raidcom command) if you want to operate more than 64 S-VOLs.

The `paircreate` command determines whether it is a ShadowImage pair or a Thin Image/ Copy-on-Write Snapshot pair by the attribute of the S-VOL. The RAID storage system also determines whether it is a Thin Image pair or a Copy-on-Write Snapshot pair by the type of the pool to be used.

When you execute the `paircreate` command, a Thin Image pair is generated in the following two cases:

▪ When a V-VOL (OPEN-0V) is specified as an S-VOL.

▪ When the pool type of the specified pool is one of the following:

   • Thin Image pool

   • HDP pool (VSP 5000 series, VSP G1x00, VSP F1500, VSP E series, VSP G/F350, G/ F370, G/F700, G/F900, VSP G200, G400, G600, G800, and VSP F400, F600, F800 only)

▪ When a pool for Thin Image is specified as the pool type.

When you execute the paircreate command, a Copy-on-Write Snapshot pair is generated in the following two cases:

- When a V-VOL (OPEN-0V) is specified as an S-VOL.

- When a pool for Copy-on-Write Snapshot is specified as the pool type.

A V-VOL has the following characteristics:

- It appears as "OPEN-0V" to identify a V-VOL easily via the SCSI Inquiry or CCI.

- A V-VOL unmapped to the S-VOL of a Copy-on-Write Snapshot will reply to a SCSI Inquiry, but Reading and/or Writing is not allowed. LDEV will reply the capacity setting as an LU to SCSI Read Capacity.

- A V-VOL that has become the S-VOL of a Copy-on-Write Snapshot will reply to a SCSI Inquiry, and Reading and/or Writing is allowed.

## Copy-on-Write Snapshot pair status

Each paired volume consists of a primary volume (P-VOL) and a secondary volume (S-VOL). Each volume has the status for controlling the pair state.

The P-VOL controls the pair state that is reflected on the status of the S-VOL. The major pair statuses are "SMPL", "PAIR", "PSUS", "COPY", and "RCPY". The status is changed when the CCI command is issued. A read or write request from the host is allowed or rejected according to the status.



See the table below for Copy-on-Write Snapshot pairing status.

| P-VOL status | Pairing status | Primary | Secondary |
|---|---|---|---|
| SMPL | Unpaired (Copy-on-Write Snapshot) volume | R/W enabled | R/W disable[1] |
| PAIR (PFUL) | The Copy-on-Write Snapshot available state allocated the resource. | R/W enabled | R/W disable |
| COPY | The preparing state allocates the resource for the Copy-on-Write Snapshot. | R/W enabled | R/W disable |
| RCPY | The copying state from Copy-on-Write Snapshot to the primary volume by using restore option. | R/W enabled | R/W disable |

| P-VOL status | Pairing status | Primary | Secondary |
|---|---|---|---|
| PSUS (PFUS) | The differences of the updated data of the primary and secondary volume are controlled with copying on write. | R/W enabled | R/W enabled |
| PSUE (Error) | "PSUS" status due to an internal failure. The differences of the updated data for the Copy-on-Write Snapshot volume are not controlled. | R/W enabled[2] | R/W disable |
| **Notes:** | | | |

1. V-VOL unmapped to the S-VOL of a Copy-on-Write Snapshot will reply to a SCSI Inquiry, but Reading and/or Writing is not allowed.

2. Reading and writing are enabled, as long as no failure occurs in the primary volume.

## Pair status relationship to Copy-on-Write Snapshot commands

The pair status relationship to Copy-on-Write Snapshot commands table applies to a Copy-on-Write Snapshot context. It explains:

1. What a pair status can be prior to any CCI command execution.

2. What the result will be after giving a CCI command.

3. What the pair status can be if the CCI command is accepted.

| | | Copy-on-Write Snapshot command | | | | | |
|---|---|---|---|---|---|---|---|
| **-** | | **paircreate** | | **pairsplit** | | | **pairresync** |
| **Pair status** | | **No -split** | **-split** | **-E option** | **-C option** | **-S option** | **Resync** |
| 1 | SMPL | Accepted (2) | Rejected | Rejected | Rejected | Acceptable | Rejected |
| 2 | COPY RCPY | Acceptable | Rejected | Rejected | Accepted* | Accepted (1) | Acceptable |
| 3 | PAIR | Acceptable | Accepted* (4) | Rejected | Accepted* | Accepted (1) | Acceptable |
| 4 | PSUS (PFUS) | Rejected | Acceptable | Rejected | Accepted* | Accepted (1) | Accepted* (2) |
| 5 | PSUE | Rejected | Rejected | Rejected | Rejected | Accepted (1) | Accepted* (2) |

| - | Copy-on-Write Snapshot command | | | | | |
|---|---|---|---|---|---|---|
| | paircreate | | pairsplit | | | pairresync |
| Pair status | No -split | -split | -E option | -C option | -S option | Resync |
| Accepted: The command is accepted and executed. When the operation ends normally, the status changes to that of the shown number. | | | | | | |
| Accepted*: The command is accepted and issued. Whether this command is executed or not is determined by the microcode version of the storage system. | | | | | | |
| Acceptable: The command is accepted, but not executed. | | | | | | |
| Rejected: The command is rejected and the operation terminates abnormally. | | | | | | |

📄 **Note:**

- **`pairsplit -S`** of a Copy-on-Write Snapshot volume is returned without verification of the state transition that waits until SMPL state. In a SMPL state, note that the volume that was an S-VOL becomes R/W disabled and data is discarded.

- In the "PSUE" state, Copy-on-Write Snapshot does not manage differential data between the primary volume and secondary volume.

# Controlling Volume Migration

Volume Migration is used to optimize your data storage by balancing resource utilization and resolving bottlenecks of system activity on the storage system. If heavy input/output (I/O) activity occurs on a specific data drive or disk processor, the host might suffer from slower response times. To avoid this situation, Volume Migration lets you migrate high-usage volumes to a low-usage data drive or a fast data drive.

You can control Volume Migration using the CCI replication commands.

## Specifications for Volume Migration

To control Volume Migration using CCI replication commands, LU paths must be defined for the data migration source volume (P-VOL) and the data migration target volume (S-VOL). For S-VOL, define the LU path for the port/host group that is not connected to the host.

The following shows an example of Volume Migration configuration using CCI. In the example, the data stored in the parity group (RAID Group) of P-VOL #18 is migrated to the volume of external storage (E-LDEV). The Volume Migration operation and the storage system behaivor are shown as follows. For details, see the Hitachi Volume Migration User Guide.

1. Execute the volume migration command (paircreate).
2. The data in the RAID Group of P-VOL #18 is copied to E-LDEV.
3. When completed, swap the data storage area of P-VOL #18 to E-LDEV.
4. From then on, I/O for P-VOL #18 from the host will be performed on the data stored in E-LDEV.



Legend:
    P-VOL: Primary volume
    S-VOL: Secondary volume
    Port for pooling: Port/host group that cannot be accessed from the host
    VM: Volume Migration
    SI: ShadowImage

**Volume Migration functions**

**(1) Command specification**

CCI operates the volume migration by specifying to the horcm*.conf as same SI and TC, because the volume migration using CCI is necessary to be defined the mapping for the target volume.

MU# (of SMPL as SI) that is not used because SI is used for Volume Migration operation.

An original volume for the migration is defined as P-VOL. A target volume for the migration is defined as S-VOL. In other words, an original volume is migrated from P-VOL to S-VOL, and the mapping between LDEV and VDEV is swapped after copied.

### (2) Mapping specification

The mapping between LUN and LDEV is maintained for the replying of SCSI-Inquiry in order to make recognize as identical LUN through the host after mapping changes.

The way to know whether the mapping is changed or not is possible to use "`-fe`" option of **pairdisplay** and/or **raidscan** command that shows the connection for the external volumes.

Also LU of the external connection and LU of RAID Group intermingle on the port for pooling, but can confirm this with the above option of the **raidscan** command.

### (3) Group operation

It is possible to execute the Volume Migration as a group by describing it to the horcm*.conf, however LU(LDEV), which was mapped to S-VOL after command execution, does not maintain the consistency of the group. In other words, you must consider the volume mapped to the S-VOL after execution as the discarded volume.

When HORCM demon is KILLed or the host has crash during group operation, the group aborting the execution of the command has LUN mixed with the external connection and RAID Group as the group. In this case, CCI skips the executed LU and issues the CC (Volume Migration) command to the un-executed LU, and an identical command is executed once again.

### (4) Using MU#

CCI manages the status of TC/SI using MU#, so CCI uses the empty MU# that is managed for SI. Therefore, execute the command of the volume migration in the environment for SI having HORCC_MRCF environment variable. An example is shown below.

P-VOL 0 —oradb— 0 S/P-VOL 1 —oradb1— 0 S-VOL

It is possible to specify MU#1 or MU#2 for CC.    It is possible to specify MU#2 for CC.

### (5) HORCM instance

It is possible to describe the original and target volume for the volume migration to MU# as another group in horcm*.conf for HORCM instance of SI and /or TC. Also, it is possible to define the original and target volume for the volume migration in the horcm*.conf as HORCM instance independent from SI/TC.

## Commands to control Volume Migration

### (1) Command for Volume Migration

CCI supports the volume migration by adding an option (`-m cc`) to the **paircreate** command.

```
paircreate -g <group> -d <pair vol> … -m <mode> -vl[r]
```

-m <mode> mode = cc (can only be specified for ShadowImage)

This option is used to specify the Volume Migration mode.

> 📄 **Note:** This option cannot be specified with "-split" option in the same command.

-vl[r]

The -vl option specifies "local", and copies from the local instance LU (P-VOL) to the remote instance LU (S-VOL), an original volume as the local instance LU is migrated from P-VOL to S-VOL, and the physical volume mapping between P-VOL and S-VOL is swapped after copied

The -vr option specifies "remote", and copies from the remote instance LU (P-VOL) to the local instance LU (S-VOL), an original volume as the remote instance LU is migrated from P-VOL to S-VOL, and the physical volume mapping between P-VOL and S-VOL is swapped after copied.

**(2) Command for discovering an external volume**

It is possible to discover the external volumes by using "-fe" option of the **raidscan** command.

```
raidscan -p <port#> -fe
```

-fe

This option is used to display the serial# and LDEV# of the external LUNs only mapped to the LDEV.

If the external LUN mapped to the LDEV on a specified port does not exist, then this option will do nothing. Also if this option is specified, -f[f][g][d] option is not allowed.

**Display example:**

```
# raidscan -p cl1-a-0 -fe -CLI
```

| PORT# /ALPA/C TID# | LU# Seq# | Num | LDEV# P/S | Status Fence | E-Seq# | E-LDEV# |
|---|---|---|---|---|---|---|
| CL1-A-0  ef  0  0 | 8 62496 | 1 | 19 SMPL | –   – | 30053 | 30 |
| CL1-A-0  ef  0  0 | 9 62496 | 1 | 21 SMPL | –   – | 30053 | 32 |
| CL1-A-0  ef  0  0 | 10 62496 | 1 | 22 SMPL | –   – | 30053 | 33 |

**E-Seq#**
     Displays the production (serial) number of the external LUN.

**E-LDEV#**

Displays the LDEV# of the external LUN.

## (3) Command for confirming the status

It is possible to confirm the status for Volume Migration by using "-fe" option of the **pairdisplay** command.

```
pairdisplay -g <group> -fe
```

```
-fe
```

This option is used to display the serial# and LDEV# of the external LUNs mapped to the LDEV and additional information for the pair volume.

This option displays the information above by adding to last column, and then ignores the format of 80 column.

This option is invalid if the cascade options (-m all,-m cas) are specified.

**Display example:**

Before execution of Volume Migration command:

```
# pairdisplay -g horc0 -fe
```

```
Group ...  Seq#,LDEV#.P/S,Status, Seq#,P-LDEV# M CTG CM EM E-Seq# E-LDEV#
```

```
horc0 ... 62496    18.SMPL  ---,-----    ---   -  -  -   -    -      -
```

```
horc0 ... 62496    19.SMPL  ---,-----    ---   -  -  -   H  30053    30
```

```
# paircreate -g horc0 -vl -m cc
```

During execution of Volume Migration command, the progress is displayed in the copy %:

```
# pairdisplay -g horc0 -fe
```

```
Group ...  Seq#,LDEV#.P/S,Status, Seq#,P-LDEV# M CTG CM EM E-Seq# E-LDEV#
```

```
horc0 ... 62496    18.P VOL COPY,62496     19 -  -  C   -    -      -
```

```
horc0 ... 62496    19.S VOL COPY,-----     18 -  -  C   H  30053    30
```

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After completion of Volume Migration command:

```
Group ...  Seq#,LDEV#.P/S,Status, Seq#,P-LDEV# M CTG CM EM E-Seq# E-LDEV#
```

```
horc0 ... 62496    18.P VOL PSUS,62496     19 -   - C   V  30053    30
```

```
horc0 ... 62496    19.S VOL SSUS,-----     18 -   - C   -   -      -
```

**CM**

> Displays the following copy modes:
>
> - N: Non Snapshot
>
> - S: Snapshot. For SMPL state, this shows that pair-volume will be created as Copy-on-Write Snapshot.
>
> - C: Volume Migration

**EM**

> Displays the following external connection modes:
>
> - H: Mapped E-lun as hidden from the host.
>
> - V: Mapped E-lun as visible to the host ' - ': Unmapped to the E-lun.
>
> - BH: Mapped E-lun as hidden from the host, but LDEV blockading.
>
> - BV: Mapped E-lun as visible to the host, but LDEV blockading.
>
> - B: Unmapped to the E-lun, but LDEV blockading

**E-Seq#**

> Displays the production (serial) number of the external LUN. Unknown is shown as '-'.

**E-LDEV#**

> Displays the LDEV# of the external LUN. 'Unknown' is shown as '-'.

**(4) Command for discovering an external volume via the device file**

It is possible to discover the external volumes by using the `inqraid` command.

**Example in Linux:**

```
# ls /dev/sd* |./inqraid -CLI
```

```
DEVICE_FILE      PORT    SERIAL   LDEV   CTG    H/M/12    SSID  R:Group   PRODUCT_ID
sdh              CL2-G    63528  15360    -     s/s/ss    0100  5:01-09   OPEN-V
sdu              CL2-G    63528   2755    -     s/s/ss    000B  S:00001   OPEN-0V
sdv              CL2-G    63528   2768    -     s/s/ss    000B  U:00000   OPEN-0V
sdw              CL2-G    63528   2769    -     s/s/ss    000B  E:16384   OPEN-V
```

**R:Group**

This displays the physical position of an LDEV according to mapping of LDEV in the RAID storage system.

| LDEV mapping | R: | Group |
|---|---|---|
| RAID Group | RAID Level<br><br>1: RAID1<br><br>5: RAID5<br><br>6: RAID6 | RAID Group number - Sub number |
| Copy-on-Write Snapshot S-VOL | S | PoolID number |
| Unmapped | U | 00000 |
| External LUN | E | External Group number |

**Example in Linux:**

```
# ls /dev/sd* |./inqraid
/dev/sdh -> CHNO =   0 TID =   1 LUN =   1
           [SQ] CL2-G Ser =   63528 LDEV =15360 [HITACHI ] [OPEN-V          ]
           HORC = SMPL  HOMRCF[MU#0 = SMPL MU#1 = SMPL MU#2 = SMPL]
           RAID5[Group  1- 9] SSID = 0x0100
/dev/sdu -> CHNO =   0 TID =   1 LUN =   14
           [[SQ] CL2-G Ser =   63528 LDEV =2755 [HITACHI ] [OPEN-V          ]
           HORC = SMPL  HOMRCF[MU#0 = SMPL MU#1 = SMPL MU#2 = SMPL]
           E-LUN[Group 00001] SSID = 0x000B
           SNAPS[PoolID 0001] SSID = 0x000B
/dev/sdv -> CHNO =   0 TID =   1 LUN =   15
           [[SQ] CL2-G Ser =   63528 LDEV =2768 [HITACHI ] [OPEN-V          ]
           HORC = SMPL  HOMRCF[MU#0 = SMPL MU#1 = SMPL MU#2 = SMPL]
           E-LUN[Group 08191] SSID = 0x000B
           UNMAP[Group 00000] SSID = 0x000B
/dev/sdw -> CHNO =   0 TID =   1 LUN =   16
           [[SQ] CL2-G Ser =   63528 LDEV =2769 [HITACHI ] [OPEN-V          ]
           HORC = SMPL  HOMRCF[MU#0 = SMPL MU#1 = SMPL MU#2 = SMPL]
           E-LUN[Group 16384] SSID = 0x000B
           E-LUN[Group 16384] SSID = 0x000B
```

**Group**

This item shows physical position of an LDEV according to mapping of LDEV in the RAID storage system.

| LDEV mapping | Display formats |
|---|---|
| RAID Group | RAID1[Group Group number - Sub number] |
| | RAID5[Group Group number - Sub number] |
| | RAID6[Group Group number - Sub number] |
| Copy-on-Write Snapshot S-VOL | SNAPS[PoolID poolID number ] |
| Unmapped | UNMAP[Group 00000] |
| External LUN | E-LUN[Group External Group number] |

## Relations between "cc" command issues and migration volume status

The migration volumes can be handled by issuing the CCI commands (pair creation and pair splitting commands). The validity of the specified operation is checked according to the status of the paired volume (primary volume).

The table shows the relations between the migration volume statuses and command acceptances.

| Command | Pair creation | Pair splitting |
|---|---|---|
| Pairing status CC | -m cc | Simplex -S |
| (1) SMPL | Accepted<br>(2) to (3)<br>(2) to (4) | Acceptable |
| (2) COPY | Acceptable | Accepted (1) |
| (3) PSUS | Rejected | Accepted (1) |
| (4) PSUE PDUB | Rejected | Accepted (1) |

Legend:

Accepted: A command is accepted and executed. When the command execution succeeds, the status changes to that of the shown number.

Acceptable: No operation is executed, though a command is accepted.

Rejected: Command execution is rejected and the operation terminates abnormally.

Other commands and options (for example, pairresync…) for operating a paired volume are rejected.

The "-m cc" option cannot be specified with "-split" option in the same command.

## Restrictions for Volume Migration

Volume Migration must be used within the following restrictions:

- **ShadowImage (HOMRCF)**: The operation for the volume migration must be operated at the "SMPL" or "PAIR" state. If not, `paircreate -m cc` command is rejected with EX_CMDRJE or EX_CMDIOE. Also ShadowImage cannot be operated to CC_SVOL moving in Volume Migration. In copying CC_SVOL, the copy operation for the volume migration is stopped, if the ShadowImage `pairsplit` command is executed.



- **TrueCopy (HORC)**: The operation for the volume migration must be performed at the "SMPL" or "PSUS" state. If not, `paircreate -m cc` command is rejected with EX_CMDRJE or EX_CMDIOE. Also HORC cannot be operated to CC_SVOL copying in Volume Migration. On one hand, in copying CC_SVOL, the copy operation for the volume migration is stopped, if `pairresync` command for of HORC is executed.



- **LDEV type for Volume Migration**: The volume of the external connection for the volume migration must be mapped to an LDEV as OPEN-V.

# Universal Replicator MxN configuration and control

## Overview

Universal Replicator supports 4X4 by using sysplex timers on the mainframe. However, open systems do not have an equivalent of sysplex timers on the mainframe, because the SCSI protocol does not have timestamps.

If the open system (CCI) has the timestamp as an equivalent of sysplex timers, Universal Replicator supports 4X4 on the open system.

- CCI: delivers the timestamp(CTQ-Marker) to the consistency group

- Storage system (RCU): arbitrates the timestamp (CTQ-Marker) across multiple storage systems connected remote command devices, and then commits the journal data.

In this architecture, CCI needs to be running. If CCI has stopped, the storage system (RCU) function does not appear to exist. Therefore, the better architecture is to include the storage system (RCU) function into CCI.

CCI already supports the group control across multiple storage systems in the TC_Sync group. This means that CCI can support Universal Replicator MxN on the open system if CCI is capable of delivering the timestamps and committing the Journal data with a CTQ-Marker.

Thus, CCI supports UR MxN for open systems in the four ways described in the policy.

## Policy

All data consistency of the consistency group across multiple storage systems is maintained by CCI. The storage system supports only basic functions; there is no relation between storage systems in order to simplify testing and configurations.

CCI supports Universal Replicator MxN in the following ways.

### (1) Delivering the timestamp (CTQ-Marker)

CCI (HORCM daemon process) makes a table for the groups registered to the horcm.conf as HORCM_CTQM with startup, and makes the threads for each group that delivers the same timestamp with an increment to the multiple storage systems configured in a group. The thread for a group delivers the same timestamp with increments, as far as a group configured Universal Replicator in the PAIR status.

The timestamp is delivered by using Freeze/Q-Marker & Run way as default. The timestamp is maintained in each storage system. CCI includes this timestamp with startup, and then delivers the same timestamp with increments to each storage system.

### (2) Arbitrating/committing the journal data with CTQ-Marker

The thread for a group on HORCM compares the timestamp of S-JNL on each storage system (RCU) as far as a group configured Universal Replicator in PAIR state. Once HORCM detects a matching point of the timestamp (CTQ-Marker) on all storage systems (RCU), it issues an order to commit the Journal data with CTQ-Marker to each storage system (RCU).

### (3) Propagating Error suspend

The thread for a group on HORCM delivers the same timestamp with increments as far as a group configured Universal Replicator in PAIR state. If the PSUE/PFUS state detects at least one storage system, then it notifies another storage system to suspend PSUS in order to keep the state consistent in the consistency group. Then the thread stops to deliver the timestamp, and keeps monitoring its consistency group with interval of HORCM_CTQM until it becomes PAIR state by next pair-resync.

### (4) Committing the Journal data inside the `pairsplit` command

The `pairsplit` command makes a suspending state on PAIR state, and inherits to compare the timestamp of S-JNL on each storage system (RCU). If it detects a matching point of the timestamp (CTQ-Marker) on all storage systems (RCUs), then it issues an order to commit the Journal data with Q-Marker to each storage system (RCU), and repeats it until it detects an EOM (End Of Marker) of CTQ-Marker with the `pairsplit` command.

# Configuration definition file (horcm.conf)

CCI supports TC_Sync group across multiple storage systems, but it does not allow TrueCopy Async (UR) group across multiple storage systems. Therefore, CCI needs to add the group definition (HORCM_CTQM) in order to allow making TrueCopy Async(UR) group across multiple storage systems. Then the HORCM daemon process delivers the timestamps (called CTQ-Marker), and commits S-VOL Journal data with CTQ-Marker to the defined group.

### (1) Definition to control UR MxN

CCI supports a way to specify CTQ-Marker to the specified group by adding "HORCM_CTQM" as a keyword in horcm.conf (see the example below).

```
HORCM CTQM
#groupinterval (10ms)mode(optional
oradb300
```

**group**

Defines the groups to be allowed as a group across multiple storage systems.

**interval**

Defines the interval for the CTQ-Marker, recommended as a few second.

**mode**

This is the run mode for the CTQ-Marker (timestamp). The default run mode is freeze/run. This does not normally need to be specified. If "run" is specified, then the timestamp is issued without freeze.

### (2) Specifying different JID for consistency groups

In order to support the MxN configuration, it is necessary to specify a different journal ID (JID) for a consistency group corresponding to a CCI group. Thus CCI adds an option to specify Journal ID in horcm.conf.

```
HORCM_LDEV
```

```
#dev_group    dev_name    Serial#    CU:LDEV(LDEV#)  MU#
  oradb       dev1        30095:1    02:40
  oradb       dev2        30095:1    02:41
  oradb       dev3        30095:2    02:42
  oradb       dev4        30095:2    02:43
```

📄 **Note:** The number at the end of the serial number (for example, :1 or :2) specifies the Journal ID.

If JID (Journal ID) is specified on horcm.conf as mentioned above, then the **paircreate** command need not specify Journal ID (-jp <jid> -js <jid>) option.

If JID (Journal ID) is not specified on horcm.conf, then Journal ID (-jp <jid> -js <jid>) option of the **paircreate** command is used.

# Command specifications

CCI does not change the command options for supporting Universal Replicator MxN Open. However the output of the command is added so that the command can display the consistency group and Q-Marker for each storage system, because the consistency group and Q-Marker are managed on each storage system.

## pairdisplay command

The output of **pairdisplay -v ctg** and **pairdisplay -v jnl[t]** are supported so that the option can display consistency group information for each storage system.

**Example for UR 2x2:**

```
# pairdisplay -g ora -v ctg
CTG  P/S    Status AP U(%) Q-Marker QM-Cnt SF(%) Seq# IFC OT/s CT/m RT/m
000  P-VOL PAIR    1  0    00000032     18  50    64034 ON   60   -    -
000  S-VOL PAIR    1  0    00000020      -  70    64035 -    -    -    -
000  P-VOL PAIR    1  0    00000031     15  50    64045 ON   60   -    -
000  S-VOL PAIR    1  0    00000022      -  70    64046 -    -    -    -
```

```
# pairdisplay -g ora -v jnl
JID MU CTG  JNLS  AP  U(%)   Q-Marker   Q-CNT  D-SZ(BLK)   Seq# Num LDEV#
001  1  0   PJNN   1   0     00000049      2  1633672703  64034
2  5376
002  1  0   SJNN   1   0     00000047      0  1633672703  64035
2  5378
001  1  0   PJNN   1   0     00000049     20   211506164  64045
13 12388
002  1  0   SJNN   1   0     00000035     20   260319089  64046
16 12544
```

```
# pairdisplay -g ora -v jnlt
JID MU CTG  JNLS  AP  U(%)   Q-Marker   Q-CNT  D-SZ(BLK)   Seq# DOW PBW APW
001  1  0   PJNN   1   0     00000c76     20  1633672703  64034
60 300  40
002  1  0   SJNN   1   0     00000c62     20  1633672703  64035
60 300  40
001  1  0   PJNN   1   0     00000c3a      7   211506164  64045
60 300  40
002  1  0   SJNN   1   0     00000c33      7   260319089  64046
60 300  40
```

```
# pairdisplay -g horc0 -v jnl -fe
JID MU CTG  JNLS  AP  U(%)   Q-Marker   Q-CNT  D-SZ(BLK)   Seq#
Num LDEV#      CTQM
```

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```
016  2   0  PJSN  1   0    0000bb1b    0  198578688  64014
1 32768      -
018  2   0  SJSN  1   0    0000bb1b    0   99283968  64014
1 32770 0000187f
017  2   0  PJSN  1   0    00000011    0  198578688  64014
1 32769      -
019  2   0  SJSN  1   0    00000011    0   99283968  64014
1 32771 0000187f
```

📄 **Note:** CTQM displays the last CTQ-Marker that was committed on S-VOL.

## pairsplit command

The **pairsplit** command does not change the command options for supporting UR MxN Open. However, internal behavior is different from 1x1 UR or TrueCopy Async.

**(1) pairsplit -r or -rw option**

- Issues Freeze to consistency group on each MCU

- Issues Suspend & Run to make a suspending state for consistency group on each MCU

- Searches/commits a minimum matching point of the CTQ-Marker on RCU via MCU (in other words, do Journal Restore with CTQ-Marker)

- Repeats above until detecting an EOM (End Of Marker) marked on MCU on all RCU via MCU

- Issues End of Suspend to terminate a suspending state, after committed with EOM (End Of Marker) marked on MCU on all RCU

Exception: If an uncommitted state (that is, link failure) is detected while executing its operation, then the operation of committing is aborted on keeping current CTQ-Marker level, and a suspending state terminates without waiting for the EOM (End Of Marker).

**(2) pairsplit -P option**

- Issues Freeze to consistency group on each MCU

- Issues Suspend & Run to make a suspending state for consistency group on each MCU

- Searches/commits a minimum matching point of the CTQ-Marker on RCU via MCU (in other words, do Journal Restore with CTQ-Marker)

- Repeats above until detecting an EOM (End Of Marker) marked on MCU on all RCU via MCU

- Issues End of Suspend to terminate a suspending state

Exception: If an uncommitted state (that is, link failure) is detected while executing its operation, then the operation of committing is aborted on keeping current CTQ-Marker level, and a suspending state terminates without waiting for the EOM (End Of Marker).

**(3) pairsplit -S option**

- Issues Freeze to consistency group on each MCU

- Issues Delete & Run to make a deleting state for consistency group on each MCU

- Searches/commits a minimum matching point of the CTQ-Marker on RCU via MCU (in other words, do Journal Restore with CTQ-Marker)

- Repeats above until detecting an EOM (End Of Marker) marked on MCU on all RCU via MCU

- Issues End of Delete to terminate a deleting state, after committed with EOM (End Of Marker) on all RCU

Exception: If an uncommitted state(that is, link failure) is detected while executing its operation, then the operation of committing is aborted on keeping current CTQ-Marker level, and a deleting state terminates without waiting for an EOM (End Of Marker).

**(4) pairsplit -RS option**

In the case of PAIR state (NO failure):

- Issues SwapSuspend to make a suspending state for consistency group on each RCU

- Searches/commits a minimum matching point of the CTQ-Marker on RCU via RCU (in other words, do Journal Restore with CTQ-Marker)

- Repeats above until detecting an EOM (End Of Marker) marked on MCU on all RCU via RCU

- Issues End of Suspend to terminate a suspending state, after committed with an EOM (End Of Marker) on all RCU

Exception: If an uncommitted state (that is, link failure) is detected while executing its operation, then the operation of committing is aborted on keeping current CTQ-Marker level, and a suspending state terminates with detecting at least one EOM (End Of Marker).

In the case of Failure (PSUE/PSUS):

- Issues SwapSuspend to make a suspending state for consistency group on each RCU

- Searches/commits a minimum matching point of the CTQ-Marker on RCU via RCU (in other words, do Journal Restore with CTQ-Marker)

- Repeats above until detecting an EOM(End Of Marker) marked on all RCU via RCU

- Issues End of Suspend to terminate a suspending state

**(5) pairsplit -R option**

In the case of PAIR state (NO failure):

- Issues Delete to make a deleting state for consistency group on each RCU

- Searches/commits a minimum matching point of the CTQ-Marker on RCU via RCU (in other words, do Journal Restore with CTQ-Marker)

- Repeats above until detecting an EOM (End Of Marker) marked on MCU on all RCU via RCU

- Issues End of Delete to terminate a deleting state, after committed with an EOM (End Of Marker) on all RCU

Exception: If an uncommitted state (that is, link failure) is detected while executing its operation, then the operation of committing is aborted on keeping current CTQ-Marker level, and a deleting state terminates with detecting at least one EOM (End Of Marker).

In the case of Failure(PSUE/PSUS):

- Issues Delete to make a deleting state for consistency group on each RCU

- Searches/commits a minimum matching point of the CTQ-Marker on RCU via RCU (in other words, do Journal Restore with CTQ-Marker)

- Repeats above until detecting an EOM(End Of Marker) marked on all RCU via RCU

- Issues End of Delete to terminate a deleting state

## Notice on system operation

CCI does not change the command options for supporting Universal Replicator MxN Open. However, the output of the command is added so that the command can display the consistency group and Q-Marker for each storage system, because the consistency group and Q-Marker are managed on each storage system.

### (1) Consistency group ID and journal ID for UR

The consistency group ID must be assigned/used as the unique identifier across multiple storage systems. Therefore, the **paircreate** command makes a group volume having the same consistency group ID across multiple storage systems.

### (2) Cascading operation

The "-FHORC" option for cascading operation does not perform with CTQ-Marker Mode. Hence the cascading volume must not be specified UR MxN volume when using the "-FHORC" option.

### (3) Running HORCM daemon

HORCM daemon process delivers the timestamps (called the consistency Q-Marker) to the defined consistency group. Therefore if HORCM daemon is stopped, then UR will stop to delta (commit) and will suspend because of Journal Full state.

Thus HORCM daemon must be running to keep the PAIR state.

### (4) Separating a command device IO from application IO

The HORCM daemon process issues IOs to the command device in order to deliver the timestamps to the defined consistency group. Therefore, it is recommended to separate the command device path from the application IO path.

**(5) About waiting application IO**

The HORCM daemon process delivers the timestamps to the defined consistency group while freezing IO for each journal.

Waiting Rate = 0.5ms * Number of journal / / Interval (ms) * 100

(Note that 0.5 ms depends on the OS platform.)

Therefore it is recommended to limit within four journal per consistency group and 8192 LDEVs per consistency group. In the case of multiple consistency groups per HORCM, it is recommended to limit within 256 LDEVs per consistency group.

**(6) HOST IO on pairsplit -RS, -R, horctakeover, pairresync -swapp(s)**

The `pairsplit -RS, -R` operation cannot be frozen and Split HOST IO from RCU in Link Normal state. In other words this option does not support At-time Split, hence these operations are required to stop HOST IO in order to keep Data Consistency on S-VOL. This is the same restriction as TC_Sync.

**(7) Suspending/deleting status**

To commit S-VOL Journal data with CTQ-Marker, the internal status of the storage system must be suspending or deleting. These statuses are controlled by CCI commands.

If a CCI command is aborted for some reason (KILL, etc.) or EX_EWSTOT, the storage system keeps that status (suspending/deleting).

To terminate this status, execute `pairsplit` or `pairsplit -S` again.

**(8) Detecting inconsistent CTQ-Marker**

The `pairsplit` command checks data consistency with CTQ-Marker across multiple storage systems. If an inconsistent CTQ-Marker is detected, then it returns with EX_VOLCUR after changed to suspend status.

This error needs to confirm if CTQMs are the same on S-VOL on each storage system using the "pairdisplay -v jnl -fe" option.

```
# pairdisplay -g horc0 -v jnl -fe
```

```
JID MU CTG   JNLS  AP   U(%)    Q-Marker   Q-CNT   D-SZ(BLK)   Seq#
Num LDEV#     CTQM
```

```
016  2    0   PJSN   1    0     0000bb1b       0   198578688   64014
1 32768        -
```

```
018  2    0   SJSN   1    0     0000bb1b       0    99283968   64014
1 32770 0000187f
```

```
017  2    0   PJSN   1    0     00000011       0   198578688   64014
1 32769        -
```

```
019  2    0   SJSN   1    0     00000011       0    99283968   64014
1 32771 0000187f
```

### (9) About pairsyncwait command

Using the Q-Marker with the `pairsyncwait` command is managed on each Journal including the target device. Therefore the `pairsyncwait` command must specify a target device (-g <group> -d <pair vol>, or -d <device file>, or -d <serial#> <ldev#>). For example:

```
# pairsyncwait -g horc0 -d dev-002 -t 500
```

```
UnitID  CTGID   Q-Marker  Status   Q-Num
```

```
     1     0  0000003de8  DONE         0
```

If group (-g <group>) is specified, then the first dev_name on the specified group is used.

**Explanation of terms:**

**JNL Consistency Restore**
> Commits up as far as MAX CTQ-Marker.

**JNL Full Restore**
> Commits up to EOM (End of marker for split).

**JNL Consistency Suspend**
> Suspends after "JNL Consistency Restore".

**JNL Full Suspend**
> Suspends after "JNL Full Restore".

# Communication method between the command devices and CCI

When using the UR MxN configuration, use the in-band method for communication between the command device and CCI.

When using the out-of-band method, the following restrictions apply.

**Out-of-band method restrictions:**

- The UR pair might be the Journal Full state or be suspended depending on to the Journal Full state.

- The host I/O response time to the UR pair is longer than that of the in-band method.

- The UR pair must be split before the microcode exchange. When using the out-of-band method, perform the microcode exchange using the following procedure.

**Microcode exchange procedure when using Out-of-band method:**

1. Split the UR pair.
2. Stop CCI.
3. Perform the microcode exchange. This exchange is performed by maintenance personnel.
4. Start CCI.
5. Resynchronize the UR pair.

# Configuration definition file example for MxN configuration

As shown in the following example, do not register the same pair information used in the MxN configuration to more than one group. Data consistency is not guaranteed if you register the pair to more than one group.

**Example**

In this example, the MU#h0 pair of LDEV#02:40 and LDEV#02:42 is registered to oradb1 and oradb2. Data consistency is not guaranteed in the following statement.

```
HORCM_LDEV
#dev_group dev_name Serial# CU:LDEV(LDEV#) MU#
oradb1 oradb1_dev1 30095:1 02:40 h0
oradb1 oradb1_dev2 30095:1 02:41 h0
oradb1 oradb1_dev3 30095:2 02:42 h0
oradb1 oradb1_dev4 30095:2 02:43 h0
oradb2 oradb2_dev1 30095:1 02:40 h0
oradb2 oradb2_dev3 30095:2 02:42 h0
HORCM_CTQM
#group interval(10ms) mode(optional)
oradb1 300
oradb2 300
```

## Configuration examples

CCI does not change the command options for supporting Universal Replicator MxN Open. However the output of the command is added so that the command can display the consistency group and Q-Marker for each storage system, because the consistency group and Q-Marker are managed on each storage system.

**(1) UR 2x2**

```
#/******** HORCM0 on production *****/
HORCM_MON
#ip_address service poll(10ms) timeout(10ms)
NONE        horcm0     1000   3000

#/********* For HORCM_CMD ***************/
HORCM_CMD
#dev_name
#UnitID #0(Serial# 64034), #1(Serial# 64045)
\\.\CMD-64034:/dev/rdsk
\\.\CMD-64045:/dev/rdsk

#/********* For HORCM_LDEV ***************/
HORCM_LDEV
#dev_group  dev_name   Serial#   LDEV#  MU#
ora         data0      64034     400
ora         data1      64034     401
ora         data2      64045     400
ora         data3      64045     401

#/********* For HORCM_INST ***************/
HORCM_INST
#dev_group  ip_address    service
ora             RHOST        horcm0

#/******** For UR of multiple DKC *****/
HORCM_CTQM
#dev_group   interval(10ms)   mode
ora             300
```

```
#/******** HORCM0 on Remote *****/
HORCM_MON
#ip_address service poll(10ms) timeout(10ms)
NONE        horcm0     1000   3000

#/********* For HORCM_CMD ***************/
HORCM_CMD
#dev_name
#UnitID #0(Serial# 64035), #1(Serial# 64046)
\\.\CMD-64035:/dev/rdsk
\\.\CMD-64046:/dev/rdsk

#/********* For HORCM_LDEV ***************/
HORCM_LDEV
#dev_group  dev_name   Serial#   LDEV#  MU#
ora         data0      64035     400
ora         data1      64035     401
ora         data2      64046     400
ora         data3      64046     401

#/********* For HORCM_INST ***************/
HORCM_INST
#dev_group  ip_address    service
ora             PHOST        horcm0

#/******** For UR of multiple DKC *****/
HORCM_CTQM
#dev_group   interval(10ms)   mode
ora             300
```

**(2) UR 2x1**

```
#/******** HORCM0 on production *****/
HORCM_MON
#ip_address service poll(10ms) timeout(10ms)
NONE        horcm0      1000   3000

#/********** For HORCM_CMD ***************/
HORCM_CMD
#dev_name
#UnitID #0(Serial# 64034), #1(Serial# 64045)
\\.\CMD-64034:/dev/rdsk
\\.\CMD-64045:/dev/rdsk

#/********** For HORCM_LDEV ***************/
HORCM_LDEV
#dev_group  dev_name  Serial#   LDEV#  MU#
ora           data0        64034:1  400
ora           data1        64034:1  401
ora           data2        64045:1  400
ora           data3        64045:1  401

#/********** For HORCM_INST ***************/
HORCM_INST
#dev_group  ip_address    service
ora           RHOST         horcm0

#/******** For UR of multiple DKC *****/
HORCM_CTQM
#dev_group   interval(10ms)   mode
ora              300
```

```
#/******** HORCM0 on Remote *****/
HORCM_MON
#ip_address service poll(10ms) timeout(10ms)
NONE        horcm0      1000   3000

#/********** For HORCM_CMD ***************/
HORCM_CMD
#dev_name
#UnitID #0(Serial# 64046)
\\.\CMD-64046:/dev/rdsk

#/********** For HORCM_LDEV ***************/
HORCM_LDEV
#dev_group  dev_name  Serial#   LDEV#  MU#
ora           data0        64046:1  400
ora           data1        64046:1  401
ora           data2        64046:2  402
ora           data3        64046:2  403

#/********** For HORCM_INST ***************/
HORCM_INST
#dev_group  ip_address    service
ora           PHOST         horcm0
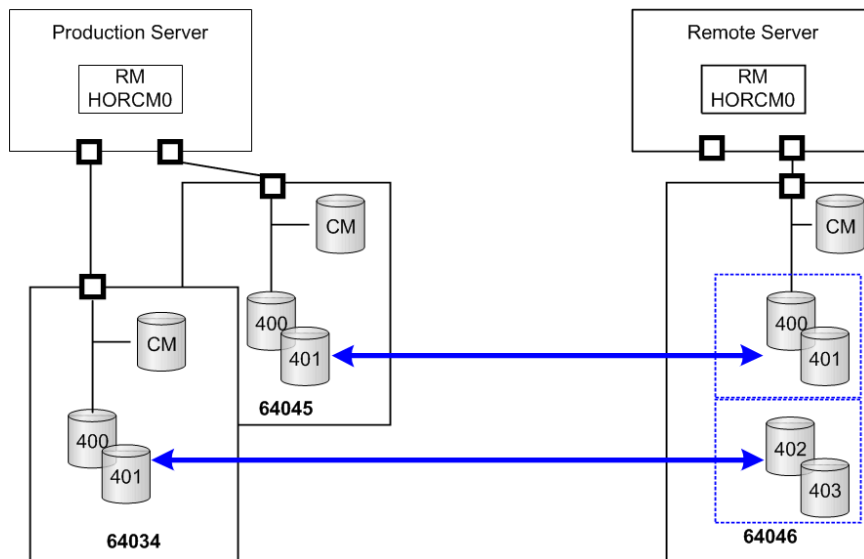
#/******** For UR of multiple DKC *****/
HORCM_CTQM
#dev_group   interval(10ms)   mode
ora              300
```



# Duplication of CCI applications

⚠ **Caution:** You must read Requirements for duplication of CCI before you duplicate CCI applications.

When a failure occurs on the CCI application (for example, failure of the server on which CCI is installed) in the MxN configuration of Universal Replicator, the data consistency in the consistency group that spans multiple storage systems will not be able to be maintained. Duplication of the CCI application is a function to use a second CCI application to maintain the data consistency in the consistency group when a failure occurs in the first CCI application.

You can use up to two CCI applications per one consistency group for each site. The following figure illustrates the typical MxN configuration.



When you specify the command device to the HORCM_CMD in the configuration definition file, you must make the definition sequence of storage system match within the site, as shown in the following definition file examples.

```
#/******** HORCM0 on production *****/
HORCM_MON
#ip_address service poll(10ms) timeout(10ms)
NONE          horcm0      1000    3000
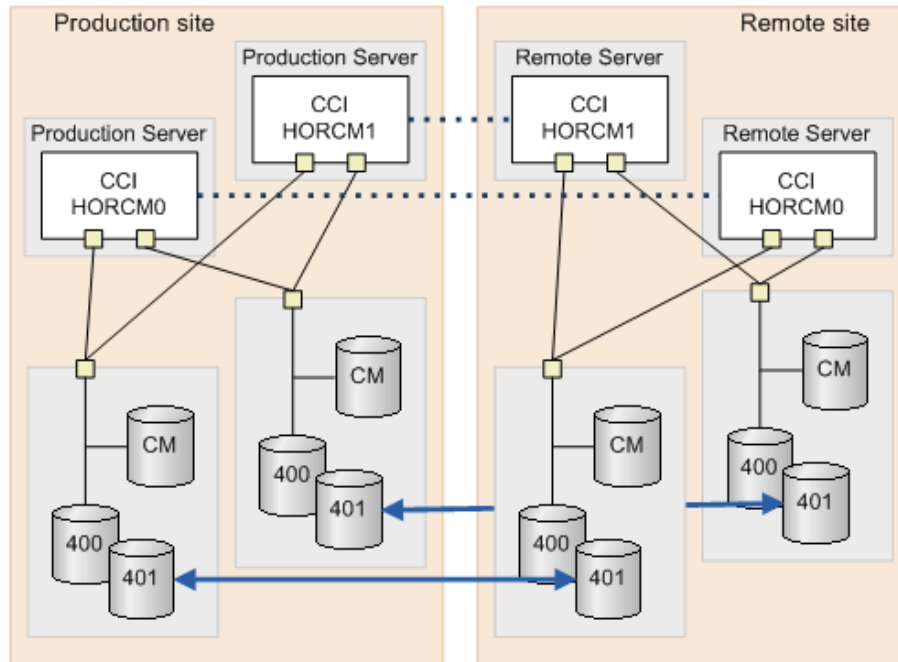
#/********** For HORCM_CMD ***************/
HORCM_CMD
#dev_name
#UnitID #0(Serial# 64034), #1(Serial# 64045)
\\.\CMD-64034:/dev/rdsk
\\.\CMD-64045:/dev/rdsk

#/********** For HORCM_LDEV ***************/
HORCM_LDEV
#dev_group   dev_name    Serial#    LDEV#   MU#
ora          data0       64034      400
ora          data1       64034      401
ora          data2       64045      400
ora          data3       64045      401

#/********** For HORCM_INST ***************/
HORCM_INST
#dev_group
ora

#/******** Fo
HORCM_CTQM
#dev_group
ora
```

```
#/******** HORCM1 on production *****/
HORCM_MON
#ip_address service poll(10ms) timeout(10ms)
NONE          horcm1      1000    3000

#/********** For HORCM_CMD ***************/
HORCM_CMD
#dev_name
#UnitID #0(Serial# 64034), #1(Serial# 64045)
\\.\CMD-64034:/dev/rdsk
\\.\CMD-64045:/dev/rdsk

#/********** For HORCM_LDEV ***************/
HORCM_LDEV
#dev_group   dev_name    Serial#    LDEV#   MU#
ora          data0       64034      400
ora          data1       64034      401
ora          data2       64045      400
ora          data3       64045      401

#/********** For HORCM_INST ***************/
HORCM_INST
#dev_group   ip_address      service
ora          RHOST           horcm1

#/******** For UR of multiple DKC *****/
HORCM_CTQM
#dev_group   interval(10ms)   mode
ora          300
```

Match the definition sequence of units.

```
#/******** HORCM0 on Remote *****/
HORCM_MON
#ip_address service poll(10ms) timeout(10ms)
NONE          horcm0      1000    3000

#/********** For HORCM_CMD ***************/
HORCM_CMD
#dev_name
#UnitID #0(Serial# 64035), #1(Serial# 64046)
\\.\CMD-64035:/dev/rdsk
\\.\CMD-64046:/dev/rdsk

#/********** For HORCM_LDEV ***************/
HORCM_LDEV
#dev_group   dev_name   Serial#   LDEV#   MU#
ora          data0      64035     400
ora          data1      64035     401
ora          data2      64046     400
ora          data3      64046     401

#/********** For HORCM_INST ***************/
HORCM_INST
#dev_group
ora

#/******** Fo
HORCM_CTQM
#dev_group
ora
```

```
#/******** HORCM1 on Remote *****/
HORCM_MON
#ip_address  service poll(10ms)  timeout(10ms)
NONE         horcm1      1000    3000

#/********** For HORCM_CMD ***************/
HORCM_CMD
#dev_name
#UnitID #0(Serial# 64035), #1(Serial# 64046)
\\.\CMD-64035:/dev/rdsk
\\.\CMD-64046:/dev/rdsk

#/********** For HORCM_LDEV ***************/
HORCM_LDEV
#dev_group   dev_name   Serial#   LDEV#   MU#
ora          data0      64035     400
ora          data1      64035     401
ora          data2      64046     400
ora          data3      64046     401

#/********** For HORCM_INST ***************/
HORCM_INST
#dev_group   ip_address      service
ora          PHOST           horcm1

#/******** For UR of multiple DKC *****/
HORCM_CTQM
#dev_group   interval(10ms)    mode
ora          300
```

Match the definition sequence of units.

## Requirements for CCI duplication

All of the following requirements must be met in order to use multiple CCI applications. If any of these requirements are not met, CCI duplication makes data inconsistent on the RCU.

- **CCI version**: 01-31-03/08 or later

- **Platform on which both CCI applications are installed**: other than OpenVMS

- **Storage system**:
  - Hitachi Virtual Storage Platform 5000 series (VSP 5000 series)
  - Hitachi Virtual Storage Platform G1x00 and Hitachi Virtual Storage Platform F1500 (VSP G1x00 and VSP F1500)
  - Hitachi Virtual Storage Platform E series
  - Hitachi Virtual Storage Platform G350, G370, G700, G900
  - Hitachi Virtual Storage Platform F350, F370, F700, F900
  - Hitachi Virtual Storage Platform G200, G400, G600, G800
  - Hitachi Virtual Storage Platform F400, F600, F800
  - Hitachi Unified Storage VM (HUS VM)
  - Hitachi Virtual Storage Platform (VSP)
- **DKCMAIN microcode version**:
  - VSP 5000 series: 90-01-0x-xx/xx or later
  - VSP G1500 and VSP F1500: 80-05-00-*xx*/*xx* or later
  - VSP G1000: 80-03-00-00/03 or later
  - VSP E series: 93-01-0x-xx/xx or later
  - VSP G130, G/F350, G/F370, G/F700, G/F900: 88-01-0x or later
  - VSP G200, G400, G600, G800, VSP F400, F600, F800: 83-03-00-*xx*/*xx* or later
  - HUS VM: 73-03-48-*x*0/00 or later
  - VSP: 70-06-20-00/00 or later
- **Connection between CCI and the storage system**: In-band method

## Note for CCI duplication

When a failure does not occur in CCI, the running CCI application handles the processing to keep the data consistency in the consistency group, for example CTQ-Marker, and the other CCI application stands by in case of a failure. If the stand-by CCI application issues the `pairsplit` command, an error (EX_INVVOL) might occur. If this error occurs, issue the `pairsplit` command from the other CCI application.

# Operations with TrueCopy consistency group consisting of multiple storage systems

This section describes how to operate a TrueCopy consistency group consisting of multiple storage systems with CCI. For details of supported configurations and behavior, see the Hitachi TrueCopy® User Guide.

## CCI Operations for TrueCopy consistency groups

To operate the TrueCopy consistency group consisting of multiple storage systems, CCI uses CTQ-Marker and Freeze/Q-Marker & Run described in Universal Replicator MxN configuration and control (on page 331).

CCI issues CTQ-Marker and freeze instructions to the storage system according to the cycle described in HORCM_CTQM in the configuration definition file, but unlike Universal Replicator, the storage system accepts I/O even if it receives a freeze instruction, except during pair splitting, pair deletion, and error suspend propagation*.

* TrueCopy consistency groups, which consist of multiple storage systems, also propagate error suspend, similar to the Universal Replicator MxN configuration. For information on propagating error suspend, see (3) Propagating Error suspend (on page 332).

### Configuration definition file (horcm.conf)

The TrueCopy configuration is the same as Universal Replicator's MxN configuration except you do not need to specify the journal ID. For details, see Configuration definition file (on page 40) and Configuration examples (on page 341).

### pairsplit command

The TrueCopy configuration is the same as Universal Replicator's MxN configuration. For details, see Command specifications (on page 334).

Performs the following operations. For details, see "Split behaviors for pairs in a CTG" in the Hitachi TrueCopy® User Guide for your storage system.

1. Issues Freeze to each consistency group.
2. Depending on the command option, splits (when the -r, -rw, or -RS option is specified) or deletes (when the -R or -S option is specified) the pair in the consistency group.

### Notices on system operation

Configure the consistency group to meet the "Consistency group requirements" in the Hitachi TrueCopy® User Guide for your storage system. See the following notices.

### Consistency group ID

The consistency group ID must be assigned/used as a unique identifier across multiple storage systems. Therefore, the **paircreate** command creates a group with the same consistency group ID across multiple storage systems.

### Cascade operations

The -FHORC and -FMRCF options cannot be used for TrueCopy consistency group pairs that consist of multiple storage systems.

### Separation of command device I/O and application I/O

The HORCM daemon process issues I/O to the command device to pass the timestamp to the defined consistency group. For this reason, it is recommended to separate the command device I/O path from the application I/O path.

**Communication method between command device and CCI**

When using a TrueCopy consistency group consisting of multiple storage systems, use the in-band method for communication between the command device and CCI.

# Remote volume discovery

In the configuration separating "Storage admin server (CCI server)" and each production server, it is difficult to verify/check the volumes on the production servers and the volumes described to the horcm.conf on CCI server.

In this configuration, you cannot use the following CCI capabilities:

- Command device security

- `pairdisplay –fd` option that displays the device file on the production host view

- `raidscan –find verify`

To solve this configuration problem, CCI supports a way to discover the volume information on the remote server by exporting the volume information with the `inqraid` command, and by importing its output with the **`raidscan –find`** command.

The following figure illustrates volume discovery.

# Discovering a remote volume

The volume information discovered on the production servers is exported by specifying the **inqraid** command with the `-CLI` option and `-export` option. The volume information includes "Keyword, Serial#, Ldev#, Device file name..". The **raidscan -find inst** command on CCI server imports the volume information, and registers it into the HORCM daemon.

The **inqraid** command is needed only for discovering LUNs on the production server.

**Example of exporting by inqraid command (Solaris):**

```
# ls /dev/rdsk/c1t* | inqraid -CLI -export
INQRAID:@CL4-G@64015@0@124@OPEN-V-CM@/dev/rdsk/c1t0d0s2
INQRAID:@CL4-G@64015@1@124@OPEN-V-CM@/dev/rdsk/c1t0d1s2
INQRAID:@CL4-G@64015@2@95@OPEN-V@/dev/rdsk/c1t0d2s2
INQRAID:@CL4-G@64015@3@95@OPEN-V@/dev/rdsk/c1t0d3s2
INQRAID:@CL4-G@64015@4@95@OPEN-V@/dev/rdsk/c1t0d4s2
INQRAID:@CL4-G@64015@5@95@OPEN-V@/dev/rdsk/c1t0d5s2
INQRAID:@CL4-G@64015@7@95@OPEN-V@/dev/rdsk/c1t0d7s2
```

**Example for exporting/importing to CCI server using pipe & SSH (Solaris):**

```
# ls /dev/rdsk/c1t* | inqraid -CLI -export | ssh
<CCI host> raidscan -find inst
DEVICE_FILE           Group     PairVol      PORT    TARG  LUN M   SERIAL   LDEV
/dev/rdsk/c1t0d2s2    G1        G1-000       CL4-G-1  57    2 0
64015     2
/dev/rdsk/c1t0d2s2    G1        G1-000       CL4-G-1  57    2 -
64015     2
/dev/rdsk/c1t0d3s2    G1        G1-001       CL4-G-1  57    3 0
64015     3
```

**Example for verifying the imported volume information (Solaris):**

```
# ls /dev/rdsk/c1t* | inqraid -CLI -export | ssh <CCI
host> raidscan -find verify
DEVICE_FILE           Group     PairVol      PORT    TARG  LUN M
SERIAL   LDEV
/dev/rdsk/c1t0d0s2    -         -            -        -     - -
64015     0
/dev/rdsk/c1t0d1s2    -         -            -        -     - -
64015     1
/dev/rdsk/c1t0d2s2    G1        G1-000       CL4-G-1  57    2 -
64015     2
/dev/rdsk/c1t0d3s2    G1        G1-001       CL4-G-1  57    3 -
64015     3
/dev/rdsk/c1t0d4s2    -         -            -        -     - -
64015     4
/dev/rdsk/c1t0d5s2    -         -            -        -     - -
64015     5
```

```
/dev/rdsk/c1t0d7s2      -      -         -        -    - -
64015    7
```

## Import method by the startup of CCI (horcmstart.sh) on the remote host

The following is the method to import the volume information by exporting the volume information which is discovered on the production server and starting up the CCI on the remote host.

### Procedure

1. Export the volume information from the local host (Production server) to /etc/horcmperm*.conf of CCI on the remote host. (* = instance number)

   **Example of exporting the volume information**:

   ```
   # ls /dev/rdsk/c1t* | inqraid -CLI -export | ssh <CCI host> cat > /etc/
   horcmperm*.conf
   ```

2. Import the volume information. This volume information is imported automatically by starting up CCI on the remote host.

   **Example of importing automatically by starting up CCI**:

   ```
   # horcmstart.sh *
   ```

   (* = instance number)

3. Verify the imported volume information on the CCI server.

   **Example for verifying the imported volume information**:

   ```
   # cat /etc/horcmperm*.conf | raidscan -find verify
   DEVICE_FILE       Group  PairVol  PORT     TARG  LUN   M  SERIAL  LDEV
   /dev/rdsk/c1t0d0s2    -      -       -        -     -    -   64015    0
   /dev/rdsk/c1t0d1s2    -      -       -        -     -    -   64015    1
   /dev/rdsk/c1t0d2s2    G1   G1-000  CL4-G-1    57    2    -   64015    2
   /dev/rdsk/c1t0d3s2    G1   G1-001  CL4-G-1    57    3    -   64015    3
   /dev/rdsk/c1t0d4s2    -      -       -        -     -    -   64015    4
   /dev/rdsk/c1t0d5s2    -      -       -        -     -    -   64015    5
   /dev/rdsk/c1t0d7s2    -      -       -        -     -    -   64015    7
   ```

# Chapter 7:  Data protection operations with CCI

This guide describes data protection operations using CCI.

## Data protection operations

User data files are normally placed on a disk through a software layer such as a file system, LVM, disk driver, SCSI protocol driver, bus adapter, and SAN switching fabric. Data corruption can happen due to software layer bugs or human error. CCI Data Protection Facility does not prevent these types of errors. On the other hand, the purpose of data protection is to prevent writing to volumes that the RAID storage system is guarding.

Data protection functions include:

- Data Retention Utility

- Volume Retention Manager

- Volume Security

- Encryption License Key

### Data Retention Utility

The purpose of the Data Retention Utility is to prevent writing to volumes that the RAID storage system is guarding. Data Retention Utility sets a protection attribute for the specified LU.

- **Hide from Inquiry command.** The RAID storage system conceals the target volumes from the SCSI Inquiry command by responding "unpopulated volume" (0x7F) to the device type. Use this feature to conceal the volumes from hosts. However, whether the concealment is enabled or not depends on the specifications of the host.

- **SIZE 0 volume.** The RAID storage system replies with "SIZE 0" to the target volumes through the SCSI Read capacity command. Use this feature to conceal the volumes from hosts. However, whether the concealment is enabled or not depends on the specifications of the host.

- **Read protection.** The RAID storage system protects reading from the target volumes by responding with the "Illegal function" check condition (SenseKey = 0x05, SenseCode = 0x2200).

- **Write protection.** The RAID storage system replies with "Write Protect" in the mode sense header, and protects from writing the target volumes by responding with the "Write Protect" check condition (SenseKey=0x07, SenseCode=0x2700).

- **S-VOL disabling.** The RAID storage system rejects the command execution of the copy series program product for not to be overwritten the secondary (target) volume by the copy process of copy series program product (TrueCopy, Universal Replicator, ShadowImage, Copy-on-Write Snapshot, global-active device), and protects the target volume. This option can be used with the other Data Retention Utility options in parallel. For example, if you want to protect from the writing by the both copy series program product and the host accessing, set the both write protection option and this option. Only the setting of write protection option cannot protect the target volume from the writing executed by the copy processing of the copy series program product.

## Restrictions on Data Retention Utility volumes

- **File systems using Data Retention Utility**

  - When setting DRU to the UNIX file system volumes, the volumes must be mounted with the Read Only option after the volumes are unmounted. If DRU is set to the volumes as they are in the mounted status, unexpected behavior or errors might occur in the system.

  - When using a file system for Write Protect Mode set disk on Windows, use the "-x mount" and "-x umount" CCI command options with the above mentioned procedures.

  - Data Retention Utility volumes set to Write Protect Mode (Read ONLY) cannot be used for the Windows file system (NTFS, FAT).

  - In a configuration with NAS modules installed, do not set Data Retention Utility in a file system volume used by a NAS module. If you do, unexpected behavior or errors might occur in the system.

- **LVM(VxVM) on Data Retention Utility**

  - If changing LVM configuration including Data Retention Utility, use the raidvchset -vg command for setting the status of the target volume checking prohibited temporarily. Also, after the completion of LVM configuration change, set again the status as checking.

- **Data Retention Utility in HA Cluster Server**

  - If HA Cluster software writes to the metadata at regular intervals to confirm whether its disks are available or not, then Data Retention Utility should not be used in HA environments.

- **Dynamic disk on Windows systems**

  - Data Retention Utility volumes cannot be used for the dynamic disk, because the dynamic disk does not handle the volumes set to Write Protect Mode (Read ONLY). Data Retention Utility volumes must be used for basic disks only.

- **LUN#0**

  - Some operating systems cannot recognize LUNs over LUN#1 if LUN#0 has the Data Retention Utility "inv" attribute set. This is because some HBA drivers do not scan all LUNs on a port if LUN#0 is invisible.

Chapter 7: Data protection operations with CCI

# Protection parameters and operations

The RAID storage systems have protection checking parameters for each LU, and these parameters are set through CCI and its command device. CCI supports the following commands to set and verify the parameters for protection checking for each LU:

- `raidvchkset`: Sets the protection checking parameter for the specified volumes.

- `raidvchkdsp`: Shows the protection checking parameter for the specified volumes based on the CCI configuration definition file.

- `raidvchkscan`: This command has three different uses depending on the options used with the command.

  - Shows the port, target ID, LDEV, and validation checking parameters for the specified volumes based on the `raidscan` command.

  - Shows the journal volume list setting and information for the journal volume.

  - Shows the Copy-on-Write Snapshot pool setting and information for the Copy-on-Write Snapshot pool.

# Data Protection facility

The Data Protection Facility permits main operations to volumes that you can see on the host, and prevents wrong operations. CCI controls protected volumes at the result of recognition of protection. CCI recognizes only volumes that the host shows. For that purpose LUN Security is provided for the CCI environment.

The Data Protection Facility ON/OFF is controlled by the security setting for the command device, as shown in the following table.

| Command device setting | | | |
|---|---|---|---|
| **Security** | **User authentication** | **Group information acquisition** | **Security to be set** |
| 0 | 0 | 0 | No security |
| 0 | 0 | 1 | Only HORCM_DEV allowed[1] |
| 0 | 1 | 0 | User authentication required[2] |
| 0 | 1 | 1 | User authentication required[2] Only HORCM_DEV allowed[1] |
| 1 | 0 | 0 | CMD security[3] |
| 1 | 0 | 1 | CMD security[3] Only HORCM_DEV allowed[1] |

| Command device setting | | | Security to be set |
|---|---|---|---|
| **Security** | **User authentication** | **Group information acquisition** | |
| 1 | 1 | 0 | CMD security[3] <br> User authentication required[2] |
| 1 | 1 | 1 | CMD security[3] <br> User authentication required[2] <br> Only HORCM_DEV allowed[1] |
| **Notes:** <br> 1. The operation can be performed only for paired logical volumes described at HORCM_DEV. <br> 2. Only the commands issued by the authorized users can be executed. <br> 3. Only the devices recognizable from the host can be operated | | | |

The Data Protection Facility uses an enhanced command device that you define using the LUN Manager software (or SNMP). When you define the command device, the Data Protection Facility is turned ON or OFF to each command device, which has an attributes to enable the Data Protection Facility. CCI distinguishes the ON from OFF attribute when CCI recognizes the command device. The figure given below shows the definition of protected volumes.

**Note:** If the command device is set to enable protection mode, there is no impact on CCI operations. CCI controls pairs under current specification. For details about the command operations when the Data Protection Facility is turned ON, see Target commands for protection.



If the CCI version is earlier than 01-68-03/00, a namespace for NVMe-oF cannot be recognized as an available volume. To perform the pair operations on an LDEV registered as the namespace for NVMe-oF, disable the security setting for the command device.

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To perform the pair operations on an LDEV registered as the namespace for NVMe-oF by enabling the command device security setting, add the following rows to the configuration definition file:

HORCM_NVME

ENABLE

For more information, see .

## Data Protection Facility specifications

Only the permitted volumes can be registered in `horcm.conf`. When creating the `horcm.conf` file, describe volumes only from the view that the host shows. CCI manages mirror descriptors (TrueCopy, ShadowImage/MU#0/1/2) as a unit.

The Data Protection Facility has two specifications: one must be a volume that you can see from the host such as the Inquiry tool, and the other must be a mirror descriptor volume that was registered in `horcm.conf`. The following table shows the registration for the mirror descriptor.

| Volumes in horcm.conf | Mirror Descriptor in horcm.conf | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | TrueCopy | | ShadowImage | | | | | |
| | | | MU#0 | | MU#1 | | MU#2 | |
| | E | none | E | none | E | none | E | none |
| Unknown | - | - | - | - | - | - | - | - |
| /dev/ rdsk/ c0t0d0 | permitted volumes | - | permitted volumes | - | permitted volumes | - | permitted volumes | - |
| Unknown | - | - | - | - | - | - | - | - |
| Legend: | | | | | | | | |
| **E**: Mirror descriptor volume to be registered in `horcm.conf`. | | | | | | | | |
| **Unknown**: Volumes that own host cannot recognize, even though volumes were registered in `horcm.conf`. | | | | | | | | |

- CCI permits operation after the **`permission`** command at startup of HORCM. The target is volume that was registered in the `horcm.conf` file.

- The **`permission`** command is necessary to permit the protected volume at first. The **`permission`** command compares an identification for volumes of `horcm.conf` to all of own host volumes, and the result is registered within HORCM. And HORCM makes tables for protected volume and permitted volumes from `horcm.conf` and Inquiry result. Inquiry result is based on configuration of Data Retention Utility. When controlling pair volumes, requests to protected volumes are rejected with error code EX_ENPERM.

- The Data Protection Facility is based on the host side view at the result of Data Retention Utility. You need to configure Data Retention Utility before CCI operation. CCI checks Data Retention Utility by Inquiry within CCI.

- The Data Protection Facility can be enabled separately for each command device. If you want to use protection and non-protection modes in the same storage system at the same time, you can define two (or more) command devices: one with protection ON, one with protection OFF. Protection mode is enabled for the host that has Data Retention Utility and ON command device.

## Examples for configuration and protected volumes

**Case (1)**: Two Hosts (See the figure given below for two host configuration). In protect mode, Ora2 are rejected to operate the paired volume, because of Unknown for Grp4 on HOST2.



\*CM = protection "On" command device

**Case (2)**: One Host (See the figure given below for one host configuration). In protect mode, Ora1 and Ora2 are rejected to operate the paired volume, because of Unknown for Grp2 and Grp4 on HOST1. If HOST1 has a protection OFF command device, then Ora1 and Ora2 are permitted to operate the paired volume.

*CM = protection "On" command device

> 📋 **Note:** The Data Protection Facility is implemented by only CCI. CCI needs to know the protection attribute for the command device whether should be permitted the operation for paired volume. If HORCM has protection ON command device at its time, then HORCM checks a permission for a paired volume.

## Operation authority with CMD security enabled

If the CMD security is enabled, you have the operation authority for the LU which meets both of the following requirements.

- The connection to the host has been recognized when you start CCI.

- The LU is the target of the pair operation specified with MU# which is defined in the configuration definition file.

For the volumes that you do not have the operation authority, "****" is displayed as the LDEV#, and "----" is displayed as the status. If you perform the pair operations, CCI rejects the request with the error code "EX_ENPERM" (`pairdisplay` is not included).

If you specify 0, 1 2... for the MU#, your operation authority is limited on the LUs for the local copy program products (ShadowImage, ShadowImage for Mainframe and Copy-on-Write Snapshot). If you specify h0, h1 or h2 for the MU#, your operation authority is limited on the LUs for the remote copy operations (TrueCopy, TrueCopy for Mainframe, TrueCopy Async, Universal Replicator, Universal Replicator for Mainframe, and global-active device). If you specify nothing for the MU#, you have the operation authority on MU#0 for the local copy and the remote copy operations.

## Target commands for protection

The following commands are controlled by the Data Protection Facility: `horctakeover`, `paircurchk`, `paircreate`, `pairsplit`, `pairresync`, `pairvolchk`, `pairevtwait`, `pairsyncwait`, `raidvchkset`, `raidvchkdsp`, `pairdisplay`. When the command is issued to non-permitted volumes, CCI rejects the request with error code "EX_ENPERM" (`pairdisplay` is not included).

▪ The `pairdisplay` command shows all volumes, so that you can confirm non-permitted volumes. Non-permitted volumes are shown without LDEV# information. As shown below, the LDEV# information is " **** " (-CLI is "-").

**Example**

```
# pairdisplay -g oradb
```

```
Group   PairVol(L/R) (Port#,TID,LU-M),Seq#, LDEV#.P/S,Status, Seq#,P-LDEV# M
oradb   oradev1(L)   (CL1-D , 3,  0-0) 35013 ****..-  -,-   -
oradb   oradev1(R)   (CL1-D , 3,  1-0) 35013 ****..-  -,-   -
```

▪ The `raidscan` command shows all volumes same as current specification, because it does not need HORCM_DEV and HORCM_INST on `horcm.conf`. If you want to know permitted volumes at `raidscan`, use `raidscan -find`. The `-find` option shows device file name and storage system information by using internal Inquiry result. You can use `raidscan -find` to make `horcm.conf`, because only permitted volumes are shown with host side view. Following is an example for HP-UX systems:

**Example**

```
# ioscan  -fun | grep rdsk | raidscan -find
```

```
DEVICE_FILE        UID  S/F PORT   TARG  LUN   SERIAL  LDEV  PRODUCT_ID
/dev/rdsk/c0t3d0    0    F  CL1-D   3    0     35013    17   OPEN-3
/dev/rdsk/c0t3d1    0    F  CL1-D   3    1     35013    18   OPEN-3
```

## permission command

CCI recognizes permitted volumes at the result of the `permission` command. The `permission` command is the `-find inst` option of `raidscan`. This option issues an inquiry to a specified device file to get Ser# and LDEV# from the RAID storage system, and checks an identification for volumes of `horcm.conf` to all of own host volumes, then stores the result within HORCM of the instance. This `permission` command is started by /etc/horcmgr automatically.

The following example shows the relation between the device file and `horcm.conf` for a manual operation on an HP-UX system. All volumes of ioscan are permitted.

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**Example**

```
# ioscan  -fun | grep rdsk | raidscan -find inst
```

```
DEVICE_FILE           Group     PairVol     PORT    TARG  LUN M   SERIAL  LDEV
/dev/rdsk/c0t3d0      oradb     oradev1     CL1-D    3    0  -    35013    17
/dev/rdsk/c0t3d0      oradb     oradev1     CL1-D    3    0  0    35013    17
```

# New options for security

## raidscan -find inst

This option registers the device file name to all mirror descriptors of the LDEV map table for CCI and permits the matching volumes on `horcm.conf` in protection mode. It is started from /etc/horcmgr automatically. You will not normally need to use this option. This option issues an Inquiry to a device file from the result of STDIN. Then CCI gets Ser# and LDEV# from the RAID storage system. Subsequently, CCI compares the Inquiry result to the contents of `horcm.conf`, and the result is stored within HORCM for the instance. At the same time CCI shows the result of this option about the relation. This option will also be terminated to avoid wasteful scanning after registration based on `horcm.conf`, because HORCM does not need the registration any more.

**Example**

```
# ioscan  -fun | grep rdsk | raidscan -find inst
```

```
DEVICE_FILE           Group     PairVol     PORT    TARG  LUN M   SERIAL  LDEV
/dev/rdsk/c0t3d0      oradb     oradev1     CL1-D    3    0  -    35013    17
/dev/rdsk/c0t3d0      oradb     oradev1     CL1-D    3    0  0    35013    17
```

📄 **Note:** When multiple device files share the same LDEV, the first device file is registered to the LDEV map table.

## raidscan -find verify [MU#]

This option shows the relation between group on `horcm.conf` and Device_File registered to the LDEV map tables from DEVICE_FILE of STDIN.

**Example**

```
# ioscan  -fun | grep rdsk | raidscan -find verify -fd
```

```
DEVICE_FILE           Group     PairVol     Device_File     M   SERIAL  LDEV
/dev/rdsk/c0t3d0      oradb     oradev1     c0t3d0          0   35013    17
```

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```
/dev/rdsk/c0t3d1        oradb    oradev2    Unknown        0    35013    18
/dev/rdsk/c0t3d2        -        -          -              0    35013    19
```

> 📄 **Note:** It shows shared LDEV among multiple device files, if there is a difference between DEVICE_FILE and Device_File. You can also use this option to the command device that specified non-protection mode. It is used for the purpose to see the relation between DEVICE_FILE and the group of `horcm.conf`.

## raidscan -f[d]

This option shows the Device_File that was registered on the group of HORCM, based on the LDEV (as defined in the local instance configuration definition file).

**Example**

```
# raidscan -p  cl1-d  -fd
```

```
Port# ,TargetID#,Lun#..Num(LDEV#....)...P/S, Status,Fence,LDEV#,Device_File
CL1-D ,       3,   0...1(17)............SMPL  -  - -,c0t3d0
CL1-D ,       3,   1...1(18)............SMPL  -  - -,c0t3d1
```

## pairdisplay -f[d]

This option shows the relation between the Device_File and the paired volumes (protected volumes and permitted volumes), based on the group, even though this option does not have any relation with protection mode.

**Example**

```
# pairdisplay -g oradb -fd
```

```
Group   PairVol(L/R) Device_File    M ,Seq#,LDEV#.P/S,Status, Seq#,P-LDEV# M
oradb   oradev1(L)   c0t3d0        0 35013   17..P-VOL COPY, 35013    18 -
oradb   oradev1(R)   c0t3d1        0 35013   18..S-VOL COPY, 35013    17 -
```

If either the local or the remote host (instance) has not been shown the Device_File, then pair operations are rejected (except the local option such as "-l") in protection mode because of Unknown volume, as shown in the following example.

**Example**

```
# pairdisplay -g oradb -fd
```

```
Group   PairVol(L/R) Device_File    M ,Seq#,LDEV#.P/S,Status, Seq#,P-LDEV# M
```

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```
oradb   oradev1(L)   c0t3d0      0 35013  17..P-VOL COPY, 35013   18  -
oradb   oradev1(R)   Unknown     0 35013 ****..-  -, - - -
```

# Permitting protected volumes

Protection mode needs recognition step to check accessible volumes and the `horcm.conf` at the startup of HORCM on protection mode. The protected volumes must be registered to enable the Data Protection Facility at each startup of HORCM, so that this registration process is executed automatically by /etc/horcmgr.

## With a $HORCMPERM file

The following is executed for registration of permitted volume file ($HORCMPERM file), if $HORCMPERM file exists and there are permitted volumes. To permit only the volumes specified, then the volume list must be defined in the $HORCMPERM file.

### Naming of $HORCMPERM file on UNIX systems

$HORCMPERM is `/etc/horcmperm.conf` or `/etc/horcmperm*.conf` (* = instance number) by default. For example, on HP-UX systems:

```
cat $HORCMPERM | /HORCM/usr/bin/raidscan -find inst
# The following are an example to permit the LVM Volume groups.
# For MU# 0
vg00  /dev/rdsk/c0t3d0  /dev/rdsk/c0t3d1
vg00  /dev/rdsk/c0t3d2  /dev/rdsk/c0t3d3
# For MU# 1
vg01  /dev/rdsk/c0t3d0  /dev/rdsk/c0t3d1
vg01  /dev/rdsk/c0t3d2  /dev/rdsk/c0t3d3
```

**Verifying a group for vg01**: The following are examples how to verify whether a LVM volume group is mapped to group (MU#1 for ShadowImage) in the `horcm.conf` file correctly.

```
# export HORCC_MRCF=1
# cat /etc/horcmperm.conf | grep vg01 | raidscan -find verify 1 -fd
```

OR

```
# vgdisplay -v /dev/vg01|grep dsk|sed 's/\/*\/dsk\//\/rdsk\//
g'|raidscan -find verify 1 -fd
DEVICE_FILE          Group    PairVol    Device_File    M   SERIAL  LDEV
/dev/rdsk/c0t3d0     oradb1   oradev1    c0t3d0         1
35013    17
/dev/rdsk/c0t3d1     oradb1   oradev2    c0t3d1         1
35013    18
/dev/rdsk/c0t3d2     oradb    oradev3    c0t3d2         1
35013    19
/dev/rdsk/c0t3d3     -        -          -              1
35013    20
```

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**Naming of $HORCMPERM file on Windows systems**

$HORCMPERM is `%windir%\horcmperm.conf` or `%windir%\horcmperm*.conf` (* = instance number) by default.

```
type $HORCMPERM | x:\HORCM\etc\raidscan.exe -find inst
# The following are an example to permit the DB Volumes.
# Note: a numerical value is interpreted as Harddisk#.
# DB0 For MU# 0
Hd0-10
harddisk12  harddisk13  harddisk17
# DB1 For MU# 1
hd20-23
```

**Verifying a group for DB1**: The following is an example of how to verify whether a DB volume group is mapped to a group (MU#1 for ShadowImage) in the `horcm.conf` file correctly.

```
D:\HORCM\etc> set HORCC_MRCF=1
D:\HORCM\etc> echo hd20-23 | raidscan -find verify 1 -fd
DEVICE_FILE         Group     PairVol     Device_File     M   SERIAL   LDEV
Harddisk20          oradb1    oradev1     Harddisk20      1   35013    17
Harddisk21          oradb1    oradev2     Harddisk21      1   35013    18
Harddisk22          oradb     oradev3     Harddisk22      1   35013    19
Harddisk23          -         -           -               1   35013    20
```

## Without a $HORCMPERM file: Commands to run on different operating systems

If NO $HORCMPERM file exists, run a command on the host to permit all volumes on the host. The following table shows the command to run on each operating system.

| System | Command |
|---|---|
| HP-UX | echo /dev/rdsk/* /dev/rdisk/* /dev/rcdisk/* \| /HORCM/usr/bin/raidscan -find inst |
| Linux | ls /dev/sd* \| /HORCM/usr/bin/raidscan -find inst<br><br>If ENABLE is specified for HORCM_NVME in the configuration definition file, run the following:<br><br>ls /dev/sd* /dev/nvme* \| /HORCM/usr/bin/raidscan -find inst -n |
| zLinux | ls /dev/sd* /dev/dasd*\| /HORCM/usr/bin/raidscan -find inst |
| Solaris | ls /dev/rdsk/* \| /HORCM/usr/bin/raidscan -find inst |
| AIX | lsdev -C -c disk \| grep hdisk \| /HORCM/usr/bin/raidscan -find inst |
| Tru64 UNIX | ls /dev/rdisk/dsk* \| /HORCM/usr/bin/raidscan -find inst |

| System | Command |
|---|---|
| Digital UNIX | ls /dev/rrz* \| /HORCM/usr/bin/raidscan -find inst |
| DYNIX/ptx | /etc/dumpconf -d \| grep sd \| /HORCM/usr/bin/raidscan -find inst |
| IRIX64 | ls /dev/rdsk/*vol /dev/rdsk/*/*vol/* \| /HORCM/usr/bin/raidscan -find inst |
| OpenVMS | /HORCM/usr/bin/raidscan -pi '$1$DGA0-10000 DKA0-10000 DGA0-10000' -find inst |
| Windows | X:\HORCM\etc\raidscan.exe -pi $PhysicalDrive -find inst |

📄 **Note:** This registration process has risk because it is executed automatically by /etc/horcmgr without judgment for protection mode in order to validate the `-fd` option. This registration brings a degradation in horcmstart.sh, but HORCM daemon has been running as usual, and it will depend on how many devices a host has. To start faster at HORCM faster in non-protection mode, create the $HORCMPERM file of "SIZE 0 byte" as a dummy file or to set HORCMPERM=MGRNOINST. At this time, the `-fd` option shows Device_File name as Unknown, and after you can use **raidscan -find inst** to validate the `-fd` option.

## Environment variables

### $HORCMPROMOD

This environment variable turns protection mode ON as specified in the following table depicting the relation between HORCMPROMOD and command device. If your command device is set for non-protection mode, this parameter sets it to protection mode.

| Command Device | HORCMPROMOD | Mode |
|---|---|---|
| Protection mode | Don't care | Protection mode |
| Non-protection mode | Not specified | Non-protection mode |
| | Specified | Protection mode |

**$HORCMPERM**

This variable is used to specify the HORCM permission file name. If no file name is specified, `/etc/horcmperm.conf` or `/etc/horcmperm*.conf` (* = instance number) is the default.

- If a HORCM permission file exists, then /etc/horcmgr executes the following command to permit the volumes specified.

    Example for UNIX systems:

    ```
    cat $HORCMPERM | /HORCM/usr/bin/raidscan -find inst
    ```

    Example for Windows systems:

    ```
    type $HORCMPERM | x:\HORCM\etc\raidscan.exe -find inst
    ```

- If no HORCM permission file exists, then /etc/horcmgr executes a built-in command to permit all volumes of a host. See Without a $HORCMPERM file: Commands to run on different operating systems for examples of commands run on an operating basis.

- /etc/horcmgr does not execute the built-in command if the following is defined for $HORCMPERM. This is used to execute a system command to permit the volumes specified from a user's shell script.

    ```
    HORCMPERM=MGRNOINST.
    ```

## Determining the protection mode command device

The inquiry page is not changed for a command device with protection mode ON. Therefore, CCI provides how to find the protection mode command device. To determine the currently used command device, use the `horcctl -D` command. This command shows the protection mode command device by adding an asterisk (*) to the device file name.

**Example for HP-UX systems:**

```
# horcctl -D
Current control device = /dev/rdsk/c0t0d0*
- * indicates protection ON.
```

# Chapter 8: Examples of using CCI commands

This guide provides examples of typical tasks performed using CCI commands.

## Group version control for mixed storage system configurations

Before executing each option of a command, CCI checks the facility version of the storage system internally to verify that the same version is installed on mixed storage system configuration. If the configuration includes older storage systems (for example, 9900V), this method might not meet the requirements for the mixed storage system environment, because the older storage system limits the availability enhancements in later facility versions. If the facility versions of the storage systems are different, you cannot use TagmaStore USP/TagmaStore NSC-specific facility, because CCI applies the minimum version to all storage systems. To expand the capability for mixed storage system configurations and avoid problems such as this, CCI supports the following group version control to manage a version for each group.

- CCI (HORCM daemon) makes a facility version for each group based on a configuration file at the startup of HORCM.

- In a mixed storage system configuration, if the facility version of the storage systems (for example, USP V/VM and TagmaStore USP/TagmaStore NSC) is different on a group, CCI will apply the minimum version for each group (see the following figure showing the definition of the group version).

# LDM volume discovery and flushing for Windows

Windows systems support the Logical Disk Manager (LDM) (such as VxVM), and a logical drive letter is typically associated with an LDM volume (\Device\HarddiskVolumeX). Therefore, you cannot know the relationship between LDM volumes and the physical volumes of the RAID storage system. Therefore, you need to create the CCI configuration file, and you need to know the relationship that is illustrated in the figure given below.



## Volume discovery function

CCI supports the volume discovery function on three levels showing the relationship between LDM volumes and the physical volumes.

- **Physical level**: CCI shows the relationship between PhysicalDrive and LDEV by giving $Physical as a KEY WORD for the discovery.

- **LDM volume level**: CCI shows the relationship between [LDM volume and PhysicalDrives] and LDEV by given $Volume as KEY WORD for the discovery.

- **Drive letter level**: CCI shows the relationship between [Drive letter and LDM volume and PhysicalDrives] and LDEV by given $LETALL as KEY WORD for the discovery.

The KEY WORD (`$Physical, $Volume, $LETALL`) can be used with `raidscan -find`, `inqraid`, `mkconf` commands.

In Windows, DOS devices (for example, C:, Volume{}) are linked to a Device Object Name (\Device\...). CCI indicates as the following by abbreviating a long Device Object Name.

- Device Object Name of the LDM for Windows:

\Device\HarddiskVolumeX for Partition : \VolX\DskY

DskY shows that VolX are configured through HarddiskY.

\Device\HarddiskDmVolumes\ ... \VolumeX for spanned volume : \DmsX\DskYs

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\Device\HarddiskDmVolumes\ ... \StripeX for striped volume : \DmtX\DskYs

\Device\HarddiskDmVolumes\ ... \RaidX for Raid-5 volume : \DmrX\DskYs

DskYs shows that DmsX(DmtX,Dmr) volumes are configured through bundling multiple drives (indicate HDD, SSD, SCM, and FMD) Y1, Y2….

- Device Object Name of the PhysicalDrive for Windows:

\Device\HarddiskX\DR?? : HarddiskX

You can determine the relationship between LDM volumes and LDEV by given a KEY WORD to the **inqraid** command.

### Example 1

```
inqraid $LETALL -CLI
DEVICE_FILE    PORT    SERIAL  LDEV CTG  H/M/12  SSID R:Group PRODUCT_ID
D:\Vol2\Dsk4   -         -      -   -      -      -       - DDRS-34560D
E:\Vol44\Dsk0  CL2-K    61456  194   -   s/s/ss  0004 1:01-10 OPEN-3
F:\Vol45\Dsk0  CL2-K    61456  194   -   s/s/ss  0004 1:01-10 OPEN-3
G:\Dmt1\Dsk1   CL2-K    61456  256   -   s/s/ss  0005 1:01-11 OPEN-3
G:\Dmt1\Dsk2   CL2-K    61456  257   -   s/s/ss  0005 1:01-11 OPEN-3
G:\Dmt1\Dsk3   CL2-K    61456  258   -   s/s/ss  0005 1:01-11 OPEN-3
```

### Example 2

```
inqraid $Volume -CLI
DEVICE_FILE    PORT    SERIAL  LDEV CTG  H/M/12  SSID R:Group PRODUCT_ID
\Vol2\Dsk4     -         -      -   -      -      -       - DDRS-34560D
\Vol44\Dsk0    CL2-K    61456  194   -   s/s/ss  0004 1:01-10 OPEN-3
\Vol45\Dsk0    CL2-K    61456  194   -   s/s/ss  0004 1:01-10 OPEN-3
\Dmt1\Dsk1     CL2-K    61456  256   -   s/s/ss  0005 1:01-11 OPEN-3
\Dmt1\Dsk2     CL2-K    61456  257   -   s/s/ss  0005 1:01-11 OPEN-3
\Dmt1\Dsk3     CL2-K    61456  258   -   s/s/ss  0005 1:01-11 OPEN-3
```

### Example 3

```
inqraid $Phy -CLI
DEVICE_FILE    PORT    SERIAL  LDEV CTG  H/M/12  SSID R:Group PRODUCT_ID
Harddisk0      CL2-K    61456  194   -   s/s/ss  0004 1:01-10 OPEN-3
Harddisk1      CL2-K    61456  256   -   s/s/ss  0005 1:01-11 OPEN-3
Harddisk2      CL2-K    61456  257   -   s/s/ss  0005 1:01-11 OPEN-3
Harddisk3      CL2-K    61456  258   -   s/s/ss  0005 1:01-11 OPEN-3
Harddisk4      -         -      -   -      -      -       - DDRS-34560D
```

- Device Object Name of the Partition for Windows

  - \Device\HarddiskX\PartitionY : \DskX\pY

- Device Object Name of the PhysicalDrive for Windows

  - \Device\HarddiskX\Partition0 : HarddiskX

**Example 4**

```
inqraid $LETALL -CLI
DEVICE_FILE      PORT     SERIAL   LDEV CTG  H/M/12  SSID R:Group PRODUCT_ID
D:\Dsk0\p1       -          -       -    -     -       -        - DDRS-34560D
E:\Dsk1\p1       CL2-K    61456    194   -   s/s/ss  0004 1:01-10 OPEN-3
F:\Dsk1\p2       CL2-K    61456    194   -   s/s/ss  0004 1:01-10 OPEN-3
```

**Example 5**

```
inqraid $Phy -CLI
DEVICE_FILE      PORT     SERIAL   LDEV CTG  H/M/12  SSID R:Group PRODUCT_ID
Harddisk0        -          -       -    -     -       -        - DDRS-34560D
Harddisk1        CL2-K    61456    194   -   s/s/ss  0005 1:01-11 OPEN-3
```

You want to know the relationship between LDM volumes and a group of the configuration files, and then find a group of the configuration file by giving a KEY WORD to **raidscan -find verify** command.

**Example 6**

```
raidscan -pi $LETALL -find verify
DEVICE_FILE              Group    PairVol      PORT    TARG  LUN M   SERIAL   LDEV
E:\Vol44\Dsk0            ORA      ORA_000      CL2-K    7    2 -     61456    194
F:\Vol45\Dsk0            ORA      ORA_000      CL2-K    7    2 -     61456    194
G:\Dmt1\Dsk1             ORB      ORB_000      CL2-K    7    4 -     61456    256
G:\Dmt1\Dsk2             ORB      ORB_001      CL2-K    7    5 -     61456    257
G:\Dmt1\Dsk3             ORB      ORB_002      CL2-K    7    6 -     61456    258
```

**Example 7**

```
raidscan -pi $LETALL -find
DEVICE_FILE        UID  S/F PORT    TARG  LUN   SERIAL   LDEV  PRODUCT_ID
E:\Vol44\Dsk0        0   F  CL2-K    7    2     61456    194   OPEN-3
F:\Vol45\Dsk0        0   F  CL2-K    7    2     61456    194   OPEN-3
G:\Dmt1\Dsk1         0   F  CL2-K    7    4     61456    256   OPEN-3
G:\Dmt1\Dsk2         0   F  CL2-K    7    5     61456    257   OPEN-3
G:\Dmt1\Dsk3         0   F  CL2-K    7    5     61456    258   OPEN-3
```

## Mountvol attached to Windows systems

Pay attention to the **mountvol /D** command attached to a Windows system, such that it does not flush the system buffer associated with the specified logical drive. The **mountvol** command shows the volume mounted as Volume{guid} as follows:

**Example**

```
mountvol
Creates, deletes, or lists a volume mount point.
.
```

```
.
MOUNTVOL [drive:]path VolumeName
MOUNTVOL [drive:]path /D
MOUNTVOL [drive:]path /L
    \\?\Volume{56e4954a-28d5-4824-a408-3ff9a6521e5d}\
        G:\
    \\?\Volume{bf48a395-0ef6-11d5-8d69-00c00d003b1e}\
        F:\
```

You can determine what `\\?\Volume{guid}\` is configured, as follows:

**Example**

```
inqraid $Volume{bf48a395-0ef6-11d5-8d69-00c00d003b1e} -CLI
DEVICE_FILE      PORT     SERIAL   LDEV CTG  H/M/12   SSID R:Group PRODUCT_ID
\Vol46\Dsk1      CL2-K    61456    193   -   S/s/ss  0004 1:01-10 OPEN-3
raidscan -pi $Volume{bf48a395-0ef6-11d5-8d69-00c00d003b1e} -find
DEVICE_FILE           UID  S/F PORT    TARG  LUN    SERIAL  LDEV  PRODUCT_ID
\Vol46\Dsk1            0   F  CL2-K     7    1      61456   193  OPEN-3
```

## System buffer flushing function

The logical drive to be flushed can be specified by the following two methods. One method is that the logical drive (for example, G:\hd1 drive, as below) is specified immediately, but this method must know about the logical drive corresponding to a group before executing the `sync` command. Also the volume is mounting by a directory and this method requires finding its volume name. To solve such a complication, CCI supports a method that flushes the system buffer associated with a logical drive through finding a volume{guid} corresponding to a group of the configuration file. This method does not depend on mounted point, so that it is possible to flush the volume mounted by a directory. This method is supported to be specified a group to the `raidscan -find sync` command. The figure given below shows the LDM volume flushing operation.

The following example flushes the system buffer associated with the ORB group through $Volume.

**Example**

```
raidscan -pi $Volume -find sync -g ORB
[SYNC] : ORB ORB_000[-] -> \Dmt1\Dsk1 : Volume{bf48a395-0ef6-11d5
8d69-00c00d003b1e}
[SYNC] : ORB ORB_001[-] -> \Dmt1\Dsk2 : Volume{bf48a395-0ef6-11d5
8d69-00c00d003b1e}
[SYNC] : ORB ORB_002[-] -> \Dmt1\Dsk3 : Volume{bf48a395-0ef6-11d5
8d69-00c00d003b1e}
```

The following example flushes the system buffer associated with all groups for the local instance.

**Example**

```
raidscan -pi $Volume -find sync
[SYNC] : ORA ORA_000[-] -> \Vol44\Dsk0 : Volume{56e4954a-28d5
4824-a408-3ff9a6521e5d}
[SYNC] : ORA ORA_000[-] -> \Vol45\Dsk0 : Volume{56e4954a-28d5
4824-a408-3ff9a6521e5e}
[SYNC] : ORB ORB_000[-] -> \Dmt1\Dsk1  : Volume{bf48a395-0ef6
11d5-8d69-00c00d003b1e}
[SYNC] : ORB ORB_001[-] -> \Dmt1\Dsk2  : Volume{bf48a395-0ef6
11d5-8d69-00c00d003b1e}
[SYNC] : ORB ORB_002[-] -> \Dmt1\Dsk3  : Volume{bf48a395-0ef6
11d5-8d69-00c00d003b1e}
```

> 📄 **Note:** Windows does not support the LDM volume, so specify $LETALL instead of $Volume.

Chapter 8: Examples of using CCI commands

**Offline backup using `raidscan -find sync` for Windows file system:**

The `raidscan -find sync` command flushes the system buffer associated with a logical drive through finding a Volume{guid} corresponding to a group of the configuration file, without using the `-x mount` and `-x umount` commands. The following examples are for group ORB.

| P-VOL Side | S-VOL Side |
|---|---|
| Close all logical drives on the P-VOL by application.<br><br>▪ Flush the system buffer for P-VOL using raidscan -pi $Volume -find sync -g ORB.<br><br>▪ Split the paired volume using pairsplit -g ORB with r/w mode.<br><br>▪ Open all logical drives on the P-VOL by application.<br><br>▪ Resynchronize the paired volume using pairresync -g ORB. | ▪ Flush the system buffer for NEW S-VOL data using raidscan -pi $Volume -find sync -g ORB.<br><br>▪ Back up the S-VOL data.<br><br>▪ Flush the system buffer for S-VOL updates using raidscan -pi $Volume -find sync -g ORB when the backup is finished. |

**Online backup using `raidscan -find sync` for Windows file system:**

The `raidscan -find sync` command flushes the system buffer associated with a logical drive through finding a Volume{guid} corresponding to a group of the configuration file, without using the `-x mount` and `-x umount` commands. The following examples are for group ORB.

| P-VOL Side | S-VOL Side |
|---|---|
| Freeze DB on opening P-VOL by application.<br><br>▪ Flush the system buffer for P-VOL using raidscan -pi $Volume -find sync -g ORB.<br><br>▪ Splits the paired volume using pairsplit -g ORB with r/w mode.<br><br>▪ Unfreeze DB on opening P-VOL by application.<br><br>▪ Resynchronize the paired volume using pairresync -g ORB. | ▪ Flush the system buffer for NEW S-VOL data using raidscan -pi $Volume -find sync -g ORB.<br><br>▪ Back up the S-VOL data.<br><br>▪ Flush the system buffer for S-VOL updates using raidscan -pi $Volume -find sync -g ORB when the backup is finished. |

Chapter 8: Examples of using CCI commands

**Offline backup using raidscan -find sync for Windows file system:**

The `raidscan -find sync` command flushes the system buffer through finding a logical drive corresponding to a group of the configuration file, without using the `-x mount` and `-x umount` commands. The following examples are for group ORB.

| P-VOL Side | S-VOL Side |
|---|---|
| Close all logical drives on the P-VOL by application.<br><br>▪ Flush the system buffer for P-VOL using raidscan -pi $LETALL -find sync -g ORB.<br><br>▪ Split the paired volume using pairsplit -g ORB with r/w mode.<br><br>▪ Open all logical drives on the P-VOL by application.<br><br>▪ Resynchronize the paired volume using pairresync -g ORB. | ▪ Back up the S-VOL data.<br><br>▪ Flush the system buffer for S-VOL updates using raidscan -pi $LETALL -find sync -g ORB when the backup is finished. |

**Online backup using `raidscan -find sync` for Windows file system:**

The `raidscan -find sync` command flushes the system buffer through finding a logical drive corresponding to a group of the configuration file, without using the `-x mount` and `-x umount` commands. The following examples are for group ORB.

| P-VOL Side | S-VOL Side |
|---|---|
| Freeze DB on opening P-VOL by application.<br><br>▪ Flush the system buffer for P-VOL using the raidscan -pi $LETALL -find sync -g ORB.<br><br>▪ Splits the paired volume using pairsplit -g ORB with r/w mode.<br><br>▪ Unfreeze DB on opening P-VOL by application.<br><br>▪ Resynchronize the paired volume using pairresync -g ORB. | ▪ Back up the S-VOL data.<br><br>▪ Flush the system buffer for S-VOL updates using raidscan -pi $LETALL -find sync -g ORB when the backup is finished. |

> 📄 **Note:**
>
> - P-VOL side must stop the WRITE IO to the logical drive corresponding to a [-g name] before issuing the `raidscan -find sync` command.
>
> - S-VOL side must close the logical drive corresponding to a [-g name] before issuing the `raidscan -find sync` command.

# Special facilities for Windows systems

CCI provides the following special facilities for Windows systems:

- Signature changing facility for Windows systems (on page 374)
- GPT disk for Windows (on page 376)

## Signature changing facility for Windows systems

Consider the following Microsoft Cluster Server (MSCS) configuration in which a MSCS P-VOL is shared from MSCS Node1 and Node2, and the copied volume of S-VOL is used for backup on Node2. If the Node2 has reboot on standby state, then MSCS of Node2 has a problem to assign drive letter of S-VOL with previous P-VOL drive letter. This problem will happen on Node2 on MSCS environment as shown in the following figure. The conditions are:

- Node1 is active.
- Node2 is standby state where P-VOL on Node2 is hidden by MSCS, and reboots the Node2.



MSCS on Node2 will misunderstand the S-VOL as MSCS cluster resource, because the signature of S-VOL and P-VOL is the same due to copied. The reason is that MSCS cluster resources are managed with the signature only. Therefore S-VOL of Node2 will unable to backup so that MSCS of Node2 carry away the S-VOL. This is a problem of MSCS service because Windows system does change the signature through reboot if the same signature is detected on NO MSCS service. MSCS will not accommodate LUNs with duplicate signatures and partition layout. The best way to avoid such problems is to transport to another host outside the cluster, but this enforces to set up a backup server, so CCI supports a facility to put back the signature as a second way.

The signature can be changed by using the **dumpcfg.exe** command attached to Windows resource kits, but if the S-VOL is created with the Noread option and the system is rebooted, then the **dumpcfg.exe** command will fail to change the signature, because the system does not know the signature and volume layout information for S-VOL.

CCI adopts the following way with this point in view:

- You must save the signature and volume layout information to the system disk by using the **inqraid -gvinf** command, after an S-VOL has set the signature and new partition by the Windows disk management.

- You can put back the signature by setting the signature and volume layout information to an S-VOL that was saved to the system disk by using the **inqraid -svinf** command, after splitting the S-VOL. If the S-VOL is created with the Noread option and the system is rebooted, then the system cannot create a device object (\Device\HarddiskVolume#) and Volume{guid} for S-VOL, but the -svinf option will create a Device object (\Device \HarddiskVolume#) and Volume{guid} without using the Windows disk management.

> **Note:** The Cluster Disk Driver does not allow using the Noread volume as [Device is not ready] at the boot time, since the Cluster Disk Driver is a Non-Plug and Play Driver. Verify this situation using the **inqraid** command as follows:
>
> ```
> inqraid $Phy -CLI
> DEVICE_FILE     PORT     SERIAL  LDEV CTG  H/M/12  SSID R:Group PRODUCT_ID
> Harddisk0       -        -       -    -    -       -    -       -
> Harddisk1       -        -       -    -    -       -    -       -
> ```
>
> In this case, do the following to disable the Cluster Disk Driver:
>
> 1. In the **Computer Management** window, double-click System Tools, and then click Device Manager.
> 2. On the View menu, click Show Hidden Devices. Non-Plug and Play Drivers appear in the list in the right pane.
> 3. Open Non-Plug and Play Drivers, right-click Cluster Disk, and then click Disable. When prompted to confirm whether to disable the cluster disk, click Yes. When prompted to restart the computer, click Yes.
> 4. Verify that you can see the Noread volume using **inqraid** command as follows.
>
>    ```
>    inqraid $Phy -CLI
>    DEVICE_FILE     PORT     SERIAL  LDEV CTG  H/M/12  SSID R:Group
>    PRODUCT_ID
>    Harddisk0       CL2-K    61456   194  -    s/S/ss  0004 1:01-10 OPEN-3
>    Harddisk1       CL2-K    61456   256  -    s/S/ss  0005 1:01-11 OPEN-3
>    ```
>
> 5. After starting up CCI and splitting the S-VOL, put back the signature by using the **inqraid -svinf** command.
> 6. Again, in the **Computer Management** window, enable the Cluster Disk Driver, and restart the computer.

Chapter 8: Examples of using CCI commands

# GPT disk for Windows

Windows supports the basic disk called GPT disk using GUID partition instead of the Signature. The GPT disk also can be used as an S-VOL of ShadowImage. Therefore, CCI supports saving/restoring the GUID DiskId of the GPT Basic disk to the `inqraid` command.

- **`gvinfex` option (Windows only)**:

  This option retrieves the LUN signature and volume layout information by way of a raw device file provided via STDIN or arguments, and saves it in a system disk file with the following format:

  `\WindowsDirectory\VOLssss_llll.ini`

  where

  `ssss = serial#`

  `llll = LDEV#`

  Normally, this option is used to save the Disk signature/GUID DiskId and volume layout information once, after it has been written on a potential (and before its `paircreate`). You do not need to directly view these host files.

  For example, saves the volume information for all physical drives:

  **Example**

  ```
  D:\HORCM\etc>inqraid $Phys -gvinfex -CLI
  \\.\PhysicalDrive10:
  # Harddisk10  -> [VOL61459_448_DA7C0D91] [OPEN-V         ]
  \\.\PhysicalDrive11:
  # Harddisk11   -> [VOL61459_449_D4CB5F17-2ADC-4FEE-8650
  D3628379E8F5] [OPEN-V         ]
  \\.\PhysicalDrive12:
  # Harddisk12   -> [VOL61459_450_9ABDCB73-3BA1-4048-9E94
  22E3798C3B61] [OPEN-V         ]
  ```

- **`-svinfex[=PTN]` option (Windows only)**:

  This option writes LUN signature/GUID DiskId and volume layout information (that had previously been saved in a system disk file) by way of a raw device file provided via STDIN or arguments.

  This option gets the serial# and LDEV# of the RAID storage system for the target device using SCSI Inquiry, and writes the signature/GUID DiskId and volume layout information from the VOLssss_llll.ini file to the target device.

  This option will work correctly (even if Harddisk# changes due to configuration changes) because the signature/GUID DiskId and volume layout information is associated the array serial# and LDEV# (not Harddisk#).

- **[=PTN]**:

  This option specifies a string pattern usable to select only the pertinent output lines being provide from STDIN. If used as shown, only the **pairdisplay** output lines containing Harddisk would be used to cause signature writing.

  **Example**

  ```
  D:\HORCM\etc>pairdisplay -l -fd -g URA | inqraid -svinfex=Harddisk
  [VOL61459_448_DA7C0D91] -> Harddisk10        [OPEN-V          ]
  [VOL61459_449_D4CB5F17-2ADC-4FEE-8650-D3628379E8F5] ->
  Harddisk11     [OPEN-V          ]
  [VOL61459_450_9ABDCB73-3BA1-4048-9E94-22E3798C3B61] ->
  Harddisk12     [OPEN-V          ]
  ```

- **-gplbaex option (Windows only)**:

  This option is used for displaying usable LBA on a Physical drive in units of 512 bytes, and is used to specify [slba] [elba] options for **raidvchkset** command.

  **Example**

  ```
  C:\HORCM\Tool>inqraid -CLI -gplbaex hd10,13
  Harddisk10   : SLBA = 0x0000003f ELBA = 0x013fe5d9 PCNT = 1 [OPEN-V        ]
  Harddisk11   : SLBA = 0x00000022 ELBA = 0x013fffdf PCNT = 2 [OPEN-V        ]
  Harddisk12   : SLBA = 0x00000022 ELBA = 0x013fffdf PCNT = 3 [OPEN-V        ]
  ```

  **SLBA**
  > Displays usable starting LBA in units of 512 bytes

  **ELBA**
  > Displays usable ending LBA (ELBA -1) in units of 512 bytes

  **PCNT**
  > Displays the number of partitions

## Directory mount facility for Windows systems

The attached **mountvol** command into Windows supports the directory mount, but it does not support the directory mount function that flushes the system buffer associated to a logical drive such as in UNIX systems. The directory mount structure on Windows is only symbolical link between a directory and Volume{guid}, illustrated in the figure given below. As such, CCI supports the function to discover the mounted volumes by a directory, and supports the operation to mount/unmount with the subcommand option.

**Volume discovery for directory mounted volume:**

CCI can discover the directory mounted volume by using $LETALL that shows the relationship between logical drive and the physical volumes. The KEY WORD ($LETALL)can also be used with the **raidscan -find** and **mkconf** commands.

**Example**

```
D:\HORCM\etc>inqraid $LETALL -CLI
DEVICE_FILE      PORT     SERIAL  LDEV CTG  H/M/12  SSID R:Group PRODUCT_ID
D:\Vol2\Dsk7     -            -     -   -      -      -       - DDRS-34560D
D:\hd1\Vol8\Dsk0 CL2-F    61459    448   -  s/s/ss  0005 1:01-01 OPEN-3
D:\hd2\Vol9\Dsk1 CL2-F    61459    449   -  s/s/ss  0005 1:01-01 OPEN-3
G:\Dms1\Dsk2     CL2-K    61456    256   -  s/s/ss  0005 1:01-11 OPEN-3
G:\Dms1\Dsk3     CL2-K    61456    257   -  s/s/ss  0005 1:01-11 OPEN-3
G:\Dms1\Dsk4     CL2-K    61456    258   -  s/s/ss  0005 1:01-11 OPEN-3
```

**Subcommand for directory mounted volume:**

CCI supports the directory mount with the -x mount,-x unmount,-x sync option so that the directory mount can be used to mount/unmount the S-VOL.

**Mount and Sync used Volume{GUID} for Windows:**

CCI supports the `mount`command option specified in the device object name, such as `\Device\Harddiskvolume X`. Windows changes the device number for the device object name after recovering from a failure of the PhysicalDrive. As a result, the `mount`command specified in the device object name might fail. Therefore, CCI supports a `mount` command option that specifies a Volume{GUID} as well as the device object name.

- **Mount**

    - The `mount` command option specifies a Volume{GUID} as well as the device object name.

    - If a Volume{GUID} is specified, then it is executed by converting a Volume{GUID} to a device object name.

    - Discover the Volume{GUID}s by using `inqraid $Volu -fv` command option.

        **Example**

        ```
        C:\HORCM\etc>inqraid -CLI $Vol -fv
        DEVICE_FILE                            PORT     SERIAL   LDEV
        CTG   H/M/12  SSID R:Group PRODUCT_ID
        Volume{cec25efe-d3b8-11d4-aead-00c00d003b1e}\Vol3\Dsk0      CL2-D
        62496   256   -       -      -        - OPEN-3-CVS-CM
        ```

    - **[ Mount used DefineDosDevice() ]**

        > 📄 **Note:** This might forcibly dismount the mounted volume due to LOG-OFF of Windows. For example:

        **Example**

        ```
        C:\HORCM\etc>raidscan -x mount E: Volume{cec25efe-d3b8-11d4-aead-00c00d003b1e}
        E: <+> HarddiskVolume3
        ```

    - **[ Mount used Directory mount ]**

        > 📄 **Note:** This prevents the forcible removal of a volume due to LOG-OFF of Windows. For example:

        **Example**

        ```
        C:\HORCM\etc>raidscan -x mount E:\ Volume{cec25efe-d3b8-11d4-aead-00c00d003b1e}
        E:\ <+> HarddiskVolume3
        ```

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- **sync**
  - The `sync` command option will also be able to specify a Volume{GUID} as well as the device object name.
  - If a Volume{GUID} is specified, then it is executed by converting a Volume{GUID} to a device object name.

  **Example**

  ```
  C:\HORCM\etc>raidscan -x sync Volume{cec25efe-d3b8-11d4-aead-00c00d003b1e}
  [SYNC] Volume{cec25efe-d3b8-11d4-aead-00c00d003b1e}
  ```

# Host group control

The RAID storage systems have the defined host group in the port and can allocate a host LU for every host group. CCI does not use this host LU, and specifies an absolute LUN in the port. To eliminate confusion that LUN of the CCI notation does not correspond to LUN on the host view and Storage Navigator, CCI supports specifying a host group and LUN on the host view.

## Specifying a host group

### (1) Defining the formats

The addition of arguments for the host group to the `raidscan` command and the configuration file means that it is not compatible with conventional CLI. Therefore, CCI provides a way to support CLI by specifying a host group in the port strings as follows.

- CL1-A-GRP#

Specifying the host group for the `raidscan` command:

```
raidscan -p CL1-A-5
```

Specifying the host group for the configuration file:

```
#dev_group    dev_name    port#       TargetID    LU#    MU#
ORA           ORA_000     CL2-D-1         4         1      0
ORA           ORA_001     CL2-D-1         4         2      0
```

### (2) Specifiable port strings

As a result, CCI supports four kinds of forms for the port name.

- Specifying the port name without a host group

CL1-A

CL1-An where n: unit ID for multiple RAID

- Specifying the port name with a host group

CL1-A-g where g: host group

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CL1-An-g where n-g: host group=g on CL1-A in unit ID=n

# Commands and options including a host group

### (1) Specifiable command for host group

The following commands can specify a host group with the port strings:

- **raidscan -p <port#>, raidar -p <port#>, raidvchkscan -p <port#>**

```
# raidscan -p CL2-D-1
PORT# /ALPA/C,TID#,LU#.Num(LDEV#....)...P/S, Status,Fence,LDEV#,P-Seq#,P-LDEV#
CL2-D-1 /da/ 0,  4,  0.1(256)...........SMPL  ----  ------ ----, -----  ----
CL2-D-1 /da/ 0,  4,  1.1(257)...........SMPL  ----  ------ ----, -----  ----
CL2-D-1 /da/ 0,  4,  2.1(258)...........SMPL  ----  ------ ----, -----  ----
```

### (2) Command option including a host group

CCI supports new option for the following commands in order to show a LUN on the host view by finding a host group via the specified device.

- **raidscan -pdg <device>, raidar -pdg <device>, raidvchkscan -pdg <device>**

```
# raidscan -pdg /dev/rdsk/c57t4d1
PORT# /ALPA/C,TID#,LU#.Num(LDEV#....)...P/S, Status,Fence,LDEV#,P-Seq#,P-LDEV#
CL2-D-1 /da/ 0,  4,  0.1(256)...........SMPL  ----  ------ ----, -----  ----
CL2-D-1 /da/ 0,  4,  1.1(257)...........SMPL  ----  ------ ----, -----  ----
CL2-D-1 /da/ 0,  4,  2.1(258)...........SMPL  ----  ------ ----, -----  ----
Specified device(hgrp=1) is LDEV# 0257
```

- **raidscan -findg**

```
# ls /dev/rdsk/c57* | raidscan -findg
DEVICE_FILE        UID  S/F PORT    TARG  LUN    SERIAL  LDEV  PRODUCT_ID
/dev/rdsk/c57t4d0   0    F  CL2-D-1   4    0      62500   256  OPEN3-CVS-CM
/dev/rdsk/c57t4d1   0    F  CL2-D-1   4    1      62500   257  OPEN3-CVS
/dev/rdsk/c57t4d2   0    F  CL2-D-1   4    2      62500   258  OPEN3-CVS
```

- **raidscan -findg conf, mkconf -gg**

```
# ls /dev/rdsk/c57* | raidscan -findg conf 0 -g ORA
HORCM_DEV
#dev_group        dev_name        port#      TargetID    LU#      MU#
# /dev/rdsk/c57t4d1    SER =    62500  LDEV =  257 [ FIBRE FCTBL = 4 ]
ORA               ORA_000        CL2-D-1          4        1        0
# /dev/rdsk/c57t4d2    SER =    62500  LDEV =  258 [ FIBRE FCTBL = 4 ]
ORA               ORA_001        CL2-D-1          4        2        0
```

- **inqraid -fg**

```
# ls /dev/rdsk/c57* | ./inqraid -CLI -fg
DEVICE_FILE      PORT     SERIAL  LDEV CTG  H/M/12  SSID R:Group PRODUCT_ID
c57t4d0          CL2-D-1  62500   256   -      -      -       - OPEN-3-CVS-CM
c57t4d1          CL2-D-1  62500   257   -   s/P/ss  0005 1:01-02 OPEN-3-CVS
c57t4d2          CL2-D-1  62500   258   -   s/P/ss  0005 1:01-02 OPEN-3-CVS
```

# Using CCI SLPR security

The Virtual Partition Manager feature of the RAID storage systems (USP V/VM) supports storage logical partitioning (SLPR), a feature that partitions the ports and volumes of the RAID storage system. If CCI does not have SLPR security, then it can operate the target volumes crossing SLPR through the command device. The purpose of CCI SLPR security is to prevent CCI from operating the volumes on another SLPR (SLPR#N) through the command device from the SLPR (SLPR#M) that is assigned to its Host. You can use CCI SLPR Security by defining the command device through the Virtual Partition Manager feature, so that CCI can protect the target volume.

The following example represents the SLPR protection facility. The figure given below shows an example of protection of the command device that has the SLPR attribute.



Legend:

**SLPR**

Split of storage

**SLPR#M**

Split number M of storage

## Specifying the SLPR protection facility

When you want to access certain SLPRs on a single Host, use the CCI protection facility so that the Host can access multiple SLPRs through a single command device. The following outline reviews the setup tasks for the SLPR protection facility.

**Procedure**

1. **Setting SLPR on the command device**: The command device has an SLPR number and an associated bitmap so you can set multiple SLPRs. You accomplish this by sharing a command device (using ports connected to different SLPRs) by setting the command device through SLPR#0 (called Storage Administrator) on Storage Navigator.

   For example, if the command device is shared with the port on SLPR#1 and SLPR#2, then the command device will automatically set the bitmap corresponding to SLPR#1 and SLPR#2.

2. **Testing SLPR**: CCI verifies whether or not the command device can access a target within SLPR. So, if the command device belongs to SLPR#0, or CCI has no SLPR function, then the SLPR protection is ignored.

   However, if the command device is shared with the port on SLPR#1 and SLPR#2, CCI allows you to operate the volume on SLPR#1 and SLPR#2.

3. **Rejecting commands**: If access is denied on the specified port (or target volume), CCI rejects the following commands and outputs an error code, EX_ESPERM:

   - **horctakeover**, **paircurchk**, **paircreate**, **pairsplit**, **pairresync**, **pairvolchk**, **pairevtwait**, **pairsyncwait**

   - **raidscan** (except **-find verify**, **-find inst**), **raidar**, **pairdisplay**

   - **raidvchkset**, **raidvchkscan** (except **-v jnl**), **raidvchkdsp**

```
[EX_ESPERM]      Permission  denied with the SLPR
[Cause ] : A specified command device does not have a
permission to access other SLPR.
[Action] : Please make the SLPR so that the target port and
the command device belongs to the same SLPR.
```

# SLPR configuration examples

## Single host

The figure given below for SLPR configuration on a single host provides an example of when control is denied to the `paircreate` and `raidscan` commands in the following cases:

- The volume described on RMINST1 is different from the SLPR of the command device, so the `paircreate` command cannot control the paired volume.

- The specified port is different from the SLPR of the command device, so the `raidscan -p CL3-A` command cannot scan any ports that are defined as SLPR#N.



**To operate SLPR#N, assign the command device**. If RMINST1 has been assigned to a command device for SLPR#N, the `paircreate` command is permitted. However, the `raidscan -p CL3-A` command (via RMINST0) is unable to scan a port, because the specified port is different than the SLPR of the command device. In this case, -p CL3-A must be operated via RMINST1, as shown in the following example for operation across SLPRs using two command devices on a single host.



Chapter 8: Examples of using CCI commands

**To operate SLPR#N, share the command device**. If RMINST1 has a shared command device for SLPR#N, the `paircreate` command is permitted. Additionally, the `raidscan -p CL3-A` command (via RMINST0), is permitted to scan a port, because the shared command device has the Bitmap settings SLPR#M and SLPR#N.

See the following example for operation across SLPRs using a shared command device on a single host.



## Dual Hosts

In the following example for SLPR configuration on dual hosts, the `paircreate` command is unable to operate the paired volume because the volume described on HostB is different than the SLPR of the command device. Also, the `raidscan -p CL3-A` command (via both Hosts), is unable to scan a port because the specified port is different than the SLPR of the command device.

**To operate SLPR#N, assign the command device**. If HostB has a command device for SLPR#N, the `paircreate` command is permitted. However, the `raidscan -p CL3-A` command via HostA is unable to scan a port because the specified port is different than the SLPR of the command device. In this case, `raidscan -p CL3-A` command must be operated via HostB.

See the following example for operation across SLPRs using two command devices on dual hosts.



**To operate SLPR#N, share the command device**. If HostB has a shared command device for SLPR#N, the `paircreate` command is permitted. Also, the `raidscan -p CL3-A` command (via HostA), is allowed to scan a port because the shared command device has the Bitmap settings SLPR#M and SLPR#N.

See the following example for operating SLPR#N by sharing the command device.

**TrueCopy using dual hosts**

In the following example, the `pair-operation` command (except the `-l` option) determines whether the operation for paired volumes should be permitted at a remote site. The result is that the `paircreate` command is not allowed to operate the paired volume, because the volume described on HostB differs from the SLPR of the command device. Also, the `raidscan -p CL3-A` command (on HostB) is not allowed to scan a port.

# Chapter 9: Troubleshooting

This guide provides CCI troubleshooting details.

## General troubleshooting

If you have a problem with the CCI software, first make sure that the problem is not being caused by the UNIX/PC server hardware or software, and try restarting the server.

| Problem | Recommended action |
|---|---|
| Deprecated SCSI ioctl<br><br>The following message is output to syslog file(/var/log/messages) with every ioctl():<br><br>`program horcmgr is using a deprecated SCSI ioctl, please convert it to SG_IO` | CCI currently uses the ioctl(SCSI_IOCTL_SEND_COMMAND) for sending the control command to the command device. However, in RHEL 4.0 using kernel 2.6.9.*xx*, the following message is output to syslog file(/var/log/messages) with every ioctl():<br><br>`program horcmgr is using a deprecated SCSI ioctl, please convert it to SG_IO` |

| Problem | Recommended action |
|---------|--------------------|
|  | This can originate from the following kernel code in drivers/scsi/scsi_ioctl.c as way of warning that ioctl(SCSI_IOCTL_…) of kernel 2.6.9.*xx* does not properly handle an error of the HBA driver.<br><br>```<br>----------------------------------------------------------------------<br><br><br>/* Check for deprecated ioctls ... all the ioctls that do not follow<br>the new unique numbering scheme are deprecated */<br><br><br>        switch (cmd) {<br><br><br>        case SCSI_IOCTL_SEND_COMMAND:<br><br><br>        case SCSI_IOCTL_TEST_UNIT_READY:<br><br><br>        case SCSI_IOCTL_BENCHMARK_COMMAND:<br><br><br>        case SCSI_IOCTL_SYNC:<br><br><br>        case SCSI_IOCTL_START_UNIT:<br><br><br>        case SCSI_IOCTL_STOP_UNIT:<br><br><br>            printk(KERN_WARNING "program %s is using a deprecated SCSI "<br><br><br>                "ioctl, please convert it to SG_IO\n", current->comm);<br><br><br>----------------------------------------------------------------------<br>``` |

Chapter 9: Troubleshooting

| Problem | Recommended action |
|---|---|
| | Thus, CCI supports a way to change to the ioctl(SG_IO) automatically, if Linux kernel supports the ioctl(SG_IO) for horcmgr and **inqraid** command. However, CCI might encounter Linux kernel that does not support the ioctl(SG_IO) fully, so CCI also supports by defining either following environment variable or "/HORCM/etc/USE_OLD_IOCTL" file(size=0) that uses the ioctl(SCSI_IOCTL_SEND_COMMAND) forcibly. For example: |
| | <pre>export USE_OLD_IOCTL=1</pre> |
| | <pre>horcmstart.sh 10</pre> |
| | <pre>HORCM/etc:</pre> |
| | <pre>-rw-r--r--  1 root root      0 Nov 11 11:12 USE_OLD_IOCTL</pre> |
| | <pre>-r--r--r--  1 root sys   32651 Nov 10 20:02 horcm.conf</pre> |
| | <pre>-r-xr--r--  1 root sys  282713 Nov 10 20:02 horcmgr</pre> |
| CCI cannot be started because horcmstart command fails | If you have changed the configuration definition file settings: make sure that the configuration definition file you changed is correct. |
| | If you have changed the settings of the storage system: make sure that the settings you changed are correct, and if necessary, change the configuration definition file settings. |
| | Make sure the instance number specified as a parameter in the **horcmstart** command is in the range of 0 to 2047. If you specify the instance number in the HORCMINST environment variable, make sure the value set in the environment variable is in the range of 0 to 2047. |
| | Even if there are no problems in these files and settings, but if you cannot run CCI, get all log files under the specified directory by HORCM_LOG (the default setting: /horcm/log/), and then contact customer support. |
| The following messages are output to the standard error output with every command I/O: | These messages are output if the path for the PA-RISC version shared library (libcl.sl) is not set when you use CCI on HP-UX (IA64). |
| | Set the path of the libcl.sl to the LD_PRELOAD environment variable. |
| | Example: `# export LD_PRELOAD=/path/libcl.sl` |
| | Enter the absolute path for specifying the directory where libcl.sl is stored into *path*. |

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| Problem | Recommended action |
|---|---|
| `"/usr/lib/`<br>`dld.sl: Can't`<br>`shl_load() a`<br>`library`<br>`containing`<br>`Thread Local`<br>`Storage: /usr/`<br>`lib/libcl.sl"`<br><br>`"/usr/lib/`<br>`dld.sl: Exec`<br>`format error"` | |
| When you attempt to remove RM Shadow Copy Provider, the installer displays a message indicating that a file cannot be deleted because it is used by another program. | Perform the following steps to delete the file:<br>1. Check the information about the program that is using the file indicated by the installer.<br>2. Stop the removal of RM Shadow Copy Provider.<br>3. Close the program you found out in step 1.<br>4. Try to remove RM Shadow Copy Provider again.<br>5. Repeat steps 1 through 4 until you can remove RM Shadow Copy Provider successfully. |
| If a failure occurs in a processor on an MP blade or controller, you cannot run certain commands on any MP blades or controllers (even if no failure occurs on those MP blades or controllers). | For details, see "Command execution with MP blade or controller failure" in *Command Control Interface Command Reference*. |

# Troubleshooting error conditions when SIM codes are output

For VSP E series, VSP Fx00 models and VSP Gx00 models, a SIM code is output when the storage system needs the intervention of maintenance personnel.

All SIMs are recorded in the storage system, and reported to the management client. For details, see the System Administrator Guide.

A SIM issues an SNMP trap and notifies the host of the failure. For details about SNMP traps, see the System Administrator Guide.

# List of SIM codes

The following table explains the SIM codes that are issued if a problem occurs while a Storage Advisor Embedded server is being operated. For details about SIM codes, see the SIM Reference Guide.

| Reference code | Failure | Cause and action |
|---|---|---|
| 7c1*xxx*\* | A failure occurred on the Storage Advisor Embedded server | Cause: Consistency of data for managing the Storage Advisor Embedded server is not assured.<br><br>Action: Delete the Storage Advisor Embedded server. See the description of the **raidcom delete server** command in the Command Control Interface Command Reference for this procedure.<br><br>If you cannot delete the server, contact customer support.<br><br>To manage host groups or iSCSI targets registered on the deleted server again on the Storage Advisor Embedded server, perform the following steps:<br><br>1. Create a server to be managed by the Storage Advisor Embedded.<br>2. Register the host groups or iSCSI targets on the created server. |

| Reference code | Failure | Cause and action |
|---|---|---|
| | | For details about creating a Storage Advisor Embedded server and registering host groups or iSCSI targets, see the description for the `raidcom add server` and `raidcom modify` server commands in the Command Control Interface Command Reference. |
| *xxx* indicates the ID of the Storage Advisor Embedded server. | | |

## Operational notes and restrictions for CCI operations

For maintenance of volumes used by CCI and the Hitachi Vantara features it supports, if a volume failure occurs, it is important to find the failure in the paired volumes, recover the volumes, and continue operation on the original system. When a CCI (HORCM) or Hitachi Vantara feature failure is detected, please collect the data in the error log file and trace data (all files in HORCM_LOG directory), and report the failure to your Hitachi Vantara representative.

| Items | Notes and restrictions |
|---|---|
| Startup restrictions | When the server starts up, sometimes a volume group (VG) is activated by the LVM, or a file system is mounted automatically, and the host writes to the S-VOL. When this happens, if the S-VOL does not permit writing, data cannot be written and the operation fails. To avoid this failure, change the S-VOL to PSUS (R/W enable) or to the SMPL state and restart the server. |
| Upper limit of instances | When using CCI with the in-band method, you can use a maximum of 2048 instances in total on a storage system. If you run more than 2048 instances, you might not be able to use other applications with the in-band method.<br><br>When using remote command devices, you can use a maximum of 16 instances per remote command device. If you try to run more than 16 instances, the startup fails. |

| Items | Notes and restrictions |
|---|---|
| Hot standby operations | Note the following when executing hot standby operations using industry-standard failover products (for example, MC/ServiceGuard, HACMP, FirstWatch®) and TrueCopy/ TrueCopy Async/ Universal Replicator.<br><br>▪ Do not split a single volume using partitions and share it among different server programs. If you do so, the takeover command is executed for the volume when failover of a server program happens, and that might affect other servers that share the volume.<br><br>▪ If you are using the LVM, do not create LDEVs for different LVM within the same volume. If you do so, the takeover command is executed for the volume when failover of a server program happens, and that might affect other servers that share the volume. |
| Coexistence of LVM mirror and TrueCopy | When the LVM mirror and TrueCopy volumes are used together, the LVM mirror handles write errors and changes the volumes. Thus, the fence level of the volumes used by the LVM mirror must be set to data. |
| Using paired volume in a single host | When constructing paired volume in a single host, it is necessary to activate two or more CCI instances. To activate two or more CCI instances, use the environment variable HORCMINST or the `-I[H|M]` option to run the relevant command with assigning instance numbers.<br><br>A configuration definition file and a log directory is set for each instance. |
| Sharing volumes in a hot standby configuration | When paired volume is used for the disk shared by the hosts in hot standby configuration using HA software, use the primary volume as the shared disk and describe the corresponding hosts using the paired volume in the configuration definition file as shown below. In the HA configuration, if a TrueCopy command issued by host C fails in host B (because host B has gone down and/or IO_ERROR of the command device), host A is connected and the command execution is retried. |

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| Items | Notes and restrictions |
|---|---|
| |  |
| Linkage with HA software | The HORC Manager must not be an object of the process monitoring by the HA software (cluster manager), because HORCM should run in the same level as the cluster manager. Cooperation with HA software is done by activating the takeover command from the shell script activated by the cluster manager in units of the package software.<br><br>**Note:** Cannot use a pair volume for the cluster lock disk that HA software uses for election. |
| Maintenance | Restart of HORCM is required if the storage system configuration is changed (for example, microcode exchange, cache memory install/ uninstall).<br><br>TrueCopy only: In the case of an error (for example, single error in cache memory) which made the pair volume is accompanied by maintenance work, the `pairresync` or `paircreate` command cannot execute copy rejection. |
| SVP/GUM microcode exchange | In out-of-band method using SVP, if the microcode exchange of the SVP is performed, the timeout on command occurs. Execute the command again after finishing the microcode exchange.<br><br>In out-of-band method using GUM, if the maintenance on the controller with GUM is performed, the timeout on command might occur. Switch the command device so that the other virtual command device of GUM can be used before the maintenance. For details about the alternate command device function, see Alternate command device function. |

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| Items | Notes and restrictions |
|---|---|
| Command device | Each TrueCopy/ShadowImage command is executed by issuing a command to the command device. A TrueCopy/ShadowImage command reads or writes from/on the specified block area of the command device. Configure the command device so that it can be read or written by CCI only. In addition, this device must not belong to an LVM volume group. For Windows systems, do not assign a drive letter to the command device to prevent utilization by general users. |
| SCSI alternate path restrictions | If the P-VOL and S-VOL are on the same server, alternate path from P-VOL to S-VOL cannot be used. Use of SCSI alternate path to a volume pair in the pair status is limited to among primary (secondary) volumes. Alternate path using Path Manager (Safe Path) is limited to primary volumes. |
| horctakeover (Swap-Takeover) | When executing `horctakeover` on a standby server manually, I/O on the active server must be stopped. When the package software goes for a standby server a failover by HA software, the HA software must guarantee an I/O insulation of the active server. |
| HORCM failure to activate | After a new system has been constructed, a failure to activate HORCM might occur due to improper environment setting and/or configuration definition. Refer to the HORCM activation log, and correct the settings. |
| Abnormal termination of command | Refer to the command log file and HORCM log file to identify the cause of the error. If a command terminates abnormally because of a remote server failure, recover the server from the failure, then re-execute the command. If HORCM has shut down, restart HORCM. If an unrecoverable error occurs, obtain the log files and contact customer support. |
| Error in paired volume operation | **TrueCopy only**: If an error occurs in duplicated writing in paired volumes (that is, pair suspension), the server software using the volumes might detect the error by means of the fence level of the paired volume. In such a case, check the error notification command or syslog file to identify a failed paired volume.<br><br>The system administrator can confirm that duplicated writing in a paired volume is suspended due to a failure and the system runs in regressed state using the error notification command of the TrueCopy. HORCM monitors failures in paired volumes at regular intervals. When it detects a failure, it outputs it to the host's syslog file. Thus, the system administrator can detect the failure by checking the syslog file. Concerning the operation of the RAID storage system, the failure can also be found on Storage Navigator (or SVP) provided. |

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| Items | Notes and restrictions |
|---|---|
| | Issue the TrueCopy commands manually to the identified failed paired volume to try to recover it. If the secondary volume is proved to be the failed volume, issue the pair resynchronization command to recover it. If the primary volume fails, delete the paired volume (pair splitting simplex) and use the secondary volume as the substitute volume. |
| About "/HORCM/.uds" directory | CCI uses "/HORCM/.uds" as the directory for the UNIX domain socket for IPC (Inter Process Communication), and makes the directory and files as "/HORCM/.uds/.lcm*" in CCI version 01-17-03/01 or later.<br><br>Caution: This "/HORCM/.uds/.lcm*" should not be removed while HORCM is running. |

# Error messages and error codes

## System log messages

The following table lists and describes the HORCM system log messages and provides recommended actions for resolving the error conditions.

| Message ID | Condition | Cause | Recommended action |
|---|---|---|---|
| HORCM_001 | The HORCM log file cannot be opened. | The file cannot be created in the HORCM directory. | Create space on the disk on which the root directory resides. |
| HORCM_002 | The HORCM trace file cannot be opened. | The file cannot be created in the HORCM directory. | Create space on the disk on which the root directory resides. |
| HORCM_003 | The HORCM daemon process cannot create a child process due to an error. | HORCM daemon attempted to create more processes than the maximum allowable number. | Terminate unnecessary programs or daemon processes running simultaneously. |
| HORCM_004 | HORCM assertion failed, resulting in a fatal internal error in the HORCM. | An internal error that could not be identified by the HORCM occurred. | Restart the system, and contact customer support. |

| Message ID | Condition | Cause | Recommended action |
|---|---|---|---|
| HORCM_005 | The CCI software failed to create the end point for remote communication. | HORCM failed to create a socket, or an error exists in the format or a parameter in the HORCM configuration definition file ($HORCM_CONF). | Refer to the HORCM startup log to identify the cause of the error. |
| HORCM_006 | HORCM memory allocation failed. | HORCM memory could not be secured. | Increase the system virtual memory, or close any unnecessary programs. |
| HORCM_007 | An error exists in the parameter value in the HORCM setup file. | An error exists in the parameter value setting in the HORCM setup file. | Refer to the startup log and reset the parameters. |
| HORCM_008 | HORCM configuration definition file parameters reading fails. | An error exists in the format or parameters of the HORCM configuration definition file ($HORCM_CONF). | Refer to the HORCM startup log to identify the cause of the error. |
| HORCM_009 | TrueCopy/ ShadowImage connection to the CCI software failed. | System devices are improperly connected, or an error exists in the device parameter in the HORCM configuration definition file. | Refer to the HORCM startup log to identify the cause of the error. |
| HORCM_101 | TrueCopy/ ShadowImage and the CCI software communication fails. | A system I/O error occurred or an error exists in the device parameter in the HORCM configuration definition file ($HORCM_CONF). | Refer to the HORCM startup log to identify the cause of the error. |
| HORCM_102 | The volume is suspended. | The pair status was suspended due to code XXXX. | Contact customer support. |

| Message ID | Condition | Cause | Recommended action |
|---|---|---|---|
| HORCM_103 | Detected a validation check error on this volume (xxxx unit#x,ldev#x): CfEC=n, MNEC=n, SCEC=n, BNEC=n | A validation error occurs on the database volume, or validation parameters for this volume are illegal. | Please confirm the following items, and use `raidvchkdsp -v <op>` command for verifying the validation parameters.<br><br>(1)Check if the block size (-vs <size>) is an appropriate size.<br><br>(2)Check if the type for checking (-vt <type>) is an appropriate type.<br><br>(3)Check if the data validations are disabled for LVM configuration changes.<br><br>(4)Check if the data validations are not shared on file system.<br><br>(5)Check if the redo log and data file are separated among the volumes. |

## Command error messages

The following table lists and describes the command error messages and their return values and provides recommended action for resolving the error conditions.

The messages below are typical command error messages. Check the command log file for details of the error. For details about the command log file, see CCI log files.

| Error code | Error message | Condition | Recommended action | Returned Value |
|---|---|---|---|---|
| EX_CO MERR | Can't be communic ate with HORC Manager | This command failed to communicate with the CCI software. | Confirm whether HORCM is enabled. If HORCM is not activated yet, start HORCM. If HORCM ended abnormally despite being activated, verify the disk capacity has 3000 KB or more free space. Free up disk space, and then restart HORCM. If the problem persists, contact customer support. | 255 |

| Error code | Error message | Condition | Recommended action | Returned Value |
|---|---|---|---|---|
| EX_RE QARG | Required Arg list | Arguments for the command are not sufficient, or the command syntax is not correct. | Please designate the correct option using the -h option. | 254 |
| EX_INV ARG | Invalid argument | An option or arguments of an option are incorrect. | Please designate the correct option using the -h option. | 253 |
| EX_UN WOPT | Unknown option | Designated an unknown option. | Please designate the correct option using the -h option. | 252 |
| EX_CO NCHK | Connectio n check error | The connection check cannot be performed. | Wait for a while, and then retry the operation. | 197 |
| EX_ATT HOR | Can't be attached to HORC Manager | Could not connect with HORCM. | Please verify that HORCM is running and/or that HORCMINST is set correctly.<br><br>When using OpenVMS, this error might occur even when "Buffered I/O byte count quota" is depleted.<br><br>If the "Buffered I/O byte count quota" is depleted, change the current value of "Buffered I/O Byte Count Limit" to a larger value.<br><br>For more information on "Buffered I/O byte count quota" and "Buffered I/O Byte Count Limit", see your OpenVMS user guide.<br><br>Verify that the storage system is ready, wait for 15 minutes, and then retry the command.<br><br>If this error occurs again 15 minutes or more after the storage system becomes ready, perform GUM reboot, and then retry the command by referring to the System Administrator Guide. | 251 |
| EX_ATT DBG | Can't be attached to a Debug layer | Failed to communicate with HORCM, or cannot make a log directory file. | Verify that HORCM is running by using UNIX commands [ps - ef \| grep horcm]. | 250 |

| Error code | Error message | Condition | Recommended action | Returned Value |
|---|---|---|---|---|
| EX_INV NAM | Invalid name of option | The name specified in an argument of an option is not appropriate. | Please designate the correct name using the -h option. | 249 |
| EX_OPT INV | A specified option is invalid | Detected contradiction in information that RAID reported. | Contact customer support. | 248 |
| EX_EN OENT | No such device or group | The designated device or group name does not exist in the configuration definition file. | Verify the device or group name and add it to the configuration definition file of the remote and local hosts. | 247 |
| EX_EN ODEV | No such device | The designated device name does not exist in the configuration definition file. | Verify the device name and add it to the configuration definition file of the remote and local hosts. | 246 |
| EX_EN OUNT | No such RAID unit | The designated RAID unit ID does not exist in the configuration definition file. | Verify the RAID unit ID and add it to the configuration definition file of the remote and local hosts. | 219 |
| EX_EN QSER | Unmatche d Serial# vs RAID unitID | The group designated by ShadowImage paircreate does not have the same RAID unit, or the unitID is not identical to the unit ID in the same RAID serial# (Seq#). | Confirm the serial# (Seq#) of the storage system using the `pairdisplay` command, or confirm that the serial# (Seq#) and the unit ID of storage system are the same among hosts using the `raidqry -r` command. | 218 |
| EX_EN OMEM | Not enough core | Insufficient memory exists. | Increase the virtual memory capacity of the system, or close any unnecessary programs and/or daemon processes. | 245 |
| EW_EN ESCR | Cannot execute script file | The script file specified by the -zt option cannot be performed. | Confirm the execution right, permission the extension, the execution path of the script file. | 131 |
| EX_ERA NGE | Result too large | Your entry is one of the following statuses. ▪ The value was entered beyond the maximum. ▪ The result value is beyond the maximum. ▪ The unit you set is invalid. | Refer to the error message, and designate an appropriate value or confirm whether you specified the unit correctly. | 244 |

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| Error code | Error message | Condition | Recommended action | Returned Value |
|---|---|---|---|---|
| EX_ENA MLG | File name too long | Undefined error. | Contact customer support. | 243 |
| EX_EN ORMT | No remote host alive for remote commands or remote HORCM might be blocked (sleeping) on an existing I/O | A timeout occurred on remote communication, and HORC Manager failed to re-execute. | Verify that the CCI instance on the remote host is running. If the CCI instance is not running, start the CCI instance, and then retry the command.<br><br>If CCI is running, take the following actions:<br><br>1. If the IP address of the host has changed, restart the CCI instance, and then retry the command.<br><br>2. If the EX_ENORMT error is returned within about one second, restart the CCI instance, and then retry the command.<br><br>3. If this error occurs again even after taking actions #1 and #2, verify the timeout value in the configuration definition file, restart the CCI instance, and then retry the command. For details about the timeout value, see HORCM_MON in Configuration definition file (on page 40). | 242 |
| EX_INV MOD | Invalid RAID command mode | Detected a contradiction for a command. | Contact customer support. | 241 |
| EX_INV CMD | Invalid RAID command | Detected a contradiction for a command. | Contact customer support. | 240 |
| EX_EN OGRP | No such group | The designated device or group name does not exist in the configuration definition file, or the network address for remote communication does not exist. | Verify the device or group name and add it to the configuration definition file of the remote and local hosts. | 239 |

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| Error code | Error message | Condition | Recommended action | Returned Value |
|---|---|---|---|---|
| EX_UNWCOD | Unknown function code | Detected a contradiction for a command. | Verify whether the necessary licenses are installed.<br><br>Retry your operation after restart of the instance for CCI. Contact customer support if the operation fails because of same error again. | 238 |
| EX_CMDIOE | Control command I/O error | A read/write to the command device failed with an I/O error. | This error might occur due to a device failure. Check device condition, then retry the command after recovery from the failure. Or, in some commands such as the `pairsplit` command, this error might occur depending on the load status of the storage. Reduce the load on the storage, and then retry the command. If the error occurs even after the retry, refer to the host syslog file, and investigate the cause of the error.<br><br>If the problem persists, collect the log information of HORCM ($HORCM_LOG), and contact customer support. | 237 |
| EX_CMDRJE | An order to the control/ command device was rejected | The request to the command device failed or was rejected.<br><br>**Note:** This error code is sometimes caused by the operating system and reported as EX_CMDIOE instead of EX_CMDRJE (see next row). | Verify the program products, such as TrueCopy and ShadowImage, are installed.<br><br>Verify ports are set.<br><br>Verify CU paths have been established by Device Manager - Storage Navigator, CCI, or other methods.<br><br>Verify that the target volume is available.<br><br>CCI displays "SSB" in the output of the commands so a service representative can identify the cause of EX_CMDRJE (except for Tru64, DYNIX).<br><br>Example:<br><br>`# paircreate -g G1 -f never -vl -nocopy` | 221 |

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| Error code | Error message | Condition | Recommended action | Returned Value |
|---|---|---|---|---|
| | | | `paircreate: [EX_CMDRJE] An order to the control/command device was rejected`<br><br>`Refer to the command log (/ HORCM/log10/horcc_u1-1.log) for details.`<br><br>`It was rejected due to SKEY=0x05, ASC=0x26, SSB=0xB9BF,0xB9C7 on Serial#(63502).` | |
| EX_CM DIOE | Control command I/O error or rejected | A read/write to the command device failed with an I/O error or was rejected. | This error might occur due to a device failure. Check device condition, then retry the command after recovery from the failure. If the error occurs even after the retry, refer to the host syslog file, and investigate the cause of the error. If the cause is "Illegal Request (0x05)" Sense Key, please confirm the following items.<br><br>Verify the program products, such as TrueCopy and ShadowImage, are installed.<br><br>Verify ports are set.<br><br>Verify CU paths have been established by Device Manager - Storage Navigator, CCI, or other methods.<br><br>Verify that the volume which is the target of the pair operation is in the appropriate status for issuing the concerned command. | 237 |

| Error code | Error message | Condition | Recommended action | Returned Value |
|---|---|---|---|---|
| | | | Verify that the status of the volume which is the target of the pair operation changed to the intended status after 160 or more seconds have passed since the concerned command issued. | |
| | | | ▪ When the status has changed as you intended: The command executed normally. The communication delay or other errors may happen. Confirm the path between the storage systems. | |
| | | | ▪ When the status has not changed: Issue the concerned command again. If the phenomenon happens again, contact customer support. | |
| | | | ▪ Other than above: Contact customer support. | |
| | | | If the command is issued by using the out-of-band method, this error might occur due to a network failure. Verify the network connection, and then retry the operation. | |
| | | | If the EX_CMDIOE error is returned within about one second after the command retry, take the following actions: | |
| | | | 1. If this error occurs in embedded CCI, perform GUM reboot, and then retry the command by referring to the System Administrator Guide. | |
| | | | 2. If this error occurs in CCI installed on the host, restart the CCI instance. | |
| | | | If the problem persists, contact customer support. | |
| EX_ENQVOL | Unmatched volume status within the group | The volume attribute or the fence level within a group is not identical. | Confirm status using the `pairdisplay` command. Make sure all volumes in the group have the same fence level and volume attributes. | 236 |

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| Error code | Error message | Condition | Recommended action | Returned Value |
|---|---|---|---|---|
| EX_EVOLCE | Pair Volume combination error | Combination of a volume is unsuitable between the remote and local host. | Confirm volume status using the `pairdisplay` command, and change the combination of volumes properly. | 235 |
| EX_EWSUSE | Pair suspended at WAIT state | Detected a suspended status (PSUE) for the paired volume, before it made it to the designated status. | Please issue the `pairresync` command manually to the identified failed paired volume to try to recover it.\n\nIf the problem persists, contact customer support. | 234 |
| EX_EWSTOT | Timeout waiting for specified status | Detected a time out, before it made it to the designated status. | Please increase the value of the timeout using the -t option. For details, refer to the troubleshooting information in the relevant user document.\n\nWhen this error occurs during execution of the pairsplit command, contact customer support. | 233 |
| EX_EWSLTO | Timeout waiting for specified status on the local host | Timeout error because the remote did not notify about expected status in time. | Please confirm that HORC Manager on the remote host is running. | 232 |
| EX_ESTMON | HORCM Monitor stopped | HORC Manager monitoring was refused. | Please confirm the value of "poll" in the configuration definition file. | 231 |
| EX_UNWCMD | Unknown command | An unknown command was attempted. | Please confirm the command name. | 230 |
| EX_INCSTG | Inconsistent status in group | The pair status of a volume within a group is not identical to the status of the other volumes in the group. | Please confirm the pair status using the `pairdisplay` command. | 229 |
| EX_INVSTP | Invalid pair status | The pair status of the target volume is not appropriate. | Please confirm the pair status using the `pairdisplay` command. | 228 |

| Error code | Error message | Condition | Recommended action | Returned Value |
|---|---|---|---|---|
| EX_INV VOL | Invalid volume status | The volume status of the target volume is not appropriate. | Please confirm the volume status using the `pairdisplay -l` or the raidvchkdsp -v aou command. | 222 |
| EX_INV MUN | Invalid mu# with HORC/ UR or HOMRCF | The MU# of the volume to be operated is not appropriate. | Please confirm the MU# (MU #1/2 cannot be used for TrueCopy and must be P-VOL for ShadowImage.) for the specified group using the `pairdisplay` command. And also confirm the command execution environment to be set as HOMRCF. | 220 |
| EX_ENL DEV | No such LDEV within the RAID | A device defined in the configuration definition file does not have a mapping to a real LUN and target ID within the RAID storage system. | Please confirm that the Port, Target ID, LUN are defined correctly under HORCM_DEV in the configuration definition file. | 227 |
| EX_INV RCD | Invalid return code | Wrong return code. | Contact customer support. | 226 |
| EX_VOL CUR | S-VOL currency error | Currency check error for S-VOL. Cannot guarantee identical data on S-VOL. | Check the volume list to see if an operation was directed to the wrong S-VOL. | 225 |
| EX_VOL CUE | Local volume currency error | The volume specified with the S-VOL-takeover command is not the same as the P-VOL. | Please confirm the pair status of the local volume using the pairdisplay command. | 224 |
| EX_VOL CRE | Local and remote volume currency error | The combination of the volumes specified with Swap-takeover is unsuitable. | Please confirm the pair status of remote and local volumes using the `pairdisplay` command. | 223 |
| EX_UN WERR | Unknown error code. | Wrong error code. | Contact customer support. | -- |

| Error code | Error message | Condition | Recommended action | Returned Value |
|---|---|---|---|---|
| EX_EN OCTG | Not enough CT groups in RAID | The specified CTG ID cannot be used when the volume for TrueCopy, Universal Replicator, global-active device or ShadowImage pair is created, because the specified CTG ID is used by the other program product in the storage system. Otherwise, CTG ID cannot be registered because the number of the consistency groups exceeds the maximum number.<br><br>For details about the maximum number of the consistency groups, see TrueCopy, Universal Replicator, and global-active device volumes. | When the specified CTG ID is used by the other program product, use the other CTG ID which is not used by the other program product in the storage system. | 217 |

| Error code | Error message | Condition | Recommended action | Returned Value |
|---|---|---|---|---|
| | | | When the number of the consistency groups exceeds the maximum number, execute one of the following actions: | |

| Error code | Error message | Condition | Recommended action | Returned Value |
|---|---|---|---|---|
| | | | ▪ To create the TC, UR, GAD or SI pair after reducing the consistency groups:<br><br>1. Select consistency group which can be deleted in the existing consistency groups.<br><br>2. Find the configuration definition file in which the name of the consistency group to be deleted is written at `dev_group`.<br><br>3. Execute the **`pairsplit -S`** command specifying the `dev_group` name of the consistency group to be deleted by the HORCM instance which matches the configuration definition file found at step 2 (split the pair).<br><br>4. Delete the `dev_group` which matches the consistency group to be deleted from the configuration definition file found in step 2 (delete both P-VOL and S-VOL which configures the split pair).<br><br>5. Restart the HORCM instance which matches the configuration definition file found at step 2, reflecting the editing results of the configuration definition file.<br><br>6. Add the device to the `dev_group` which matches the consistency group to be added using new or existing configuration definition file (add P-VOL and S-VOL which configures the pair to be added).<br><br>7. Start or restart the HORCM instance which matches the configuration definition file used at step 6.<br><br>8. Execute the **`paircreate`** command specifying the | |

| Error code | Error message | Condition | Recommended action | Returned Value |
|---|---|---|---|---|
| | | | `dev_group` name of the consistency group in which the pair is added by the HORCM instance which matches the configuration definition file used at step 6 as follows. In case of TC, UR, or GAD: `paircreate -g <dev_group name> -f[g] <fence> [CTGID]` In case of SI: `paircreate -g <dev_group name> -m grp [CTGID]` Confirm the CTG ID of the existing consistency group by **pairvolchk** command. When the `-fg` option is specified and `CTGID` is omitted in the **paircreate** command, unused CTG ID is set automatically. | |

| Error code | Error message | Condition | Recommended action | Returned Value |
|---|---|---|---|---|
| | | | ▪ To add the TC, UR, GAD or SI pair to the existing consistency group that is used by the same program product:<br><br>1. Select an existing consistency group to which the pair can be added.<br><br>2. Find the configuration definition file in which the name of the consistency group to which the pair is added is written at `dev_group`.<br><br>3. Add the device to the `dev_group` in the configuration definition file found at step 2 which matches the consistency group to which the pair is added (add P-VOL and S-VOL which configures the pair to be added).<br><br>4. Restart the HORCM instance which matches the configuration definition file found at step 2, reflecting the editing results of the configuration definition file.<br><br>5. Execute the **paircreate** command specifying the `dev_group` name of the consistency group to which the pair is added by the HORCM instance which matches the configuration definition file found at step 2 as follows.<br><br>In case of TC, UR, or GAD:<br><br>`paircreate -g <dev_group name> -f[g] <fence> [CTGID]`<br><br>In case of SI:<br><br>`paircreate -g <dev_group name> -m grp [CTGID]` | |

| Error code | Error message | Condition | Recommended action | Returned Value |
|---|---|---|---|---|
| | | | Confirm the CTG ID of the existing consistency group by `pairvolchk` command.<br><br>When the `-fg` option is specified and `CTGID` is omitted in the `paircreate` command, unused CTG ID is set automatically. | |
| EX_EXT CTG | Extended CT group across RAIDs | A TrueCopy, Universal Replicator, global-active device, or ShadowImage volume is defined in the configuration definition file (HORCM_CONF) as a group that extends across storage systems. | Please confirm the serial # of the volumes by using the `pairdisplay` command to verify that the consistency group is contained completely within one RAID storage system. | 216 |
| EX_ENX CTG | No CT groups left for OPEN Vol use. | An available consistency group for OPEN Volume does not exist. | Please confirm whether all consistency groups are already used by mainframe volumes. | 215 |
| EX_EN QCTG | Unmatche d CTGID within the group | The consistency group references within a group do not have an identical CTG ID. | Please confirm the CTG ID using the `pairvolchk` command and confirm that group references within the configuration definition file (HORCM_CONF) refer to the same consistency group. | 214 |
| EX_ENP ERM | Permissio n denied with the LDEV | A device mentioned in the configuration definition file does not have a permission for a pair-operation. | Please confirm whether pair-operation is permitted on the device by using the `pairdisplay` or `raidscan -find verify` command. | 213 |
| EX_EN QSIZ | Unmatche d volume size for pairing | Size of a volume is unsuitable between the remote and local volume. | Please confirm volume size or number of LUSE volume using the 'raidscan -f' command, and make sure the volume sizes are identical. | 212 |
| EX_ERP ERM | Permissio n denied with the RAID | A storage system (RAID) mentioned in the configuration file does not have a permission for CCI. | Please confirm if the type of storage system is permitted for a CCI by using the `inqraid -CLI` and `raidqry -h` commands. | 211 |

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| Error code | Error message | Condition | Recommended action | Returned Value |
|---|---|---|---|---|
| EX_ESVOLD | S-VOL denied due to be disabling | A specified target volume for S-VOL is denied to become S-VOL by the setting of Data Retention Utility. | Please confirm whether a target volume is setting to S-VOL disabling y using `inqraid -fl` or `raidvchkscan -v gflag` command. | 209 |
| EX_ENOSUP | Microcode not supported | The storage system does not support a function for CCI. | Please confirm the storage system model name and microcode version by using the `raidqry -l` command. | 210 |
| EX_EPRORT | Mode changes denied due to retention time | A target volume is denied to be changing due to retention time via LDEV guarding. | Please confirm the retention time for a target volume that is set to Data Retention Utility by using `raidvchkscan -v gflag` command. | 208 |
| EX_ESPERM | Permission denied with the SLPR | A specified command device does not have a permission to access other SLPR. | Please make the SLPR so that the target port and the command device belongs to the same SLPR. | 207 |
| EX_ENOPOL | Not enough Pool in RAID | Could not retain the pool for executing a command due to be exceeded the threshold rate. | Please release the pair of older generations paired volume, or re-synchronize the pair of split status paired volume. | 206 |
| EX_ENOOBJ | No such Object in the RAID | The specified object is not installed. There are port, LDEV, and Hostgroup in the object. | Specify the appropriate object. Check the status of one of the following.<br><br>▪ The specified port is not installed.<br><br>▪ The value of the specified port is invalid.<br><br>▪ LU path is defined.<br><br>▪ A logical path between MCU and RCU remain.<br><br>▪ LDEV is not installed.<br><br>▪ The attribute of the port is not Target (TAR) or RCU Target (RCU).<br><br>▪ LUN security is invalid. | 205 |

| Error code | Error message | Condition | Recommended action | Returned Value |
|---|---|---|---|---|
| | | | ▪ The specified host group is not installed.<br>▪ The specified virtual port ID is not correct. | |
| EX_EPP ERM | Permissio n denied with the privilege | The specified command device does not have an authority to execute this command. | Perform the following procedure:<br>1. Check the operation authentication. If you do not have the operation authentication, get the operation authentication.<br>2. Execute the `raidcom -logout` and `raidcom -login` commands.<br>3. Re-run the command that caused an error. If the same error still occurs, check whether the microcode being used supports the operation you are trying. | 203 |
| EX_EN QCLP | Unmatche d CLPR with JNL and Volume | The specified command device does not have an authority to execute this command. | Check the operation authentication. | 204 |
| EX_CTX CHK | Context check error | An error is detected by the Context Checking. | Check if the operation by the command executes a proper procedures and has the consistency or not. | 199 |
| EX_EAC CES | Access denied with Lock/ Unlock | The resource that you specified to lock or unlock has already been used by another user. | Check if the specified resource is used by such as Storage Navigator or Device Manager - Storage Navigator or not. | 200 |
| EX_ENA UTH | Authentic ation failed with User | User authentication failed at the authentication command device. | Check the user ID and password. | 202 |
| EW_INV ARG | Invalid argument | Invalid option or an argument of the option. | User -h option to check the correct option, and specify it. | 253 |

| Error code | Error message | Condition | Recommended action | Returned Value |
|---|---|---|---|---|
| EW_INV OPA | Invalid option argument | Invalid argument of an option | Use -h option to check the correct option and use it. | 131 |
| EW_INV OPT | Invalid option | Invalid option. | Use -h option to check the correct option and use it. | 131 |
| EW_LN GARG | Argument too long | The number of character for action, object, option or argument of option exceeded the maximum. | Specify the number of characters of action, object, option, an argument of option, or the total number of characters are to be appropriate number of characters. | 131 |
| EW_MA XARG | Maximum argument | The total number of option or the argument of option exceeded the maximum. | Check the total number of option or argument of option. | 131 |
| EW_EN FILE | No such file | The specified file dies not exist. | Check if the specified file exist or not, and specify the correct file. | 131 |
| EW_RE QCMD | Required action/ object list | The number of action or the argument of object is insufficient. | Use -h option and specify the correct action or object. | 131 |
| EW_RE QOPT | Required option list | The number of option or the argument of option is insufficient. | Use -h option and specify the correct option. | 131 |
| EW_UN WCMD | Unknown command | The command action or an object is undefined. | Check the issued command action and object. | 230 |
| EW_UN WOPT | raidcom: [EW_UN WOPT] Unknown option | Specifies an undefined option. | Use -h option and specify the correct option. | 252 |
| EW_SY SERR | System error | An invalid internal error has detected. | Contact customer support. | 131 |
| EW_EN OMEM | Not enough core | Memory to execute a command cannot be allocated in HORCM. | Add more virtual memory of a whole system, or terminate unnecessary programs or daemons that are executed in parallel. | 245 |

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| Error code | Error message | Condition | Recommended action | Returned Value |
|---|---|---|---|---|
| EX_CHGOBJ | Objects was changed while referring | The object is in operation. | Issue the command again after the operation of the object is complete. | 198 |
| EX_EGPERM | Permission denied with the Resource Group | You do not have the operation authority to operate the target resource group. | Specify the resource group that is allocated to the user group as the operation target or set the operation authority to the user group in order to operate the target resource group. | 201 |
| EX_IDEXHA | There is no available request ID. | There are no request IDs that can be used for the storage system. | Release the request IDs that are no longer used. | 194 |
| EX_ESSINV | The session information is invalid. Login again. | The storage system was restarted or a timeout error occurred while the user logs in. | Establish the SSH connection again. | 195 |
| EX_ESNRDY | This command cannot be executed in this session. Check if storage system is ready and log in again. | The user logged in when the storage system was still in the startup process. | Make sure that the startup process of the storage system completes, and then establish the SSH connection. | 196 |
| EX_RSIDEX | There is no available ID. | There are no available HG or LU IDs. | Release unused HG or LU IDs. | 192 |
| EX_EMUTYP | Emulation type error. | The emulation type of the volume is invalid. | Check the emulation type. | 189 |

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## Generic error codes (`horctakeover` and `pair` commands)

The following table lists the generic error codes returned by the following commands:

- **`horctakeover`**

- **`paircurchk`**, **`paircreate`**, **`pairsplit`**, **`pairresync`**, **`pairevtwait`**, **`pairvolchk`**, **`pairsyncwait`**, **`pairdisplay`**

In this table, "Unrecoverable" indicates errors that cannot be recovered by reexecuting the command, and "Recoverable" indicates errors that can be recovered by reexecuting the command.

| Category | Error code | Error message | Return Value |
|---|---|---|---|
| Syntax for Argument (Unrecoverable) | EX_REQARG | Required Arg list | 254 |
| | EX_INVARG | Invalid argument | 253 |
| | EX_INVNAM | Invalid name of option | 249 |
| | EX_UNWOPT | Unknown option | 252 |
| | EX_UNWCOD | Unknown function code | 238 |
| | EX_UNWCMD | Unknown command | 230 |
| | EX_ERANGE | Result too large | 244 |
| | EX_ENAMLG | File name too long | 243 |
| | EX_INVRCD | Invalid return code | 226 |
| Configuration (Unrecoverable) | EX_ENOGRP | No such group | 239 |
| | EX_ENOENT | No such device or group | 247 |
| | EX_ENODEV | No such device | 246 |
| | EX_ENLDEV | No such LDEV within the RAID | 227 |
| | EX_ENOUNT | No such RAID unit | 219 |
| | EX_INVMUN | Invalid mu# with HORC or HOMRCF | 220 |
| | EX_ENQSER | Unmatched Serial# vs RAID unitID | 218 |
| | EX_EXTCTG | Extended CTgroup across RAIDs | 216 |
| | EX_ENQCTG | Unmatched CTGID within the group | 214 |
| | EX_ENPERM | Permission denied with the LDEV | 213 |

| Category | Error code | Error message | Return Value |
|---|---|---|---|
| | EX_ERPERM | Permission denied with the RAID | 211 |
| | EX_ESPERM | Permission denied with the SLPR | 207 |
| Command I/O to RAID (Recoverable) | EX_CMDRJE | An order to the control/command was rejected | 221 |
| | EX_CMDIOE | Control command I/O error, or rejected | 237 |
| | EX_OPTINV | A specified option is invalid | 248 |
| | EX_INVMOD | Invalid RAID command mode | 241 |
| | EX_INVCMD | Invalid RAID command | 240 |
| Communication for HORCM (Recoverable) | EX_ATTHOR | Cannot be attached to HORC manager | 251 |
| | EX_ATTDBG | Cannot be attached to a Debug layer | 250 |
| | EX_COMERR | Cannot be communicate with HORC manager | 255 |
| Recoverable | EX_ENORMT | No remote host alive for remote commands, or Remote CCI might be blocked (sleeping) on an existing I/O. | 242 |
| Resource (Unrecoverable) | EX_ENOMEM | Not enough core | 245 |

## Generic error codes (raidscan, raidqry, raidar, horcctl)

The following table lists the generic error codes returned by the following commands:

- **raidscan**

- **raidqry**

- **raidar**

- **horcctl**

In this table, "Unrecoverable" indicates errors that cannot be recovered by reexecuting the command, and "Recoverable" indicates errors that can be recovered by reexecuting the command.

| Category | Error code | Error message | Value |
|---|---|---|---|
| Syntax for Argument (Unrecoverable) | EX_REQARG | Required Arg list | 254 |
| | EX_INVARG | Invalid argument | 253 |
| | EX_INVNAM | Invalid name of option | 249 |
| | EX_UNWOPT | Unknown option | 252 |
| | EX_UNWCOD | Unknown function code | 238 |
| | EX_UNWCMD | Unknown command | 230 |
| | EX_ERANGE | Result too large | 244 |
| | EX_ENAMLG | File name too long | 243 |
| | EX_INVRCD | Invalid return code | 226 |
| Configuration (Unrecoverable) | EX_ENLDEV | No such LDEV within the RAID | 227 |
| | EX_ENOUNT | No such RAID unit | 219 |
| | EX_INVMUN | Invalid mu# with HORC or HOMRCF | 220 |
| | EX_ERPERM | Permission denied with the RAID | 211 |
| | EX_ENOSUP | Microcode not supported | 210 |
| | EX_ESPERM | Permission denied with the SLPR | 207 |
| Command I/O to RAID (Recoverable) | EX_CMDIOE | Control command I/O error | 237 |
| | EX_OPTINV | A specified option is invalid | 248 |
| | EX_INVMOD | Invalid RAID command mode | 241 |
| | EX_INVCMD | Invalid RAID command | 240 |
| Communication for HORCM (Recoverable) | EX_ATTHOR | Can't be attached to HORC manager | 251 |
| | EX_ATTDBG | Can't be attached to a Debug layer | 250 |
| | EX_COMERR | Can't be communicated with HORC manager | 255 |
| Resource (Unrecoverable) | EX_ENOMEM | Not enough core | 245 |

## Specific error codes

The following table lists the specific error codes returned by the following commands:

- **horctakeover**

- **paircurchk**, **paircreate**, **pairsplit**, **pairresync**, **pairevtwait**, **pairvolchk**, **pairsyncwait**, **raidvchkset**

In this table, "Unrecoverable" indicates errors that cannot be recovered by reexecuting the command, and "Recoverable" indicates errors that can be recovered by reexecuting the command.

See the *Command Control Interface Command Reference* for more information on error codes for each command.

| Category | Error code | Error message | Value |
|---|---|---|---|
| Volume Status (Unrecoverable) | EX_ENQVOL | Unmatched volume status within the group | 236 |
| | EX_INCSTG | Inconsistent status in group | 229 |
| | EX_INVVOL | Invalid volume status | 222 |
| | EX_EVOLCE | Pair Volume combination error | 235 |
| | EX_INVSTP | Invalid pair status | 228 |
| | EX_VOLCUR | S-VOL currency error | 225 |
| | EX_VOLCUE | Local Volume currency error | 224 |
| | EX_VOLCRE | Local and Remote Volume currency error | 223 |
| | EX_EWSUSE | Pair suspended at WAIT state | 234 |
| | EX_ENQSIZ | Unmatched volume size for pairing | 212 |
| | EX_ESVOLD | S-VOL denied due to be disabling | 209 |
| | EX_EPRORT | Mode changes denied due to retention time | 208 |
| Timer (Recoverable) | EX_EWSTOT | Timeout waiting for specified status | 233 |
| | EX_EWSLTO | Timeout waiting for specified status on the local host | 232 |
| Resource (Unrecoverable) | EX_ENOCTG | Not enough CT groups in the RAID | 217 |
| | EX_ENXCTG | No CT groups left for OPEN Vol use. | 215 |
| | EX_ENOPOL | Not enough Pool in RAID | 206 |

## Status Field output

If an SSB (sense byte) code is not output, the Status Field information might be output to the log file or the console on CCI.

In the following example, 0x00004000 is the Status Field information.

The Status Field information is valid when a command device with a namespace for NVMe-oF defined is used.

**Status Field example output to console**

```
# raidcom delete ldev -ldev_id 10 -I10
raidcom: [EX_CMDRJE] An order to the control/command device was rejected
It was rejected due to SKEY=0x05, ASC=0xFF, ASCQ=0xFF, SSB=Unknown on
Serial#(500054)
SF=0x00004000
```

The following table lists the Status Field information returned by the command.

For more information about the other error codes, contact customer support.

| Status Field | Description |
|---|---|
| 0x00004286 | A namespace that is specified for HORCM_CMD in the configuration definition file is not defined as a command device.<br><br>Verify whether a namespace that is specified for HORCM_CMD is defined as a command device, and then restart the CCI instance. |

## SSB codes

An SSB code is error information that is output when an error occurs by executing a CCI command. The SSB code is output to the CCI execution log file or to the console. Identify the SSB code from an error code as follows:

▪ SSB code that is output to the CCI execution log file.

The following shows an example of a SSB code that is output to the CCI execution log file.

Example:11:06:03-37897-10413- SSB = 0xb9a0,2089

The alphanumeric characters after the equal sign shows an error code. The last four digits of alphanumeric characters on the left side of the comma (,) is SSB1 (for example, b9ao), and the alphanumeric characters on the right side is SSB2 (for example, 2089).

▪ SSB code that is output on the console.



The following shows an example of an SSB code that is output to the console.

The alphanumeric characters after the "SSB=" show an error code. The last four digits of alphanumeric characters on the left side of comma (,) is SSB1 (for example, B9E1), and the last four digits of alphanumeric characters on the right side is SSB2 (for example, B901).

If a command device with a namespace for NVMe-oF defined is used, the following default values are output for SKEY, ASC, and ASCQ:

SKEY=0x05

ASC=0xFF

ASCQ=0xFF

The following describes the SSB codes returned by the replication commands and the configuration setting command (raidcom).

## SSB codes returned by the replication commands

When a replication command returns an SSB code, refer to the troubleshooting information in the user document for the product as follows:

| Command | Product returning the SSB code |
|---|---|
| ▪ paircreate<br>▪ pairresync<br>▪ pairsplit<br>▪ horctakeover<br>▪ horctakeoff | Hitachi TrueCopy® |
| ▪ paircreate<br>▪ pairresync<br>▪ pairsplit<br>▪ horctakeover<br>▪ horctakeoff | Universal Replicator |
| ▪ paircreate<br>▪ pairresync<br>▪ pairsplit<br>▪ horctakeover<br>▪ horctakeoff | global-active device |
| ▪ paircreate<br>▪ pairresync<br>▪ pairsplit | Hitachi ShadowImage® |
| ▪ paircreate<br>▪ pairsplit | Hitachi Volume Migration |

| Command | Product returning the SSB code |
|---|---|
| ▪ paircreate<br>▪ pairresync<br>▪ pairsplit | Hitachi Thin Image |
| ▪ raidvchkset -vg | Data Retention Utility |
| ▪ raidvchkset -vext | Hitachi Dynamic Provisioning |

The following tables provide information about the SSB codes returned by the replication commands. If you see an error not described in the tables, contact customer support.

**SSB codes returned by the `paircreate` command**

<table>
<tr><th colspan="5">paircreate</th></tr>
<tr><th rowspan="2">Error message</th><th rowspan="2">Executing/<br>Async</th><th colspan="2">Error code</th><th rowspan="2">Description</th></tr>
<tr><th>SSB1</th><th>SSB2</th></tr>
<tr><td>CMDRJE</td><td>Executing</td><td>B980</td><td>B901</td><td>The command was rejected because the specified port is for NAS Platform (System LU).</td></tr>
<tr><td>CMDRJE</td><td>Executing</td><td>B980</td><td>B903</td><td>The command was rejected because the selected resource belongs to NAS_Platform_System_RSG.</td></tr>
</table>

**SSB codes returned by the `pairsplit` command**

<table>
<tr><th colspan="5">pairsplit</th></tr>
<tr><th rowspan="2">Error message</th><th rowspan="2">Executing/<br>Async</th><th colspan="2">Error code</th><th rowspan="2">Description</th></tr>
<tr><th>SSB1</th><th>SSB2</th></tr>
<tr><td>CMDRJE</td><td>Executing</td><td>B980</td><td>B901</td><td>The command was rejected because the specified port is for NAS Platform (System LU).</td></tr>
</table>

**SSB codes returned by the `pairsplit -S` command**

| pairsplit -S | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS Platform (System LU). |

## SSB codes returned by the configuration setting command (raidcom)

Executing the configuration setting command (`raidcom` command) can return an SSB code. An error can occur whether the command is executed synchronously or asynchronously. For an asynchronous error, the error information is displayed on the console by executing `raidcom get command_status` command. When the error message shows "CMDRJE" or "Get Command Status", check the contents of SSB1 and SSB2. You can verify a content of an error by the `raidcom get error_message` command. When you specify the SSB code with the `raidcom get error_message` command, make sure not to specify a wrong SSB code.

The following tables provide information about each SSB code returned by the configuration setting command (`raidcom` command). If you see an error not described in the tables, contact customer support.

| Common | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E10 | 8000 | The operation cannot be performed because Storage Navigator or Device Manager - Storage Navigator is in progress, another application is in progress on the SVP, or the configuration is being changed. Wait a while, and then retry the operation. |
| Get Command Status | Async | 2E10 | 8003 | The specified operation cannot be performed because the storage system is being turned off. |
| CMDRJE | Executing | 2E11 | 2205 | The resource group to which the operation object belongs is locked by another user (or another session). Check the lock status of the resource group. If maintenance personnel is performing maintenance operations, retry the command after confirming the completion of the operations. |

| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | 2E11 | 2206 | You do not have the operation authority for the target resource group. Specify the resource group that is allocated to the user group as the operation target, or set the operation authority to the user group in order to operate the target resource group. |
| CMDRJE | Executing | 2E11 | 2207 | The system is locked by another user (or another session). Wait a while, then retry the command. If maintenance personnel is performing maintenance operations, retry the command after confirming the completion of the operations. |
| CMDRJE Get Command Status | Executing/ Async | 2E11 | 8014 | The command cannot be accepted. After a while, execute the same command. |
| CMDRJE | Executing | 2E11 | 801C | The operation cannot be performed because Device Manager - Storage Navigator is in progress, another application is in progress on the SVP, or the configuration is being changed. Wait a while, and then retry the operation. |
| CMDRJE Get Command Status | Executing/ Async | 2E11 | 8303 | The command cannot be executed because there is blocked part in the system. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: 1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands. 2. Rerun the command that caused an error. If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE | Executing | 2E31 | 9100 | The command cannot be executed because the user authentication is not performed. |

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| Common | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE<br><br>Get Command Status | Executing/ | 2E3F | 8000 | The specified operation is not supported in the current microcode version. |
| Get Command Status | Async | 2E91 | FEEC | An internal error occurred. Take the following actions:<br><br>1. The number of asynchronous commands might have exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>   a. Run the raidcom `get command_status` command to wait for completion of the running asynchronous commands.<br><br>   b. Rerun the command that caused an error.<br><br>2. If the same error occurs in action 1, other users might be running commands. Wait for a while, and then rerun the command that caused an error.<br><br>3. If action 2 repeatedly fails with the same error, contact customer support. |
| CMDRJE | Executing | 2EBE | 9E01 | The specified parameter is invalid. Check the *Command Control Interface Command Reference*. |
| CMDRJE | Executing | 2EF3 | 9300 | The specified command cannot be executed due to the following reasons:<br><br>▪ The command cannot be accepted because it is not supported.<br><br>▪ The command is not supported in the current CCI version. |
| CMDRJE | Executing | 2EF3 | 9F02 | The specified operation is not supported in the current microcode version. |
| CMDRJE | Executing | 2EF4 | 0026 | The virtual storage machine with the specified serial number is not found. |
| CMDRJE | Executing | 2EFF | FF00 | The specified operation is not supported in the current microcode version. |

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| Common | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B90F | B90F | The specified operation is not supported in the current microcode version. |
| CMDRJE | Executing | B954 | FF5F | The specified operation is not supported in the current microcode version. |
| CMDRJE | Executing | B9EC | B9EC | The specified operation is not supported in the current microcode version. |
| CMDRJE | Executing | B9EE | B9EE | The specified operation is not supported in the current microcode version. |
| CMDRJE | Executing | B9FD | B90A | The specified operation is not supported in the current microcode version. |
| CMDRJE | Executing | B9FD | B90B | The specified operation is not supported in the current microcode version. |
| CMDRJE | Executing | B9FD | B90C | The specified operation is not supported in the current microcode version. |
| Get Command Status | Async | B9FF | B910 | An internal error occurred. After a while, retry the failed command. If the internal error occurs again, contact customer support. |

## SSB codes returned by raidcom add external_grp

| raidcom add external_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 000D | Invalid emulation type. |
| Get Command Status | Async | 2E00 | 0013 | There are not enough cache management devices. |
| CMDRJE | Executing | 2E00 | 4100 | The external volume group is not in a effective range. |
| Get Command Status | Async | 2E00 | 4104 | The command cannot be executed by receiving the multiple operations for the same external volume group. |

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| raidcom add external_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E00 | 4108 | The external volume group exists already. |
| Get Command Status | Async | 2E00 | 410B | The specified CLPR does not exist. |
| CMDRJE | Executing | 2E00 | 410D | The volume cannot be mapped for online data migration because the emulation type is not OPEN-V. |
| CMDRJE | Executing | 2E00 | 410E | The specified external volume group attribute is invalid. |
| CMDRJE<br>Get Command Status | Executing<br>Async | 2E00 | 4111 | This command does not support the specified emulation type. |
| CMDRJE | Executing | 2E00 | 4200 | LUN of the specified external storage port is out of range. |
| CMDRJE | Executing | 2E00 | 4500 | The path group is not in a effective range. |
| CMDRJE | Executing | 2E00 | 8400 | The value of the specified port is not valid. |
| CMDRJE | Executing | 2E00 | 9B01 | The specified iSCSI name is invalid. |
| Get Command Status | Async | 2E02 | 4101 | The iSCSI target cannot be specified because the emulation type is for mainframe. |
| CMDRJE | Executing | 2E02 | 8403 | The specified virtual port number is out of range. |
| Get Command Status | Async | 2E10 | 4200 | LUN of the specified external storage port does not exist. |
| Get Command Status | Async | 2E10 | 4201 | The external volume cannot be created because the specified external LU is a command device. |
| Get Command Status | Async | 2E10 | 4203 | The volume cannot be mapped as a remote command device because the specified external LU is not a command device. |
| Get Command Status | Async | 2E10 | 4400 | The WWN on the side of the specified external storage does not connected to a External port.<br><br>This message may be output if the migration source storage system is USP V/VM and the host mode option 2 is not set to the port that connects to the migration target storage system. |

| raidcom add external_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E10 | 8404 | The iSCSI virtual port mode for the specified port is disabled. |
| Get Command Status | Async | 2E11 | 4106 | The specified external LU cannot create a external volume because the transition of data is required. |
| Get Command Status | Async | 2E11 | 4200 | The specified path group cannot be operated because a path between other devices exists. |
| Get Command Status | Async | 2E11 | 800F | The operation cannot be performed because the unsupported microcode version exists in the system. |
| CMDRJE | Executing | 2E11 | 8010 | The storage system is in internal process, or the configuration changing processes are conflicting. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E20 | 4102 | The emulation type for mainframe system cannot be specified because CHB for mainframe system is not installed. |
| Get Command Status | Async | 2E20 | 8300 | The specified MP Blade is not installed. |
| CMDRJE | Executing | 2E20 | 8401 | The specified virtual port is not defined. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E21 | 9008 | The program product of Universal Volume Manager is not installed. |
| CMDRJE | Executing/ Async | 2E21 | 9013 | The program product of nondisruptive migration is not installed. |

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| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| Get Command Status | | | | |
| Get Command Status | Async | 2E22 | 4100 | The external volume group exists already. |
| CMDRJE | Executing | 2E22 | 4100 | The external volume group exists already. |
| Get Command Status | Async | 2E23 | 0201 | The operation cannot be performed because the number of remote command devices that can be created in the system exceeds the maximum number. |
| Get Command Status | Async | 2E23 | 4102 | Exceeded the number of mapping that can be set per 1 port. |
| Get Command Status | Async | 2E23 | 4303 | The operation cannot be performed because the number of path in the path group exceeds 8. |
| Get Command Status | Async | 2E30 | 4119 | The external volume cannot be added because the number of virtual volumes that can be created in the system exceeded the maximum number. |
| Get Command Status | Async | 2E30 | 411B | The external volume having the Data Direct Mapping attribute cannot be created because the size of the specified external LU is less than 8GB. |
| Get Command Status | Async | 2E30 | 4201 | The specified external LU has mapped already. |
| CMDRJE | Executing | 2E30 | 8400 | The port attribute is not External. |
| CMDRJE | Executing | 2E30 | 840E | The command cannot be executed with the specified port attribute. |
| CMDRJE Get Command Status | Executing/ Async | 2E30 | 8410 | The specified port cannot be operated because the operation mode of the port is NVMe mode. |
| Get Command Status | Async | 2E31 | 4000 | The specified external storage LU is the device of not supported. |
| Get Command Status | Async | 2E31 | 4001 | The specified external storage system is not supported. |
| Get Command Status | Async | 2E31 | 4002 | The specified external volume does not support nondisruptive migration. |

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| raidcom add external_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E31 | 9000 | The usage capacity exceeds the license capacity of the program product. |
| CMDRJE | Executing | 2EDA | 00EE | The command cannot be accepted. After a while, execute the same command. |
| Get Command Status | Async | 2EDA | 41FA | An internal error occurred. Contact customer support. |
| Get Command Status | Async | 2EDA | FEEC | An internal error occurred. After a while, re-execute the failed command. If the internal error occurs again, contact customer support. |
| Get Command Status | Async | 2EDB | FEEC | An internal error occurred. After a while, re-execute the failed command. If the internal error occurs again, contact customer support. |
| CMDRJE | Executing | 2EF3 | 4102 | The specified parameter is invalid. Check the *Command Control Interface Command Reference*. |
| CMDRJE | Executing / Async | B9FD | B90B | The specified operation is not supported in the current microcode version. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS Platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the selected port is for NAS Platform (User LU). |

*SSB codes returned by raidcom check_ext_storage external_grp*

| raidcom check_ext_storage external_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 4100 | The external volume group is not in the effective range. |

| raidcom check_ext_storage external_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E10 | 4301 | The specified external volume has already disconnected the path, or is in the process of checking path. |
| CMDRJE | Executing | 2E11 | 001B | The target LDEV is blocked. |
| CMDRJE | Executing | 2E11 | 4000 | The path for the specified external path is in the state of disconnected. |
| CMDRJE | Executing | 2E11 | 4302 | All the paths for the specified external path are blocked. |
| CMDRJE | Executing | 2E20 | 4100 | There is no external volume group. |
| CMDRJE | Executing | 2E20 | 4300 | There is no external path. |
| CMDRJE | Executing | 2E30 | 001E | Online from the mainframe host. |
| Get Command Status | Async | 2EDA | 0905 | An internal error occurred by the operation of external path. Call customer support. |
| CMDRJE | Executing | 2EDA | 0905 | An internal error occurred by the operation of external volume. Call customer support. |

## SSB codes returned by raidcom delete external_grp

| raidcom delete external_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 4100 | The external volume group # is in the effective range. |
| Get Command Status | Async | 2E10 | 0012 | LDEVs in the external volume group are devices that have a CC/XRC attributes. |
| CMDRJE | Executing | 2E11 | 0153 | The specified external volume group is used in another operation. |

| raidcom delete external_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E11 | 4103 | The external volume disconnection is not performed. |
| Get Command Status | Async | 2E11 | 4104 | The external volume is used as Compatible FlashCopy® V2. |
| Get Command Status | Async | 2E11 | 4105 | The specified external volume cannot be deleted because audit logs for the system disk are being used. |
| Get Command Status | Async | 2E11 | 8004 | The operation cannot be performed because the internal processing is in progress. |
| CMDRJE | Executing | 2E11 | 8010 | The storage system is in internal process, or the configuration changing processes are conflicting. |
| Get Command Status | Async | 2E11 | 8108 | The operation cannot be performed because there is blocked part in the system. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: <br><br> 1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands. <br><br> 2. Rerun the command that caused an error. <br><br> If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE | Executing | 2E20 | 4100 | There is no external volume group. |
| CMDRJE | Executing | 2E30 | 0007 | LU path is defined to LDEV in the external volume group. |
| Get Command Status | Async | 2E30 | 0057 | The external volume is used as a system disk. |
| Get Command Status | Async | 2E30 | 020E | The operation cannot be performed because the specified external volume group contains an LDEV registered as namespace in the NVM subsystem. This SSB error code is displayed only for VSP 5000 series and VSP E1090. |

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| raidcom delete external_grp | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| Get Command Status | Async | 2E30 | 4101 | The external volume is used as LUSE. |
| Get Command Status | Async | 2E30 | 4102 | The external volume is used as a TrueCopy pair volume. |
| Get Command Status | Async | 2E30 | 4103 | The external volume is used as a TrueCopy pair volume. |
| Get Command Status | Async | 2E30 | 4104 | The specified volume is used as a ShadowImage pair volume, a Thin Image pair volume, or a FICON® Data Migration volume. |
| Get Command Status | Async | 2E30 | 4105 | The specified volume is used as a ShadowImage pair volume, a Thin Image pair volume, or a FICON® Data Migration volume. |
| Get Command Status | Async | 2E30 | 4106 | There is the volume that has path definition. |
| Get Command Status | Async | 2E30 | 4107 | The external volume is used as a ShadowImage reserved VOL. |
| Get Command Status | Async | 2E30 | 4108 | The external volume is used as aVolume Migration reserved VOL. |
| Get Command Status | Async | 2E30 | 4109 | There is a mainframe path group setting in the external volume. |
| Get Command Status | Async | 2E30 | 410A | There is a Data Retention Utility setting in the external volume. |
| Get Command Status | Async | 2E30 | 410B | There is a mainframe LDEV Guard setting in the external volume. |
| Get Command Status | Async | 2E30 | 410C | There is a Volume Security setting in the external volume. |
| Get Command Status | Async | 2E30 | 410D | The external volume is used as a Universal Replicator pair volume. |
| Get Command Status | Async | 2E30 | 410E | The external volume is used as a Universal Replicator journal volume. |
| Get Command Status | Async | 2E30 | 410F | The external volume is used as a pool-VOL. |

| | | Error code | | |
|---|---|---|---|---|
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| Get Command Status | Async | 2E30 | 4110 | The external volume is used as a pool-VOL. |
| Get Command Status | Async | 2E30 | 4111 | The external volume is used as a Volume Migration VOL. |
| Get Command Status | Async | 2E30 | 4112 | The external volume is used as a Volume Migration VOL. |
| CMDRJE Get Command Status | Executing/ Async | 2E30 | 8410 | The specified port cannot be operated because the operation mode of the port is NVMe mode. |
| Get Command Status | Async | 2E31 | 0001 | The target external group cannot be deleted because a quorum disk exists in it. |
| CMDRJE | Executing | 2EDA | 00EE | The command cannot be accepted. After a while, execute the same command. |
| Get Command Status | Async | 2EDA | FFFF | An internal error occurred. After a while, re-execute the failed command. If the internal error occurs again, contact customer support. |
| Get Command Status | Async | 2EE8 | FFFB | An internal error occurred. Call customer support. |
| Get Command Status | Async | 2EFF | 41FF | An internal error occurred. Call customer support. |

*(table title: raidcom delete external_grp)*

## SSB codes returned by raidcom check_ext_storage path

| | | Error code | | |
|---|---|---|---|---|
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| CMDRJE | Executing | 2E00 | 4500 | The path group is not in the enabled range. |
| CMDRJE | Executing | 2E00 | 8400 | The value of the port is not enabled. |
| CMDRJE | Executing | 2E02 | 8403 | The specified virtual port number is out of range. |

*(table title: raidcom check_ext_storage path)*

| raidcom check_ext_storage path | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| Get Command Status | Async | 2E10 | 4301 | The specified external volume has already disconnected the path, or is in the process of checking path. |
| CMDRJE | Executing | 2E10 | 8404 | The iSCSI virtual port mode for the specified port is disabled. |
| Get Command Status | Async | 2E11 | 001B | The target LDEV is blocked. |
| Get Command Status | Async | 2E11 | 4000 | The path for the specified external path is in the state of disconnected. |
| Get Command Status | Async | 2E11 | 4302 | All the paths for the specified external path are blocked. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: <br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands. <br>2. Rerun the command that caused an error. <br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E20 | 4100 | There is no specified external volume. |
| Get Command Status<br><br>CMDRJE | Async/ Executing | 2E20 | 4300 | There is no specified path. |
| CMDRJE | Executing | 2E20 | 4400 | WWN is not registered. |
| CMDRJE | Executing | 2E20 | 4500 | This command cannot be operated due to one of the following reasons:<br><br>▪ There is no path group.<br>▪ external_wwn is not defined. |
| CMDRJE | Executing | 2E20 | 8401 | The specified virtual port is not defined. |

| raidcom check_ext_storage path | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E30 | 001E | Online from the mainframe host. |
| CMDRJE | Executing | 2E30 | 8400 | The port attribute is not External (ELUN). |
| CMDRJE | Executing | 2E30 | 840E | The command cannot be executed with the specified port attribute. |
| CMDRJE | Executing | 2EDA | 00EE | The command cannot be accepted. After a while, execute the same command. |
| Get Command Status | Async | 2EDA | 0905 | An internal error occurred by the operation of external path.<br><br>Call customer support. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the specified port is for NAS platform (User LU). |

*SSB codes returned by raidcom disconnect external_grp*

| raidcom disconnect external_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 4100 | The external volume group is not in the effective range. |
| CMDRJE | Executing | 2E10 | 0000 | The specified LDEV is used for a ShadowImage pair. |
| CMDRJE | Executing | 2E10 | 0001 | It is used as a TrueCopy or Universal Replicator pair. |
| CMDRJE | Executing | 2E10 | 0003 | A ShadowImage pair, a Thin Image/Copy-on-Write Snapshot pair or a Compatible FlashCopy® V2 relationship or in status of splitting or pending exists. |

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| | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| Error message | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E10 | 0004 | The specified LDEV is used for a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0008 | It is used as a system disk. |
| CMDRJE | Executing | 2E10 | 0012 | It is used as a concurrent copy or XRC. |
| CMDRJE | Executing | 2E10 | 0062 | The specified LDEV is used as the primary volume of a global-active device (GAD) pair. |
| CMDRJE | Executing | 2E10 | 0063 | The specified LDEV is used as the secondary volume of aGAD pair. |
| CMDRJE | Executing | 2E10 | 4100 | The specified external volume group is in the state of disconnected. |
| CMDRJE | Executing | 2E10 | 4102 | The specified external device is in the state of disconnected. |
| CMDRJE | Executing | 2E10 | 4301 | The specified external volume has already disconnected the path, or is in the process of checking path. |
| CMDRJE | Executing | 2E11 | 0007 | It is in the state of shredding. |
| CMDRJE | Executing | 2E11 | 001B | The target LDEV is blocked. |
| CMDRJE | Executing | 2E11 | 4000 | The path for the specified external path is in the state of disconnected. |
| CMDRJE | Executing | 2E11 | 410D | The DP-VOL with the Data Direct Mapping attribute which is allocated to the specified external volume is not blocked. |
| CMDRJE | Executing | 2E11 | 4302 | All the paths for the specified external path are blocked. |
| CMDRJE | Executing | 2E11 | 6005 | The specified external volume belongs to a Thin Image or Copy-on-Write Snapshot where the pair in the PSUS status exists. |
| CMDRJE | Executing | 2E11 | 800E | The operation cannot be performed because the internal processing is in progress. Wait for a while, then retry the operation. |
| CMDRJE | Executing | 2E20 | 4100 | There is no specified external volume. |
| CMDRJE | Executing | 2E20 | 4300 | There is no specified path. |

Chapter 9: Troubleshooting

| raidcom disconnect external_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E30 | 000A | It is included the Hitachi Dynamic Provisioning volume that is associated with a pool. |
| CMDRJE | Executing | 2E30 | 000C | The specified LDEV is used as a quorum disk. |
| CMDRJE | Executing | 2E30 | 000E | It is used as a pool volume. |
| CMDRJE | Executing | 2E30 | 000F | It is used as a journal volume. |
| CMDRJE | Executing | 2E30 | 0014 | It is used as a reserved volume of Volume Migration. |
| CMDRJE | Executing | 2E30 | 001A | Volume Security is set. |
| CMDRJE | Executing | 2E30 | 001C | It is used as a remote command device. |
| CMDRJE | Executing | 2E30 | 001E | Online from the mainframe host. |
| CMDRJE | Executing | 2E30 | 004E | This is a volume that the Data Retention Utility is set. |
| CMDRJE | Executing | 2E30 | 0061 | The Dynamic Provisioning volume not in the blocked state is included in the Dynamic Provisioning that is associated with the pool to which the pool volume is belongs. |
| CMDRJE | Executing | 2EDA | 0000 | An internal error occurred by the operation of disconnecting the external volume. Call customer support. |
| CMDRJE | Executing | 2EDA | 0905 | An internal error occurred by the operation of external volume. Call customer support. |

*SSB codes returned by raidcom modify external_grp*

| raidcom modify external_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 4100 | The external volume group is not in the effective range. |

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| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | 2E00 | 410F | The specified value of the load balance mode is invalid. |
| CMDRJE | Executing | 2E00 | 4110 | The specified value of the ALUA mode is invalid. |
| CMDRJE | Executing | 2E00 | 8301 | MP Blade ID is not in the effective range. |
| CMDRJE | Executing | 2E10 | 4202 | The operation cannot be performed because the volume used for data migration is reserved from the host. |
| CMDRJE | Executing | 2E10 | 8300 | The specified MP Blade is blocked. |
| CMDRJE | Executing | 2E11 | 4107 | The attribute cannot be changed because Volume Migration is being executed. |
| CMDRJE | Executing | 2E11 | 4303 | The load balance mode cannot be changed because the alternative path mode is set to Single. |
| CMDRJE | Executing | 2E11 | 800F | The load balance mode cannot be changed because microcodes of multiple versions are in the storage system. |
| CMDRJE | Executing | 2E20 | 4100 | There is no external volume group. |
| CMDRJE | Executing | 2E20 | 8300 | The specified MP Blade is not installed. |
| CMDRJE | Executing | 2E30 | 4104 | The attribute cannot be changed because the external volume is used as a ShadowImage pair volume. |
| CMDRJE | Executing | 2E30 | 410D | The external volume is used as a Universal Replicator pair volume. |
| CMDRJE | Executing | 2E30 | 411A | The external volume is used as a TrueCopy volume. |
| CMDRJE | Executing | 2E30 | 411C | The operation cannot be performed because the external volume is being used as a global-active device pair. |
| CMDRJE | Executing | 2E31 | 000C | Cache mode cannot be changed because there is an LDEV that Cache Residency Manager bind mode is set. |

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| raidcom modify external_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E31 | 4101 | Cache mode cannot be changed because the specified external volume includes a pool volume or an LDEV that is used by LUSE. |
| CMDRJE | Executing | 2E31 | 4107 | The cache mode cannot be changed because the specified external volume is one of the following.<br><br>▪ A pool volume in the pool that consists of both external volumes and internal volumes.<br><br>▪ A pool volume in the pool whose multi-tier pool option is enabled. |
| CMDRJE | Executing | 2E31 | 4108 | The attribute of the external volume cannot be changed from the current cache mode to the specified cache mode. |
| CMDRJE | Executing | 2E31 | 4109 | The attribute cannot be changed because the external volume group is not mapped for online data migration. |
| CMDRJE | Executing | 2EDA | 00F1 | The specified command cannot be accepted because the command is not supported. |
| CMDRJE | Executing | 2EDA | 0905 | An internal error occurred on the changing of an external volume option.<br><br>Call customer support. |
| CMDRJE | Executing | 2EF3 | 0002 | The specified parameter is incorrect. Check the *Command Control Interface Command Reference*. |

## SSB codes returned by raidcom modify port -loop_id

| raidcom modify port -loop_id | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B955 | 0404 | A remote path has been defined. |
| CMDRJE | Executing | B955 | 040F | An internal error occurred.<br><br>Contact customer support. |

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| raidcom modify port -loop_id | | | | |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | B955 | 044C | The specified AL-PA is invalid. |
| CMDRJE | Executing | B955 | 054E | The specified topology is invalid. |
| CMDRJE | Executing | B955 | 05A6 | The other than "fabric on" cannot be specified when specifying a topology of the package for Fibre Channel over Ethernet. |
| CMDRJE | Executing | B955 | 05A7 | The other than "P-to-P (point to point)" cannot be specified when specifying a topology of the package for Fibre Channel over Ethernet. |
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 104F | The program product is not installed. |
| CMDRJE | Executing | B955 | 113D | Invalid host speed is set for the 4Gbps fibre adapter. The available host speeds are AUTO, 1G, 2G, and 4G only. |
| CMDRJE | Executing | B955 | 113F | Invalid host speed is set for the 8Gbps fibre adapter. The available host speeds are AUTO, 2G, 4G, and 8G only. |
| CMDRJE | Executing | B955 | 11A5 | The other than "10G" cannot be specified when specifying a host speed of the package for Fibre Channel over Ethernet. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS Platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the selected port is for NAS Platform (User LU). |

*SSB codes returned by raidcom modify port -topology*

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| raidcom modify port -topology | | | | |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | B955 | 0404 | A remote path has been defined. |

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| raidcom modify port -topology | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | B955 | 040F | An internal error occurred. Contact customer support. |
| CMDRJE | Executing | B955 | 044C | The specified AL-PA is invalid. |
| CMDRJE | Executing | B955 | 054E | The specified topology is invalid. |
| CMDRJE | Executing | B955 | 05A6 | The other than "fabric on" cannot be specified when specifying a topology of the package for Fibre Channel over Ethernet. |
| CMDRJE | Executing | B955 | 05A7 | The other than "P-to-P (point to point)" cannot be specified when specifying a topology of the package for Fibre Channel over Ethernet. |
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 104F | The program product is not installed. |
| CMDRJE | Executing | B955 | 113D | Invalid host speed is set for the 4Gbps fibre adapter. The available host speeds are AUTO, 1G, 2G, and 4G only. |
| CMDRJE | Executing | B955 | 113F | Invalid host speed is set for the 8Gbps fibre adapter. The available host speeds are AUTO, 2G, 4G, and 8G only. |
| CMDRJE | Executing | B955 | 11A5 | The other than "10G" cannot be specified when specifying a host speed of the package for Fibre Channel over Ethernet. |
| CMDRJE | Executing | B955 | 12AF | The combination of the specified topology FC-AL and the host speed set for the fibre channel adapter is not supported. See the *Provisioning Guide* of your system for supported combinations of data transfer speed and type of connection. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS Platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the selected port is for NAS Platform (User LU). |

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## *SSB codes returned by raidcom modify port -security_switch*

| raidcom modify port -security_switch | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B955 | 0404 | A remote path has been defined. |
| CMDRJE | Executing | B955 | 040F | An internal error occurred. Contact customer support. |
| CMDRJE | Executing | B955 | 044C | The specified AL-PA is invalid. |
| CMDRJE | Executing | B955 | 054E | The specified topology is invalid. |
| CMDRJE | Executing | B955 | 05A6 | The other than "fabric on" cannot be specified when specifying a topology of the package for Fibre Channel over Ethernet. |
| CMDRJE | Executing | B955 | 05A7 | The other than "P-to-P (point to point)" cannot be specified when specifying a topology of the package for Fibre Channel over Ethernet. |
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 104F | The program product is not installed. |
| CMDRJE | Executing | B955 | 113D | Invalid host speed is set for the 4Gbps fibre adapter. The available host speeds are AUTO, 1G, 2G, and 4G only. |
| CMDRJE | Executing | B955 | 113F | Invalid host speed is set for the 8Gbps fibre adapter. The available host speeds are AUTO, 2G, 4G, and 8G only. |
| CMDRJE | Executing | B955 | 11A5 | The other than "10G" cannot be specified when specifying a host speed of the package for Fibre Channel over Ethernet. |
| CMDRJE | Executing | B955 | 1216 | The operation cannot be performed because the specified port is used by Ops Center Administrator Embedded. |
| CMDRJE | Executing | B955 | 1217 | The operation cannot be performed because the specified port is used by Ops Center Administrator Embedded. |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a |

| raidcom modify port -security_switch | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| | | | | channel board to which the specified port belongs. Wait for a while, and then retry the command. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS Platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the selected port is for NAS Platform (User LU). |

## SSB codes returned by raidcom add ldev

| raidcom add ldev | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is out of settable range. |
| CMDRJE Get Command Status | Executing/ Async | 2E00 | 0002 | The specified capacity is not in the effective range. |
| CMDRJE | Executing | 2E00 | 0003 | SSID is not in the effective range. |
| CMDRJE | Executing | 2E00 | 000D | The value of the specified emulation type is invalid. |
| CMDRJE Get Command Status | Executing/ Async | 2E00 | 000E | The specified emulation type is not supported in this command. |
| Get Command Status | Async | 2E00 | 0010 | The operation cannot be performed because the specified LDEV number is already used. |
| Get Command Status | Async | 2E00 | 0013 | The operation cannot be performed because there are not enough cache management devices. |
| Get Command Status | Async | 2E00 | 0014 | Cannot create because the specified capacity is invalid. |

| raidcom add ldev | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 0019 | The capacity in the case of specifying a emulation type of the mainframe series must be dividable by the cylinder. |
| CMDRJE | Executing | 2E00 | 001A | The capacity when 3390-V emulation type is specified must be divisible by page unit. |
| CMDRJE | Executing | 2E00 | 001C | When you specify emulation type for open system, you cannot specify the size by the cylinder. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E00 | 0025 | The following external volume cannot be created because the capacity which is specified with LBA is not same as the size of the external volume group.<br><br>▪ An external volume for the online data migration.<br><br>▪ An external volume having the Data Direct Mapping attribute. |
| CMDRJE | Executing | 2E00 | 0026 | The capacity must be specified because LDEVs are in the parity group (or the external volume group). |
| CMDRJE | Executing | 2E00 | 0027 | The capacity must be specified. |
| Get Command Status | Async | 2E00 | 002D | The emulation type of the mainframe cannot be specified because the virtual volume is set for the specified LDEV. |
| CMDRJE | Executing | 2E00 | 002F | The specified value of the Full Allocation is invalid. |
| Get Command Status | Async | 2E00 | 0030 | Full Allocation cannot be specified to the specified LDEV because the emulation type is not supported. |
| CMDRJE | Executing | 2E00 | 0101 | The parity group number or the external group number is not in the effective range. |
| Get Command Status | Async | 2E00 | 1005 | Failed to restore the LDEV that is created to external volume group. |
| CMDRJE | Executing | 2E00 | 2202 | The specified resource ID is not in the effective range. |

| raidcom add ldev | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E00 | 6000 | The specified pool ID is not in the effective range. |
| CMDRJE | Executing | 2E00 | 7000 | The specified CLPR ID is not in the effective range. |
| CMDRJE | Executing | 2E00 | 8301 | MP Blade ID is not in the effective range. |
| CMDRJE | Executing | 2E02 | 0201 | The specified protection type is not supported. |
| Get Command Status | Async | 2E02 | 0203 | The specified operation cannot be performed because it is an external volume. |
| Get Command Status | Async | 2E02 | 0204 | The operation cannot be performed because the specified capacity is less than 8 GB. |
| Get Command Status | Async | 2E02 | 0205 | Full Allocation cannot be performed because the pool uses the LDEV belonging to a parity group with accelerated compression enabled. |
| CMDRJE Get Command Status | Executing/ Async | 2E02 | A601 | The operation cannot be performed because either of the following applies: <br>▪ The specified request ID is invalid. <br>▪ A request ID managed by another session is specified. |
| CMDRJE | Executing | 2E10 | 0003 | The specified LDEV is used as a Compatible FlashCopy® V2 relationship. |
| Get Command Status | Async | 2E10 | 001F | The operation cannot be performed because the total capacity of virtual volumes for Dynamic Tiering or active flash in the system exceeds the maximum. |
| Get Command Status | Async | 2E10 | 002D | The operation cannot be performed because the specified LDEV is a journal volume. |
| Get Command Status | Async | 2E10 | 005A | The operation cannot be performed because the following information of the migration source and the migration target does not match. <br>▪ serial number <br>▪ product ID <br>▪ emulation type <br>▪ SSID <br>▪ LUSE |

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| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| | | | | ▪ CVS configuration<br>▪ LDEV number |
| Get Command Status | Async | 2E10 | 0064 | The specified pool volume is already linked with the virtual volume having the Data Direct Mapping attribute. |
| Get Command Status | Async | 2E10 | 0100 | The volumes cannot be added because the encryption value of the key number that is set to encryption ECC is invalid. |
| Get Command Status | Async | 2E10 | 0101 | The volumes cannot be added because the check sum of the encryption key does not match. |
| Get Command Status | Async | 2E10 | 020E | The specified LDEV is not in the status where the capacity saving setting can be enabled. |
| Get Command Status | Async | 2E10 | 0237 | The specified operation cannot be performed because the type of the drive configuring the specified pool is not supported. |
| Get Command Status | Async | 2E10 | 6014 | The operation cannot be performed because the specified pool status is incorrect. |
| Get Command Status | Async | 2E10 | 601B | The free space in the specified pool is insufficient. |
| Get Command Status | Async | 2E10 | 601C | Full Allocation cannot be performed because the pool volume is being deleted. |
| Get Command Status | Async | 2E10 | 6020 | The deduplication function cannot be used in the specified pool. |
| Get Command Status | Async | 2E10 | 6021 | The deduplication system data volume defined for the specified pool is not in the normal status. Alternatively, the specified pool contains a pool volume that is not in the normal status. Contact customer support. |
| Get Command Status | Async | 2E10 | 6022 | The operation cannot be performed because the deduplication system data volume of the pool associated with the specified LDEV is blocked. Alternatively, the pool associated with the specified LDEV contains a pool volume that is not in the normal status. Contact customer support. |

| raidcom add ldev | | | | |
|---|---|---|---|---|
| | Executing/ Async | Error code | | |
| Error message | | SSB1 | SSB2 | Description |
| Get Command Status | Async | 2E10 | 602D | The operation cannot be performed because the deduplication system data volume defined for the specified pool is in the process of changing the configuration. Wait a while, then retry the operation. If this problem occurs again, contact customer support.. |
| Get Command Status | Async | 2E10 | 602E | The deduplication system data volume defined for the specified pool is not in the normal status. |
| Get Command Status | Async | 2E10 | 602F | The operation cannot be performed because there are not enough LDEV numbers available for the deduplication system data volume defined for the specified pool. |
| Get Command Status | Async | 2E10 | 6032 | The operation cannot be performed because the capacity of the deduplication system data volume (data store) which is used by the specified pool exceeds the upper limit. |
| Get Command Status | Async | 2E10 | 6037 | The operation cannot be performed because the subscription limit of the pool linked with the specified LDEV is not unlimited. |
| Get Command Status | Async | 2E10 | 8B01 | The ACLF is unavailable.* |
| Get Command Status | Async | 2E11 | 0003 | An LDEV that is in the state of shredding is included in the parity group of the target LDEV. |
| Get Command Status | Async | 2E11 | 0004 | An LDEV that is in the state of formatting is included in the parity group of the target LDEV. |
| Get Command Status | Async | 2E11 | 0005 | An LDEV that is in the state of executing quick format is included in the parity group of the target LDEV. |
| Get Command Status | Async | 2E11 | 001B | The specified LDEV is blocked. Alternatively, the pool associated with the specified LDEV contains a pool volume that is not in the normal status. If either of the following conditions is met, contact customer support: ▪ The pool contains a pool volume that is not in the normal status. ▪ The LDEV cannot be restored. |

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| raidcom add ldev | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E11 | 0053 | The specified LDEV is used in another operation. |
| Get Command Status | Async | 2E11 | 0102 | The parity group of the target LDEV is in the state of correction copy. |
| CMDRJE | Executing | 2E11 | 0153 | The parity group or the external volume group that the specified LDEV is belongs to is used in another operation. |
| Get Command Status | Async | 2E11 | 0205 | The operation cannot be performed because the total capacity of provisioning virtual volumes defined in the specified pool exceeds the subscription limit of the pool. |
| Get Command Status | Async | 2E11 | 0209 | The operation cannot be performed due to a cache memory failure or maintenance work being performed. |
| CMDRJE Get Command Status | Executing/ Async | 2E11 | 2208 | The operation cannot be performed because you do not have the resource group authority. |
| CMDRJE Get Command Status | Executing/ Async | 2E11 | 2209 | The operation cannot be performed because there is no LDEV ID that can be used in a system or resource group. |
| Get Command Status | Async | 2E11 | 6007 | The operation cannot be performed because the specified pool volume is blocked. |
| Get Command Status | Async | 2E11 | 6008 | The operation cannot be performed because the pool linked with the specified LDEV is in the unusable status. |
| Get Command Status | Async | 2E11 | 8004 | The operation cannot be performed because the internal processing is in progress. |
| CMDRJE | Executing | 2E11 | 8010 | The storage system is in internal process, or the configuration changing processes are conflicting. |
| Get Command Status | Async | 2E11 | 8105 | Cache segment size is incorrect. |
| Get Command Status | Async | 2E11 | 8108 | The operation cannot be performed because there is blocked part in the system. |

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| | | Error code | | |
|---|---|---|---|---|
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br><br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E11 | A602 | The operation cannot be performed because the internal processing is in progress. After a while, perform the operation again. |
| CMDRJE | Executing | 2E20 | 0000 | The specified LDEV is not defined. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E20 | 0007 | The specified CLPR does not exist. |
| CMDRJE | Executing | 2E20 | 0100 | There is no parity group. |
| CMDRJE | Executing | 2E20 | 2200 | The specified resource group is not defined. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E20 | 6000 | Pool ID is invalid. |
| Get Command Status | Async | 2E20 | 8300 | The specified MP Blade is not installed. |
| Get Command Status | Async | 2E20 | 8B01 | The ACLF is not installed on some BKMFs.* |
| Get Command Status | Async | 2E21 | 6003 | There is not enough free shared memory space. |
| Get Command Status | Async | 2E21 | 8103 | The operation cannot be performed because the capacity of shared memory is insufficient. |

| raidcom add ldev | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E21 | 810A | The shared memory is not installed. |
| Get Command Status | Async | 2E21 | 8300 | The emulation type for mainframe system cannot be specified because CHB for mainframe system is not installed. |
| Get Command Status | Async | 2E21 | 9000 | The program product is not installed. |
| CMDRJE | Executing | 2E21 | 9001 | The program product is not installed. |
| CMDRJE | Executing | 2E21 | 9002 | The program product is not installed. |
| CMDRJE/Get Command Status | Executing/ Async | 2E21 | 9004 | The program product is not installed. |
| CMDRJE | Executing | 2E21 | 900E | Hitachi Compatible Software for IBM® FlashCopy® SE program product is not installed. |
| CMDRJE | Async | 2E21 | 9017 | The Thin Image Advanced software product is not installed. |
| CMDRJE | Executing | 2E22 | 0001 | LDEV is already defined. |
| CMDRJE | Executing | 2E22 | 000F | You cannot create the volume because the size of the specified external volume group exceeds the maximum capacity of the external volume for online data migration. |
| CMDRJE Get Command Status | Executing/ Async | 2E23 | 0001 | The number exceeds the maximum number of LDEV that can be created in the current system configuration. |
| Get Command Status | Async | 2E30 | 0006 | The specified LDEV is used in the FICON® Data Migration. |
| CMDRJE | Executing | 2E30 | 0020 | The specified SSID is already used in another CU. |
| CMDRJE | Executing | 2E30 | 0021 | The SSID is allocated to the CU already. |
| Get Command Status | Async | 2E30 | 0025 | The specified volume is used as an alias device in Compatible PAV. |

| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| Get Command Status | Async | 2E30 | 0026 | An LDEV of another emulation type is allocated in the range where the number is divided into each 32LDEVs. |
| CMDRJE | Executing | 2E30 | 004C | The emulation type that cannot be mixed with is specified. |
| CMDRJE | Executing | 2E30 | 004D | The number of LDEVs exceeds the maximum number of LDEVs that can be created in the parity group or the external volume group. |
| CMDRJE | Executing | 2E30 | 0098 | The volume which is specified as a pool volume must have a Data Direct Mapping attribute. |
| Get Command Status | Async | 2E30 | 0099 | The specified LDEV is a volume for which the Data Direct Mapping attribute is enabled. |
| Get Command Status | Async | 2E30 | 009A | The page reservation cannot be set for the specified LDEV with the specified operation. |
| Get Command Status | Async | 2E30 | 009B | The operation cannot be performed because the page reservation is set for the specified LDEV. |
| CMDRJE | Executing | 2E30 | 0104 | There is not enough amount of free space that is specified in the parity group or the external volume group. |
| CMDRJE | Executing | 2E30 | 0104 | The specified operation failed due to either of the following reasons:<br>▪ There is not enough amount of free space that is specified in the parity group or the external volume group.<br>▪ If you specified "all", the combination of the drive format and the drive level is not valid for creating LDEVs. Specify the capacity in bytes or in blocks. |
| CMDRJE | Executing | 2E30 | 0105 | The location is out of the range that can be specified. |
| CMDRJE | Executing | 2E30 | 0106 | Volume whose emulation type is 3390-V cannot be created in RAID1 parity group. |
| CMDRJE | Executing/ Async | 2E30 | 4119 | The virtual volume cannot be added because the number of virtual volumes that can be created in the system exceeded the maximum number. |

| raidcom add ldev | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| Get Command Status | | | | |
| CMDRJE Get Command Status | Executing/ Async | 2E30 | 6003 | The specified pool is the pool for Thin Image or Copy-on-Write Snapshot. |
| Get Command Status | Async | 2E30 | 6012 | The operation cannot be performed because the specified pool is used for Data Direct Mapping. |
| Get Command Status | Async | 2E30 | 6014 | (VSP 5000 series, VSP G1x00 and VSP F1500) The operation cannot be performed because the specified pool is for active flash. (VSP G200, G400, G600, G800 and VSP F400, F600, F800, VSP G/F350, G/F370, G/F700, G/F900, and VSP E series) The operation cannot be performed because the specified pool is for Dynamic Tiering. |
| Get Command Status | Async | 2E30 | 6016 | The operation cannot be performed because the specified pool is for Dynamic Tiering. |
| Get Command Status | Async | 2E30 | 7101 | Mainframe volumes and multiplatform volumes cannot be contained in the CU with the same CU number because the Compatible Super PAV feature is enabled. |
| CMDRJE Get Command Status | Executing/ Async | 2E31 | 020E | The specified operation failed because of either of the following reasons: ▪ ESE-VOL cannot be created with the specified emulation type. ▪ ESE-VOL cannot be created with the emulation type of a pool volume in the specified pool. |
| CMDRJE Get Command Status | Executing/ Async | 2E31 | 020F | ESE-VOL cannot be created with the combination of the specified pool ID and the CU number of the LDEV. If the pool ID of the pool is an even number, specify an even number for the CU number. If the pool ID of the pool is an odd number, specify an odd number for the CU number. |

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| raidcom add ldev | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E31 | 0017 | Failed to restore the LDEV because there are no normal paths to external volumes. |
| Get Command Status | Async | 2E31 | 6003 | The operation cannot be performed with the specified pool type. |
| CMDRJE | Executing | 2E31 | 6007 | TSE-VOL cannot be created because of the following conditions. <br>▪ The specified pool is other than HDPz pool. <br>▪ The specified emulation type is other than 3390-A. |
| CMDRJE | Executing | 2E31 | 6008 | TSE-VOL cannot be created in combination with the specified pool ID and the CU number of LDEV. <br>You must specify the even CU number for the pool of even pool ID, and the odd CU number for the pool of odd pool ID. |
| Get Command Status | Async | 2E31 | 6009 | A TSE-VOL cannot be created in the specified pool for Dynamic Tiering or active flash. |
| CMDRJE <br>Get Command Status | Executing/ Async | 2E31 | 9005 | The operation cannot be performed because ESE Volume, User Directed Space Release is not enabled for the mainframe system function. Enable ESE Volume, User Directed Space Release, and then rerun the operation. For details, see the Provisioning Guide for your storage system. |
| CMDRJE <br>Get Command Status | Executing/ Async | 2E3F | 8000 | The specified operation is not supported in the current microcode version. |
| CMDRJE <br>Get Command Status | Executing/ Async | 2EBE | 9E01 | The specified parameter is invalid. |
| CMDRJE | Executing | 2EE8 | 00EE | The command cannot be accepted. After a while, execute the same command. |
| Get Command Status | Async | 2EE8 | FFFB | An internal error occurred. <br>Call customer support. |

| raidcom add ldev | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2EF3 | 0002 | The specified parameter is invalid. Check the *Command Control Interface Command Reference*. |
| CMDRJE | Executing | B980 | B903 | The command was rejected because the selected resource belongs to NAS_Platform_System_RSG. |
| ERANGE Result too large | Executing | - | - | The value of the capacity is invalid. |
| *ACLF: Module that implements compression accelerator. | | | | |

## SSB codes returned by raidcom add journal

| raidcom add journal | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 0000 | The value of LDEV number is invalid. |
| CMDRJE | Executing | 2E00 | 0018 | A new journal volume cannot be registered because the number of journal volume exceeds the maximum that can be registered. |
| Get Command Status | Async | 2E00 | 0023 | The specified volume capacity is too small. |
| CMDRJE | Executing | 2E00 | 8301 | The specified MP Blade ID is invalid. |
| CMDRJE Get Command Status | Executing/ Async | 2E10 | 0000 | The specified volume is already used by another program product. |
| CMDRJE Get Command Status | Executing/ Async | 2E10 | 0011 | The specified volume is not installed or cannot be used. |
| Get Command Status | Async | 2E10 | 001A | The specified volume is connected from the mainframe host. |

Chapter 9: Troubleshooting

| raidcom add journal | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E10 | 001B | There is a PIN slot in the journal volume. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E10 | 001C | The specified volume cannot be registered as a journal volume because it is in shredding. Wait until the shredding operation is completed, then retry the operation. |
| Get Command Status | Async | 2E10 | 0053 | The specified volume is used in maintenance operation. |
| Get Command Status | Async | 2E10 | 0056 | The specified volume cannot be used as the journal volume because the virtual LDEV ID is deleted. |
| Get Command Status | Async | 2E10 | 0057 | The specified volume cannot be used as the journal volume because it is the virtual volume. |
| Get Command Status | Async | 2E10 | 5000 | The specified operation failed because the journal or mirror is not in the operable status. |
| Get Command Status | Async | 2E11 | 800B | The operation cannot be performed because it is in the state of start-up. |
| Get Command Status | Async | 2E11 | 800E | The operation cannot be performed because the internal processing is in progress. Wait for a while, then retry the operation. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E11 | 810A | Abnormal cache status. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error. |

Chapter 9: Troubleshooting

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| | | | | If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE | Executing | 2E20 | 0000 | The specified LDEV is not defined. |
| CMDRJE | Executing | 2E20 | 8300 | The specified MP Blade is not installed. |
| Get Command Status | Async | 2E21 | 5000 | The operation failed because the specified journal is not installed. |
| Get Command Status | Async | 2E21 | 8104 | The journal volume cannot be added, or the journal cannot be added to the extended consistency group due to insufficient capacity of the shared memory. |
| CMDRJE | Executing | 2E21 | 8105 | The shared memory for Universal Replicator is not installed. |
| Get Command Status | Async | 2E21 | 9000 | A journal volume cannot be registered, or a journal cannot be added to the extended consistency group because the program product of Universal Replicator or Hitachi Universal Replicator software for Mainframe is not installed. |
| Get Command Status | Async | 2E23 | 0005 | A new journal volume cannot be registered, or the number of selected volumes is too many. |
| CMDRJE | Executing | 2E23 | 0008 | The number of specified LDEVs is invalid. |
| Get Command Status | Async | 2E23 | 003E | The operation failed because the multiple LDKC numbers cannot be mixed in the journal. |
| Get Command Status | Async | 2E23 | 5000 | The operation failed because the number of journals in the journal or the extended consistency group exceeds the maximum. |
| CMDRJE  Get Command Status | Executing/ Async | 2E30 | 0005 | The specified volume cannot be used as a journal volume because it is set by Cache Residency Manager or Cache Residency Manager for Mainframe. |
| CMDRJE  Get Command Status | Executing/ Async | 2E30 | 0006 | The specified volume cannot be used because it is used in FICON$^{®}$ Data Migration. |

Chapter 9: Troubleshooting

| raidcom add journal | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E30 | 0007 | A path is defined in the specified volume. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E30 | 000C | The operation failed because the specified volume is a quorum disk. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E30 | 000D | The specified volume cannot be used as a journal volume because it is a system disk. |
| Get Command Status | Async | 2E30 | 000E | The operation failed because the specified volume is a pool volume of Dynamic Provisioning. |
| Get Command Status<br><br>CMDRJE | Async/ Executing | 2E30 | 000F | The specified volume is already used as a journal volume or a data volume. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E30 | 0010 | The specified volume is used as a command device. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E30 | 0013 | The specified volume cannot be used as a journal volume because it is a LUSE volume. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E30 | 0019 | The specified volume cannot be used as a journal volume because it is set by Data Retention Utility or Volume Retention Manager. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E30 | 001A | Using the specified volume is prohibited by Volume Security. |
| CMDRJE | Executing | 2E30 | 0035 | The internal volumes and external volumes exist in the specified journal. |
| Get Command Status | Async | 2E30 | 0040 | The emulation type of the specified volume is not supported. Or, the combination of an emulation type of the journal volume is incorrect. |

Chapter 9: Troubleshooting

| raidcom add journal | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E30 | 0041 | The volume cannot be registered as a journal volume because the CLPR ID of the specified volume differs from the CLPR ID of the registered journal volume. |
| CMDRJE | Executing | 2E30 | 005F | The specified LDEV is a remote command device. |
| CMDRJE Get Command Status | Executing/ Async | 2E30 | 0062 | The specified volume cannot be used as a journal volume because it is an external volume that can execute the I/O suppression mode. |
| CMDRJE Get Command Status | Executing/ Async | 2E30 | 0064 | The specified volume is a reserved volume of a mainframe host. |
| CMDRJE Get Command Status | Executing/ Async | 2E30 | 0065 | The specified volume is used by XRC. |
| CMDRJE Get Command Status | Executing/ Async | 2E30 | 0067 | The specified volume is a volume of Just in Time (On-demand) function. |
| Get Command Status | Async | 2E30 | 0068 | The specified volume cannot be used as a journal volume because it is used by Compatible PAV. |
| CMDRJE Get Command Status | Executing/ Async | 2E30 | 0070 | The resource group ID of the specified volume cannot be registered because the resource group ID is different from the resource group ID of the other journal volume in the specified journal group. |
| CMDRJE Get Command Status | Executing/ Async | 2E30 | 0074 | The specified LDEV cannot be operated because it is an external volume mapped for online data migration. |
| Get Command Status | Async | 2E30 | 0084 | The specified LDEV cannot be used as a journal volume because the size of the LDEV is less than the minimum capacity of journal volume. |
| CMDRJE Get Command Status | Executing/ Async | 2E30 | 0086 | The operation cannot be performed because the specified volume is not the Dynamic Provisioning V-VOL. |

| raidcom add journal | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E30 | 0208 | The operation cannot be performed because the specified LDEV is a volume for which capacity saving setting is enabled or a deduplication system data volume. |
| Get Command Status | Async | 2E30 | 020E | The operation cannot be performed because the specified LDEV is registered as namespace in the NVM subsystem. This SSB error code is displayed only for VSP 5000 series and VSP E1090. |
| CMDRJE | Executing | 2EE4 | 08E6 | The command cannot be accepted. After a while, execute the same command. |
| CMDRJE Get Command Status | Executing/ Async | 2EE4 | 50EE | An internal error occurred. Call customer support. |
| CMDRJE Get Command Status | Executing/ Async | 2EE4 | FEEC | An internal error occurred. Call customer support. |
| CMDRJE | Executing | 2EF3 | 5002 | The specified parameter is invalid. Check the *Command Control Interface Command Reference*. |
| CMDRJE | Executing | B980 | B903 | The command was rejected because the selected resource belongs to NAS_Platform_System_RSG. |

## SSB codes returned by raidcom delete journal

| raidcom delete journal | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 0000 | The number of specified LDEV is invalid. |
| Get Command Status | Async | 2E00 | 0023 | The specified volume capacity is too small. |

| raidcom delete journal | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 5000 | The specified journal ID is exceeds the range. |
| Get Command Status | Async | 2E10 | 0011 | The specified volume is not installed or cannot be used. |
| Get Command Status | Async | 2E10 | 0053 | The specified volume is used in maintenance operation. |
| Get Command Status | Async | 2E10 | 5000 | The specified operation failed because the journal or mirror is not in the operable status. |
| Get Command Status | Async | 2E10 | 5010 | The journal volume cannot be deleted with the specified journal status. |
| Get Command Status | Async | 2E11 | 800B | The operation cannot be performed because it is in the state of start-up. |
| Get Command Status | Async | 2E11 | 800E | The operation cannot be performed because the internal processing is in progress. Wait for a while, then retry the operation. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: <br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands. <br>2. Rerun the command that caused an error. <br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE | Executing | 2E13 | 5002 | The specified LDEV is not in the journal. |
| CMDRJE | Executing | 2E20 | 5000 | The specified journal ID is not registered. |
| Get Command Status | Async | 2E21 | 5000 | The operation failed because the specified journal is not registered. |
| Get Command Status | Async | 2E21 | 8104 | The journal volume cannot be added, or the journal cannot be added to the extended consistency group due to insufficient capacity of the shared memory. |

Chapter 9: Troubleshooting

| raidcom delete journal | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E21 | 8105 | The shared memory for Universal Replicator is not installed. |
| CMDRJE | Executing | 2E23 | 0008 | The number of specified LDEVs is invalid. |
| Get Command Status | Async | 2E30 | 0062 | The specified volume cannot be used as a journal volume because it is an external volume that can execute the I/O suppression mode. |
| Get Command Status | Async | 2E30 | 5002 | The specified journal cannot be deleted because there are data volumes. |
| CMDRJE | Executing | 2EE4 | 08E6 | The command cannot be accepted. After a while, execute the same command. |
| Get Command Status | Async | 2EE4 | 50EE | An internal error occurred. Call customer support. |
| CMDRJE | Executing | B980 | B903 | The command was rejected because the selected resource belongs to NAS_Platform_System_RSG. |

## SSB codes returned by raidcom modify journal

| raidcom modify journal | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE Get Command Status | Executing/ Async | 2E00 | 0000 | The specified volume number is out of effective range. |
| CMDRJE | Executing | 2E00 | 0023 | The specified volume capacity is too small. |
| CMDRJE | Executing | 2E00 | 5000 | The specified journal ID exceeds the range. |
| CMDRJE | Executing | 2E00 | 500B | The specified path blocked path monitoring is not in the valid range. |
| CMDRJE | Executing | 2E00 | 8301 | The specified MP Blade ID is invalid. |
| CMDRJE | Executing/ | 2E02 | 5201 | The specified mirror ID is out of effective range. |

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| raidcom modify journal | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| Get Command Status | Async | | | |
| CMDRJE<br>Get Command Status | Executing/ Async | 2E10 | 0011 | The specified volume is not installed or cannot be used. |
| Get Command Status | Async | 2E10 | 021C | The specified remote command device cannot be operated because it is blocked. |
| Get Command Status | Async | 2E10 | 021D | No more mirrors can be assigned to the specified remote command device. |
| Get Command Status | Async | 2E10 | 021E | The operation cannot be performed because the number of remote command devices that can be assigned to the mirror exceeds the maximum. |
| CMDRJE | Executing | 2E10 | 5000 | The specified operation failed because the journal or mirror is not in the operable status. |
| CMDRJE | Executing | 2E10 | 5006 | The specified operation failed because the mirror of journal is not in the operable status. |
| CMDRJE | Executing | 2E10 | 8300 | The specified MP Blade is blocked. |
| Get Command Status | Async | 2E11 | 4306 | The operation cannot be performed due to a temporary path failure. |
| Get Command Status | Async | 2E11 | 5201 | Another remote command device is already assigned to the specified mirror. |
| Get Command Status | Async | 2E11 | 5202 | The operation cannot be performed because the mirror of the journal is not in the operable status. |
| Get Command Status | Async | 2E11 | 5203 | The operation cannot be performed because the specified mirror is not available. |
| Get Command Status | Async | 2E11 | 5204 | The operation cannot be performed because the remote command device is not assigned to the specified mirror. |
| Get Command Status | Async | 2E11 | 5205 | The assignment of the remote command device failed because the Universal Replicator pair in the specified mirror is cooperating with the global-active device pair. |
| CMDRJE | Executing/ Async | 2E11 | 800B | The operation cannot be performed because it is in the state of start-up. |

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| raidcom modify journal | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| Get Command Status | | | | |
| Get Command Status | Async | 2E11 | 800E | The operation cannot be performed because the internal processing is in progress. Wait a while, then retry the operation. |
| Get Command Status | Async | 2E11 | 8801 | The operation cannot be performed because the remote command device does not match the serial number of the mirror. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: <br> 1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands. <br> 2. Rerun the command that caused an error. <br> If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E13 | 5003 | The operation cannot be performed because the specified journal is not in a 3DC cascade or 3DC multi target configuration. |
| CMDRJE | Executing | 2E20 | 0000 | The specified volume is not installed. |
| CMDRJE | Executing | 2E20 | 5000 | The specified journal ID is not registered. |
| CMDRJE <br> Get Command Status | Executing/ Async | 2E21 | 5000 | The operation failed because the specified journal is not registered. |
| CMDRJE <br> Get Command Status | Executing/ Async | 2E21 | 8104 | The journal volume cannot be added, or the journal cannot be added to the extended consistency group due to insufficient capacity of the shared memory. |
| CMDRJE | Executing | 2E23 | 0008 | The number of specified LDEVs is invalid. |

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| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| Get Command Status | Async | 2E30 | 0062 | The specified volume cannot be used as a journal volume because it is an external volume that can execute the I/O suppression mode. |
| Get Command Status | Async | 2E30 | 020A | The operation cannot be performed because the specified volume is not a remote command device. |
| CMDRJE | Executing | 2E30 | 5001 | The timer type cannot be changed because the specified journal belongs to the extended consistency group. |
| CMDRJE | Executing | 2E30 | 5003 | The parameter of inflow control cannot be changed because the specified journal is not a primary journal. |
| CMDRJE | Executing | 2E30 | 5005 | The cache mode option or the data overflow monitoring time cannot be changed because the specified journal is used by both the primary and the secondary journals. |
| CMDRJE | Executing | 2EE4 | 07DC | The specified data transfer speed is invalid. |
| CMDRJE<br>Get Command Status | Executing/ Async | 2EE4 | 50EE | An internal error occurred.<br>Call customer support. |
| CMDRJE<br>Get Command Status | Executing/ Async | 2EE4 | FEEC | An internal error occurred.<br>Call customer support. |
| Get Command Status | Async | 2EF3 | 3001 | The remote storage system does not support configuration operation for remote command devices. |

The table title row reads: **raidcom modify journal**

## SSB codes returned by raidcom modify ldev

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | B980 | B903 | The command was rejected because the selected resource belongs to NAS_Platform_System_RSG. |
| CMDRJE | Executing | B980 | B906 | An LDEV for which an LU path is set in NAS Platform (User LU) cannot have the Command Device attribute. |

*(header "raidcom modify ldev" spans the table)*

## SSB codes returned by raidcom modify ldev -alua

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is out of settable range. |
| CMDRJE | Executing | 2E11 | 0059 | The status of the GAD pair is not able to change ALUA. |
| CMDRJE | Executing | 2E11 | 800F | The operation cannot be performed because the unsupported microcode version exists in the system. |
| CMDRJE | Executing | 2E20 | 0000 | The specified LDEV is not installed. |
| CMDRJE | Executing | 2E23 | 1001 | The number of the host groups which can be set by ALUA exceeded the maximum. |
| CMDRJE | Executing | 2EE8 | 0201 | The system is locked by another user (or another session). After a while, execute the same command. If the error occurs repeatedly, contact customer support. |
| CMDRJE | Executing | 2EE8 | FEEC | An internal error occurred. Contact customer support. |

*(header "raidcom modify ldev -alua" spans the table)*

## SSB codes returned by raidcom modify ldev -mp_blade_id

<table>
<tr><th colspan="5">raidcom modify ldev -mp_blade_id</th></tr>
<tr><th rowspan="2">Error message</th><th rowspan="2">Executing/<br>Async</th><th colspan="2">Error code</th><th rowspan="2">Description</th></tr>
<tr><th>SSB1</th><th>SSB2</th></tr>
<tr><td>CMDRJE</td><td>Executing</td><td>2E00</td><td>0000</td><td>The LDEV number is out of settable range.</td></tr>
<tr><td>CMDRJE</td><td>Executing</td><td>2E00</td><td>8301</td><td>MP Blade ID is not in the effective range.</td></tr>
<tr><td>CMDRJE</td><td>Executing</td><td>2E10</td><td>8300</td><td>The specified MP Blade is blocked.</td></tr>
<tr><td>CMDRJE</td><td>Executing</td><td>2E20</td><td>0000</td><td>LDEV is not installed.</td></tr>
<tr><td>CMDRJE</td><td>Executing</td><td>2E20</td><td>8300</td><td>The specified MP Blade is not installed.</td></tr>
</table>

## SSB codes returned by raidcom add device_grp

<table>
<tr><th colspan="5">raidcom add device_grp</th></tr>
<tr><th rowspan="2">Error message</th><th rowspan="2">Executing/<br>Async</th><th colspan="2">Error code</th><th rowspan="2">Description</th></tr>
<tr><th>SSB1</th><th>SSB2</th></tr>
<tr><td>CMDRJE</td><td>Executing</td><td>2E00</td><td>0000</td><td>The LDEV number is out of settable range.</td></tr>
<tr><td>CMDRJE</td><td>Executing</td><td>2E20</td><td>0000</td><td>LDEV is not installed.</td></tr>
<tr><td>CMDRJE</td><td>Executing</td><td>2E22</td><td>0009</td><td>The number of device name in the system has reached the maximum.</td></tr>
<tr><td>CMDRJE</td><td>Executing</td><td>2E22</td><td>000A</td><td>The device name of an LDEV is duplicated in the system.</td></tr>
<tr><td>CMDRJE</td><td>Executing</td><td>2E22</td><td>000E</td><td>The number of LDEVs that can be registered in a operation exceeds the maximum. The number of LDEVs that can be registered includes the number of LDEVs of a LUSE.</td></tr>
<tr><td>CMDRJE</td><td>Executing</td><td>2E23</td><td>0008</td><td>The number of specified LDEVs is invalid.</td></tr>
<tr><td>CMDRJE</td><td>Executing</td><td>2E23</td><td>2100</td><td>It exceeds the number of device group in the system.</td></tr>
<tr><td>CMDRJE</td><td>Executing</td><td>2E30</td><td>0051</td><td>The LDEV to be allocated to the device group is not set the device name.</td></tr>
</table>

| raidcom add device_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E30 | 0072 | The specified resource group ID of the LDEV cannot be registered because it is different from other resource group ID of the LDEV in the specified device group. |
| CMDRJE | Executing | 2EEA | FEEC | An internal error occurred. Call customer support. |

## SSB codes returned by raidcom delete device_grp

| raidcom delete device_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is out of settable range. |
| CMDRJE | Executing | 2E20 | 0000 | LDEV is not installed. |
| CMDRJE | Executing | 2E20 | 0002 | LDEV is not registered in the device group. |
| CMDRJE | Executing | 2E20 | 2100 | A device group is not installed. |
| CMDRJE | Executing | 2E22 | 000E | The number of LDEVs that can be deleted in a operation exceeds the maximum. The number of LDEVs that can be deleted includes the number of LDEVs of a LUSE. |
| CMDRJE | Executing | 2E23 | 0008 | The number of specified LDEVs is invalid. |

## SSB codes returned by raidcom modify ldev -ldev_name

| raidcom modify ldev -ldev_name | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is out of settable range. |
| CMDRJE | Executing | 2E00 | 0007 | LDEV nickname is not specified. |

| raidcom modify ldev -ldev_name | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E20 | 0000 | LDEV is not installed. |
| Invalid Character | Executing | - | - | Unavailable character is included in LDEV nickname. |

## SSB codes returned by raidcom initialize ldev

| raidcom initialize ldev | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is out of settable range. |
| Get Command Status | Async | 2E10 | 0000 | The specified LDEV is used for a ShadowImage pair. |
| Get Command Status | Async | 2E10 | 0001 | The specified LDEV is used for a TrueCopy pair or a Universal Replicator pair. |
| Get Command Status | Async | 2E10 | 0003 | The specified LDEV is used as a Compatible FlashCopy® V2 relationship. |
| Get Command Status | Async | 2E10 | 0004 | The specified LDEV is used for a Thin Image pair or a Copy-on-Write Snapshot pair. |
| Get Command Status | Async | 2E10 | 0008 | The specified LDEV is used on the system disk. |
| Get Command Status | Async | 2E10 | 0010 | LDEV is not blocked. |
| Get Command Status | Async | 2E10 | 0012 | The specified LDEV is a CC/XRC attribute device. |
| Get Command Status | Async | 2E10 | 0062 | The specified LDEV is used as the primary volume of aGAD pair. |
| Get Command Status | Async | 2E10 | 0063 | The specified LDEV is used as the secondary volume of aGAD pair. |
| Get Command Status | Async | 2E10 | 0100 | The formatting operation cannot be performed because the encryption value of the key number that is set to encryption ECC is invalid. |

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| raidcom initialize ldev | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E10 | 0101 | The formatting operation cannot be performed because the check sum of the encryption key is not coincident. |
| Get Command Status | Async | 2E10 | 0210 | The specified LDEV cannot be operated because capacity saving status is Failed. |
| Get Command Status | Async | 2E10 | 0239 | The operation cannot be performed because the capacity saving setting for the specified volume is not configured correctly. For details, see the *Hitachi Thin Image Advanced User Guide*. |
| Get Command Status | Async | 2E10 | 6022 | The operation cannot be performed because the deduplication system data volume of the pool linked with the specified LDEV is blocked. |
| Get Command Status | Async | 2E10 | 6033 | The operation cannot be performed because the deduplication system data volume (data store) of the pool linked with the specified LDEV is not formatted. |
| Get Command Status | Async | 2E11 | 0007 | The LDEV is in shredding. |
| Get Command Status | Async | 2E11 | 0009 | The operation cannot be performed because LDEV is now expanding. |
| Get Command Status | Async | 2E11 | 001E | The operation cannot be performed because the virtual disk space is blocked. |
| CMDRJE | Executing | 2E11 | 0053 | The specified LDEV is used in another operation. |
| CMDRJE Get Command Status | Executing/ Async | 2E11 | 0060 | The operation failed because accelerated compression of the parity group to which the specified LDEV belongs is enabled. |
| Get Command Status | Async | 2E11 | 0102 | The parity group of the target LDEV is in the state of correction copy. |
| Get Command Status | Async | 2E11 | 010B | The operation cannot be performed because the parity group for which the specified LDEV is defined is configured using an FMD HDE drive, but it is not encrypted. |
| CMDRJE | Executing | 2E11 | 0153 | The parity group or the external volume group to which the specified LDEV belongs is used in another operation. |

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| raidcom initialize ldev | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E11 | 0201 | The operation cannot be performed because the parity group format is not done for the parity group to which the specified LDEV belongs. |
| Get Command Status | Async | 2E11 | 0206 | The operation cannot be performed because a Thin Image pair that uses a Dynamic Provisioning V-VOL remains. |
| Get Command Status | Async | 2E11 | 020C | The operation cannot be performed because an LDEV is being formatted or shredded, or a Quick Format operation is in process for an LDEV. |
| Get Command Status | Async | 2E11 | 6004 | The operation of Dynamic Provisioning V-VOL cannot be performed because there is a blocked pool. |
| Get Command Status | Async | 2E11 | 6006 | The operation of Dynamic Provisioning V-VOL cannot be performed because there is a blocked pool volume. |
| Get Command Status | Async | 2E11 | 8004 | The operation cannot be performed because the internal processing is in progress. |
| Get Command Status | Async | 2E11 | 8010 | The operation cannot be performed because the internal processing is in progress. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E14 | 0000 | The processing stopped because aborting processing is required. |
| CMDRJE | Executing | 2E20 | 0000 | LDEV is not installed. |
| CMDRJE | Executing | 2E21 | 9011 | The program product is not installed. |

| raidcom initialize ldev | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| Get Command Status | Async | 2E22 | 0100 | The quick format cannot be performed because the total number of parity groups in which the LDEVs in quick formatting or the LDEVs blocked while quick formatting are implemented exceeds the maximum number that can be performed at the same time. |
| Get Command Status | Async | 2E30 | 000A | The specified LDEV is used for a Dynamic Provisioning. |
| Get Command Status | Async | 2E30 | 000C | The specified LDEV is used as a quorum disk. |
| CMDRJE Get Command Status | Executing/ Async | 2E30 | 000E | The specified LDEV is used as a pool volume. |
| Get Command Status | Async | 2E30 | 000F | The specified LDEV is used as a journal volume. |
| Get Command Status | Async | 2E30 | 001A | Volume Security is set to the specified LDEV. |
| Get Command Status | Async | 2E30 | 002D | Quick format cannot be performed because the target LDEV is not an internal volume. |
| Get Command Status | Async | 2E30 | 004E | The specified LDEV is a Data Retention Utility/ Volume Retention Manager attribute device. |
| Get Command Status | Async | 2E30 | 0061 | The specified LDEV is a pool volume and the pool volume include the Dynamic Provisioning volume that is not in the blocked status. |
| Get Command Status | Async | 2E30 | 0074 | The specified LDEV cannot be operated because it is an external volume mapped for online data migration. |
| CMDRJE | Executing | 2E30 | 0075 | The specified ldev is used as the TSE-VOL. |
| CMDRJE Get Command Status | Executing/ Async | 2E30 | 0206 | The operation cannot be performed because the specified LDEV is a deduplication system data volume. |
| CMDRJE | Executing | 2E30 | 0209 | The operation cannot be performed because the specified LDEV is a volume for which capacity saving setting is enabled. |

| raidcom initialize ldev | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E31 | 0001 | Maintenance work cannot be performed because the target LDEV is a quorum disk. |
| Get Command Status | Async | 2E31 | 0017 | LDEV cannot be formatted because there is no normal external path. |
| CMDRJE | Executing | 2EE8 | 00EE | The command cannot be accepted. After a while, execute the same command. |
| Get Command Status | Async | 2EE8 | 0A18 | An internal error occurred. Contact customer support. |
| CMDRJE Get Command Status | Executing/ Async | 2EE8 | FEEC | An internal error occurred. Contact customer support. |
| CMDRJE Get Command Status | Executing/ Async | 2EE8 | FFFF | An internal error occurred. Contact customer support. |
| CMDRJE | Executing | 2EF3 | 0002 | The specified parameter is incorrect. Check the *Command Control Interface Command Reference*. |
| CMDRJE | Executing | B980 | B903 | The command was rejected because the selected resource belongs to NAS_Platform_System_RSG. |

## SSB codes returned by raidcom modify ldev -command_device

| raidcom modify ldev -command_device | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E10 | 0000 | The command device cannot be set to the specified LDEV because of the following causes.<br>▪ The LDEV is used for a ShadowImage pair.<br>▪ The reserve attribute of a ShadowImage is configured. |
| CMDRJE | Executing | 2E10 | 0001 | The specified LDEV is used for a TrueCopy pair. |

| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
|---|---|---|---|---|
| CMDRJE | Executing | 2E10 | 0002 | The specified LDEV is used for a Universal Replicator pair or a journal. |
| CMDRJE | Executing | 2E10 | 0004 | The specified volume cannot be set because it is used by a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0062 | The specified LDEV is used as the primary volume of aGAD pair. |
| CMDRJE | Executing | 2E10 | 0063 | The specified LDEV is used as the secondary volume of aGAD. |
| CMDRJE | Executing | 2E10 | 0201 | The operation failed because the T10 PI attribute of the specified LDEV is enabled. |
| CMDRJE | Executing | 2E10 | 0223 | The operation cannot be performed because QoS settings are enabled for the specified LDEV. |
| CMDRJE | Executing | 2E10 | 0224 | The command device cannot be set because the specified LDEV is registered as namespace in the NVM subsystem. This SSB error code is displayed only for VSP 5000 series and VSP E1090. |
| CMDRJE | Executing | 2E10 | 0239 | The operation cannot be performed because the capacity saving setting for the specified volume is not configured correctly. For details, see the *Hitachi Thin Image Advanced User Guide*. |
| CMDRJE | Executing | 2E20 | 0000 | The specified LDEV is not defined. |
| CMDRJE  Get Command Status | Executing/ Async | B958 | 0C28 | The operation cannot be performed because the capacity saving setting for the specified volume is not configured correctly. For details, see the *Hitachi Thin Image Advanced User Guide*. |
| CMDRJE | Executing | 2E21 | 9000 | The following settings cannot be performed because the program product of LUN Manager is not installed.<br>▪ Command device settings<br>▪ Command security settings |
| CMDRJE | Executing | 2E30 | 0004 | The emulation type of the specified volume is not OPEN volume. |

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E30 | 0008 | The command device cannot be set because LDEV is used as a virtual volume of Thin Image or Copy-on-Write Snapshot. |
| CMDRJE | Executing | 2E30 | 000C | The specified volume cannot be set because it is a quorum disk. |
| CMDRJE | Executing | 2E30 | 000D | The specified volume cannot be set because it is a system disk. |
| CMDRJE | Executing | 2E30 | 000E | The specified volume cannot be set because it is a pool volume. |
| CMDRJE | Executing | 2E30 | 0012 | The specified LDEV cannot be released because it is command device that is being used. |
| CMDRJE | Executing | 2E30 | 0013 | The specified volume cannot be set because it is a LUSE volume. |
| CMDRJE | Executing | 2E30 | 0014 | The command device cannot be set to the specified LDEV because of the following causes. <br> ▪ It is used as aVolume Migration. <br> ▪ The reserve attribute of aVolume Migration is configured. |
| CMDRJE | Executing | 2E30 | 0019 | The specified volume cannot be used as a command device because it is set by a Data Retention Utility. |
| CMDRJE | Executing | 2E30 | 0074 | The specified LDEV cannot be operated because it is an external volume mapped for online data migration. |
| CMDRJE | Executing | 2E30 | 0096 | The specified LDEV is used as an ALU. |
| Get Command Status | Async | 2E30 | 0206 | The operation cannot be performed because the specified LDEV is a deduplication system data volume. |
| CMDRJE | Executing | 2EE8 | FEEC | An internal error occurred. <br><br> Call customer support. |

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## SSB codes returned by raidcom modify ldev -ssid

| raidcom modify ldev -ssid | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E11 | 0023 | SSID cannot be changed because there are LDEVs in the boundary where the specified LDEV belongs. |
| CMDRJE | Executing | 2E11 | 8010 | The operation cannot be performed because the internal processing is in progress. Wait a while, and then retry the command. |
| CMDRJE | Executing | 2E22 | 7201 | The specified SSID is used for the other boundary. |
| CMDRJE | Executing | 2EE8 | FEEC | An internal error occurred. Call customer support. |
| CMDRJE | Executing | 2EF3 | 0002 | The specified parameter is invalid. Check the *Command Control Interface Command Reference*. |

## SSB codes returned by raidcom modify ldev -status nml

| raidcom modify ldev -status nml | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is out of settable range. |
| Get Command Status | Async | 2E10 | 0000 | The specified LDEV is used for a ShadowImage pair. |
| Get Command Status | Async | 2E10 | 0001 | The specified LDEV is used for a TrueCopy pair or a Universal Replicator pair. |
| Get Command Status | Async | 2E10 | 0003 | The specified LDEV is used as a Compatible FlashCopy® V2 relationship. |
| Get Command Status | Async | 2E10 | 0004 | The specified LDEV is used for a Thin Image pair or a Copy-on-Write Snapshot pair. |
| Get Command Status | Async | 2E10 | 0008 | The specified LDEV is used as a system disk. |
| CMDRJE | Executing | 2E10 | 0010 | LDEV is not blocked. |

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| raidcom modify ldev -status nml | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| Get Command Status | Async | 2E10 | 0012 | The specified LDEV is a CC/XRC attribute device. |
| Get Command Status | Async | 2E10 | 001E | The specified LDEV is not formatted after it is used as the journal volume. |
| Get Command Status | Async | 2E10 | 0062 | The specified LDEV is used as the primary volume of aGAD pair. |
| Get Command Status | Async | 2E10 | 0063 | The specified LDEV is used as the secondary volume of aGAD pair. |
| Get Command Status | Async | 2E10 | 600B | The pool is blocked. |
| Get Command Status | Async | 2E11 | 0009 | The operation cannot be performed because LDEV is not expanding. |
| Get Command Status | Async | 2E11 | 001E | The operation cannot be performed because the virtual disk space is blocked. |
| CMDRJE | Executing | 2E11 | 0053 | The specified LDEV is used in another operation. |
| CMDRJE | Executing | 2E11 | 0153 | The parity group or the external group to which the specified LDEV belongs is used in another operation. |
| Get Command Status | Async | 2E11 | 6006 | The operation of Dynamic Provisioning V-VOL cannot be performed because there is a blocked pool volume. |
| Get Command Status | Async | 2E11 | 8004 | The operation cannot be performed because the internal processing is in progress. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: 1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands. 2. Rerun the command that caused an error. |

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| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| | | | | If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE | Executing | 2E20 | 0000 | The specified LDEV is not installed. |
| Get Command Status | Async | 2E30 | 000A | The specified LDEV is used for a Dynamic Provisioning. |
| Get Command Status | Async | 2E30 | 000C | The specified LDEV is used as a quorum disk. |
| Get Command Status | Async | 2E30 | 000E | The specified LDEV is used as a pool volume. |
| Get Command Status | Async | 2E30 | 0014 | The specified LDEV is used as a reserved volume of Volume Migration. |
| Get Command Status | Async | 2E30 | 001A | Volume Security is set to the specified LDEV. |
| Get Command Status | Async | 2E30 | 002C | The specified LDEV cannot be restored because the shredding or the formatting operation has not been performed. |
| Get Command Status | Async | 2E30 | 004E | The specified LDEV is a Data Retention Utility/ Volume Retention Manager attribute device. |
| Get Command Status | Async | 2E31 | 0017 | LDEV cannot be restored because there is no connection path to the normal external path. |
| CMDRJE | Executing | 2EB1 | A301 | The specified password is not correct. |
| CMDRJE | Executing | 2EE8 | 00EE | The command cannot be accepted. After a while, execute the same command. |

The table above has the heading: **raidcom modify ldev -status nml**

## SSB codes returned by raidcom modify ldev -status blk

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is out of settable range. |

The table above has the heading: **raidcom modify ldev -status blk**

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| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| Get Command Status | Async | 2E10 | 0000 | The specified LDEV is used for a pair of ShadowImage/Thin Image/Copy-on-Write Snapshot/Volume Migration or as a relationship of Compatible FlashCopy® V2/Hitachi Compatible Software for IBM® FlashCopy® SE. |
| Get Command Status | Async | 2E10 | 0001 | The specified LDEV is used for a pair of TrueCopy or Universal Replicator. |
| Get Command Status | Async | 2E10 | 0003 | The specified LDEV is used as a Compatible FlashCopy® V2 relationship. |
| Get Command Status | Async | 2E10 | 0004 | The specified LDEV is used for a Thin Image pair or a Copy-on-Write Snapshot pair. |
| Get Command Status | Async | 2E10 | 0008 | The specified LDEV is used as a system disk. |
| CMDRJE | Executing | 2E10 | 0011 | LDEV is not installed, or LDEV is not in the state of Normal. |
| Get Command Status | Async | 2E10 | 0012 | The specified LDEV is used at the concurrent copy or XRC. |
| Get Command Status | Async | 2E10 | 0062 | The specified LDEV is used as the primary volume of aGAD pair. |
| Get Command Status | Async | 2E10 | 0063 | The specified LDEV is used as the secondary volume of aGAD pair. |
| Get Command Status | Async | 2E11 | 0009 | The operation cannot be performed because LDEV is now expanding. |
| Get Command Status | Async | 2E11 | 001E | The operation cannot be performed because the virtual disk space is blocked. |
| CMDRJE | Executing | 2E11 | 0053 | The specified LDEV is used in another operation. |
| CMDRJE | Executing | 2E11 | 0153 | The parity group or the external group to which the specified LDEV belongs is used in another operation. |
| Get Command Status | Async | 2E11 | 020B | The operation cannot be performed because the pool linked with the specified LDEV contains a volume which is not blocked, and for which capacity saving function is enabled. |

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| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| Get Command Status | Async | 2E11 | 8004 | The operation cannot be performed because the internal processing is in progress. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE | Executing | 2E20 | 0000 | The specified LDEV is not installed. |
| Get Command Status | Async | 2E30 | 000A | The specified LDEV is used for a Dynamic Provisioning. |
| Get Command Status | Async | 2E30 | 000C | The specified LDEV is used as a quorum disk. |
| Get Command Status | Async | 2E30 | 000E | The specified LDEV is used as a pool volume. |
| CMDRJE | Executing | 2E30 | 000F | It is used as a journal. |
| Get Command Status | Async | 2E30 | 0014 | The specified LDEV is used as a reserved volume of Volume Migration. |
| Get Command Status | Async | 2E30 | 001A | Volume Security is set to the specified LDEV. |
| Get Command Status | Async | 2E30 | 001C | It is used as a remote command device. |
| Get Command Status | Async | 2E30 | 004E | It is a volume that the Data Retention Utility is set. |
| Get Command Status | Async | 2E30 | 004E | The specified LDEV is a Data Retention Utility/ Volume Retention Manager attribute device. |
| Get Command Status | Async | 2E30 | 0060 | It is used as a command device that is used at extended consistency group. |

| | | raidcom modify ldev -status blk | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E30 | 0061 | DP volume that is not in the blocked state is included in the DP volume associated with a pool that the pool volume is belongs to. |
| Get Command Status | Async | 2E31 | 0001 | Maintenance work cannot be performed because the target LDEV is a quorum disk. |
| Get Command Status | Async | 2E31 | 0017 | LDEV cannot be blocked because there is no connection path to the normal external path. |
| Get Command Status | Async | 2EE8 | 0A18 | An internal error occurred. Contact customer support. |

## *SSB codes returned by raidcom modify ldev -status enable_reallocation/ disable_reallocation/new_page_allocation/enable_relocation_policy*

| | | raidcom modify ldev -status enable_reallocation/disable_reallocation/new_page_allocation/ enable_relocation_policy | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 0000 | Invalid LDEV number. |
| CMDRJE | Executing | 2E00 | 6101 | The tiering policy is not in the effective range. |
| CMDRJE | Executing | 2E00 | 6102 | The new page assignment tier is invalid. |
| CMDRJE | Executing | 2E20 | 0000 | The specified LDEV is not installed. |
| CMDRJE | Executing | 2E21 | 8102 | The shared memory for Dynamic Tiering or active flash is not installed. |
| CMDRJE | Executing | 2E30 | 0206 | The operation cannot be performed because the specified LDEV is a deduplication system data volume. |
| CMDRJE | Executing | 2E30 | 000B | The specified LDEV is not a virtual volume of Dynamic Provisioning, Dynamic Tiering, or active flash. |
| CMDRJE | Executing | 2E30 | 0073 | The specified LDEV is not a virtual volume of Dynamic Tiering or active flash. |

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| raidcom modify ldev -status enable_reallocation/disable_reallocation/new_page_allocation/ enable_relocation_policy | | | | |
|---|---|---|---|---|
| | **Executing/ Async** | **Error code** | | |
| **Error message** | | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | 2E30 | 0209 | The operation cannot be performed because the specified LDEV is a volume for which the capacity saving setting is enabled. |
| CMDRJE | Executing | 2EE8 | 0014 | The specified LDEV is not a virtual volume of Dynamic Tiering or active flash. |

## SSB codes returned by raidcom modify ldev -status discard_zero_page/ stop_discard_zero_page

| raidcom modify ldev -status discard_zero_page/stop_discard_zero_page | | | | |
|---|---|---|---|---|
| | **Executing/ Async** | **Error code** | | |
| **Error message** | | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | 2E00 | 0000 | The specified volume number is out of the effective range. |
| CMDRJE | Executing | 2E10 | 0000 | The specified LDEV is used for a ShadowImage pair.<br><br>The specified operation failed due to either of the following reasons:<br><br>▪ The specified LDEV is used for a ShadowImage pair.<br><br>▪ The ShadowImage pair of the specified LDEV is not in an operable status.<br><br>For details about whether zero data pages of V-VOLs can be discarded, see the *Provisioning Guide* for your storage system. |
| CMDRJE | Executing | 2E10 | 0001 | The specified LDEV is used for a TrueCopy pair. |
| CMDRJE | Executing | 2E10 | 0002 | The specified LDEV is used for a Universal Replicator pair. |
| CMDRJE | Executing | 2E10 | 0003 | The specified LDEV is used as a Compatible FlashCopy® V2 relationship. |
| CMDRJE | Executing | 2E10 | 0004 | The specified LDEV is used for a Thin Image pair or a Copy-on-Write Snapshot pair. |

| Error message | Executing/ Async | Error code SSB1 | Error code SSB2 | Description |
|---|---|---|---|---|
| CMDRJE | Executing | 2E10 | 0005 | The specified LDEV is used for aVolume Migration pair. |
| CMDRJE | Executing | 2E10 | 0011 | The specified LDEV is blocked. |
| CMDRJE | Executing | 2E10 | 600B | The associated pool is blocked. |
| CMDRJE | Executing | 2E11 | 0054 | The page cannot be discarded because the pool volume is being deleted or the Tier is being reallocated. |
| CMDRJE | Executing | 2E11 | 0055 | The operation cannot be performed because the system pool volume is blocked. |
| CMDRJE<br>Get Command Status | Executing/ Async | 2E11 | 8003 | The operation cannot be performed because the power supply is switched off. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE | Executing | 2E14 | 0001 | The page cannot be discarded because of the non-operable status. |
| CMDRJE | Executing | 2E20 | 0000 | The specified LDEV is not installed. |
| CMDRJE | Executing | 2E20 | 000A | The operation cannot be performed because the specified volume is being formatted. |
| CMDRJE | Executing | 2E30 | 000B | The specified LDEV is not a virtual volume of Dynamic Provisioning, Dynamic Tiering, or active flash. |
| CMDRJE | Executing | 2E30 | 000F | The specified LDEV is used as a journal volume. |

The table title spans: **raidcom modify ldev -status discard_zero_page/stop_discard_zero_page**

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| raidcom modify ldev -status discard_zero_page/stop_discard_zero_page | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E30 | 0033 | It is not associated to a pool. |
| CMDRJE | Executing | 2E30 | 0065 | The specified volume is used by XRC. |
| CMDRJE | Executing | 2E30 | 0075 | The page cannot be discarded because the specified LDEV is a TSE-VOL. |
| CMDRJE | Executing | 2E30 | 0099 | The specified LDEV is a volume of which Data Direct Mapping attribute is enabled. |
| Get Command Status | Async | 2E30 | 0206 | The operation cannot be performed because the specified LDEV is a deduplication system data volume. |
| CMDRJE | Executing | 2E31 | 001B | The page of DP-VOL cannot be discarded because the LU path to the host group whose host mode option 97 is enabled is defined to the specified LDEV. |
| CMDRJE | Executing | 2EBE | 9E01 | The specified parameter is invalid. |
| CMDRJE | Executing | 2EE8 | 00E7 | An internal error occurred. Call customer support. |
| CMDRJE Get Command Status | Executing Async | 2EE8 | FEEC | An internal error occurred. Call customer support. |
| CMDRJE | Executing | 2EF3 | 9F02 | The specified operation cannot be performed because it is not supported. |

## SSB codes returned by raidcom modify ldev -status enable_fullallocation/disable_fullallocation

| raidcom modify ldev -status enable_fullallocation/disable_fullallocation | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is out of settable range. |
| CMDRJE | Executing | 2E00 | 002F | The specified value of the Full Allocation is invalid. |

| raidcom modify ldev -status enable_fullallocation/disable_fullallocation | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 0030 | Full Allocation cannot be specified to the specified LDEV because the emulation type is not supported. |
| CMDRJE | Executing | 2E10 | 0065 | The operation failed because the specified LDEV is a DP-VOL that belongs to the pool of which accelerated compression is enabled. |
| CMDRJE | Executing | 2E10 | 600B | The associated pool is blocked. |
| CMDRJE | Executing | 2E10 | 600D | The operation cannot be performed because a pool volume is being deleted. |
| CMDRJE | Executing | 2E10 | 601B | The free space in the specified pool is insufficient. |
| CMDRJE | Executing | 2E10 | 8000 | The operation cannot be performed because Storage Navigator or Device Manager - Storage Navigator is in progress, another application is in progress on the SVP, or the configuration is being changed. Wait a while, and then retry the operation. |
| CMDRJE | Executing | 2E11 | 001B | The specified LDEV is blocked. |
| CMDRJE | Executing | 2E20 | 0000 | LDEV is not installed. |
| CMDRJE | Executing | 2E30 | 000B | The specified LDEV is not DP-VOL. |
| CMDRJE | Executing | 2E30 | 0099 | The specified LDEV is a volume of which Data Direct Mapping attribute is enabled. |
| Get Command Status | Async | 2E30 | 0206 | The operation cannot be performed because the specified LDEV is a deduplication system data volume. |
| Get Command Status | Async | 2E30 | 0209 | The operation cannot be performed because the specified LDEV is a volume for which the capacity saving setting is enabled. |
| CMDRJE | Executing | 2EE8 | 00EE | The command cannot be accepted because the DKC is busy. After a while, execute the same command. |
| CMDRJE | Executing | 2EE8 | FEEC | An internal error occurred. Contact customer support. |

| raidcom modify ldev -status enable_fullallocation/disable_fullallocation | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2EF3 | 9F02 | The specified operation cannot be performed because it is not supported. |

## SSB codes returned by raidcom modify ldev -quorum_enable

| raidcom modify ldev -quorum_enable | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is out of settable range. |
| CMDRJE Get Command Status | Executing / Async | 2E00 | 8000 | The device type is invalid. |
| CMDRJE | Executing | 2E00 | 8001 | The serial number is invalid. |
| CMDRJE | Executing | 2E00 | A001 | The quorum disk ID is out of settable range. |
| Get Command Status | Async | 2E10 | 0004 | The specified LDEV is used for a Thin Image pair or a Hitachi Copy-on-Write Snapshot pair. |
| Get Command Status | Async | 2E10 | 0005 | The specified LDEV is used for Volume Migration. |
| Get Command Status | Async | 2E10 | 0057 | The specified LDEV cannot be configured because the LDEV is a virtual volume. |
| Get Command Status | Async | 2E10 | 0201 | The operation failed because the T10 PI attribute of the specified LDEV is enabled. |
| Get Command Status | Async | 2E10 | 0202 | The specified volume belongs to the resource group of NAS_Platform_System_RSG. |
| Get Command Status | Async | 2E10 | A001 | The specified quorum disk ID is being used. |
| Get Command Status | Async | 2E10 | A003 | The specified quorum disk is in processing. |
| Get Command Status | Async | 2E10 | A005 | The specified quorum disk is used as the quorum disk of the different device. |

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| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| Get Command Status | Async | 2E10 | A006 | The specified LDEV is used as the quorum disk. |
| Get Command Status | Async | 2E10 | A007 | The operation failed because the quorum disk was inaccessible. |
| Get Command Status | Async | 2E11 | 001B | The specified LDEV is blocked. |
| CMDRJE | Executing | 2E11 | 0053 | The specified LDEV is used for other operation. |
| Get Command Status | Async | 2E11 | 410B | The external volume is inaccessible. |
| Get Command Status | Async | 2E11 | 410C | An unformatted external volume is used. Format the external volume, then retry the operation. |
| Get Command Status | Async | 2E13 | 0001 | The specified LDEV is not the first LDEV that belongs to the external volume group. |
| CMDRJE | Executing | 2E20 | 0000 | LDEV is not installed. |
| Get Command Status | Async | 2E20 | 000E | The specified LDEV is not an external volume. |
| Get Command Status | Async | 2E21 | 810A | A shared memory is not installed. |
| Get Command Status | Async | 2E30 | 0005 | Cache Residency Manager is set to the specified volume. |
| Get Command Status | Async | 2E30 | 0007 | A path is defined to the specified volume. |
| Get Command Status | Async | 2E30 | 000E | The specified LDEV is used as a pool volume. |
| Get Command Status | Async | 2E30 | 000F | The specified LDEV is used as a journal volume. |
| Get Command Status | Async | 2E30 | 0010 | The specified volume is used as a command device. |
| Get Command Status | Async | 2E30 | 004E | Data Retention Utility is set to the specified volume. |

**raidcom modify ldev -quorum_enable**

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | **SSB1** | **SSB2** | |
| **raidcom modify ldev -quorum_enable** | | | | |
| Get Command Status | Async | 2E30 | 0074 | The specified LDEV cannot be operated because it is an external volume mapped for online data migration. |
| Get Command Status | Async | 2E30 | 008E | The emulation type of the specified LDEV is not OPEN-V. |
| Get Command Status | Async | 2E30 | 0092 | The specified LDEV cannot be used because the size of LDEV is less than the minimum capacity of the quorum disk. |
| Get Command Status | Async | 2E30 | 0099 | The specified LDEV is a volume of which Data Direct Mapping attribute is enabled. |
| Get Command Status | Async | 2E30 | 020E | The operation cannot be performed because the specified LDEV is registered as namespace in the NVM subsystem. This SSB error code is displayed only for VSP 5000 series and VSP E1090. |
| CMDRJE Get Command Status | Executing/ Async | 2EE8 | FEEC | An internal error occurred. Contact customer support. |

## SSB codes returned by raidcom modify ldev -quorum_disable

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | **SSB1** | **SSB2** | |
| **raidcom modify ldev -quorum_disable** | | | | |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is out of settable range. |
| Get Command Status | Async | 2E10 | A002 | The specified LDEV is not a quorum disk. |
| Get Command Status | Async | 2E10 | A003 | The specified quorum disk is in processing. |
| Get Command Status | Async | 2E10 | A004 | The pair using the specified quorum disk exists. |

| | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| **Error message** | | **SSB1** | **SSB2** | |
| | **raidcom modify ldev -quorum_disable** | | | |

| Error message | Executing/ Async | SSB1 | SSB2 | Description |
|---|---|---|---|---|
| Get Command Status | Async | 2E10 | A007 | The setting of the quorum disk was released but the operation failed.<br><br>If you display the ldev information using raidcom get ldev command, "QRD" (that means the disk is the quorum disk) is not displayed on VOL_ATTR because the quorum disk setting was released. But the management information possibly remains in the external volume.<br><br>If you define again an external volume in which the management information remains as a quorum disk, an error may occur. When you reuse an external volume which was used as a quorum disk after removing it, format the external volume. |
| CMDRJE | Executing | 2E11 | 0053 | The specified LDEV is being used for other operation. |
| CMDRJE | Executing | 2E20 | 0000 | LDEV is not installed. |
| Get Command Status | Async | 2E21 | 810A | A shared memory is not installed. |
| CMDRJE<br>Get Command Status | Executing | 2EE8 | FEEC | An internal error occurred.<br><br>Contact customer support. |

## SSB codes returned by raidcom modify ldev -pool (VSP 5000 series and VSP E1090 only)

| | | Error code | | |
|---|---|---|---|---|
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| | **raidcom modify ldev -pool** | | | |
| CMDRJE | Executing | 2E00 | 6000 | The pool ID is out of the effective range. |
| Get Command Status | Async | 2E10 | 8B01 | The ACLF is unavailable.* |
| CMDRJE | Executing/ Async | 2E20 | 6000 | The pool ID is not implemented. |

| raidcom modify ldev -pool | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | | | | |
| CMDRJE | Executing | 2EBE | 9E01 | The specified parameter is incorrect. |
| CMDRJE Get Command Status | Executing/ Async | 2EE7 | FEEC | An internal error occurred. Contact customer support. |
| *ACLF: Module that implements compression accelerator. | | | | |

## SSB codes returned by raidcom add lun

| raidcom add lun | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2EF6 | 0014 | An invalid LDEV exists in the specified LDEVs. |
| CMDRJE Get Command Status | Executing/ Async | B958 | 0101 | The LU path cannot be set because it is reserved for Volume Migration. |
| CMDRJE Get Command Status | Executing/ Async | B958 | 010C | The LU path cannot be set because the volume is a deduplication system data volume. |
| CMDRJE | Executing | B958 | 014A | When an ISCSI is used, the LU path cannot be set in the LDEV other than the OPEN volume. |
| CMDRJE | Executing | B958 | 0150 | The attribute of the specified port is Initiator or External. |
| CMDRJE | Executing | B958 | 0155 | The other than HMDE volume or OPEN volume is included in the specified LDEV. |
| CMDRJE Get Command Status | Executing/ Async | B958 | 015A | An LU path has already been defined in the target LDEV. |
| CMDRJE | Executing | B958 | 015D | An invalid LDEV exists in the specified LDEVs. |

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| raidcom add lun | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 015E | It exceeds the maximum LUN under the port. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 0178 | LDEV is set as a pool volume. |
| CMDRJE | Executing | B958 | 017B | The LU path cannot be set because the LDEV is a system disk. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 017C | The LU path cannot be set because the LDEV is a journal volume. |
| CMDRJE | Executing | B958 | 017D | The LU path cannot be set because the access attribute of LDEV Data Retention Utility is reserved. |
| CMDRJE | Executing | B958 | 017E | The LU path cannot be set because the access attribute of LDEV Data Retention Utility is different from "Read/Write". |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 018E | The LU path cannot be set because the LDEV has an ALU attribute. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 019F | The specified host group is used for Storage Advisor Embedded, but the specified LDEV is not supported by Storage Advisor Embedded. |
| CMDRJE | Executing | B958 | 01A3 | When the host mode is Universal Volume Manager(0x4C), the LU path cannot be set in other than the external volume. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 01C1 | The LU path cannot be defined because the volume is used as a quorum disk. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 01DC | The number of the host groups which can be set by ALUA exceeded the maximum. |

| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 01DE | The operation cannot be performed because the specified LDEV is the external volume having the Data Direct Mapping attribute. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 01DF | The LU path cannot be defined because the LDEV belongs to the parity group of which accelerated compression is enabled. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 01F2 | The host group and the LDEV that configure the LU path do not exist in the same virtual storage machine. |
| CMDRJE | Executing | B958 | 01F3 | The LU path cannot be defined because the virtual LDEV information of the specified LDEV is not defined yet. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 01F4 | The path of the external volume which has an NDM attribute cannot be defined. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 01F9 | The LU path cannot be added because the setting of the T10 PI attribute on the specified port or on the specified LDEV is not correct.<br><br>Enable the T10 PI attribute on the specified port. Otherwise, disable the T10 PI attribute on the specified LDEV. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 01FA | The operation failed because the T10 PI attribute of the specified LDEV is enabled. |
| CMDRJE | Executing | B958 | 0601 | The command device cannot be set because it is reserved for Volume Migration. |
| CMDRJE | Executing | B958 | 0606 | The command device cannot be set because it is a ShadowImage pair or it is reserved. |
| CMDRJE | Executing | B958 | 060F | The specified LDEV is not installed. |
| CMDRJE | Executing | B958 | 0639 | The command device cannot be operated because it is used at the local CCI. |
| CMDRJE | Executing | B958 | 064A | A command device cannot be set because LDEV is other than the OPEN volume. |

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| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | B958 | 065D | The specified LDEV is not installed. |
| CMDRJE | Executing | B958 | 0679 | A command device cannot be set because LDEV is the virtual volume of Thin Image or Copy-on-Write Snapshot. |
| CMDRJE | Executing | B958 | 06C0 | The specified LDEV is being used as a volume of aGAD pair. |
| CMDRJE | Executing | B958 | 06C1 | The specified LDEV is used as a quorum disk. |
| CMDRJE | Executing | B958 | 06C2 | The specified LDEV is used for a TrueCopy pair or a Universal Replicator pair. |
| CMDRJE Get Command Status | Executing/ Async | B958 | 090F | An internal error occurred. Call customer support. |
| CMDRJE Get Command Status | Executing/ Async | B958 | 091F | The specified host group is used for Storage Advisor Embedded, but the specified LDEV is not supported by Storage Advisor Embedded. |
| CMDRJE | Executing | B958 | 0927 | The command cannot be operated because the virtual LDEV is not defined yet. |
| CMDRJE | Executing | B958 | 0944 | The value of LUN exceeds the maximum. |
| CMDRJE | Executing | B958 | 0945 | The value of LDEV exceeds the maximum. |
| CMDRJE | Executing | B958 | 0947 | The LU creation failed due to one of the following reasons:<br><br>▪ Another LDEV is already mapped to the specified LUN.<br><br>▪ Multiple `raidcom add lun` commands were executed at the same time for the same host group or iSCSI target.<br><br>If an LUN is specified, specify another LUN and retry the command. If no LUN is specified, execute the command again. |
| CMDRJE | Executing | B958 | 0956 | The value of Host group ID exceeds the maximum. |
| CMDRJE | Executing/ Async | B958 | 0957 | The program product is not installed. |

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| raidcom add lun | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | | | | |
| CMDRJE Get Command Status | Executing/ Async | B958 | 0959 | The specified host group is not installed. |
| CMDRJE Get Command Status | Executing/ Async | B958 | 095D | An invalid LDEV exists in the specified LDEVs. |
| CMDRJE | Executing | B958 | 098C | The multiple LDEV cannot be specified. |
| CMDRJE | Executing | B958 | 098D | When the host mode option 60 is set, the LU path of LUN0 cannot be set or released. |
| CMDRJE | Executing | B958 | 0994 | An invalid LDEV exists in the specified LDEVs. |
| CMDRJE | Executing | B958 | 0996 | The LU path cannot be added because the virtual LDEV ID of the specified volume was deleted. |
| CMDRJE | Executing | B958 | 099C | The number of paths exceeds the maximum. |
| CMDRJE | Executing/ Async | B958 | 099D | Only one path is set for NAS Platform (User LU). |
| CMDRJE | Executing/ Async | B958 | 099E | The same port number is specified more than once. |
| CMDRJE Get Command Status | Executing/ Async | B958 | 099F | The specified port is not mounted. |
| CMDRJE Get Command Status | Executing/ Async | B958 | 09F8 | The LU path cannot be set because the specified LDEV is being deleted. |
| Get Command Status | Async | B958 | 1307 | The operation cannot be performed because there is no free common LU path number in the specified host group. |
| CMDRJE Get Command Status | Executing/ Async | B958 | 0101 | The LU path cannot be set because it is reserved for Volume Migration. |

| raidcom add lun | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 010C | The LU path cannot be set because the volume is a deduplication system data volume. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 015A | An LU path has already been defined in the target LDEV. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 015E | It exceeds the maximum LUN under the port. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 0178 | LDEV is set as a pool volume. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 017C | The LU path cannot be set because the LDEV is a journal volume. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 018E | The LU path cannot be set because the LDEV has an ALU attribute. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 01C1 | The LU path cannot be defined because the volume is used as a quorum disk. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 01DC | The number of the host groups which can be set by ALUA exceeded the maximum. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 01DE | The operation cannot be performed because the specified LDEV is the external volume having the Data Direct Mapping attribute. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 01DF | The LU path cannot be defined because the LDEV belongs to the parity group of which accelerated compression is enabled. |

| raidcom add lun | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 01F2 | The host group and the LDEV that configure the LU path do not exist in the same virtual storage machine. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 01F4 | The path of the external volume which has an NDM attribute cannot be defined. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 01F9 | The LU path cannot be added because the setting of the T10 PI attribute on the specified port or on the specified LDEV is not correct.<br><br>Enable the T10 PI attribute on the specified port. Otherwise, disable the T10 PI attribute on the specified LDEV. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 01FA | The operation failed because the T10 PI attribute of the specified LDEV is enabled. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 090F | An internal error occurred. Contact customer support. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 0957 | The program product is not installed. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 0959 | The specified host group is not installed. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 095D | An invalid LDEV exists in the specified LDEVs. |
| CMDRJE | Executing | B958 | 099E | The same port number is specified more than once. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 099F | The specified port is not mounted. |

| raidcom add lun | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 09F8 | The LU path cannot be set because the specified LDEV is being deleted. |
| CMDRJE | Executing | B958 | 0C1B | The LU path cannot be added because the operation mode of the specified port is NVMe mode. This SSB error code is displayed only for VSP 5000 series and VSP E1090. |
| CMDRJE | Executing | B958 | 0C1F | The operation cannot be performed because the operation mode of the specified port is being changed. This SSB error code is displayed only for VSP 5000 series and VSP E1090. |
| CMDRJE | Executing | B958 | 0C21 | The specified LDEV is registered as namespace in the NVM subsystem. This SSB error code is displayed only for VSP 5000 series and VSP E1090. |
| CMDRJE | Executing | B958 | 0C22 | The operation cannot be performed because the specified LDEV is being registered as namespace in the NVM subsystem. This SSB error code is displayed only for VSP 5000 series and VSP E1090. |
| CMDRJE<br><br>Get Command Status | Async | B958 | 1307 | The operation cannot be performed because there is no free LU path number which can be shared in the specified host group. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | B958 | 2116 | The operation cannot be performed because the specified port is used by Storage Advisor Embedded. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS Platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the specified port is for NAS Platform (User LU). |
| CMDRJE | Executing | B980 | B903 | The command was rejected because the selected resource belongs to NAS_Platform_System_RSG. |
| CMDRJE | Executing | B980 | B905 | The LU path cannot be set in Command Device because Port is NAS Platform (User LU). |

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## SSB codes returned by raidcom delete lun

| raidcom delete lun | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | B958 | 0155 | The other than multiplatform volume or OPEN volume is included in the specified LDEV. |
| CMDRJE | Executing | B958 | 015D | An used LDEV exists in the specified LDEV. |
| CMDRJE | Executing | B958 | 0202 | It cannot be deleted because it is the last path of a TrueCopy or GAD pair. |
| CMDRJE | Executing | B958 | 0203 | It cannot be deleted because it is the last path of ShadowImage. |
| CMDRJE | Executing | B958 | 020A | It cannot be deleted because it is the last path of Thin Image or Copy-on-Write Snapshot. |
| CMDRJE | Executing | B958 | 020B | It cannot be deleted because it is the last path of Universal Replicator. |
| CMDRJE | Executing | B958 | 020F | The specified LDEV is not installed. |
| CMDRJE | Executing | B958 | 0219 | The LU path cannot be deleted because the specified volumes have the ALU attribute with the SLU attribute volumes bound. |
| CMDRJE | Executing | B958 | 0233 | It cannot be deleted because the operation object LU is executing host I/O. |
| CMDRJE | Executing | B958 | 0234 | It cannot be deleted because the operation object LU is reserved. |
| CMDRJE | Executing | B958 | 0239 | The command device is being used in the local Command Control Interface. |
| CMDRJE | Executing | B958 | 0240 | A command device is being set. |
| CMDRJE | Executing | B958 | 028E | It cannot be deleted because of the ALU path definition. |
| CMDRJE | Executing | B958 | 0927 | The command cannot be operated because the virtual LDEV is not defined yet. |
| CMDRJE | Executing | B958 | 0944 | The value of LUN exceeds the maximum. |
| CMDRJE | Executing | B958 | 0945 | The value of LDEV exceeds the maximum. |
| CMDRJE | Executing | B958 | 0956 | The value of host group ID exceeds the maximum. |

| raidcom delete lun | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B958 | 0957 | The program product is not installed. |
| CMDRJE | Executing | B958 | 0959 | Host group is not installed. |
| CMDRJE | Executing | B958 | 095D | An invalid LDEV exists in the specified LDEVs. |
| CMDRJE | Executing | B958 | 098C | Multiple LDEVs cannot be specified. |
| CMDRJE | Executing | B958 | 098D | When the host mode option 60 is set, the LU path of LUN0 cannot be set or released. |
| CMDRJE | Executing | B958 | 0996 | The LU path cannot be deleted because the virtual LDEV ID of the specified volume was deleted. |
| CMDRJE | Executing | B958 | 099F | The specified port is not mounted. |
| CMDRJE | Executing | B958 | 09A1 | Another LDEV is already mapped in the specified LUN. |
| CMDRJE | Executing | B958 | 0C1C | The LU path cannot be deleted because the operation mode of the specified port is NVMe mode. This SSB error code is displayed only for VSP 5000 series and VSP E1090. |
| CMDRJE | Executing | B958 | 0C1F | The operation cannot be performed because the operation mode of the specified port is being changed. This SSB error code is displayed only for VSP 5000 series and VSP E1090. |
| CMDRJE | Executing | B958 | 0C21 | The specified LDEV is registered as namespace in the NVM subsystem. This SSB error code is displayed only for VSP 5000 series and VSP E1090. |
| CMDRJE / Get Command Status | Executing/ Async | B958 | 2116 | The operation cannot be performed because the specified port is used by Ops Center Administrator Embedded. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS Platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the specified port is for NAS Platform (User LU). |
| CMDRJE | Executing | B980 | B903 | The command was rejected because the selected resource belongs to NAS_Platform_System_RSG. |

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## SSB codes returned by raidcom modify lun

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E02 | 1000 | The value of host group ID exceeds the maximum. |
| CMDRJE | Executing | 2E02 | 1102 | The value of LUN exceeds the maximum. |
| CMDRJE | Executing | 2E02 | 8404 | The value of the specified port is invalid. |
| CMDRJE | Executing | 2E11 | 2206 | You do not have the operation authority to operate the target resource group. Specify the resource group that is allocated to the user group as the operation target or set the operation authority to the user group in order to operate the target resource group. |
| CMDRJE | Executing | 2E20 | 1003 | The specified host group is not installed. |
| CMDRJE | Executing | 2E20 | 1102 | The LU path definition does not exist in the host group. |
| CMDRJE | Executing | 2E20 | 1103 | The path is not defined for the specified LUN. |
| Get Command Status | Async | 2EA9 | FEEC | An internal error occurred. Call customer support. |
| CMDRJE | Executing | B958 | 5021 | The PCB type of the port to which the host group belongs is out of operation target. |
| CMDRJE | Executing | B958 | 5046 | The LU path definition does not exist in the host group. |
| CMDRJE | Executing | B958 | 5056 | The value of host group ID exceeds the maximum. |
| CMDRJE | Executing | B958 | 5059 | Host group is not installed. |
| CMDRJE | Executing | B958 | 50DD | The specified ALUA path priority is invalid. |
| CMDRJE | Executing | B958 | 50F7 | Unavailable to operate because another application is in progress on Storage Navigator, Device Manager - Storage Navigator, or SVP. |
| CMDRJE | Executing | B958 | 50F8 | The system is locked by another user (or another session). After a while, execute the same command. |

| raidcom modify lun | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| | | | | If the error occurs repeatedly, contact customer support. |

## SSB codes returned by raidcom discover lun

| raidcom discover lun | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 9B01 | The specified iSCSI name is invalid. |
| CMDRJE | Executing | 2E02 | 8403 | The specified virtual port number is out of range. |
| CMDRJE | Executing | 2E10 | 8404 | The iSCSI virtual port mode for the specified port is disabled. |
| CMDRJE | Executing | 2E20 | 8401 | The specified virtual port is not defined. |

## SSB codes returned by raidcom modify pool

| raidcom modify pool | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is out of the valid range. |
| CMDRJE | Executing | 2E00 | 0003 | The SSID is out of the valid range. |
| Get Command Status | Async | 2E00 | 0010 | The specified LDEV number is already used. |
| Get Command Status | Async | 2E00 | 0013 | There are not enough cache management devices. |
| Get Command Status | Async | 2E00 | 0016 | The command cannot be executed by receiving multiple operations for the same pool ID. |
| CMDRJE | Executing | 2E00 | 002F | The specified attribute is invalid. |

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| raidcom modify pool | | | | |
|---|---|---|---|---|
| | Executing/ Async | Error code | | |
| Error message | | SSB1 | SSB2 | Description |
| CMDRJE | Executing | 2E00 | 6000 | The value of pool ID is invalid. |
| CMDRJE | Executing | 2E00 | 6001 | The specified pool is for Thin Image or Copy-on-Write Snapshot. |
| CMDRJE | Executing | 2E00 | 6002 | The specified subscription limit is not in the effective range. |
| CMDRJE | Executing | 2E00 | 6003 | The specified Tier Range value is invalid. |
| CMDRJE | Executing | 2E00 | 6004 | Relations between the specified lower limit of Tier Range and the Delta value is invalid. |
| CMDRJE | Executing | 2E00 | 6006 | The specified Tier capacity threshold value is out of range. |
| CMDRJE | Executing | 2E00 | 6009 | The threshold of the specified High water mark is out of range. |
| CMDRJE | Executing | 2E00 | 600A | The operation cannot be performed because the specified threshold of Warning is larger than the threshold of the specified High water mark. |
| CMDRJE | Executing | 2E00 | 6100 | The specified tier number is out of range. |
| CMDRJE | Executing | 2E02 | 0202 | The threshold value cannot be changed to the specified value, because the specified pool is used for Data Direct Mapping. |
| CMDRJE Get Command Status | Executing/ Async | 2E10 | 001F | The operation cannot be performed because the total capacity of virtual volumes for Dynamic Tiering or active flash in the system exceeds the maximum. |
| CMDRJE | Executing | 2E10 | 600B | The specified pool is in the state of blocked. |
| Get Command Status | Async | 2E10 | 600C | The setting of the threshold value is less than the pool usage value. |
| CMDRJE | Executing | 2E10 | 600D | The operation cannot be performed because it is in the state of shrinking. |
| CMDRJE | Executing | 2E10 | 6011 | The operation cannot be performed because it is being discarded pages. |
| Get Command Status | Async | 2E10 | 6012 | Pool cannot be restored because the usage rate of pool is 100%. |

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| raidcom modify pool | | | | |
|---|---|---|---|---|
| | Executing/ Async | Error code | | |
| Error message | | SSB1 | SSB2 | Description |
| Get Command Status | Async | 2E10 | 6014 | The operation cannot be performed because the specified pool status is incorrect. |
| CMDRJE | Executing | 2E10 | 6015 | The operation cannot be performed because the Tier is being deterred reallocation. |
| CMDRJE | Executing | 2E10 | 6017 | The operation cannot be performed because collecting the performance monitoring data is being prepared. |
| CMDRJE | Executing | 2E10 | 601D | The specified pool cannot be changed to the pool for Data Direct Mapping, because the threshold value of High water mark is fixed. |
| CMDRJE Get Command Status | Executing/ Async | 2E10 | 601F | The deduplication function is set to be enabled for the specified pool. |
| Get Command Status | Async | 2E10 | 6020 | The deduplication function cannot be used in the specified pool. |
| Get Command Status | Async | 2E10 | 6030 | This command cannot be operated due to one of the following reasons:<br><br>▪ The pool is not being shrunk.<br><br>▪ The time period for canceling pool shrinking has passed. |
| CMDRJE | Executing | 2E10 | 6039 | The operation cannot be performed because the specified pool contains LDEVs belonging to a parity group with accelerated compression enabled. |
| CMDRJE Get Command Status | Executing/ Async | 2E10 | 8000 | The operation cannot be performed because Storage Navigator or Device Manager - Storage Navigator is in progress, another application is in progress on the SVP, or the configuration is being changed. Wait a while, and then retry the operation. |
| CMDRJE Get Command Status | Executing/ Async | 2E11 | 0205 | The operation cannot be performed because the total capacity of provisioning virtual volumes defined in the specified pool exceeds the subscription limit of the pool. |

| raidcom modify pool | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E11 | 6003 | The pool is not in the status where the pool option can be set. |
| Get Command Status | Async | 2E11 | 8003 | The operation cannot be performed because power-off is in progress. |
| Get Command Status | Async | 2E11 | 8004 | The operation cannot be performed because of the internal processing. |
| CMDRJE | Executing | 2E11 | 800F | The operation cannot be performed because the unsupported microcode version exists in the system. |
| Get Command Status | Async | 2E11 | 8010 | The storage system is in the internal processing or the configuration change processes are conflicting. |
| Get Command Status | Async | 2E11 | 8105 | The cache segment size is incorrect. |
| Get Command Status | Async | 2E11 | 8108 | The operation cannot be performed because there is a blocked part in the storage system. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE | Executing | 2E13 | 6000 | The Dynamic Tiering or active flash operations cannot be performed to the pool because the specified pool contains RAID 1 pool VOLs. |
| CMDRJE | Executing | 2E13 | 6002 | The specified pool for Dynamic Provisioning cannot be changed to a pool for Dynamic Tiering because the pool is related to TSE-VOL. |

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| raidcom modify pool | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E13 | 6005 | The setting cannot be performed because the microcode does not support active flash. |
| CMDRJE | Executing | 2E13 | 6007 | The operation cannot be performed because the specified pool is already linked with the virtual volume of Dynamic Provisioning. |
| CMDRJE | Executing | 2E13 | 6008 | The operation cannot be performed because the pool volume having the Data Direct Mapping attribute is included in the specified pool. |
| Get Command Status | Async | 2E13 | 600A | The operation cannot be performed because the specified pool is linked with an LDEV for which the deduplication function is enabled. |
| Get Command Status | Async | 2E13 | 600B | The operation cannot be performed because the specified pool is linked with an LDEV that has deduplication data. |
| Get Command Status | Async | 2E13 | 600C | The operation cannot be performed because the specified pool is linked with a volume for which capacity saving function is enabled. |
| Get Command Status | Async | 2E13 | 600D | The specified pool includes a pool volume defined in a distributed parity group. |
| Get Command Status | Async | 2E13 | 600E | The parity group configuring the specified pool includes a volume that is not defined as a pool volume in the target pool. |
| Get Command Status | Async | 2E13 | 600F | The specified pool includes a drive type that does not support this operation. |
| Get Command Status | Async | 2E13 | 6013 | The operation cannot be performed because a volume with capacity saving enabled is associated with the specified pool. |
| Get Command Status | Async | 2E13 | 6014 | The operation cannot be performed because a volume with capacity saving enabled is associated with the specified pool. |
| Get Command Status | Async | 2E13 | 8701 | The connected drive box is not supported. |
| Get Command Status | Async | 2E13 | 8702 | The drive box is cascaded. |

| raidcom modify pool | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E20 | 6000 | Pool ID is not installed. |
| Get Command Status | Async | 2E20 | 6000 | Pool ID is not installed. |
| CMDRJE | Executing | 2E20 | 6101 | The specified Tier number is invalid. |
| Get Command Status | Async | 2E20 | 8300 | The specified MP blade or MP unit is not installed. |
| CMDRJE | Executing | 2E21 | 8101 | The shared memory for Dynamic Provisioning is not installed. |
| CMDRJE | Executing | 2E21 | 8102 | The shared memory for Dynamic Tiering or active flash is not installed. |
| Get Command Status | Async | 2E21 | 8103 | The operation cannot be performed because of the insufficient capacity of shared memory. |
| Get Command Status | Async | 2E21 | 810A | The shared memory is not installed. |
| Get Command Status | Async | 2E21 | 9000 | The program product is not installed. |
| CMDRJE | Executing | 2E21 | 9014 | Data Retention Utility program product is not installed. |
| CMDRJE Get Command Status | Executing/ Async | 2E22 | 0001 | The specified LDEV is already defined. |
| Get Command Status | Async | 2E23 | 0001 | The number exceeds the maximum number of LDEVs that can be created in the current system configuration. |
| CMDRJE Get Command Status | Executing/ Async | 2E23 | 0008 | The number of specified deduplication system data volumes exceeds the maximum limit. |
| CMDRJE | Executing | 2E23 | 7201 | The specified SSID number exceeds the maximum limit. |
| Get Command Status | Async | 2E30 | 0020 | The specified SSID is already used in the another CU. |

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| raidcom modify pool | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E30 | 0021 | The SSID is already allocated to the CU. |
| Get Command Status | Async | 2E30 | 0025 | The specified volume is used as an alias device in Compatible PAV. |
| Get Command Status | Async | 2E30 | 0026 | An LDEV of another emulation type is allocated in the range where the number is divided into each 32 LDEVs. |
| CMDRJE | Executing | 2E30 | 006E | The Dynamic Tiering or active flash operation cannot be performed to the pool because the specified pool contains the external volumes whose cache mode is invalid. |
| CMDRJE  Get Command Status | Executing/ Async | 2E30 | 0071 | A pool volume cannot be operated because the LDEV of the resource group different from the resource group of the pool volume belonging to the specified pool is specified. |
| Get Command Status | Async | 2E30 | 009A | The page reservation cannot be set on the specified LDEV with the specified operation. |
| Get Command Status | Async | 2E30 | 4119 | The operation cannot be performed because the number of V-VOLs that can be created in the system exceeds the maximum number. |
| CMDRJE | Executing | 2E30 | 6000 | The threshold value 1 is out of range. |
| CMDRJE | Executing | 2E30 | 6003 | The specified pool is for Thin Image or Copy-on-Write Snapshot. |
| CMDRJE | Executing | 2E30 | 6005 | The specified pool must be assigned two user-defined thresholds to. |
| CMDRJE | Executing | 2E30 | 600D | On the specified pool, Tier Reallocation is not enabled. |
| CMDRJE | Executing | 2E30 | 600F | The specified operation cannot be performed because the specified pool is not for Dynamic Provisioning. |
| CMDRJE | Executing | 2E30 | 6010 | Active flash cannot be enabled because an SSD medium does not exist on Tier 1 of Dynamic Provisioning. |

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| raidcom modify pool | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E30 | 6011 | Active flash cannot be enabled or disabled because the pool is for Dynamic Provisioning. |
| CMDRJE | Executing | 2E30 | 6012 | The operation of Dynamic Tiering cannot be performed because the specified pool is used for Data Direct Mapping. |
| Get Command Status | Async | 2E30 | 6014 | (VSP G1x00 and VSP F1500) The operation cannot be performed because the specified pool is for active flash.<br><br>(VSP G200, G400, G600, G800 and VSP F400, F600, F800) The operation cannot be performed because the specified pool is for Dynamic Tiering. |
| Get Command Status | Async | 2E31 | 6003 | The operation cannot be performed because the specified pool is for Dynamic Provisioning for Mainframe. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E31 | 6003 | The operation cannot be performed because the specified pool is for Dynamic Provisioning for Mainframe, Dynamic Tiering, and active flash for mainframe. |
| CMDRJE | Executing | 2E31 | 6004 | The specified pool includes the different RAID levels of volumes although the pool cannot include those volumes together. |
| CMDRJE | Executing | 2E31 | 6005 | The specified pool includes external volumes although the pool cannot include those volumes together. |
| CMDRJE | Executing | 2E31 | 6006 | The specified pool cannot be used for a Dynamic Tiering or active flash. |
| Get Command Status | Async | 2E31 | 600D | The pool cannot be changed to the pool with the Data Direct Mapping attribute because the specified pool includes an LDEV composed of SCM drives. |

| raidcom modify pool | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E31 | 600E | The operation cannot be performed due to the following reasons:<br><br>▪ The combination of drive types of the drives that compose the hierarchy is incorrect.<br><br>For details about the supported combinations, see the Provisioning Guidefor your storage system.<br><br>▪ The pool cannot be changed to the pool for active flash because the specified pool includes an LDEV composed of SCM drives. |
| CMDRJE | Executing | 2E31 | 9000 | The capacity that can be used by the installed program products exceeds the maximum. |
| CMDRJE | Executing | 2E31 | 9001 | The program product is not installed. |
| CMDRJE | Executing | 2E3F | 8000 | The specified operation is not supported in the current microcode version. |
| CMDRJE | Executing | 2EB1 | A301 | The specified password is not correct. |
| CMDRJE | Executing | 2EE7 | 0001 | Pool ID is not installed. |
| CMDRJE | Executing | 2EE7 | 0011 | An internal error occurred at the pool operation.<br><br>Call customer support. |
| CMDRJE | Executing | 2EE7 | 00EE | The command cannot be accepted. After a while, execute the same command. |
| CMDRJE | Executing | 2EE7 | 00F0 | The specified command cannot be accepted because the command is not supported. |
| CMDRJE | Executing | 2EE7 | FEEC | An internal error occurred in the pool operation.<br><br>Call customer support. |
| CMDRJE | Executing | 2EF3 | 9F02 | The specified operation cannot be performed because it is not supported. |

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## SSB codes returned by raidcom rename pool

| Error message | Executing/ Async | Error code SSB1 | Error code SSB2 | Description |
|---|---|---|---|---|
| **raidcom rename pool** | | | | |
| CMDRJE | Executing | 2E00 | 6000 | The value of pool ID is out of range. |
| CMDRJE | Executing | 2E10 | 6016 | The pool name cannot be changed because the pool configuration is being changed. |
| CMDRJE | Executing | 2E20 | 6000 | Invalid pool ID. |
| CMDRJE | Executing | 2E31 | 6001 | The pool name is duplicated with another pool. |
| CMDRJE | Executing | 2EE7 | FEEC | An internal error occurred. Call customer support. |

## SSB codes returned by raidcom delete pool

| Error message | Executing/ Async | Error code SSB1 | Error code SSB2 | Description |
|---|---|---|---|---|
| **raidcom delete pool** | | | | |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is out of settable range. |
| CMDRJE | Executing | 2E00 | 6000 | The value of pool ID is out of range. |
| Get Command Status | Async | 2E00 | 600B | All pool volumes associated to a pool cannot be deleted. |
| Get Command Status | Async | 2E10 | 0009 | The specified LDEV is in the state of blocked. |
| CMDRJE | Executing | 2E10 | 600D | This pool cannot be deleted because a pool volume is being deleted. |
| Get Command Status | Async | 2E10 | 600E | The operation cannot be performed because the pool usage rate exceeds the threshold value of the pool usage. |
| Get Command Status | Async | 2E10 | 600F | The operation cannot be performed because the current capacity rate exceeds the value of the subscription limit. |
| Get Command Status | Async | 2E10 | 6010 | It cannot be deleted because the pool volume is set in the state of being deterred deleting. |

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| raidcom delete pool | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E10 | 6011 | Deleting operation cannot be performed because it is being discarded pages. |
| Get Command Status | Async | 2E10 | 601F | The deduplication function is set to be enabled for the specified pool. |
| Get Command Status | Async | 2E10 | 8002 | The specified operation is not supported in the current microcode version. |
| Get Command Status | Async | 2E10 | 8500 | The specified operation cannot be performed because the drive copy is in process. |
| Get Command Status | Async | 2E11 | 0001 | The specified operation cannot be performed because the LDEV is being verified. |
| Get Command Status | Async | 2E11 | 001E | The operation cannot be performed because the virtual disk space is blocked. |
| Get Command Status | Async | 2E11 | 001F | The operation cannot be performed because a Thin Image pair or a Copy-on-Write Snapshot pair remains or the association with a Dynamic Provisioning virtual volume exists. |
| Get Command Status | Async | 2E11 | 0020 | The operation cannot be performed because a Thin Image pair or a Copy-on-Write Snapshot pair is being deleted or a Dynamic Provisioning virtual volume is being deleted. |
| Get Command Status | Async | 2E11 | 0021 | The operation cannot be performed because a pool volume of a specified pool is being formatted. |
| Get Command Status | Async | 2E11 | 020C | The specified operation cannot be performed because there is an LDEV that is under format, shredding, or quick format. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E11 | 6003 | The pool is not in the status where the pool can be deleted or a pool volume can be deleted. |
| Get Command Status | Async | 2E11 | 8003 | The operation cannot be performed because the power supply is switched off. |
| Get Command Status | Async | 2E11 | 8010 | The storage system is in internal process, or configuration change processes are conflicting. |
| Get Command Status | Async | 2E11 | 8013 | The specified operation cannot be performed because the storage system is in process. |

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| raidcom delete pool | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E11 | 8102 | The specified operation cannot be performed because cache memory is blocked. |
| Get Command Status | Async | 2E11 | 810A | The specified operation cannot be performed because the cache status is abnormal. |
| Get Command Status | Async | 2E11 | 8200 | The specified operation cannot be performed because the MP unit status is being changed. |
| Get Command Status | Async | 2E11 | 8201 | The specified operation cannot be performed because the MP unit is blocked. |
| Get Command Status | Async | 2E11 | 8301 | The specified operation cannot be performed because the DKB status is being changed. |
| Get Command Status | Async | 2E11 | 8302 | The specified operation cannot be performed because the CHB status is being changed. |
| Get Command Status | Async | 2E11 | 8311 | The specified operation cannot be performed because DKB is blocked. |
| Get Command Status | Async | 2E11 | 8312 | The specified operation cannot be performed because CHB is blocked. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E13 | 0002 | The operation cannot be performed because the specified LDEV is linked with the virtual volume having the Data Direct Mapping attribute. |
| Get Command Status | Async | 2E13 | 6006 | The last SSD medium on Tier 1 of active flash cannot be deleted. |

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| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E13 | 6009 | The operation cannot be performed because the pool capacity is insufficient for Data Direct Mapping. |
| Get Command Status | Async | 2E13 | 600E | The pool volume cannot be deleted when the pool is deleted because the parity group in the specified pool has volumes that are not set as pool volumes of the target pool. |
| CMDRJE | Executing | 2E20 | 0003 | The specified LDEV is not registered to the pool. |
| Get Command Status | Async | 2E20 | 0003 | The operation cannot be performed because the pool volume is not of a specified pool. |
| CMDRJE Get Command Status | Executing/ Async | 2E20 | 6000 | Pool ID is not installed. |
| Get Command Status | Async | 2E21 | 8106 | The operation cannot be performed because the shared memory is not initialized. |
| CMDRJE | Executing | 2E23 | 0008 | The number of specified LDEVs is invalid. |
| CMDRJE | Executing | 2E30 | 0052 | The specified LDEV cannot be deleted because it is a top VOL of the pool. |
| CMDRJE | Executing | 2E30 | 6003 | The specified pool is a pool for Thin Image or Copy-on-Write Snapshot. |
| CMDRJE | Executing | 2EE7 | 00EE | The command cannot be accepted. After a while, execute the same command. |
| CMDRJE | Executing | 2EE7 | 00F9 | Pool ID is not installed. |
| CMDRJE | Executing | 2EE7 | FEEC | An internal error occurred. Call customer support. |
| CMDRJE | Executing | 2EF3 | 6002 | The specified parameter is invalid. Check the *Command Control Interface Command Reference*. |
| CMDRJE | Executing | B980 | B903 | The command was rejected because the selected resource belongs to NAS_Platform_System_RSG. |

Table title: **raidcom delete pool**

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| Get Command Status | Async | 2E00 | 0000 | The LDEV number is out of settable range. |
| Get Command Status | Async | 2E00 | 0013 | A pair cannot be created because there are not enough cache management devices. |
| Get Command Status | Async | 2E00 | 0108 | The RAID type of the specified parity group is not correct. |
| CMDRJE | Executing | 2E00 | 2202 | The specified resource ID is out of the effective range. |
| CMDRJE | Executing | 2E00 | 6000 | Pool ID is out of range. |
| CMDRJE | Executing | 2E00 | 6001 | The type of pool is invalid. |
| CMDRJE | Executing | 2E00 | 6002 | The subscription limit for V-VOL is out of range. |
| CMDRJE | Executing | 2E00 | 7000 | The specified CLPR ID is out of the range. |
| Get Command Status | Async | 2E10 | 0001 | The LDEV is used as a TrueCopy pair volume or Universal Replicator pair volume. |
| Get Command Status | Async | 2E10 | 000C | The operation cannot be performed because a SATA-E drive in the state of quick formatting is in the specified LDEV. |
| Get Command Status | Async | 2E10 | 0009 | The specified LDEV is in the state of blocked. |
| CMDRJE | Executing | 2E10 | 0011 | The specified LDEV is in the state of blocked, or not installed. |
| Get Command Status | Async | 2E10 | 001F | The operation cannot be performed because the total capacity of virtual volumes for Dynamic Tiering or active flash in the system exceeds the maximum. |
| Get Command Status | Async | 2E10 | 0050 | Thin Image cannot be used because there are not enough cache management devices to create pairs. |
| Get Command Status | Async | 2E10 | 0101 | The specified operation cannot be performed because the checksum of the encryption key does not match. |

| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| Get Command Status | Async | 2E10 | 0102 | The pool cannot be created because there are not enough resources (VDEV) depending on cache management devices. |
| Get Command Status | Async | 2E10 | 600D | The operation cannot be performed because the pool volume is being deleted. |
| Get Command Status | Async | 2E10 | 8003 | The specified operation cannot be performed because the storage system is being turned off. |
| Get Command Status | Async | 2E10 | 8500 | The specified operation cannot be performed because the drive copy is in process. |
| Get Command Status | Async | 2E11 | 0001 | The specified operation cannot be performed because the LDEV is being verified. |
| Get Command Status | Async | 2E11 | 001E | The operation cannot be performed because the virtual disk space is blocked. |
| Get Command Status | Async | 2E11 | 005F | The operation failed because accelerated compression of the parity group to which the specified LDEV belongs is enabled and the other LDEV in the parity group is being used for the other pool. |
| Get Command Status | Async | 2E11 | 0108 | The specified LDEV is the LDEV configuring the RAID configuration which cannot be used for the pool volume. |
| Get Command Status | Async | 2E11 | 020C | The specified operation cannot be performed because there is an LDEV that is under format, shredding, or quick format. |
| CMDRJE | Executing | 2E11 | 2208 | The operation cannot be performed because you do not have the resource group authority. |
| Get Command Status | Async | 2E11 | 2209 | The operation cannot be performed because there is no LDEV ID that can be used in a system or resource group. |
| CMDRJE Get Command Status | Executing/ Async | 2E11 | 6003 | The pool is not in the status where the pool volume can be added. |
| Get Command Status | Async | 2E11 | 8003 | The operation cannot be performed because the power supply is switched off. |

| raidcom add snap_pool | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E11 | 8004 | The operation cannot be performed because the storage system is in internal process. |
| Get Command Status | Async | 2E11 | 8010 | The storage system is in internal process, or the configuration change processes are conflicting. |
| Get Command Status | Async | 2E11 | 8013 | The specified operation cannot be performed because the storage system is in process. |
| Get Command Status | Async | 2E11 | 8102 | The specified operation cannot be performed because cache memory is blocked. |
| Get Command Status | Async | 2E11 | 810A | The specified operation cannot be performed because the cache status is abnormal. |
| Get Command Status | Async | 2E11 | 8200 | The specified operation cannot be performed because the MP unit status is being changed. |
| Get Command Status | Async | 2E11 | 8201 | The specified operation cannot be performed because the MP unit is blocked. |
| Get Command Status | Async | 2E11 | 8301 | The specified operation cannot be performed because the DKB status is being changed. |
| Get Command Status | Async | 2E11 | 8302 | The specified operation cannot be performed because the CHB status is being changed. |
| Get Command Status | Async | 2E11 | 8311 | The specified operation cannot be performed because DKB is blocked. |
| Get Command Status | Async | 2E11 | 8312 | The specified operation cannot be performed because CHB is blocked. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br><br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |

Chapter 9: Troubleshooting

| raidcom add snap_pool | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E13 | 0103 | The specified parity group is not the first parity group of the distributed parity group. |
| Get Command Status | Async | 2E13 | 0104 | The specified parity group cannot be operated because it does not have enough capacity for pool volume creation. |
| Get Command Status | Async | 2E13 | 0105 | The operation failed because accelerated compression of the specified parity group is enabled and the parity group contains an LDEV being used for another pool. |
| Get Command Status | Async | 2E13 | 0106 | The operation cannot be performed because there is a blocked LDEV in the specified parity group. |
| Get Command Status | Async | 2E13 | 6007 | The operation cannot be performed because the specified pool is already linked with the virtual volume of Dynamic ProvisioningDynamic Provisioning. |
| Get Command Status | Async | 2E20 | 0000 | The specified LDEV is not installed. |
| CMDRJE | Executing | 2E20 | 0101 | The specified parity group is not installed. |
| CMDRJE | Executing | 2E20 | 2200 | The specified resource group is not defined. |
| Get Command Status | Async | 2E21 | 8103 | The operation cannot be performed because the memory capacity of the shared memory is insufficient. |
| Get Command Status | Async | 2E21 | 8106 | The operation cannot be performed because the shared memory for Thin Image or Copy-on-Write Snapshot is not initialized. |
| CMDRJE | Executing | 2E21 | 9007 | Thin Image or Copy-on-Write Snapshot program product is not installed. |
| Get Command Status | Async | 2E22 | 0005 | Exceeded the number of pool volume that can be registered in a pool. |
| Get Command Status | Async | 2E22 | 000D | The larger number of drive types than the supported configuration cannot be added to the specified pool. |

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| Get Command Status | Async | 2E22 | 6100 | Pool volume cannot be registered because the drive type of the specified LDEV is different from the other pool volume type, or the drive type in the pool exceeds the three. |
| CMDRJE | Executing | 2E23 | 0008 | The number of specified LDEVs is invalid. |
| Get Command Status | Async | 2E23 | 6001 | There are no unused pool IDs. |
| Get Command Status | Async | 2E30 | 0000 | The emulation type of the specified LDEV cannot be used as a pool VOL. |
| Get Command Status | Async | 2E30 | 0007 | The specified LDEV has the LU path definition. |
| Get Command Status | Async | 2E30 | 000C | The specified LDEV is used as a quorum disk. |
| Get Command Status | Async | 2E30 | 000D | The specified LDEV is used as a system disk. |
| Get Command Status | Async | 2E30 | 000E | The specified LDEV is already used as a pool volume. |
| Get Command Status | Async | 2E30 | 000F | The LDEV is used as a journal volume. |
| Get Command Status | Async | 2E30 | 0010 | The specified LDEV is a command device. |
| Get Command Status | Async | 2E30 | 0038 | It cannot be used as a pool volume because the size of the specified LDEV is less than 8GB. |
| Get Command Status | Async | 2E30 | 0039 | Creating a pool or adding a pool volume cannot be performed because CLPR is mixed in the specified pool. |
| Get Command Status | Async | 2E30 | 004D | The number of LDEVs that can be created in the parity group or the external volume group exceeds the maximum. |
| Get Command Status | Async | 2E30 | 005C | The specified LDEV is used as a V-VOL. |
| Get Command Status | Async | 2E30 | 005E | The specified LDEV is used in another program product. |

The title row "raidcom add snap_pool" spans the full width of the table above.

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| raidcom add snap_pool | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E30 | 006C | An LDEV, whose emulation type is not available to be mixed, is in the specified LDEVs. |
| CMDRJE | Executing | 2E30 | 006D | The emulation type of the specified volume is not OPEN-V. |
| Get Command Status | Async | 2E30 | 006E | The operation cannot be performed for the following reasons:<br><br>▪ The pool volumes include external volumes whose cache modes are invalid.<br><br>▪ The pool includes both external volumes whose cache modes are invalid and internal volumes. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E30 | 0071 | A pool volume cannot be added because the LDEV of the resource group different from the resource group of the pool volume to which the specified pool belongs is specified. |
| Get Command Status | Async | 2E30 | 0074 | The specified LDEV cannot be operated because it is an external volume mapped for online data migration. |
| Get Command Status | Async | 2E30 | 0085 | The specified volume cannot be used as a pool volume. |
| Get Command Status | Async | 2E30 | 0099 | The specified LDEV is a volume of which Data Direct Mapping attribute is enabled. |
| Get Command Status | Async | 2E30 | 020E | The operation cannot be performed because the specified LDEV is registered as namespace in the NVM subsystem. This SSB error code is displayed only for VSP 5000 series and VSP E1090. |
| CMDRJE | Executing | 2E30 | 6000 | The threshold value 1 is out of range. |
| Get Command Status | Async | 2E30 | 6004 | The specified pool attribute differs from the pool attribute of existed pool. |
| Get Command Status | Async | 2E31 | 0015 | The RAID level of the specified LDEV is different from the RAID level of the other pool volumes. |
| Get Command Status | Async | 2E31 | 0016 | There is a blocked pool volume. |

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| raidcom add snap_pool | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E31 | 0018 | External volumes whose cache modes are different are included. |
| Get Command Status | Async | 2E31 | 0204 | The operation cannot be performed because the specified parity group or drive contains a remote command device used by the mirror of the journal group. |
| Get Command Status | Async | 2E31 | 0205 | The operation cannot be performed because there is an unformatted LDEV. |
| Get Command Status | Async | 2E31 | 0206 | The operation cannot be performed because the number of LDEVs that can be created exceeds the maximum. |
| CMDRJE | Executing | 2E31 | 6001 | The POOL Name is duplicated with another pool. |
| Get Command Status | Async | 2E31 | 6004 | The pool cannot include volumes in different RAID levels because the pool cannot include those volumes. Or the pool cannot include the RAID 1 volumes and the volumes of other RAID levels together. |
| Get Command Status | Async | 2E31 | 6005 | The pool cannot include both internal volumes and external volumes because the pool is not set to Mixable. |
| Get Command Status | Async | 2E31 | 600A | The function to add a pool volume automatically cannot be set for Dynamic Provisioning for Mainframe pools. |
| Get Command Status | Async | 2E31 | 600B | The specified LDEV cannot be added to a pool because it consists of drives whose drive type code starts with SP. |
| Get Command Status | Async | 2E31 | 600C | The following pools cannot include an LDEV composed of SCM drives:<br>▪ A pool for active flash<br>▪ A pool for Thin Image<br>▪ A pool with the Data Direct Mapping attribute<br>▪ A pool for mainframe system |
| Get Command Status | Async | 2E31 | 9000 | The usage capacity exceeds the license capacity of program product. |

| raidcom add snap_pool | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E31 | 9003 | This operation cannot be performed due to either of the following reasons:<br>▪ The Dynamic Provisioning or Thin Image application is not installed.<br>▪ The capacity exceeds the licensed capacity of the application. |
| CMDRJE | Executing | 2EBE | 9E01 | The specified parameter is not correct. |
| CMDRJE<br><br>Get Command Status | Executing<br><br>Async | 2EE7 | FEEC | An internal error occurred.<br><br>Call customer support. |
| Get Command Status | Async | 2EE7 | FFFF | An internal error occurred.<br><br>Call customer support. |
| CMDRJE | Executing | 2EF3 | 0002 | The specified parameter is invalid. Check the *Command Control Interface Command Reference*. |
| CMDRJE | Executing | B980 | B903 | The command was rejected because the selected resource belongs to NAS_Platform_System_RSG. |

## SSB codes returned by raidcom add snapshot

| raidcom add snapshot | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is out of settable range. |
| CMDRJE | Executing | 2E00 | 000B | The MU number exceeds the maximum. |
| CMDRJE | Executing | 2E00 | 0013 | A pair cannot be created because there are not enough cache management devices. |

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E00 | 0028 | The command ends abnormally because the volume whose LDEV number is out of range is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E00 | 0029 | The command ends abnormally because the volume whose LDEV number is out of range is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E00 | 6000 | The specified pool ID is out of the range. |
| CMDRJE | Executing | 2E00 | 9701 | There are not enough required input parameters. |
| CMDRJE | Executing | 2E10 | 0020 | A pair cannot be created because the volume that has the size exceeding the supported size is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0021 | A pair cannot be created because the volume exceeded the support size is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0022 | A pair cannot be created because the V-VOL is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0023 | A pair cannot be created because the pool-VOL is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0024 | A pair cannot be created because the journal volume of Universal Replicator is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0025 | The command ends abnormally because the LUSE volumes of different structure are specified as the P-VOL and the S-VOL. |
| CMDRJE | Executing | 2E10 | 0026 | A pair cannot be created because the volume in which the VMA is set is specified as the P-VOL. |
| CMDRJE | Executing | 2E10 | 0027 | A pair cannot be created because the external volume is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |

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| raidcom add snapshot | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E10 | 0028 | A pair cannot be created because the volume other than V-VOL is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0029 | A pair cannot be created because the pool-VOL is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 002A | A pair cannot be created because the volume (the data volume or the journal volume) of the Universal Replicator pair that is in the intermediate site of the 3DC cascading configuration is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 002B | A pair cannot be created because the P-VOL of a Universal Replicator pair is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 002C | A pair cannot be created because the S-VOL of a Universal Replicator pair is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 002D | A pair cannot be created because the journal volume of the Universal Replicator is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 002E | The command ends abnormally because the volume to which S-VOL Disable option is set is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 002F | A pair cannot be created because the volume to which VMA is set is specified as the S-VOL of a Thin Image pair or aCopy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0030 | The command ends abnormally because the volumes of different Max LBA size are specified as the P-VOL and S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |

| raidcom add snapshot | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E10 | 0031 | The command ends abnormally because the volumes whose the number of slots is different are specified as the P-VOL and S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0032 | A pair cannot be created because the Dynamic Provisioning V-VOL is specified as the S-VOL of a Thin Image pair or the specified Thin Image pair does not exist. |
| CMDRJE | Executing | 2E10 | 0033 | The command ends abnormally because the ShadowImage reserved volume is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0034 | The command ends abnormally because the Volume Migration source volume is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0035 | The command ends abnormally because the Volume Migration target volume is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0036 | The command ends abnormally because the Volume Migration reserved volume is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0037 | The command ends abnormally because the P-VOL of a ShadowImage pair is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0038 | The command ends abnormally because the S-VOL of a ShadowImage pair is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0039 | The command ends abnormally because the ShadowImage reserved volume is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E10 | 003A | The command ends abnormally because the Volume Migration source volume is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 003B | The command ends abnormally because the Volume Migration target volume is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 003C | The command ends abnormally because the Volume Migration reserved volume is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 003D | A Thin Image pair or aCopy-on-Write Snapshot pair cannot be created because the volume of Universal Replicator for the delta resync is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 003E | A Thin Image pair or aCopy-on-Write Snapshot pair cannot be created because the volume of Universal Replicator pair for the delta resync operation is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 003F | The command ends abnormally because the quorum disk is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0040 | The command ends abnormally because the quorum disk is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0041 | A Thin Image pair or a Copy-on-Write Snapshot pair cannot be operated because the Dynamic Provisioning whose capacity is being expanded is specified as the P-VOL of the Thin Image pair or the Copy-on-Write Snapshot pair. Rerun the command after the capacity has been expanded. |
| CMDRJE | Executing | 2E10 | 0042 | A pair cannot be created because the page discard (reclaim zero pages) is being executed by a SCSI command from the Host to the specified P-VOL. |

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| raidcom add snapshot | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E10 | 0045 | A pair cannot be created because the P-VOL of a TrueCopy pair is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0046 | A pair cannot be created because the S-VOL of a TrueCopy pair is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0049 | The command ends abnormally because the ShadowImage pair is being resynchronized when the volume is shared between the P-VOL of a Thin Image/Copy-on-Write Snapshot pair and the P-VOL of a ShadowImage pair. |
| CMDRJE | Executing | 2E10 | 004A | The command ends abnormally because the ShadowImage pair status is other than PSUS when the volume is shared between P-VOL of a Thin Image/Copy-on-Write Snapshot pair and the S-VOL of a ShadowImage pair. |
| CMDRJE | Executing | 2E10 | 004E | The operation cannot be performed because the P-VOL of the ShadowImage pair on which the Quick Restore is being operated is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0051 | The pair operation cannot be performed because the volume which specifies the volume using two mirrors cannot accept the specified command in the following configurations using three Universal Replicator sites.<br><br>▪ 3DC multi target configuration<br><br>▪ 3DC cascade configuration<br><br>▪ Delta resync configuration |
| CMDRJE | Executing | 2E10 | 0052 | A Thin Image pair cannot be created because the pair status of all Thin Image pairs sharing the specified P-VOL is PSUE. |
| CMDRJE | Executing | 2E10 | 0056 | The specified volume cannot be used for the Thin Image pair operation because the virtual LDEV ID is deleted. |

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| raidcom add snapshot | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E10 | 005B | The Thin Image pair operation cannot be performed because the virtual storage machine of the specified P-VOL is different from the virtual storage machine of the specified S-VOL. |
| CMDRJE | Executing | 2E10 | 005C | A Thin Image pair cannot be operated because changing the model and the serial number in the virtual storage machine of the specified P-VOL is in progress. |
| CMDRJE | Executing | 2E10 | 005D | A Thin Image pair cannot be operated because changing the model and the serial number in the virtual storage machine of the specified S-VOL is in progress. |
| CMDRJE | Executing | 2E10 | 0203 | The operation failed because the setting of the T10 PI attribute is not match between the specified P-VOL and the specified S-VOL. |
| CMDRJE | Executing | 2E10 | 0205 | A pair cannot be created because the page discard (reclaim zero pages) is being executed by a SCSI command from the Host to the specified S-VOL. |
| CMDRJE | Executing | 2E10 | 0206 | A Thin Image pair cannot be operated because the Dynamic Provisioning whose capacity is being expanded is specified as the S-VOL of the Thin Image pair. Rerun the command after the capacity has been expanded. |
| CMDRJE | Executing | 2E10 | 0235 | The specified operation cannot be performed because the specified volume is a data reduction shared volume. |
| CMDRJE | Executing | 2E10 | 0236 | The specified operation cannot be performed because the specified volume is not a data reduction shared volume. |
| CMDRJE | Executing | 2E10 | 0238 | The specified operation cannot be performed because the specified data reduction shared volume is in a status that the Thin Image pair operation cannot be performed. |
| CMDRJE | Executing | 2E10 | 0211 | The command ends abnormally because the volume which is being deleted is specified. |

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| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E10 | 2300 | A Thin Image pair or a Copy-on-Write Snapshot pair with the specified consistency group ID cannot be created due to one of the following reasons:<br><br>▪ The specified consistency group ID is used by the ShadowImage.<br><br>▪ The number of pairs that can be defined in a consistency group exceeds the maximum.<br><br>▪ The pair created by using the same P-VOL already exists in the specified consistency group. |
| CMDRJE | Executing | 2E10 | 2302 | A Thin Image pair specifying CTG mode cannot be created because the maximum number of consistency groups has already been defined. |
| CMDRJE | Executing | 2E10 | 6018 | A Thin Image pair cannot be created due to one of the following reasons:<br><br>▪ The pool usage value exceeds the threshold value.<br><br>▪ The specified pool is blocked. |
| CMDRJE | Executing | 2E10 | 8100 | A Thin Image pair or a Copy-on-Write Snapshot pair cannot be created because there are not enough pair tables. |
| CMDRJE | Executing | 2E10 | 8101 | A Thin Image pair or a Copy-on-Write Snapshot pair cannot be created because there are not enough differential tables. |
| CMDRJE | Executing | 2E10 | 8102 | A pair cannot be created because there is not enough free shared memory space. |
| CMDRJE | Executing | 2E10 | 9502 | The specified MU number is already used. |
| CMDRJE | Executing | 2E10 | 9500 | The operation cannot be performed because the MU number used in ShadowImage is specified. |
| CMDRJE | Executing | 2E10 | 9501 | The operation cannot be performed due to the following combined reasons:<br><br>▪ The S-VOL of the ShadowImage pair is specified as the P-VOL of the Thin Image pair.<br><br>▪ 0 is specified for the MU number. |

The header row spanning "raidcom add snapshot":

**raidcom add snapshot**

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| raidcom add snapshot | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E10 | 9701 | The command ends abnormally because the pair is in the state of unacceptable the command. |
| CMDRJE | Executing | 2E10 | 9705 | A Thin Image pair or a Copy-on-Write Snapshot pair cannot be created because the number of Thin Image pairs or Copy-on-Write Snapshot pairs has already reached the maximum. |
| CMDRJE | Executing | 2E10 | 9706 | A Thin Image pair cannot be created because the maximum number of Snapshot IDs (MU numbers) has already been in use for the specified P-VOL. |
| CMDRJE | Executing | 2E10 | 9707 | A Thin Image pair cannot be created because the maximum number of Snapshot groups has already been defined, or the maximum number of Thin Image pairs has already been defined in the specified Snapshot group. |
| CMDRJE | Executing | 2E10 | 9708 | A Thin Image pair cannot be created because the DP pool is being initialized. |
| CMDRJE | Executing | 2E10 | 970D | The pair cannot be created because the number of pair layers in the cascade configuration exceeds the maximum number. |
| CMDRJE | Executing | 2E10 | 970E | The pair cannot be created because the number of clone attribute pair layers exceeds the maximum number. |
| CMDRJE | Executing | 2E10 | 970F | When the pair status is other than PAIR or PSUS, you cannot create a pair by specifying the S-VOL of a Thin Image pair. |
| CMDRJE | Executing | 2E10 | 9712 | Thin Image pairs that can be cascaded or cloned and Thin Image pairs that cannot be cascaded or cloned cannot be contained in a snapshot tree. |
| CMDRJE | Executing | 2E10 | 9713 | The operation cannot be performed because the snapshot tree is being deleted. |
| CMDRJE | Executing | 2E10 | 9800 | An error occurred at the operation of Thin Image due to one of the following reasons: ▪ The LDEV number specified for the P-VOL or the S-VOL is incorrect. ▪ The LDEV specified as the P-VOL or the S-VOL is not paired. |

| | | Error code | | |
|---|---|---|---|---|
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| | | | | ▪ The pair of the specified P-VOL or the S-VOL is not ready to perform the specified operation.<br>▪ The specified Snapshot ID (MU number) is wrong.<br>▪ The specified Snapshot ID (MU number) is already used.<br>▪ The specified pool is not in the usable status.<br>▪ The license capacity has exceeded the maximum.<br>▪ The control table for Thin Image is depleted.<br>▪ The number of pairs that can be created in a snapshot tree has exceeded the maximum.<br>▪ The specified LDEV number is the same between the primary and secondary volumes. |
| CMDRJE | Executing | 2E11 | 0205 | The operation cannot be performed because the total capacity of provisioning virtual volumes defined in the specified pool exceeds the subscription limit of the pool. |
| CMDRJE | Executing | 2E11 | 8003 | The operation cannot be performed because power-off is in progress. |
| CMDRJE | Executing | 2E11 | 800F | The operation failed because multiple versions of DKCMAIN microcode are included. |
| CMDRJE | Executing | 2E11 | 9701 | A pair cannot be created because the specified snapshot group contains Thin Image pairs with the clone attribute and without the clone attribute. |
| CMDRJE | Executing | 2E11 | 9702 | A pair cannot be created in the same consistency group as the Thin Image pair which uses the specified P-VOL as an S-VOL. |
| CMDRJE | Executing | 2E12 | 2401 | The specified operation cannot be performed because the specified snapshot group contains a Thin Image pair and a Thin Image Advanced pair. |
| CMDRJE | Executing | 2E12 | 6001 | The specified operation cannot be performed because the specified pool is not the same as the one that includes the specified volume. |

<table>
<tr><td colspan="5" align="center">raidcom add snapshot</td></tr>
</table>

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| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | 2E13 | 0000 | A Thin Image pair or a Copy-on-Write Snapshot pair cannot be created because the specified P-VOL is a LUSE volume. |
| CMDRJE | Executing | 2E13 | 6003 | A pair cannot be created because there is a pair in the specified primary volume, which is using a different pool number from the specified pool number. |
| CMDRJE | Executing | 2E13 | 6004 | The specified pair operation cannot be performed for the specified pool. |
| CMDRJE | Executing | 2E13 | 9900 | The consistency group to be used in the specified Snapshot Group is in one of the following status: <br><br> ▪ The number of pairs that can be defined in a consistency group exceeds the maximum. <br><br> ▪ The pair created by using the same P-VOL already exists in the specified consistency group. |
| CMDRJE | Executing | 2E20 | 0000 | The specified LDEV is not defined. |
| CMDRJE | Executing | 2E20 | 0008 | The command ends abnormally because an unmounted volume is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E20 | 0009 | The command ends abnormally because either of the following volumes is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair: <br><br> ▪ A blocked volume <br><br> ▪ A volume in a pool that contains a blocked pool volume |
| CMDRJE | Executing | 2E20 | 000A | The command ends abnormally because the volume in formatting is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E20 | 000B | The command ends abnormally because an unmounted volume is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |

The table header spans "raidcom add snapshot".

| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | 2E20 | 000C | The command ends abnormally because either of the following volumes is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair:<br>▪ A blocked volume<br>▪ A volume in a pool that contains a blocked pool volume |
| CMDRJE | Executing | 2E20 | 000D | The command ends abnormally because the volume in formatting is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E20 | 0201 | When you create a pair with the clone attribute, you must specify the S-VOL. |
| CMDRJE | Executing | 2E21 | 8107 | The command ends abnormally because the shared memory (FC, TPF, or Extension1) is not added for necessary capacity or maintenance work is being performed. |
| CMDRJE | Executing | 2E21 | 8108 | The shared memory for Thin Image or Copy-on-Write Snapshot is not installed. |
| CMDRJE | Executing | 2E21 | 8109 | A Thin Image pair or a Copy-on-Write Snapshot pair cannot be created due to one of the following reasons:<br>▪ The shared memory is not expanded for necessary capacity.<br>▪ It is in the initializing process. |
| CMDRJE | Executing | 2E21 | 810A | The shared memory is not installed. |
| CMDRJE | Executing | 2E21 | 9010 | The program product is not installed. |
| CMDRJE | Executing | 2E21 | 9017 | The Thin Image Advanced software product is not installed. |
| CMDRJE | Executing | 2E21 | 9306 | The virutal LDEV ID for a virtual storage machine is not defined on the specified LDEV. |
| CMDRJE | Executing | 2E21 | 930A | The virtual storage machine with the specified serial number is not found. |
| CMDRJE | Executing | 2E30 | 000C | The specified LDEV is used as a quorum disk. |

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| raidcom add snapshot | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E30 | 0076 | A pair cannot be created because the volume is already used in the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair is specified as the P-VOL. |
| CMDRJE | Executing | 2E30 | 0077 | A pair cannot be created because the volume is already used as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair is specified as the S-VOL. |
| CMDRJE | Executing | 2E30 | 0078 | A pair cannot be created because the volume is already used as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair is specified as the S-VOL. |
| CMDRJE | Executing | 2E30 | 007A | The command ends abnormally because the volume other than OPEN-V is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E30 | 007B | A pair cannot be created because the volume whose command device is set is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E30 | 007C | The command ends abnormally because the volume other than OPEN-V is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E30 | 007D | A pair cannot be created because the volume whose command device is set is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E30 | 007E | The command ends abnormally because the volume having no path definition is specified as the P-VOL of a Thin Image pair or the specified Thin Image pair does not exist. |
| CMDRJE | Executing | 2E30 | 007F | The command ends abnormally because the volume having no path definition is specified as the S-VOL of a Thin Image pair or the specified Thin Image pair does not exist. |

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E30 | 0080 | The command ends abnormally because the external volume mapped for the online data migration is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E30 | 0081 | The command ends abnormally because the external volume mapped for the online data migration is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E30 | 0090 | The pair operation is rejected because the specified volume as the primary volume is a reserved volume for GAD, or a volume for the GAD pair which is in the invalid status. |
| CMDRJE | Executing | 2E30 | 0091 | The pair operation is rejected because the specified volume as the secondary volume is a reserved volume for GAD, or a volume for aGAD pair. |
| CMDRJE | Executing | 2E30 | 0099 | The specified LDEV is a volume of which Data Direct Mapping attribute is enabled. |
| CMDRJE | Executing | 2E30 | 0201 | The specified LDEV is an external volume of which Data Direct Mapping attribute is enabled. |
| CMDRJE | Executing | 2E30 | 0202 | The specified LDEV is a virtual volume of which Data Direct Mapping attribute is enabled. |
| CMDRJE | Executing | 2E30 | 0206 | The operation cannot be performed because the specified LDEV is a deduplication system data volume. |
| CMDRJE | Executing | 2E30 | 020C | A pair with the SLU attribute cannot be created because a volume with the SLU attribute was specified as an S-VOL. |
| CMDRJE | Executing | 2E30 | 020D | A pair cannot be created because a volume with the ALU attribute was specified as a P-VOL or S-VOL. |
| CMDRJE | Executing | 2E30 | 600E | A pair cannot be created because the attribute of the pool is other than Thin Image or Copy-on-Write Snapshot. |

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| raidcom add snapshot | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| | | | | A pair for which a snapshot group was specified cannot be created because the specified pool is one of the following:<br><br>▪ The specified pool does not exist.<br><br>▪ A pool for which Data Direct Mapping attribute is enabled.<br><br>▪ A pool for HDT.<br><br>▪ A pool for mainframe. |
| CMDRJE | Executing | 2E31 | 9002 | A pair cannot be created because the capacity exceeds the licensed capacity. |
| CMDRJE | Executing | 2E31 | 9701 | For creation of a pair with the cascade or clone attribute, a Dynamic Provisioning V-VOL is not specified for the S-VOL. |
| CMDRJE | Executing | 2E31 | 9702 | A pair cannot be created in the specified pool due to restrictions of the system. |
| CMDRJE | Executing | 2E3F | 8000 | The specified operation is not supported in the current microcode version. |
| CMDRJE | Executing | 2EBE | 9E03 | A pair cannot be created because both the clone and SLU option were specified. |
| CMDRJE | Executing | 2EC6 | FEEC | An internal error occurred. Call customer support. |
| CMDRJE | Executing | B980 | B903 | The command was rejected because the selected resource belongs to NAS_Platform_System_RSG. |

## SSB codes returned by raidcom modify snapshot

| raidcom modify snapshot | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is out of settable range. |
| CMDRJE | Executing | 2E00 | 000B | The MU number exceeds the maximum. |

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| raidcom modify snapshot | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E00 | 0028 | The command ends abnormally because the volume whose LDEV number is out of range is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E02 | 9701 | The command cannot be executed because the clone specification of the input parameter and the clone attribute of a Thin Image pair to be operated do not match. |
| CMDRJE | Executing | 2E10 | 0030 | The command ends abnormally because the volumes of different Max LBA size are specified as the P-VOL and S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0033 | The command ends abnormally because the ShadowImage reserved volume is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0034 | The command ends abnormally because the Volume Migration source volume is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0035 | The command ends abnormally because the Volume Migration target volume is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0036 | The command ends abnormally because the Volume Migration reserved volume is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 003F | The command ends abnormally because the quorum disk is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0041 | A Thin Image pair or a Copy-on-Write Snapshot pair cannot be operated because the Dynamic Provisioning V-VOL whose capacity is being expanded is specified as the P-VOL of the Thin Image or the Copy-on-Write Snapshot pair. Rerun the command after the capacity has been expanded. |

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| raidcom modify snapshot | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E10 | 0043 | The Thin Image pair or the Copy-on-Write Snapshot pair cannot be restored because the TrueCopy pair status is other than PSUS or PSUE when the volume is shared between the P-VOL of a Thin Image/Copy-on-Write Snapshot pair and the P-VOL of a TrueCopy pair. |
| CMDRJE | Executing | 2E10 | 0044 | A Thin Image pair or a Copy-on-Write Snapshot pair cannot be restored because the Universal Replicator pair status is other than PSUS or PSUE when the volume is shared between the P-VOL of a Thin Image/Copy-on-Write Snapshot pair and the P-VOL of a Universal Replicator pair. |
| CMDRJE | Executing | 2E10 | 0047 | A Snapshot data cannot be obtained because the TrueCopy pair status is COPY when the volume is shared between the P-VOL of a Thin Image/Copy-on-Write Snapshot pair and the S-VOL of a TrueCopy pair. |
| CMDRJE | Executing | 2E10 | 0048 | A Snapshot data cannot be obtained because the Universal Replicator pair status is COPY when the volume is shared between the P-VOL of a Thin Image/Copy-on-Write Snapshot pair and the S-VOL of a Universal Replicator pair. |
| CMDRJE | Executing | 2E10 | 0049 | The command ends abnormally because the ShadowImage pair is being resynchronized when the volume is shared between the P-VOL of a Thin Image/Copy-on-Write Snapshot pair and the P-VOL of a ShadowImage pair. |
| CMDRJE | Executing | 2E10 | 004A | The command ends abnormally because the ShadowImage pair status is other than PSUS when the volume is shared between P-VOL of a Thin Image/Copy-on-Write Snapshot pair and the S-VOL of a ShadowImage pair. |
| CMDRJE | Executing | 2E10 | 004B | The Thin Image pair or the Copy-on-Write Snapshot pair cannot be restored because the ShadowImage pair status is other than PSUS or PSUE when the volume is shared between the P-VOL of a Thin Image/Copy-on-Write Snapshot pair and the P-VOL of a ShadowImage pair. |

| raidcom modify snapshot | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E10 | 004C | The Thin Image pair or the Copy-on-Write Snapshot pair cannot be restored because the Thin Image pair or the Copy-on-Write Snapshot pair status is other than PSUS when the volume is shared between the P-VOL of a Thin Image/Copy-on-Write Snapshot pair and the S-VOL of a ShadowImage pair. |
| CMDRJE | Executing | 2E10 | 004D | A Snapshot data cannot be obtained because the TrueCopy asynchronous pair status is other than PSUS or PSUE when the volume is shared between the P-VOL of a Thin Image/Copy-on-Write Snapshot pair and the S-VOL of a TrueCopy asynchronous pair. |
| CMDRJE | Executing | 2E10 | 004E | The operation cannot be performed because the P-VOL of the ShadowImage pair on which the Quick Restore is being operated is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0051 | The pair operation cannot be performed because the volume which specifies the volume using two mirrors cannot accept the specified command in the following configurations using three Universal Replicator sites.<br><br>▪ 3DC multi target configuration<br><br>▪ 3DC cascade configuration<br><br>▪ Delta resync configuration |
| CMDRJE | Executing | 2E10 | 0052 | A Thin Image pair operation cannot be performed because the pair status of all Thin Image pairs sharing the specified P-VOL is PSUE. |
| CMDRJE | Executing | 2E10 | 0056 | The specified volume cannot be used for the Thin Image pair operation because the virtual LDEV ID is deleted. |
| CMDRJE | Executing | 2E10 | 005B | The Thin Image pair operation cannot be performed because the virtual storage machine of the specified P-VOL is different from the virtual storage machine of the specified S-VOL. |

| raidcom modify snapshot | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E10 | 0061 | The Thin Image pair operation cannot be performed because the virtual LDEV ID of the specified volume is deleted. |
| CMDRJE | Executing | 2E10 | 0206 | A Thin Image pair cannot be operated because the Dynamic Provisioning V-VOL whose capacity is being expanded is specified as the S-VOL of the Thin Image pair. Rerun the command after the capacity has been expanded. |
| CMDRJE | Executing | 2E10 | 0235 | The specified operation cannot be performed because the specified volume is a data reduction shared volume. |
| CMDRJE | Executing | 2E10 | 0236 | The specified operation cannot be performed because the specified volume is not a data reduction shared volume. |
| CMDRJE | Executing | 2E10 | 6018 | A Thin Image pair cannot be created due to one of the following reasons:<br>▪ The pool usage value exceeds the threshold value.<br>▪ The specified pool is blocked. |
| CMDRJE | Executing | 2E10 | 6019 | A Snapshot data cannot be obtained because the pool or the pool-VOL is blocked or the pool is full. |
| CMDRJE | Executing | 2E10 | 8100 | A Thin Image pair or a Copy-on-Write Snapshot pair cannot be created because there are not enough pair tables. |
| CMDRJE | Executing | 2E10 | 8101 | A Thin Image pair or a Copy-on-Write Snapshot pair cannot be created because there are not enough differential tables. |
| CMDRJE | Executing | 2E10 | 8102 | A pair cannot be created because there is not enough free shared memory space. |
| CMDRJE | Executing | 2E10 | 9700 | The command ends abnormally because other than the raidcom add snapshot command is issued for the volume other than the Thin Image pair or the Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 9701 | The command ends abnormally because the pair is in the state of unacceptable the command. |

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| raidcom modify snapshot | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E10 | 9702 | The Thin Image pair or the Copy-on-Write Snapshot pair cannot be restored because the volume is shared between the P-VOL of a Thin Image/Copy-on-Write Snapshot pair and the S-VOL of a TrueCopy pair. |
| CMDRJE | Executing | 2E10 | 9703 | The Thin Image pair or the Copy-on-Write Snapshot pair cannot be restored because the volume is shared between the P-VOL of a Thin Image/Copy-on-Write Snapshot pair and the S-VOL of a Universal Replicator pair. |
| CMDRJE | Executing | 2E10 | 9704 | The Thin Image pair or the Copy-on-Write Snapshot pair cannot be restored due to one of the following reasons:<br><br>▪ Snapshot data of a restore target Thin Image pair or Copy-on-Write Snapshot pair is being obtained per consistency group.<br><br>▪ Snapshot data of a different pair whose primary volume is the restore target P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair is being obtained per consistency group. |
| CMDRJE | Executing | 2E10 | 9710 | The clone or diff clone attribute of the specified Thin Image pair is enabled. |
| CMDRJE | Executing | 2E10 | 9713 | The operation cannot be performed because the snapshot tree is being deleted. |
| CMDRJE | Executing | 2E10 | 9714 | The specified snapshot group name cannot be changed because it is already registered. |
| CMDRJE | Executing | 2E10 | 9715 | The diff clone attribute of the specified Thin Image pair is enabled. |
| CMDRJE | Executing | 2E10 | 9716 | The volume of the specified Thin Image pair is used in the Thin Image with the diff clone attribute enabled. |

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| raidcom modify snapshot | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E10 | 9717 | The read only snapshot data could not be created due to one of the following reasons:<br><br>▪ The specified pair is not a cascade pair.<br><br>▪ The specified pair is a pair with the clone attribute.<br><br>▪ The specified pair belongs to a consistency group. |
| CMDRJE | Executing | 2E10 | 9800 | An error occurred at the operation of Thin Image due to one of the following reasons:<br><br>▪ The LDEV number specified for the P-VOL or the S-VOL is incorrect.<br><br>▪ The LDEV specified as the P-VOL or the S-VOL is not paired.<br><br>▪ The pair of the specified P-VOL or the S-VOL is not ready to perform the specified operation.<br><br>▪ The specified Snapshot ID (MU number) is wrong.<br><br>▪ The specified Snapshot ID (MU number) is already used.<br><br>▪ The specified pool is not in the usable status.<br><br>▪ The license capacity has exceeded the maximum.<br><br>▪ The control table for Thin Image is depleted.<br><br>▪ The snapshot group name cannot be changed. |
| CMDRJE | Executing | 2E11 | 0210 | The operation cannot be performed because the specified volume is not a root volume of a Thin Image pair. |
| CMDRJE | Executing | 2E11 | 8003 | The operation cannot be performed because power-off is in progress. |
| CMDRJE | Executing | 2E11 | 800F | The operation cannot be performed because there is an unsupported microcode version of the MP (processor) in the storage system. |

| raidcom modify snapshot | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E11 | 801D | The operation cannot be performed because the storage system is in internal process, or the configuration changing processes are conflicting. Wait a while, and then retry the operation. |
| CMDRJE | Executing | 2E11 | 801E | The operation cannot be performed because the local replica pair is being initialized. |
| CMDRJE | Executing | 2E11 | 9703 | The pair operation cannot be performed because the status of the pair that uses the specified P-VOL as an S-VOL is not PSUS. |
| CMDRJE | Executing | 2E11 | 9705 | The command was rejected because pairs in the status other than PAIR exist under the specified pair. |
| CMDRJE | Executing | 2E11 | 9708 | The execution status of the snapshot garbage data deletion processing (defragmentation processing) of the specified root volume is not in an operable status. |
| CMDRJE | Executing | 2E20 | 0000 | The specified LDEV is not defined. |
| CMDRJE | Executing | 2E20 | 0008 | The command ends abnormally because an unmounted volume is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E20 | 0009 | The command ends abnormally because either of the following volumes is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair: <br>▪ A blocked volume <br>▪ A volume in a pool that contains a blocked pool volume |
| CMDRJE | Executing | 2E20 | 000A | The command ends abnormally because the volume in formatting is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |

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| raidcom modify snapshot | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E20 | 000C | The command ends abnormally because either of the following volumes is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair:<br>▪ A blocked volume<br>▪ A volume in a pool that contains a blocked pool volume |
| CMDRJE | Executing | 2E21 | 8107 | The command ends abnormally because the shared memory (FC, TPF, or Extension1) is not added for necessary capacity or maintenance work is being performed. |
| CMDRJE | Executing | 2E21 | 8108 | The shared memory for Thin Image or Copy-on-Write Snapshot is not installed. |
| CMDRJE | Executing | 2E21 | 810A | The shared memory is not installed. |
| CMDRJE | Executing | 2E21 | 9010 | The program product is not installed. |
| CMDRJE | Executing | 2E21 | 9017 | The Thin Image Advanced software product is not installed. |
| CMDRJE | Executing | 2E21 | 9306 | The virutal LDEV ID for a virtual storage machine is not defined on the specified LDEV. |
| CMDRJE | Executing | 2E21 | 930A | The virtual storage machine with the specified serial number is not found. |
| CMDRJE | Executing | 2E30 | 000C | The specified LDEV is used as a quorum disk. |
| CMDRJE | Executing | 2E30 | 0079 | The Thin Image pair or the Copy-on-Write Snapshot pair cannot be restored because the volume that is set the S-VOL Disable is specified as the P-VOL. |
| CMDRJE | Executing | 2E30 | 007A | The command ends abnormally because the volume other than OPEN-V is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E30 | 0081 | The command ends abnormally because the external volume mapped for the online data migration is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |

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| raidcom modify snapshot | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E30 | 0090 | The pair operation is rejected because the specified volume as the primary volume is a reserved volume for GAD, or the volume for the GAD pair which is in the invalid status. |
| CMDRJE | Executing | 2E30 | 0091 | The pair operation is rejected because the specified volume as the secondary volume is a reserved volume for GAD, or the volume for the GAD pair. |
| CMDRJE | Executing | 2E30 | 0099 | The specified LDEV is a volume of which Data Direct Mapping attribute is enabled. |
| CMDRJE | Executing | 2E30 | 0201 | The specified LDEV is an external volume of which Data Direct Mapping attribute is enabled. |
| CMDRJE | Executing | 2E30 | 0202 | The specified LDEV is a virtual volume of which Data Direct Mapping attribute is enabled. |
| CMDRJE | Executing | 2E3F | 8000 | The specified operation is not supported in the current microcode version. |
| CMDRJE | Executing | 2EC6 | FEEC | An internal error occurred. Call customer support. |
| CMDRJE | Executing | 2EF3 | 0002 | The specified parameter is invalid. Check the *Command Control Interface Command Reference*. |
| CMDRJE | Executing | B980 | B903 | The command was rejected because the selected resource belongs to NAS_Platform_System_RSG. |

## SSB codes returned by raidcom get snapshot

| raidcom get snapshot | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2EC5 | FEEC | An internal error occurred. Call customer support. |

## *SSB codes returned by raidcom delete snapshot*

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is out of settable range. |
| CMDRJE | Executing | 2E00 | 000B | The MU number exceeds the maximum. |
| CMDRJE | Executing | 2E00 | 0028 | The command ends abnormally because the volume whose LDEV number is out of range is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0033 | The command ends abnormally because the ShadowImage reserved volume is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0034 | The command ends abnormally because the Volume Migration source volume is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0035 | The command ends abnormally because the Volume Migration target volume is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0036 | The command ends abnormally because the Volume Migration reserved volume is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0041 | A Thin Image pair or a Copy-on-Write Snapshot pair cannot be operated because the Dynamic Provisioning V-VOL whose capacity is being expanded is specified as the P-VOL of the Thin Image pair or the Copy-on-Write Snapshot pair. Rerun the command after the capacity has been expanded. |
| CMDRJE | Executing | 2E10 | 0049 | The command ends abnormally because the ShadowImage pair is being resynchronized when the volume is shared between the P-VOL of a Thin Image/Copy-on-Write Snapshot pair and the P-VOL of a ShadowImage pair. |

| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | 2E10 | 004A | The command ends abnormally because the ShadowImage pair status is other than PSUS when the volume is shared between P-VOL of a Thin Image/Copy-on-Write Snapshot pair and the S-VOL of a ShadowImage pair. |
| CMDRJE | Executing | 2E10 | 004D | A Snapshot data cannot be obtained because the TrueCopy asynchronous pair status is other than PSUS or PSUE when the volume is shared between the P-VOL of a Thin Image/Copy-on-Write Snapshot pair and the S-VOL of a TrueCopy asynchronous pair. |
| CMDRJE | Executing | 2E10 | 004E | The operation cannot be performed because the P-VOL of the ShadowImage pair on which the Quick Restore is being operated is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0056 | The specified volume cannot be used for the Thin Image pair operation because the virtual LDEV ID is deleted. |
| CMDRJE | Executing | 2E10 | 005B | The Thin Image pair operation cannot be performed because the virtual storage machine of the specified P-VOL is different from the virtual storage machine of the specified S-VOL. |
| CMDRJE | Executing | 2E10 | 0061 | The specified volume cannot be used for the Thin Image pair operation because the virtual LDEV ID is deleted. |
| CMDRJE | Executing | 2E10 | 0204 | The operation failed because the specified LDEV which is holding the attribute of SLU is bind to the LDEV which is holding the attribute of ALU. |
| CMDRJE | Executing | 2E10 | 0206 | A Thin Image pair cannot be operated because the Dynamic Provisioning V-VOL whose capacity is being expanded is specified as the S-VOL of the Thin Image pair. Rerun the command after the capacity has been expanded. |
| CMDRJE | Executing | 2E10 | 0235 | The operation cannot be performed because the specified volume is a data reduction shared volume. |

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| raidcom delete snapshot | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E10 | 6019 | A Snapshot data cannot be obtained because the pool or the pool-VOL is blocked. |
| CMDRJE | Executing | 2E10 | 9700 | The command ends abnormally because other than the raidcom add snapshot command is issued for the volume other than the Thin Image pair or the Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 9701 | The command ends abnormally because the pair is in the state of unacceptable the command. |
| CMDRJE | Executing | 2E10 | 9716 | The volume of the specified Thin Image pair (HTI only) is used in the Thin Image with the diff clone attribute enabled. |
| CMDRJE | Executing | 2E10 | 9800 | An error occurred at the operation of Thin Image due to one of the following reasons:<br><br>▪ The LDEV number specified for the P-VOL or the S-VOL is incorrect.<br><br>▪ The LDEV specified as the P-VOL or the S-VOL is not paired.<br><br>▪ The pair of the specified P-VOL or the S-VOL is not ready to perform the specified operation.<br><br>▪ The specified Snapshot ID (MU number) is wrong.<br><br>▪ The specified Snapshot ID (MU number) is already used.<br><br>▪ The specified pool is not in the usable status.<br><br>▪ The license capacity has exceeded the maximum.<br><br>▪ The control table for Thin Image is depleted. |
| CMDRJE | Executing | 2E11 | 0211 | The snapshot tree cannot be deleted because it contains a Thin Image Advanced pair. |
| CMDRJE | Executing | 2E11 | 2206 | You do not have the operation authority to operate the target resource group.<br><br>Specify the resource group that is allocated to the user group as the operation target, or set the operation authority to the user group in order to operate the target resource group. |

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| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E11 | 8003 | The operation cannot be performed because power-off is in progress. |
| CMDRJE | Executing | 2E11 | 9704 | The operation cannot be performed because a pair exists under the specified pair. |
| CMDRJE | Executing | 2E11 | 9706 | The operation cannot be performed because the specified volume is not a root volume of a pair with the cascade or clone attribute, or the volume is an S-VOL in another snapshot tree. |
| CMDRJE | Executing | 2E20 | 0000 | The specified LDEV is not defined. |
| CMDRJE | Executing | 2E20 | 0008 | The command ends abnormally because an unmounted volume is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E21 | 8107 | The command ends abnormally because the shared memory (FC, TPF, or Extension2) is not added for necessary capacity or maintenance work is being performed. |
| CMDRJE | Executing | 2E21 | 8108 | The shared memory for Thin Image or Copy-on-Write Snapshot is not installed. |
| CMDRJE | Executing | 2E21 | 9306 | The virutal LDEV ID for a virtual storage machine is not defined on the specified LDEV. |
| CMDRJE | Executing | 2E21 | 930A | The virtual storage machine with the specified serial number is not found. |
| CMDRJE | Executing | 2EC6 | FEEC | An internal error occurred. Call customer support. |
| CMDRJE | Executing | B980 | B903 | The command was rejected because the selected resource belongs to NAS_Platform_System_RSG. |

The table above has the title **raidcom delete snapshot** spanning across all columns.

## *SSB codes returned by raidcom map snapshot*

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E00 | 0028 | The command ends abnormally because the volume whose LDEV number is out of range is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E00 | 0029 | The command ends abnormally because the volume whose LDEV number is out of range is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0020 | The command ends abnormally because the volume that has the size exceeding the supported size is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0025 | The command ends abnormally because the LUSE volumes of different structure are specified as the P-VOL and the S-VOL. |
| CMDRJE | Executing | 2E10 | 0027 | The command ends abnormally because the external volume is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0028 | The command ends abnormally because the volume other than V-VOL is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0029 | The command ends abnormally because the pool-VOL is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 002A | The command ends abnormally because the volume (the data volume or the journal volume) of the Universal Replicator pair that is in the intermediate site of the 3DC cascading configuration is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 002B | The command ends abnormally because the P-VOL of a Universal Replicator pair is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |

| raidcom map snapshot | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E10 | 002C | The command ends abnormally because the S-VOL of a Universal Replicator pair is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 002D | The command ends abnormally because the journal volume of the Universal Replicator is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 002E | The command ends abnormally because the volume to which S-VOL Disable option is set is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 002F | The command ends abnormally because the volume to which VMA is set is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0030 | The command ends abnormally because the volumes of different Max LBA size are specified as the P-VOL and S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0031 | The command ends abnormally because the volumes whose the number of slots is different are specified as the P-VOL and S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0032 | A pair cannot be created because the Dynamic Provisioning V-VOL is specified as the S-VOL of a Thin Image pair or the specified Thin Image pair does not exist. |
| CMDRJE | Executing | 2E10 | 0037 | The command ends abnormally because the P-VOL of a ShadowImage pair is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0038 | The command ends abnormally because the S-VOL of a ShadowImage pair is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |

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| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | 2E10 | 003A | The command ends abnormally because the Volume Migration source volume is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 003B | The command ends abnormally because the Volume Migration target volume is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 003E | The command ends abnormally because the volume of Universal Replicator pair for the delta resync operation is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0041 | A Thin Image pair or a Copy-on-Write Snapshot pair cannot be operated because the Dynamic Provisioning V-VOL whose capacity is being expanded is specified as the P-VOL of the Thin Image pair or the Copy-on-Write Snapshot pair. Rerun the command after the capacity has been expanded. |
| CMDRJE | Executing | 2E10 | 0045 | The command ends abnormally because the P-VOL of a TrueCopy pair is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0046 | The command ends abnormally because the S-VOL of a TrueCopy pair is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0056 | The specified volume cannot be used for the Thin Image pair operation because the virtual LDEV ID is deleted. |
| CMDRJE | Executing | 2E10 | 005B | The Thin Image pair operation cannot be performed because the virtual storage machine of the specified P-VOL is different from the virtual storage machine of the specified S-VOL. |
| CMDRJE | Executing | 2E10 | 005F | The command ends abnormally because the specified S-VOL is assigned to a Thin Image pair. |

**raidcom map snapshot**

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| raidcom map snapshot | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E10 | 0203 | The operation failed because the setting of the T10 PI attribute is not match between the specified P-VOL and the specified S-VOL. |
| CMDRJE | Executing | 2E10 | 0206 | A Thin Image pair cannot be operated because the Dynamic Provisioning V-VOL whose capacity is being expanded is specified as the S-VOL of the Thin Image pair. Rerun the command after the capacity has been expanded. |
| CMDRJE | Executing | 2E10 | 0211 | The command ends abnormally because the volume which is being deleted is specified. |
| CMDRJE | Executing | 2E10 | 0235 | The specified operation cannot be performed because the specified volume is a data reduction shared volume. |
| CMDRJE | Executing | 2E10 | 0236 | The specified operation cannot be performed because the specified volume is not a data reduction shared volume. |
| CMDRJE | Executing | 2E10 | 0238 | The specified operation cannot be performed because the specified data reduction shared volume is in a status that the Thin Image pair operation cannot be performed. |
| CMDRJE | Executing | 2E10 | 9709 | The command ends abnormally because the specified Thin Image pair does not exist. |
| CMDRJE | Executing | 2E10 | 970B | The command ends abnormally because the specified Thin Image pair is assigned to an S-VOL. |
| CMDRJE | Executing | 2E10 | 9713 | The operation cannot be performed because the snapshot tree is being deleted. |
| CMDRJE | Executing | 2E10 | 9800 | An error occurred during the Thin Image operation due to the following reason:<br>▪ The specified LDEV number is the same between the primary and secondary volumes. |
| CMDRJE | Executing | 2E11 | 800F | The operation failed because multiple versions of DKCMAIN microcode are included. |

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| | | Error code | | |
|---|---|---|---|---|
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| CMDRJE | Executing | 2E12 | 6001 | The specified operation cannot be performed because the specified pool is not the same as the one that contains the specified volume. |
| CMDRJE | Executing | 2E20 | 0000 | The specified LDEV is not defined. |
| CMDRJE | Executing | 2E20 | 0008 | The command ends abnormally because an unmounted volume is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E20 | 000B | The command ends abnormally because an unmounted volume is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E20 | 000C | The command ends abnormally because either of the following volumes is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair: <br>▪ A blocked volume <br>▪ A volume in a pool that contains a blocked pool volume |
| CMDRJE | Executing | 2E20 | 000D | The command ends abnormally because the volume in formatting is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E21 | 8107 | The command ends abnormally because the shared memory (FC, TPF, or Extension1) is not added for necessary capacity or maintenance work is being performed. |
| CMDRJE | Executing | 2E21 | 8108 | The shared memory for Thin Image or Copy-on-Write Snapshot is not installed. |
| CMDRJE | Executing | 2E21 | 9010 | The program product is not installed. |
| CMDRJE | Executing | 2E21 | 9306 | The virutal LDEV ID for a virtual storage machine is not defined on the specified LDEV. |
| CMDRJE | Executing | 2E21 | 930A | The virtual storage machine with the specified serial number is not found. |

Note: the table title row "raidcom map snapshot" spans the full width of the table header.

| Error message | Executing/ Async | Error code SSB1 | Error code SSB2 | Description |
|---|---|---|---|---|
| CMDRJE | Executing | 2E30 | 0077 | The command ends abnormally because the volume is already used as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair is specified as the S-VOL. |
| CMDRJE | Executing | 2E30 | 0078 | The command ends abnormally because the volume is already used as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair is specified as the S-VOL. |
| CMDRJE | Executing | 2E30 | 007C | The command ends abnormally because the volume other than OPEN-V is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E30 | 007D | The command ends abnormally because the volume whose command device is set is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E30 | 007F | The command ends abnormally because the volume having no path definition is specified as the S-VOL of a Thin Image pair or the specified Thin Image pair does not exist. |
| CMDRJE | Executing | 2E30 | 0081 | The command ends abnormally because the external volume mapped for the online data migration is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E30 | 008F | The command ends abnormally because the specified P-VOL is not a P-VOL of a Thin Image pair. |
| CMDRJE | Executing | 2E30 | 0099 | The specified LDEV is a volume of which Data Direct Mapping attribute is enabled. |
| CMDRJE | Executing | 2E30 | 0201 | The specified LDEV is an external volume of which Data Direct Mapping attribute is enabled. |
| CMDRJE | Executing | 2E30 | 0202 | The specified LDEV is a virtual volume of which Data Direct Mapping attribute is enabled. |
| CMDRJE | Executing | 2E30 | 0206 | The operation cannot be performed because the specified LDEV is a deduplication system data volume. |

The table title is "raidcom map snapshot".

| raidcom map snapshot | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E30 | 0207 | The operation cannot be performed because the specified volume is a DP-VOL with the SLU attribute. |
| CMDRJE | Executing | 2E30 | 2E30 | The specified LDEV is a V-VOL for which the Data Direct Mapping attribute is enabled. |
| CMDRJE | Executing | 2E31 | 9701 | For mapping pairs with the cascade or clone attribute, the Dynamic Provisioning V-VOL is not specified as an S-VOL. |
| CMDRJE | Executing | 2E3F | 8000 | The specified operation is not supported in the current microcode version. |
| CMDRJE | Executing | B980 | B903 | The operation cannot be performed because the selected resource belongs to NAS_Platform_System_RSG. |

## SSB codes returned by raidcom replace snapshot

| raidcom replace snapshot | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 0029 | The command ends abnormally because the volume whose LDEV number is out of range is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0020 | The command ends abnormally because the volume that has the size exceeding the supported size is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0025 | The command ends abnormally because the LUSE volumes of different structure are specified as the P-VOL and the S-VOL. |
| CMDRJE | Executing | 2E10 | 0027 | The command ends abnormally because the external volume is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E10 | 0028 | The command ends abnormally because the volume other than V-VOL is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0029 | The command ends abnormally because the pool-VOL is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 002A | The command ends abnormally because the volume (the data volume or the journal volume) of the Universal Replicator pair that is in the intermediate site of the 3DC cascading configuration is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 002B | The command ends abnormally because the P-VOL of a Universal Replicator pair is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 002C | The command ends abnormally because the S-VOL of a Universal Replicator pair is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 002D | The command ends abnormally because the journal volume of the Universal Replicator is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 002E | The command ends abnormally because the volume to which S-VOL Disable option is set is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 002F | The command ends abnormally because the volume to which VMA is set is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0030 | The command ends abnormally because the volumes of different Max LBA size are specified as the P-VOL and S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |

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| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E10 | 0031 | The command ends abnormally because the volumes whose the number of slots is different are specified as the P-VOL and S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0032 | A pair cannot be created because the Dynamic Provisioning V-VOL is specified as the S-VOL of a Thin Image pair or the specified Thin Image pair doest not exist. |
| CMDRJE | Executing | 2E10 | 0037 | The command ends abnormally because the P-VOL of a ShadowImage pair is specified as the S-VOL of a Thin Imagepair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0038 | The command ends abnormally because the S-VOL of a ShadowImage pair is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 003A | The command ends abnormally because the Volume Migration source volume is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 003B | The command ends abnormally because the Volume Migration target volume is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 003E | The command ends abnormally because the volume of Universal Replicator pair for the delta resync operation is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0041 | A Thin Image pair or a Copy-on-Write Snapshot pair cannot be operated because the Dynamic Provisioning V-VOL whose capacity is being expanded is specified as the P-VOL of the Thin Image pair or the Copy-on-Write Snapshot pair. Rerun the command after the capacity has been expanded. |

| raidcom replace snapshot | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E10 | 0045 | The command ends abnormally because the P-VOL of a TrueCopy pair is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0046 | The command ends abnormally because the S-VOL of a TrueCopy pair is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0056 | The specified volume cannot be used for the Thin Image pair operation because the virtual LDEV ID is deleted. |
| CMDRJE | Executing | 2E10 | 005B | The Thin Image pair operation cannot be performed because the virtual storage machine of the specified P-VOL is different from the virtual storage machine of the specified S-VOL. |
| CMDRJE | Executing | 2E10 | 0060 | The command ends abnormally because the specified S-VOL is not assigned to a Thin Image pair. |
| CMDRJE | Executing | 2E10 | 0061 | The specified volume cannot be used for the Thin Image pair operation because the virtual LDEV ID is deleted. |
| CMDRJE | Executing | 2E10 | 0204 | The operation failed because the specified LDEV which is holding the attribute of SLU is bind to the LDEV which is holding the attribute of ALU. |
| CMDRJE | Executing | 2E10 | 0206 | A Thin Image pair cannot be operated because the Dynamic Provisioning V-VOL whose capacity is being expanded is specified as the S-VOL of the Thin Image pair. Rerun the command after the capacity has been expanded. |
| CMDRJE | Executing | 2E10 | 9709 | The command ends abnormally because the specified Thin Image pair is not exist. |
| CMDRJE | Executing | 2E10 | 970B | The command ends abnormally because the specified Thin Image pair is assigned to an S-VOL. |

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E10 | 970C | The command ends abnormally because the specified Thin Image pair is not assigned to an S-VOL. |
| CMDRJE | Executing | 2E10 | 9710 | The clone or diff clone attribute of the specified Thin Image pair is enabled. |
| CMDRJE | Executing | 2E10 | 9711 | The operation cannot be performed because the S-VOL is the node volume. |
| CMDRJE | Executing | 2E10 | 9713 | The operation cannot be performed because the snapshot tree is being deleted. |
| CMDRJE | Executing | 2E11 | 800F | The operation failed because multiple versions of DKCMAIN microcode are included. |
| CMDRJE | Executing | 2E20 | 0000 | The specified LDEV is not defined. |
| CMDRJE | Executing | 2E20 | 000B | The command ends abnormally because an unmounted volume is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E20 | 000C | The command ends abnormally because either of the following volumes is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair:<br>▪ A blocked volume<br>▪ A volume in a pool that contains a blocked pool volume |
| CMDRJE | Executing | 2E20 | 000D | The command ends abnormally because the volume in formatting is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E21 | 8107 | The command ends abnormally because the shared memory (FC, TPF, or Extension1) is not added for necessary capacity or maintenance work is being performed. |
| CMDRJE | Executing | 2E21 | 8108 | The shared memory for Thin Image or Copy-on-Write Snapshot is not installed. |
| CMDRJE | Executing | 2E21 | 9010 | The program product is not installed. |

Chapter 9: Troubleshooting

| raidcom replace snapshot | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E21 | 9306 | The virutal LDEV ID for a virtual storage machine is not defined on the specified LDEV. |
| CMDRJE | Executing | 2E21 | 930A | The virtual storage machine with the specified serial number is not found. |
| CMDRJE | Executing | 2E30 | 0077 | The command ends abnormally because the volume is already used as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair is specified as the S-VOL. |
| CMDRJE | Executing | 2E30 | 0078 | The command ends abnormally because the volume is already used as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair is specified as the S-VOL. |
| CMDRJE | Executing | 2E30 | 007C | The command ends abnormally because the volume other than OPEN-V is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E30 | 007D | The command ends abnormally because the volume whose command device is set is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E30 | 007F | The command ends abnormally because the volume having no path definition is specified as the S-VOL of a Thin Image pair or the specified Thin Image pair doest not exist. |
| CMDRJE | Executing | 2E30 | 0081 | The command ends abnormally because the external volume mapped for the online data migration is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E30 | 0099 | The specified LDEV is a volume of which Data Direct Mapping attribute is enabled. |
| CMDRJE | Executing | 2E30 | 0201 | The specified LDEV is an external volume of which Data Direct Mapping attribute is enabled. |
| CMDRJE | Executing | 2E30 | 0202 | The specified LDEV is a virtual volume of which Data Direct Mapping attribute is enabled. |

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| raidcom replace snapshot | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E31 | 9701 | For replacement of pairs with the cascade or clone attribute, a Dynamic Provisioning V-VOL is not specified for the S-VOL. |
| CMDRJE | Executing | 2E3F | 8000 | The specified operation is not supported in the current microcode version. |
| CMDRJE | Executing | B980 | B903 | The operation cannot be performed because the selected resource belongs to NAS_Platform_System_RSG. |

## SSB codes returned by raidcom unmap snapshot

| raidcom unmap snapshot | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 0028 | The command ends abnormally because the volume whose LDEV number is out of range is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E00 | 0029 | The command ends abnormally because the volume whose LDEV number is out of range is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0028 | The command ends abnormally because the volume other than V-VOL is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E10 | 0041 | A Thin Image pair or a Copy-on-Write Snapshot pair cannot be operated because the Dynamic Provisioning V-VOL whose capacity is being expanded is specified as the P-VOL of the Thin Image pair or the Copy-on-Write Snapshot pair. Rerun the command after the capacity has been expanded. |

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E10 | 0056 | The specified volume cannot be used for the Thin Image pair operation because the virtual LDEV ID is deleted. |
| CMDRJE | Executing | 2E10 | 005B | The Thin Image pair operation cannot be performed because the virtual storage machine of the specified P-VOL is different from the virtual storage machine of the specified S-VOL. |
| CMDRJE | Executing | 2E10 | 0060 | The command ends abnormally because the specified S-VOL is not assigned to a Thin Image pair. |
| CMDRJE | Executing | 2E10 | 0061 | The specified volume cannot be used for the Thin Image pair operation because the virtual LDEV ID is deleted. |
| CMDRJE | Executing | 2E10 | 0204 | The operation failed because the specified LDEV which is holding the attribute of SLU is bind to the LDEV which is holding the attribute of ALU. |
| CMDRJE | Executing | 2E10 | 0206 | A Thin Image pair cannot be operated because the Dynamic Provisioning V-VOL whose capacity is being expanded is specified as the S-VOL of the Thin Image pair. Rerun the command after the capacity has been expanded. |
| CMDRJE | Executing | 2E10 | 9709 | The command ends abnormally because the specified Thin Image pair is not exist. |
| CMDRJE | Executing | 2E10 | 970C | The command ends abnormally because the specified Thin Image pair is not assigned to an S-VOL. |
| CMDRJE | Executing | 2E10 | 9710 | The clone or diff clone attribute of the specified Thin Image pair is enabled. |
| CMDRJE | Executing | 2E10 | 9711 | The operation cannot be performed because the S-VOL is the node volume. |
| CMDRJE | Executing | 2E10 | 9713 | The operation cannot be performed because the snapshot tree is being deleted. |
| CMDRJE | Executing | 2E11 | 800F | The operation failed because multiple versions of DKCMAIN microcode are included. |
| CMDRJE | Executing | 2E20 | 0000 | The specified LDEV is not defined. |

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| raidcom unmap snapshot | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E20 | 0008 | The command ends abnormally because an unmounted volume is specified as the P-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E20 | 000B | The command ends abnormally because an unmounted volume is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E20 | 000C | The command ends abnormally because either of the following volumes is specified as the S-VOL of a Thin Image pair or a Copy-on-Write Snapshot pair:<br><br>▪ A blocked volume<br><br>▪ A volume in a pool that contains a blocked pool volume |
| CMDRJE | Executing | 2E21 | 8107 | The command ends abnormally because the shared memory (FC, TPF, or Extension1) is not added for necessary capacity or maintenance work is being performed. |
| CMDRJE | Executing | 2E21 | 8108 | The shared memory for Thin Image or Copy-on-Write Snapshot is not installed. |
| CMDRJE | Executing | 2E21 | 9010 | The program product is not installed. |
| CMDRJE | Executing | 2E21 | 9306 | The virutal LDEV ID for a virtual storage machine is not defined on the specified LDEV. |
| CMDRJE | Executing | 2E21 | 930A | The virtual storage machine with the specified serial number is not found. |
| CMDRJE | Executing | 2E30 | 008F | The command ends abnormally because the specified P-VOL is not a P-VOL of a Thin Image pair. |
| CMDRJE | Executing | 2E30 | 0099 | The specified LDEV is a volume of which Data Direct Mapping attribute is enabled. |
| CMDRJE | Executing | 2E30 | 0201 | The specified LDEV is an external volume of which Data Direct Mapping attribute is enabled. |
| CMDRJE | Executing | 2E30 | 0202 | The specified LDEV is a virtual volume of which Data Direct Mapping attribute is enabled. |

Chapter 9: Troubleshooting

| raidcom unmap snapshot | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E3F | 8000 | The specified operation is not supported in the current microcode version. |
| CMDRJE | Executing | B980 | B903 | The operation cannot be performed because the selected resource belongs to NAS_Platform_System_RSG. |

## SSB codes returned by raidcom add ssid

| raidcom add ssid | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 3001 | The CU number of the RCU exceeds the effective value. |
| CMDRJE | Executing | 2E00 | 3008 | The command cannot be executed because the parameter of the specified RCU is invalid. |
| CMDRJE | Executing | 2E00 | 7100 | The CU number is out of effective range. |
| CMDRJE | Executing | 2E11 | 8004 | The operation cannot be performed because the microcode is being changed. |
| CMDRJE | Executing | 2E20 | 3000 | The serial number, product ID, or SSID of the target storage system is incorrect. |
| CMDRJE | Executing | 2E20 | 3001 | The command cannot be executed because the specified RCU is not registered. |
| CMDRJE | Executing | 2E22 | 3002 | The operation cannot be performed due to one of the following reasons:<br>▪ The number of RCUs registered in MCU or RCU is more than four.<br>▪ The number of RCUs registered in the system is more than 64 in the case of specifying the cu free. |
| CMDRJE | Executing | 2E23 | 3301 | The number of the specified SSIDs is invalid. |
| CMDRJE | Executing | 2E31 | 3001 | The command cannot be executed because the RCU identification code of a path is invalid. |

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| raidcom add ssid | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2ED6 | 00EF | An internal error occurred. Call customer support. |
| CMDRJE | Executing | 2ED6 | 3300 | The SSID is invalid. |
| CMDRJE | Executing | 2EF3 | 3002 | The specified parameter is invalid. Check the *Command Control Interface Command Reference*. |

## SSB codes returned by raidcom delete ssid

| raidcom delete ssid | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E00 | 3001 | The CU number of the RCU exceeds the effective value. |
| CMDRJE | Executing | 2E00 | 3008 | The command cannot be executed because the parameter of the specified RCU is invalid. |
| CMDRJE | Executing | 2E00 | 7100 | The CU number is out of effective range. |
| CMDRJE | Executing | 2E11 | 8004 | The operation cannot be performed because the microcode is being changed. |
| CMDRJE | Executing | 2E20 | 3000 | The serial number, the product ID, or the SSID of the remote storage system is invalid. |
| CMDRJE | Executing | 2E20 | 3001 | The command cannot be executed because the specified RCU is not registered. |
| CMDRJE | Executing | 2E23 | 3301 | The number of the specified SSIDs is invalid. |
| CMDRJE | Executing | 2ED6 | 00EF | An internal error occurred. Call customer support. |
| CMDRJE | Executing | 2ED6 | 3300 | The SSID is invalid. |
| CMDRJE | Executing | 2EF3 | 3002 | The specified parameter is invalid. Check the *Command Control Interface Command Reference*. |

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## SSB codes returned by raidcom add dp_pool

| Error message | Executing/ Async | Error code SSB1 | SSB2 | Description |
|---|---|---|---|---|
| | | **raidcom add dp_pool** | | |
| Get Command Status | Async | 2E00 | 0000 | The LDEV number is out of settable range. |
| Get Command Status | Async | 2E00 | 0013 | A pair cannot be created because cache management devices are insufficient. |
| Get Command Status | Async | 2E00 | 0108 | The RAID type of the specified parity group is not correct. |
| CMDRJE | Executing | 2E00 | 2202 | The specified resource ID is out of the effective range. |
| CMDRJE | Executing | 2E00 | 6000 | The value of pool ID is out of range. |
| CMDRJE | Executing | 2E00 | 6001 | The type of pool is invalid. |
| CMDRJE | Executing | 2E00 | 6002 | The subscription limit of V-VOL is out of range. |
| CMDRJE | Executing | 2E00 | 6006 | The capacity threshold value of the specified tier is out of the range. |
| CMDRJE | Executing | 2E00 | 6009 | The threshold of the specified High water mark is out of range. |
| CMDRJE | Executing | 2E00 | 600A | The operation cannot be performed because the specified threshold of Warning is larger than the threshold of the specified High water mark. |
| CMDRJE | Executing | 2E00 | 7000 | The specified CLPR ID is out of the range. |
| Get Command Status | Async | 2E10 | 0001 | The LDEV is used for a TrueCopy pair or Universal Replicator pair. |
| Get Command Status | Async | 2E10 | 0009 | The specified LDEV is in the state of blocked. |
| Get Command Status | Async | 2E10 | 000C | The operation cannot be performed because a SATA-E drive in the state of quick formatting is in the specified LDEV. |
| CMDRJE | Executing | 2E10 | 0011 | The specified LDEV is in the state of blocked, or not installed. |

| raidcom add dp_pool | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E10 | 001F | The operation cannot be performed because the total capacity of virtual volumes for Dynamic Tiering or active flash in the system exceeds the maximum. |
| Get Command Status | Async | 2E10 | 0101 | The specified operation cannot be performed because the checksum of the encryption key does not match. |
| Get Command Status | Async | 2E10 | 0102 | The pool cannot be created because there are not enough resources (VDEV) depending on cache management devices. |
| Get Command Status | Async | 2E10 | 600D | The operation cannot be performed because the pool volume is being deleted. |
| Get Command Status | Async | 2E10 | 6029 | The lowest tier cannot be added because either of the following applies to the specified pool:<br>▪ The pool contains a volume for which capacity saving is enabled.<br>▪ The deduplication function is enabled. |
| Get Command Status | Async | 2E10 | 603A | The LDEVs belonging to a parity group with accelerated compression enabled cannot be used for a pool whose subscription limit is not set to Unlimited. |
| Get Command Status | Async | 2E10 | 603C | The pool volume cannot be registered because a volume with an unsupported drive type is specified in a pool that includes a data reduction shared volume. |
| Get Command Status | Async | 2E10 | 8002 | The specified operation is not supported in the current microcode version. |
| Get Command Status | Async | 2E10 | 8003 | The specified operation cannot be performed because the storage system is being turned off. |
| Get Command Status | Async | 2E10 | 8500 | The specified operation cannot be performed because the drive copy is in process. |
| Get Command Status | Async | 2E11 | 0001 | The specified operation cannot be performed because the LDEV is being verified. |
| Get Command Status | Async | 2E11 | 001E | The operation cannot be performed because the virtual disk space is blocked. |

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| raidcom add dp_pool | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | **Error code** | | Description |
| | | SSB1 | SSB2 | |
| Get Command Status | Async | 2E11 | 005F | The operation failed because accelerated compression of the parity group to which the specified LDEV belongs is enabled and the other LDEV in the parity group is being used for the other pool. |
| Get Command Status | Async | 2E11 | 0108 | The specified LDEV is the LDEV configuring the RAID configuration which cannot be used for the pool volume. |
| Get Command Status | Async | 2E11 | 020C | The specified operation cannot be performed because there is an LDEV that is under format, shredding, or quick format. |
| CMDRJE | Executing | 2E11 | 2208 | The operation cannot be performed because you do not have the resource group authority. |
| Get Command Status | Async | 2E11 | 2209 | The operation cannot be performed because there is no LDEV ID that can be used in a system or resource group. |
| CMDRJE Get Command Status | Executing/ Async | 2E11 | 6003 | The pool is not in the status where the pool volume can be added. |
| Get Command Status | Async | 2E11 | 8003 | The operation cannot be performed because the power supply is switched off. |
| Get Command Status | Async | 2E11 | 8004 | The operation cannot be performed because the internal processing is in progress. |
| Get Command Status | Async | 2E11 | 800F | The operation cannot be performed because the unsupported microcode version exists in the system. |
| Get Command Status | Async | 2E11 | 8010 | The storage system is in internal process, or the configuration change processes are conflicting. |
| Get Command Status | Async | 2E11 | 8013 | The specified operation cannot be performed because the storage system is in process. |
| Get Command Status | Async | 2E11 | 8102 | The specified operation cannot be performed because cache memory is blocked. |
| Get Command Status | Async | 2E11 | 810A | The specified operation cannot be performed because the cache status is abnormal. |

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| raidcom add dp_pool | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| Get Command Status | Async | 2E11 | 8200 | The specified operation cannot be performed because the MP unit status is being changed. |
| Get Command Status | Async | 2E11 | 8201 | The specified operation cannot be performed because the MP unit is blocked. |
| Get Command Status | Async | 2E11 | 8301 | The specified operation cannot be performed because the DKB status is being changed. |
| Get Command Status | Async | 2E11 | 8302 | The specified operation cannot be performed because the CHB status is being changed. |
| Get Command Status | Async | 2E11 | 8311 | The specified operation cannot be performed because DKB is blocked. |
| Get Command Status | Async | 2E11 | 8312 | The specified operation cannot be performed because CHB is blocked. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE | Executing | 2E13 | 0103 | The specified parity group is not the first parity group of the distributed parity group. |
| Get Command Status | Async | 2E13 | 0104 | The specified parity group cannot be operated because it does not have enough capacity for pool volume creation. |
| Get Command Status | Async | 2E13 | 0105 | The operation failed because accelerated compression of the specified parity group is enabled and the parity group contains an LDEV being used for another pool. |

| raidcom add dp_pool | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E13 | 0106 | The operation cannot be performed because there is a blocked LDEV in the specified parity group. |
| Get Command Status | Async | 2E13 | 6007 | The operation cannot be performed because the specified pool is already linked with the virtual volume of Dynamic Provisioning. |
| Get Command Status | Async | 2E13 | 6009 | The operation cannot be performed because the pool capacity is insufficient for Data Direct Mapping. |
| Get Command Status | Async | 2E20 | 0000 | The specified LDEV is not installed. |
| CMDRJE | Executing | 2E20 | 0101 | The specified parity group is not installed. |
| CMDRJE | Executing | 2E20 | 2200 | The specified resource group is not defined. |
| Get Command Status | Async | 2E21 | 8103 | The operation cannot be performed because the memory capacity of the shared memory is insufficient. |
| Get Command Status | Async | 2E21 | 8106 | The operation cannot be performed because the shared memory is not initialized. |
| CMDRJE | Executing | 2E21 | 9007 | Dynamic Provisioning program product is not installed. |
| Get Command Status | Async | 2E21 | 9014 | Data Retention Utility program product is not installed. |
| Get Command Status | Async | 2E22 | 0005 | Exceeded the number of pool volume that can be registered in a pool. |
| Get Command Status | Async | 2E22 | 000D | The larger number of drive types than the supported configuration cannot be added to the specified pool. |
| Get Command Status | Async | 2E22 | 6100 | Pool volume cannot be registered because the drive type of the specified LDEV is different from the other pool volume type, or the drive type in the pool exceeds three. |
| CMDRJE | Executing | 2E23 | 0008 | The number of specified LDEVs is invalid. |
| Get Command Status | Async | 2E23 | 6001 | There are no unused pool IDs. |

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| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E30 | 0000 | The emulation type of the specified LDEV cannot be used as a pool VOL. |
| Get Command Status | Async | 2E30 | 0007 | The specified LDEV has the LU path definition. |
| Get Command Status | Async | 2E30 | 000C | The specified LDEV is used as a quorum disk. |
| Get Command Status | Async | 2E30 | 000D | The specified LDEV is used as a system disk. |
| Get Command Status | Async | 2E30 | 000E | The specified LDEV is already used as a pool volume. |
| Get Command Status | Async | 2E30 | 000F | The LDEV is being used as a journal volume. |
| Get Command Status | Async | 2E30 | 0010 | The specified LDEV is used as a command device. |
| Get Command Status | Async | 2E30 | 0010 | The specified LDEV is a command device. |
| Get Command Status | Async | 2E30 | 0038 | It cannot be used as a pool volume because the size of the specified LDEV is less than 8GB. |
| Get Command Status | Async | 2E30 | 0039 | Creating a pool or adding a pool volume cannot be performed because CLPR is mixed in the specified pool. |
| Get Command Status | Async | 2E30 | 004D | The number of LDEVs that can be created in the parity group or the external volume exceeds the maximum. |
| Get Command Status | Async | 2E30 | 005C | The specified LDEV is used as a V-VOL. |
| Get Command Status | Async | 2E30 | 005D | The specified LDEV is a volume of unsupported Dynamic Tiering or active flash. |
| Get Command Status | Async | 2E30 | 005E | The specified LDEV is used in another program product. |
| CMDRJE | Executing | 2E30 | 006C | An LDEV, whose emulation type is not available to be mixed, is in the specified LDEVs. |

**raidcom add dp_pool**

| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| Get Command Status | Async | 2E30 | 006E | The operation cannot be performed for the following reasons: <br><br>▪ The pool volumes to be added to the Dynamic Tiering pool or active flash pool include external volumes whose cache modes are invalid. <br><br>▪ The Dynamic Provisioning pool includes both external volumes whose cache modes are invalid and internal volumes. |
| CMDRJE <br><br> Get Command Status | Executing/ Async | 2E30 | 0071 | A pool volume cannot be added because the LDEV of the resource group different from the resource group of the pool volume to which the specified pool belongs is specified. |
| Get Command Status | Async | 2E30 | 0074 | The specified LDEV cannot be operated because it is an external volume mapped for online data migration. |
| Get Command Status | Async | 2E30 | 0085 | The specified volume cannot be used as a pool volume. |
| Get Command Status | Async | 2E30 | 0099 | The specified LDEV is a volume of which Data Direct Mapping attribute is enabled. |
| Get Command Status | Async | 2E30 | 020E | The operation cannot be performed because the specified LDEV is registered as namespace in the NVM subsystem. This SSB error code is displayed only for VSP 5000 series and VSP E1090. |
| CMDRJE | Executing | 2E30 | 6000 | The threshold value 1 is out of range. |
| Get Command Status | Async | 2E30 | 6004 | The specified pool attribute differs from the pool attribute of existed pool. |
| Get Command Status | Async | 2E30 | 600D | Tier reallocation of the specified is not enabled. |
| Get Command Status | Async | 2E30 | 6010 | Active flash cannot be enabled because an SSD medium does not exist on Tier 1 of Dynamic Provisioning. |

**raidcom add dp_pool**

| raidcom add dp_pool | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| Get Command Status | Async | 2E30 | 6013 | The LDEV that belongs to the parity group which accelerated compression is enabled cannot be added to the pool with the DP-VOL which is full allocated. |
| Get Command Status | Async | 2E31 | 0015 | The RAID level of the specified LDEV is different with the RAID level of others. |
| Get Command Status | Async | 2E31 | 0016 | There is a blocked pool volume. |
| Get Command Status | Async | 2E31 | 0018 | External volumes whose cache modes are different are included. |
| Get Command Status | Async | 2E31 | 0204 | The operation cannot be performed because the specified parity group or drive contains the remote command device used by the mirror of the journal group. |
| Get Command Status | Async | 2E31 | 0205 | The operation cannot be performed because there is an unformatted LDEV. |
| Get Command Status | Async | 2E31 | 0206 | The operation cannot be performed because the number of LDEVs that can be created exceeds the maximum. |
| CMDRJE | Executing | 2E31 | 6001 | The POOL Name is duplicated with another pool. |
| Get Command Status | Async | 2E31 | 6004 | The pool cannot include volumes in different RAID levels because the pool cannot include those volumes. Or the pool cannot include the RAID 1 volumes and the volumes of other RAID levels together. |
| Get Command Status | Async | 2E31 | 6005 | The pool cannot include both internal volumes and external volumes because the pool is not set to Mixable. |
| Get Command Status | Async | 2E31 | 600A | The function to add a pool volume automatically cannot be set for Dynamic Provisioning for Mainframe pools. |
| Get Command Status | Async | 2E31 | 600B | The specified LDEV cannot be added to a pool because it consists of drives whose drive type code starts with SP. |

| raidcom add dp_pool | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| Get Command Status | Async | 2E31 | 600C | The following pools cannot include an LDEV composed of SCM drives:<br><br>▪ A pool for active flash<br><br>▪ A pool for Thin Image<br><br>▪ A pool with the Data Direct Mapping attribute<br><br>▪ A pool for mainframe system |
| Get Command Status | Async | 2E31 | 6101 | The operation cannot be performed because the combination of drive types of the drives that compose the hierarchy is incorrect.<br><br>For details about the supported combinations, see the Provisioning Guide for your storage system. |
| Get Command Status | Async | 2E31 | 9000 | The usage capacity exceeds the license capacity of program product. |
| Get Command Status | Async | 2E31 | 9003 | This operation cannot be performed due to either of the following reasons:<br><br>▪ The program product of Dynamic Provisioning, Dynamic Tiering, or active flash is not installed.<br><br>▪ The capacity exceeds the licensed capacity for the program product. |
| Get Command Status | Async | 2E31 | 9004 | The operation cannot be performed because Dynamic Tiering program product is not installed or the usage capacity exceeds the license capacity. |
| CMDRJE | Executing | 2EE7 | 00EE | The command cannot be accepted. After a while, execute the same command. |
| CMDRJE<br>Get Command Status | Executing/ Async | 2EE7 | FEEC | An internal error occurred.<br><br>Call customer support. |
| Get Command Status | Async | 2EE7 | FFFF | An internal error occurred.<br><br>Call customer support. |
| CMDRJE | Executing | B980 | B903 | The command was rejected because the selected resource belongs to NAS_Platform_System_RSG. |

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## SSB codes returned by raidcom modify rcu

| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
|---|---|---|---|---|
| CMDRJE | Executing | 2E00 | 3001 | CU# of RCU exceed the effective value. |
| CMDRJE | Executing | 2E00 | 3002 | The value of least path number is invalid. |
| CMDRJE | Executing | 2E00 | 3003 | The value of RIO MIH time is invalid. |
| CMDRJE | Executing | 2E00 | 3004 | The value of Round-trip response time is invalid. |
| CMDRJE | Executing | 2E00 | 3005 | Invalid product ID or path registration ID. |
| CMDRJE | Executing | 2E00 | 3007 | Incident that is created by CU is not in the one of followings.<br><br>- Incident that is sent to MCU host and RCU.<br><br>- Incident that is sent to RCU. |
| Get Command Status | Async | 2E00 | 3008 | The command cannot be executed because the parameter of the specified RCU is invalid. |
| Get Command Status | Async | 2E00 | 3009 | The command cannot be executed because all the CU numbers in the RCU is not unified at the path that is specified creation or deletion. |
| CMDRJE | Executing | 2E00 | 7100 | The CU number is out of effective range. |
| CMDRJE | Executing | 2E11 | 8004 | The operation cannot be performed because the microcode is being changed. |
| CMDRJE | Executing | 2E20 | 3000 | The serial number, the product ID, or the SSID of the target storage system is incorrect. |
| CMDRJE | Executing | 2E20 | 3001 | The attribute of the RCU cannot be changed because the specified RCU is not registered. |
| Get Command Status | Async | 2E21 | 7101 | The specified CU number is not defined, or an LDEV is not defined under the CU number. |
| CMDRJE | Executing | 2E23 | 3101 | The operation cannot be performed because the number of paths becomes less than the least path number. |
| Get Command Status | Async | 2E31 | 3001 | The command cannot be executed because the RCU identification code of a path is invalid. |
| CMDRJE | Executing | 2ED6 | 00EF | An internal error occurred.<br><br>Call customer support. |

| raidcom modify rcu | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2ED6 | 3300 | The value of SSID for the remote storage system is invalid. |

## SSB codes returned by raidcom delete rcu_path

| raidcom delete rcu_path | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E00 | 3001 | The CU# of RCU exceeds the effective value. |
| CMDRJE | Executing | 2E00 | 3005 | The product ID or the path registration ID is invalid. |
| Get Command Status | Async | 2E00 | 3008 | The command cannot be executed because the parameter of the specified RCU is invalid. |
| CMDRJE | Executing | 2E00 | 3200 | The specified port # on the side of RCU is invalid. |
| CMDRJE Get Command Status | Executing/ Async | 2E00 | 7100 | The CU number is out of effective range. |
| CMDRJE Get Command Status | Executing/ Async | 2E00 | 8400 | The value of the specified port is invalid. |
| Get Command Status | Async | 2E10 | 3101 | Failed to establish a path or the deletion operation. The following factor can be thought.<br>▪ Input parameter is invalid.<br>▪ Port status or the MP Blade status is in the state of abnormal.<br>▪ Cable is not connected correctly.<br>▪ Port is specified incorrectly. |
| Get Command Status | Async | 2E11 | 8004 | The operation cannot be performed because the microcode is being changed. |

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| raidcom delete rcu_path | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: <br><br> 1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands. <br> 2. Rerun the command that caused an error. <br><br> If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E20 | 3001 | A logical path cannot be deleted because the specified RCU is not registered. |
| Get Command Status | Async | 2E21 | 7101 | The specified CU number is not defined, or an LDEV is not defined under the CU number. |
| Get Command Status | Async | 2E23 | 3101 | The operation cannot be performed because the number of paths becomes less than the least path number. |
| CMDRJE | Executing | 2E30 | 840A | The port attribute is not Initiator (MCU). |
| CMDRJE | Executing | 2E30 | 840E | The command cannot be executed with the specified port attribute. |
| Get Command Status | Async | 2E31 | 3001 | The command cannot be executed because the RCU identification code of a path is invalid. |
| Get Command Status | Async | 2E31 | 3101 | The command cannot be executed because the serial number is not unified in the specified path. |
| CMDRJE | Executing | 2ED6 | 00EE | The command cannot be accepted because the DKC is busy. After a while, execute the same command. |
| Get Command Status | Async | 2ED6 | 3005 | An internal error occurred. <br><br> Call customer support. |
| CMDRJE | Executing | 2EF3 | 3002 | The specified parameter is invalid. Check the *Command Control Interface Command Reference*. |

| raidcom delete rcu_path | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS Platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the specified port is for NAS Platform (User LU). |

## SSB codes returned by raidcom add rcu_path

| raidcom add rcu_path | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 3001 | CU# of RCU exceeds the effective value. |
| CMDRJE | Executing | 2E00 | 3005 | Invalid product ID or path registration ID. |
| Get Command Status | Async | 2E00 | 3008 | The command cannot be executed because the parameter of the specified RCU is invalid. |
| Get Command Status | Async | 2E00 | 3009 | The command cannot be executed because all the CU numbers in the RCU is not unified at the path that is specified creation or deletion. |
| CMDRJE | Executing | 2E00 | 3200 | The value of port # on the side of RCU is invalid. |
| CMDRJE Get Command Status | Executing /Async | 2E00 | 7100 | The CU number is out of effective range. |
| CMDRJE Get Command Status | Executing/ Async | 2E00 | 8400 | The value of the specified port is invalid. |
| Get Command Status | Async | 2E10 | 3101 | Failed to establish a path or the deletion operation. The following factor can be thought. ▪ Input parameter is invalid. ▪ Port status or the MP Blade status is in the state of abnormal. ▪ Cable is not connected correctly. ▪ Port is specified incorrectly. |

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| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E11 | 8004 | The operation cannot be performed because the microcode is being changed. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E20 | 3000 | The serial number, the product ID, or the SSID of the target storage system is incorrect. |
| Get Command Status | Async | 2E20 | 3001 | A logical path cannot be added because the specified RCU is not registered. |
| Get Command Status | Async | 2E21 | 7101 | The specified CU number is not defined, or an LDEV is not defined under the CU number. |
| Get Command Status | Async | 2E23 | 3100 | An RCU path cannot be added because the number of valid paths exceeds the maximum. |
| Get Command Status | Async | 2E23 | 3101 | The operation cannot be performed because the number of paths becomes less than the least path number. |
| CMDRJE | Executing | 2E30 | 840A | The port attribute is not Initiator (MCU). |
| CMDRJE | Executing | 2E30 | 840E | The command cannot be executed with the specified port attribute. |
| CMDRJE | Executing | 2E30 | 8410 | The specified port cannot be operated because the operation mode of the port is NVMe mode. |
| Get Command Status | Async | 2E31 | 3001 | The command cannot be executed because the RCU identification code of a path is invalid. |
| Get Command Status | Async | 2E31 | 3101 | The command cannot be executed because the serial number is not unified in the specified path. |

| | raidcom add rcu_path | | | |
|---|---|---|---|---|

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| raidcom add rcu_path | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2ED6 | 00EE | The command cannot be accepted because the DKC is busy. After a while, execute the same command. |
| Get Command Status | Async | 2ED6 | 3005 | An internal error occurred. Call customer support. |
| CMDRJE | Executing | 2ED6 | 3300 | The value of SSID on the remote storage system is invalid. |
| CMDRJE | Executing | 2EF3 | 3002 | The specified parameter is invalid. Check the *Command Control Interface Command Reference*. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS Platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the specified port is for NAS Platform (User LU). |

## SSB codes returned by raidcom delete rcu

| raidcom delete rcu | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 3001 | CU# on the RCU exceeds the effective range. |
| CMDRJE | Executing | 2E00 | 3005 | Invalid product ID or path registration ID. |
| Get Command Status | Async | 2E00 | 3008 | The command cannot be executed because the parameter of the specified RCU is invalid. |
| CMDRJE | Executing | 2E00 | 3200 | The value of the specified port# on the RCU side is invalid. |
| Get Command Status | Async | 2E00 | 7100 | The CU number is out of effective range. |
| CMDRJE Get Command Status | Executing/ Async | 2E00 | 8400 | The value of the specified port is invalid. |

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| raidcom delete rcu | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| Get Command Status | Async | 2E11 | 8004 | The operation cannot be performed because the microcode is being changed. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E20 | 3000 | The serial number, the product ID, or the SSID of the target storage system is incorrect. |
| Get Command Status | Async | 2E20 | 3001 | The specified RCU cannot be deleted because the RCU is not registered. |
| Get Command Status | Async | 2E21 | 7101 | The specified CU number is not defined, or an LDEV is not defined under the CU number. |
| Get Command Status | Async | 2E22 | 3101 | The path cannot be deleted because there is a pair of TrueCopy/Universal Replicator, or a journal volume is in the target CU. |
| Get Command Status | Async | 2E31 | 3001 | The command cannot be executed because the RCU identification code of a path is invalid. |
| CMDRJE | Executing | 2ED6 | 00EE | The command cannot be accepted because the DKC is busy. After a while, execute the same command. |
| Get Command Status | Async | 2ED6 | 3005 | An internal error occurred.<br><br>Call customer support. |
| CMDRJE | Executing | 2ED6 | 3300 | The value of SSID on the remote storage system is invalid. |
| CMDRJE | Executing | 2EDE | 00D1 | RCU storage system does not exist. |

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| raidcom delete rcu | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2EF3 | 3002 | The specified parameter is invalid. Check the *Command Control Interface Command Reference*. |

## SSB codes returned by raidcom add rcu

| raidcom add rcu | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 3001 | The value of CU# on the RCU exceeds the effective range. |
| CMDRJE | Executing | 2E00 | 3005 | Invalid product ID or path registration ID. |
| Get Command Status | Async | 2E00 | 3008 | The command cannot be executed because the parameter of the specified RCU is invalid. |
| Get Command Status | Async | 2E00 | 3009 | The command cannot be executed because all the CU numbers in the RCU is not unified at the path that is specified creation or deletion. |
| CMDRJE | Executing | 2E00 | 3200 | The value of port# on the side of RCU is invalid. |
| CMDRJE Get Command Status | Executing/ Async | 2E00 | 7100 | The CU number is out of effective range. |
| CMDRJE Get Command Status | Executing/ Async | 2E00 | 8400 | The value of the specified port is invalid. |
| Get Command Status | Async | 2E10 | 3101 | Failed to establish a path or the deletion operation. The following factor can be thought.<br><br>▪ Input parameter is invalid.<br><br>▪ Port status or the MP Blade status is in the state of abnormal.<br><br>▪ Cable is not connected correctly.<br><br>▪ Port is specified incorrectly. |

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| raidcom add rcu | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E11 | 8004 | The operation cannot be performed because the microcode is being changed. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E20 | 3000 | The serial number, the product ID, or the SSID of the target storage system is incorrect. |
| Get Command Status | Async | 2E21 | 7101 | The specified CU number is not defined, or an LDEV is not defined under the CU number. |
| Get Command Status | Async | 2E22 | 3001 | The specified RCU is already registered to another product ID. |
| Get Command Status | Async | 2E22 | 3002 | The operation cannot be performed due to one of the following reasons:<br><br>▪ The number of RCUs registered in MCU or RCU is more than four.<br>▪ The number of RCUs registered in the system is more than 64 in the case of specifying the cu free. |
| Get Command Status | Async | 2E22 | 3300 | The specified SSID is already registered to another RCU. |
| Get Command Status | Async | 2E23 | 3000 | The specified RCU is cannot be registered because there is no free RCU. |
| Get Command Status | Async | 2E23 | 3101 | The operation cannot be performed because the number of paths becomes less than the least path number. |
| CMDRJE | Executing | 2E30 | 840A | The port attribute is not Initiator (MCU). |

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| raidcom add rcu | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E30 | 8410 | The specified port cannot be operated because the operation mode of the port is NVMe mode. |
| Get Command Status | Async | 2E31 | 3001 | The command cannot be executed because the RCU identification code of a path is invalid. |
| Get Command Status | Async | 2E31 | 3002 | The operation cannot be performed because the remote storage system does not support the path between CUs. |
| Get Command Status | Async | 2E31 | 3101 | The command cannot be executed because the serial number is not unified in the specified path. |
| CMDRJE | Executing | 2ED6 | 00EE | The command cannot be accepted because the DKC is busy. After a while, execute the same command. |
| Get Command Status | Async | 2ED6 | 3005 | An internal error occurred. Call customer support. |
| CMDRJE | Executing | 2ED6 | 3300 | The value of SSID on the remote storage system is invalid. |
| CMDRJE | Executing | 2EF3 | 3002 | The specified parameter is invalid. Check the *Command Control Interface Command Reference*. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS Platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the specified port is for NAS Platform (User LU). |

## SSB codes returned by raidcom delete ldev

| raidcom delete ldev | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is out of settable range. |

| raidcom delete ldev | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| Get Command Status | Async | 2E00 | 000E | This command does not support the emulation type of the specified LDEV. |
| Get Command Status | Async | 2E00 | 0016 | The command cannot be executed by receiving multiple operations for the same LDEV. |
| Get Command Status | Async | 2E10 | 0000 | The specified LDEV is used for a pair of ShadowImage/Thin Image/Copy-on-Write Snapshot/Volume Migration or as a relationship of Compatible FlashCopy® V2/Hitachi Compatible Software for IBM® FlashCopy® SE. |
| Get Command Status | Async | 2E10 | 0001 | The specified LDEV is used for a TrueCopy pair, a Universal Replicator pair or a command device defined by Business Continuity Manager. |
| Get Command Status | Async | 2E10 | 0002 | The specified LDEV is used for a Universal Replicator pair or a journal. |
| Get Command Status | Async | 2E10 | 0003 | The specified LDEV is used as a Compatible FlashCopy® V2 relationship. |
| Get Command Status | Async | 2E10 | 0004 | The specified LDEV is used for a Thin Image pair or a Copy-on-Write Snapshot pair. |
| Get Command Status | Async | 2E10 | 0005 | The specified LDEV is used for aVolume Migration. |
| Get Command Status | Async | 2E10 | 0008 | The specified LDEV is used as a system disk. |
| Get Command Status | Async | 2E10 | 0012 | The specified LDEV is used as a CC/XRC attribute device. |
| Get Command Status | Async | 2E10 | 0062 | The specified LDEV is used as the primary volume for the GAD pair. |
| Get Command Status | Async | 2E10 | 0063 | The specified LDEV is used as the secondary volume for the GAD pair. |
| Get Command Status | Async | 2E10 | 020B | The specified LDEV cannot be operated because the deduplication function is set. |
| Get Command Status | Async | 2E10 | 020C | The specified LDEV cannot be operated because deduplicated data exists. |

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| raidcom delete ldev | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E10 | 020D | The specified LDEV cannot be operated because it is in the status where the capacity saving setting cannot be disabled. |
| Get Command Status | Async | 2E10 | 0212 | The operation cannot be performed because a page is allocated to the specified LDEV. To delete the volume, specify the `-operation initialize_capacity_saving` option, or perform any one of the following before the deletion:<br>▪ Format the LDEV.<br>▪ Disable the capacity saving setting of the LDEV.<br>▪ Initialize the deduplication system data volume of the pool and the volume that contains deduplicated data. |
| CMDRJE<br>Get Command Status | Executing/ Async | 2E10 | 0217 | The specified LDEV cannot be operated because it is a volume for which capacity saving setting is disabled. |
| Get Command Status | Async | 2E10 | 023A | The operation cannot be performed because the specified LDEV is a data reduction shared volume. |
| Get Command Status | Async | 2E10 | 600B | The pool is blocked. |
| Get Command Status | Async | 2E10 | 6022 | The operation cannot be performed because the deduplication system data volume of the pool linked with the specified LDEV is blocked. |
| Get Command Status | Async | 2E10 | 6026 | The specified virtual volume cannot be operated because the used capacity of the pool associated with the specified virtual volume exceeds the depletion threshold. |
| Get Command Status | Async | 2E11 | 0004 | An LDEV that is in the state of formatting is included in the parity group of the target LDEV. |
| Get Command Status | Async | 2E11 | 0005 | An LDEV that is in the state of executing quick format is included in the parity group of the target LDEV. |

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| | | Error code | | |
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
|---|---|---|---|---|
| | | | raidcom delete ldev | |
| Get Command Status | Async | 2E11 | 001B | The specified LDEV is blocked. |
| CMDRJE | Executing | 2E11 | 0053 | The specified LDEV is used in another operation. |
| Get Command Status | Async | 2E11 | 0102 | The parity group of the target LDEV is in the state of correction copy. |
| CMDRJE | Executing | 2E11 | 0153 | The parity group or the external volume group that the specified LDEV is belongs to is used in another operation. |
| Get Command Status | Async | 2E11 | 0202 | The external volume group with the Data Direct Mapping attribute which is allocated to the specified LDEV is not in the state of disconnected. |
| Get Command Status | Async | 2E11 | 6004 | The operation cannot be performed because pools are blocked. |
| Get Command Status | Async | 2E11 | 6008 | The operation cannot be performed because the pool linked with the specified LDEV is in the unusable status. |
| Get Command Status | Async | 2E11 | 8004 | The operation cannot be performed because the internal processing is in progress. |
| Get Command Status | Async | 2E11 | 800F | The operation failed because multiple versions of DKCMAIN microcode are included. |
| CMDRJE | Executing | 2E11 | 8010 | The storage system is in internal process, or the configuration changing processes are conflicting. |
| Get Command Status | Async | 2E11 | 8108 | The operation cannot be performed because there is blocked part in the system. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: 1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands. 2. Rerun the command that caused an error. |

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| | | | | If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE Get Command Status | Executing/ Async | 2E20 | 0000 | LDEV is not installed. |
| CMDRJE | Executing | 2E30 | 0007 | An LU path has been defined. |
| Get Command Status | Async | 2E30 | 000A | The specified LDEV is used for a Dynamic Provisioning. |
| Get Command Status | Async | 2E30 | 000C | The specified LDEV is used as a quorum disk. |
| Get Command Status | Async | 2E30 | 000E | The specified LDEV is used as a pool volume. |
| Get Command Status | Async | 2E30 | 000F | The specified LDEV is used as a journal volume. |
| Get Command Status | Async | 2E30 | 0006 | The specified LDEV is used in the FICON$^®$ Data Migration. |
| CMDRJE | Executing | 2E30 | 009C | The specified option cannot be performed for the attribute of the specified LDEV. |
| Get Command Status | Async | 2E30 | 0010 | The specified LDEV is a command device. |
| CMDRJE Get Command Status | Executing/ Async | 2E30 | 0013 | The specified volume cannot be deleted because it is a LUSE volume. |
| Get Command Status | Async | 2E30 | 0014 | The specified LDEV is used as a reserved volume of Volume Migration. |
| Get Command Status | Async | 2E30 | 0018 | This is a volume that the Data Retention Utility is set. |
| Get Command Status | Async | 2E30 | 001A | Volume Security is set to the specified LDEV. |
| Get Command Status | Async | 2E30 | 001E | The specified LDEV cannot be deleted because of online from the mainframe host. |

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| raidcom delete ldev | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E30 | 002C | The specified LDEV cannot be operated because it has not been formatted. Alternatively, the pool associated with the specified LDEV contains a pool volume that is not in the normal status.<br><br>If either of the following conditions is met, contact customer support:<br><br>▪ The pool contains a pool volume that is not in the normal status.<br><br>▪ The LDEV cannot be formatted. |
| Get Command Status | Async | 2E30 | 004E | The specified LDEV is a Data Retention Utility/ Volume Retention Manager attribute device. |
| Get Command Status | Async | 2E30 | 0053 | This is a volume that the Volume Retention Manager is set. |
| Get Command Status | Async | 2E30 | 0054 | The specified LDEV is used as a Compatible FlashCopy® V2 or a Hitachi Compatible Software for IBM® FlashCopy® SE relationship. |
| Get Command Status | Async | 2E30 | 0055 | The specified LDEV is used for aVolume Migration. |
| Get Command Status | Async | 2E30 | 0056 | The specified LDEV is used for aVolume Migration |
| Get Command Status | Async | 2E30 | 0057 | The specified LDEV is used as a system disk. |
| Get Command Status | Async | 2E30 | 0058 | The specified LDEV is used as a system disk. |
| Get Command Status | Async | 2E30 | 0060 | The specified LDEV is a command device. |
| Get Command Status | Async | 2E30 | 0074 | The specified LDEV cannot be operated because it is an external volume mapped for online data migration. |
| Get Command Status | Async | 2E30 | 0096 | The specified LDEV is used as an ALU. |
| Get Command Status | Async | 2E30 | 0097 | The specified LDEV is used as an SLU. |

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| raidcom delete ldev | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E30 | 0206 | The operation cannot be performed because the specified LDEV is a deduplication system data volume. |
| Get Command Status | Async | 2E30 | 020B | The operation cannot be performed because the specified LDEV is used by Ops Center Administrator Embedded. |
| CMDRJE / Get Command Status | Executing/ Async | 2E30 | 020E | The operation cannot be performed because the specified LDEV is registered as namespace in the NVM subsystem. This SSB error code is displayed only for VSP 5000 series and VSP E1090. |
| Get Command Status | Async | 2E30 | 4102 | The specified volume is used as a TrueCopy. |
| Get Command Status | Async | 2E30 | 4103 | The specified volume is used as a TrueCopy. |
| Get Command Status | Async | 2E30 | 4104 | The specified volume is used as a ShadowImage pair volume, a Thin Image pair volume, or a FICON® Data Migration volume. |
| Get Command Status | Async | 2E30 | 4105 | The specified volume is used as a ShadowImage pair volume, a Thin Image pair volume, or a FICON® Data Migration volume. |
| Get Command Status | Async | 2E30 | 4107 | The specified volume is used as a ShadowImage. |
| Get Command Status | Async | 2E30 | 4108 | The specified LDEV is used as a reserved volume of Volume Migration. |
| Get Command Status | Async | 2E31 | 0001 | The target LDEV is a quorum disk and cannot be deleted. |
| CMDRJE | Executing | 2EE8 | 00EE | The command cannot be accepted. After a while, execute the same command. |
| CMDRJE | Executing | 2EE8 | 00F0 | The specified command cannot be accepted because the command is not supported. |
| Get Command Status | Async | 2EE8 | 0A18 | An internal error occurred. Contact customer support. |

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| raidcom delete ldev | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE  Get Command Status | Executing/ Async | 2EE8 | FEEC | An internal error occurred.  Contact customer support. |
| Get Command Status | Async | 2EE8 | FFFB | An internal error occurred.  Contact customer support. |
| CMDRJE | Executing | B980 | B903 | The command was rejected because the selected resource belongs to NAS_Platform_System_RSG. |

## SSB codes returned by raidcom delete hba_wwn

| raidcom delete hba_wwn | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B957 | 401E | The operation cannot be performed due to the following compound conditions:  ▪ The specified host group is linked with Server Priority Manager.  ▪ You do not have the Server Priority Manager authority. |
| CMDRJE | Executing | B957 | 404F | The program product is not installed. |
| CMDRJE | Executing | B957 | 4087 | The host group ID exceeds the maximum value. |
| CMDRJE | Executing | B957 | 4089 | The specified host group is not installed. |
| CMDRJE | Executing | B957 | 408A | The attribute of the specified port is Initiator or External. |
| CMDRJE | Executing | B957 | 408F | The specified command is not supported for the iSCSI port. |
| CMDRJE | Executing | B957 | 4816 | The operation cannot be performed because the specified port is used by Ops Center Administrator Embedded. |

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| raidcom delete hba_wwn | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B957 | B9DA | The operation cannot be performed because it is locked by another session. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS Platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the specified port is for NAS Platform (User LU). |

## SSB codes returned by raidcom add hba_wwn

| raidcom add hba_wwn | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B957 | 401E | The operation cannot be performed due to the following compound conditions:<br>▪ The specified host group is linked with Server Priority Manager.<br>▪ You do not have the Server Priority Manager authority. |
| CMDRJE | Executing | B957 | 404F | The program product is not installed. |
| CMDRJE | Executing | B957 | 4081 | The value of hba_wwn is invalid. |
| CMDRJE | Executing | B957 | 4087 | The value of host group ID exceeds the maximum. |
| CMDRJE | Executing | B957 | 4089 | The host group is not installed. |
| CMDRJE | Executing | B957 | 408A | The attribute of the specified port is Initiator or External. |
| CMDRJE | Executing | B957 | 408F | The specified command is not supported for the iSCSI port. |
| CMDRJE | Executing | B957 | 4184 | The number of WWN reached the maximum. |
| CMDRJE | Executing | B957 | 4188 | HBA WWN is already registered. |

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| raidcom add hba_wwn | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B957 | 4816 | The operation cannot be performed because the specified port is used by Storage Advisor Embedded. |
| CMDRJE | Executing | B957 | 4818 | For the specified host group, HBAs have been defined to the upper limit of Storage Advisor Embedded. |
| CMDRJE | Executing | B957 | B9D1 | The number of WWNs exceeds the maximum that can be set by SPM. |
| CMDRJE | Executing | B957 | B9D4 | The Server Priority Manager program product is not installed. |
| CMDRJE | Executing | B957 | B9D5 | The number of WWNs exceeds the maximum that can be set to the port. |
| CMDRJE | Executing | B957 | B9D8 | The WWN belonging to the specified host group is registered in another SPM group. |
| CMDRJE | Executing | B957 | B9DA | The operation cannot be performed because it is locked by another session. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS Platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the specified port is for NAS Platform (User LU). |

## SSB codes returned by raidcom set hba_wwn

| raidcom set hba_wwn | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B957 | 404F | The program product is not installed. |
| CMDRJE | Executing | B957 | 4087 | The value of host group ID exceeds the maximum. |
| CMDRJE | Executing | B957 | 4089 | The host group is not installed. |

| raidcom set hba_wwn | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B957 | 408A | The attribute of the specified port is Initiator or External. |
| CMDRJE | Executing | B957 | 4385 | The specified WWN does not exist. |
| CMDRJE | Executing | B957 | 438B | The specified WWN nickname is already used in the same port. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS Platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the specified port is for NAS Platform (User LU). |

## SSB codes returned by raidcom reset hba_wwn

| raidcom reset hba_wwn | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B957 | 404F | The program product is not installed. |
| CMDRJE | Executing | B957 | 4087 | The value of Host group ID exceeds the maximum. |
| CMDRJE | Executing | B957 | 4089 | The host group is not installed. |
| CMDRJE | Executing | B957 | 408A | The attribute of the specified port is Initiator or External. |
| CMDRJE | Executing | B957 | 4385 | The specified WWN does not exist. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS Platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the specified port is for NAS Platform (User LU). |

## *SSB codes returned by raidcom add copy_grp*

| raidcom add copy_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 000B | The number of MU# exceeds the maximum. |
| CMDRJE | Executing | 2E00 | 2100 | Invalid device number. |
| CMDRJE | Executing | 2E00 | 5000 | The specified journal ID exceeds the range. |
| CMDRJE | Executing | 2E20 | 2100 | A device group is not installed. |
| CMDRJE | Executing | 2E22 | 2000 | There is a copy group. |
| CMDRJE | Executing | 2E23 | 2000 | The number of copy groups in the system reached the maximum. |
| CMDRJE | Executing | 2E30 | 2100 | The specified device group is already defined in the other copy group. |
| CMDRJE | Executing | 2E31 | 0012 | There is an LDEV in the device group that has an undefined device name. |
| CMDRJE | Executing | 2E31 | 0013 | The same device names of LDEV are in the device group. |
| CMDRJE | Executing | 2E31 | 0014 | The same LDEVs are in the copy group. |
| Invalid Character | Executing | - | - | Unavailable character is included in the name of copy group. |

## *SSB codes returned by raidcom delete copy_grp*

| raidcom delete copy_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E20 | 2000 | The copy group is not installed. |
| Invalid Character | Executing | - | - | Unavailable character is included in the name of copy group. |

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## SSB codes returned by raidcom modify port -port_speed

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | B954 | FF21 | The specified operation cannot be performed, because the package containing the specified port is not subject to the operation. |
| CMDRJE | Executing | B955 | 0404 | A remote path has been defined. |
| CMDRJE | Executing | B955 | 040F | An internal error occurred. Contact customer support. |
| CMDRJE | Executing | B955 | 044C | The specified AL-PA is invalid. |
| CMDRJE | Executing | B955 | 054E | The specified topology is invalid. |
| CMDRJE | Executing | B955 | 05A6 | The other than "fabric on" cannot be specified when specifying a topology of the package for Fibre Channel over Ethernet. |
| CMDRJE | Executing | B955 | 05A7 | The other than "P-to-P (point to point)" cannot be specified when specifying a topology of the package for Fibre Channel over Ethernet. |
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 104F | The program product is not installed. |
| CMDRJE | Executing | B955 | 1124 | The specified operation cannot be performed, because the host speed set for the specified FICON$^{®}$ adapter is not valid. |
| CMDRJE | Executing | B955 | 113D | Invalid host speed is set for 4Gbps fibre adapter. The available host speeds are AUTO, 1G, 2G, and 4G only. |
| CMDRJE | Executing | B955 | 113E | Invalid host speed is set for the specified fibre adapter. |
| CMDRJE | Executing | B955 | 113F | Invalid host speed is set for 8Gbps fibre adapter. The available host speeds are AUTO, 2G, 4G, and 8G only. |
| CMDRJE | Executing | B955 | 11A5 | The other than "10G" cannot be specified when specifying a host speed of the package for Fibre Channel over Ethernet. |

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | **SSB1** | **SSB2** | |
| | | header: **raidcom modify port -port_speed** | | |

| **raidcom modify port -port_speed** | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B955 | 11AE | Invalid host speed is set for 16Gbps fibre adapter. The available host speeds are AUTO, 2G, 4G, and 8G only. |
| CMDRJE | Executing | B955 | 11AF | The specified operation cannot be performed because an invalid host speed is specified for a port on an iSCSI channel board. |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a channel board to which the specified port belongs. Wait for a while, and then retry the command. |
| CMDRJE | Executing | B955 | 12AF | The combination of the specified host speed and the topology FC-AL set for the fibre channel adapter is not supported. See the *Provisioning Guide* of your system for supported combinations of data transfer speed and type of connection. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS Platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the specified port is for NAS Platform (User LU). |

## SSB codes returned by raidcom modify port -port_attribute

| **raidcom modify port -port_attribute** | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 8401 | The specified port attribute is not supported. |
| Get Command Status | Async | 2E00 | 8404 | The target channel adapter or the channel board does not support the specified port attribute. |
| CMDRJE | Executing | 2E10 | 8001 | The operation cannot be performed because another application, for example Storage Navigator, Device Manager - Storage Navigator, and SVP is used. |
| CMDRJE | Executing | 2E10 | 8400 | The specified port is blocked. |

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| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E10 | 8402 | There is a pair for TrueCopy/Universal Replicator that is using the specified port. |
| CMDRJE | Executing | 2E10 | 8403 | There is a pair for TrueCopy/Universal Replicator that is using the specified port. |
| CMDRJE | Executing | 2E11 | 800D | The storage system is in the state of start-up. Wait for a while, then retry the operation. |
| CMDRJE | Executing | 2E13 | 8401 | The port attribute cannot be changed because it is used for the iSCSI path of the remote replication. |
| CMDRJE | Executing | 2E13 | 8402 | iSNS is set for the specified port. |
| CMDRJE | Executing | 2E20 | 8400 | The specified port is not installed. |
| CMDRJE | Executing | 2E30 | 8403 | There is a path for TrueCopy/Universal Replicator in the specified port. |
| CMDRJE | Executing | 2E30 | 8406 | There is an external VOL path in the specified port. |
| CMDRJE | Executing | 2E30 | 8407 | There is a path for TrueCopy/Universal Replicator in the specified port. |
| CMDRJE | Executing | 2E30 | 8408 | There is a path for TrueCopy/Universal Replicator in the specified port. |
| CMDRJE | Executing | 2E30 | 8409 | An LU path has been defined. |
| Get Command Status | Async | 2E30 | 8410 | The specified port cannot be changed because its operation mode is NVMe mode. This SSB error code is displayed only for VSP 5000 series and VSP E1090. |
| CMDRJE | Executing | 2ED0 | 84FC | An internal error occurred. Call customer support. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS Platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the specified port is for NAS Platform (User LU). |

The table title "raidcom modify port -port_attribute" appears as a header spanning the table.

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## SSB codes returned by raidcom modify port -delayed_ack_mode

| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
|---|---|---|---|---|
| | | **raidcom modify port -delayed_ack_mode** | | |
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 120E | The command cannot be executed because the iSCSI virtual port mode is ON. |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a channel board to which the specified port belongs. Wait for a while, and then retry the command. |

## SSB codes returned by raidcom modify port -ipv4_address

| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
|---|---|---|---|---|
| | | **raidcom modify port -ipv4_address** | | |
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 10B3 | The network address, loop-back address, broadcast address or the IP address beginning with 255 cannot be used as the IP address for IPv4. |
| CMDRJE | Executing | B955 | 120E | The command cannot be executed because the iSCSI virtual port mode is ON. |
| CMDRJE | Executing | B955 | 1225 | The specified operation cannot be performed because the same IP address is already set for a channel board to which the specified port belongs. |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a channel board to which the specified port belongs. Wait for a while, and then retry the command. |

## SSB codes returned by raidcom modify port -ipv4_subnetmask

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 10DB | The subnet mask cannot be set because the specified value is invalid. |
| CMDRJE | Executing | B955 | 120E | The command cannot be executed because the iSCSI virtual port mode is ON. |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a channel board to which the specified port belongs. Wait for a while, and then retry the command. |

*Table title row: raidcom modify port -ipv4_subnetmask*

## SSB codes returned by raidcom modify port -ipv4_gateway_address

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 120E | The command cannot be executed because the iSCSI virtual port mode is ON. |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a channel board to which the specified port belongs. Wait for a while, and then retry the command. |

*Table title row: raidcom modify port -ipv4_gateway_address*

## SSB codes returned by raidcom modify port -ipv6_gateway_address

| | | Error code | | |
|---|---|---|---|---|
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 10B9 | The multicast address or the loop-back address cannot be set as the default gateway for IPv6. |
| CMDRJE | Executing | B955 | 10C9 | The same IPv6 address cannot be set to the same port redundantly. |
| CMDRJE | Executing | B955 | 120E | The command cannot be executed because the iSCSI virtual port mode is ON. |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a channel board to which the specified port belongs. Wait for a while, and then retry the command. |

*Note: the first row of the table above spans a header "raidcom modify port -ipv6_gateway_address".*

## SSB codes returned by raidcom modify port -ipv6_global_address

| | | Error code | | |
|---|---|---|---|---|
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 10B8 | The multicast address or the loop-back address cannot be set as global address 1 for IPv6. |
| CMDRJE | Executing | B955 | 10C9 | The same IPv6 address cannot be set to the same port redundantly. |
| CMDRJE | Executing | B955 | 120E | The command cannot be executed because the iSCSI virtual port mode is ON. |
| CMDRJE | Executing | B955 | 1225 | The specified operation cannot be performed because the same IP address is already set for a channel board to which the specified port belongs. |

| raidcom modify port -ipv6_global_address | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a channel board to which the specified port belongs. Wait for a while, and then retry the command. |

*SSB codes returned by raidcom modify port -ipv6_global_address2*

| raidcom modify port -ipv6_global_address2 | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 10C9 | The same IPv6 address cannot be set to the same port redundantly. |
| CMDRJE | Executing | B955 | 10FD | If global address 1 for IPv6 is not set, you cannot set global address 2 for IPv6 manually. |
| CMDRJE | Executing | B955 | 10FE | The multicast address or the loop-back address cannot be set as global address 2 for IPv6. |
| CMDRJE | Executing | B955 | 120E | The command cannot be executed because the iSCSI virtual port mode is ON. |
| CMDRJE | Executing | B955 | 1225 | The specified operation cannot be performed because the same IP address is already set for a channel board to which the specified port belongs. |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a channel board to which the specified port belongs. Wait for a while, and then retry the command. |

## SSB codes returned by raidcom modify port -ipv6_local_address

| | | Error code | | |
|---|---|---|---|---|
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 10B6 | The invalid value is specified for the link local address of IPv6. |
| CMDRJE | Executing | B955 | 10C9 | The same IPv6 address cannot be set to the same port redundantly. |
| CMDRJE | Executing | B955 | 120E | The command cannot be executed because the iSCSI virtual port mode is ON. |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a channel board to which the specified port belongs. Wait for a while, and then retry the command. |

(Table title: **raidcom modify port -ipv6_local_address**)

## SSB codes returned by raidcom modify port -ipv6_mode

| | | Error code | | |
|---|---|---|---|---|
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 10C8 | To disable IPv6, delete the remote path for avoiding the failure of remote copy. |
| CMDRJE | Executing | B955 | 120E | The command cannot be executed because the iSCSI virtual port mode is ON. |
| CMDRJE | Executing | B955 | 1225 | The specified operation cannot be performed because the same IP address is already set for a channel board to which the specified port belongs. |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a channel board to which the specified port belongs. Wait for a while, and then retry the command. |

(Table title: **raidcom modify port -ipv6_mode**)

## SSB codes returned by raidcom modify port -isns_mode

| Error message | Executing/ Async | Error code | | Description |
| --- | --- | --- | --- | --- |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 10FC | The attribute of the specified port is Initiator or External. |
| CMDRJE | Executing | B955 | 120E | The command cannot be executed because the iSCSI virtual port mode is ON. |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a channel board to which the specified port belongs. Wait for a while, and then retry the command. |

*Table header: raidcom modify port -isns_mode*

## SSB codes returned by raidcom modify port -isns_port

| Error message | Executing/ Async | Error code | | Description |
| --- | --- | --- | --- | --- |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 120E | The command cannot be executed because the iSCSI virtual port mode is ON. |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a channel board to which the specified port belongs. Wait for a while, and then retry the command. |

*Table header: raidcom modify port -isns_port*

## SSB codes returned by raidcom modify port -isns_server_address

| | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| Error message | | SSB1 | SSB2 | |
| raidcom modify port -isns_server_address | | | | |

| Error message | Executing/ Async | SSB1 | SSB2 | Description |
|---|---|---|---|---|
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 10C5 | The specified IP address of the iSNS server is incorrect by the following reasons:<br><br>▪ The loop-back address, broadcast address or the IP address beginning with 255 has been set as the IPv4 address.<br><br>▪ The multicast address or the loop-back address has been set as the IPv6 address, or the address has not been specified yet. |
| CMDRJE | Executing | B955 | 120E | The command cannot be executed because the iSCSI virtual port mode is ON. |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a channel board to which the specified port belongs. Wait for a while, and then retry the command. |

## SSB codes returned by raidcom modify port -keep_alive_timer

| raidcom modify port -keep_alive_timer | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 10BE | The invalid value is specified for the Keep Alive timer. |
| CMDRJE | Executing | B955 | 10FB | The attribute of the specified port is Initiator or External. |
| CMDRJE | Executing | B955 | 120E | The command cannot be executed because the iSCSI virtual port mode is ON. |

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| raidcom modify port -keep_alive_timer | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a channel board to which the specified port belongs. Wait for a while, and then retry the command. |

## SSB codes returned by raidcom modify port -mtu

| raidcom modify port -mtu | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 10B0 | The invalid value is specified for the Ethernet MTU size. |
| CMDRJE | Executing | B955 | 120E | The command cannot be executed because the iSCSI virtual port mode is ON. |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a channel board to which the specified port belongs. Wait for a while, and then retry the command. |

## SSB codes returned by raidcom modify port -selective_ack_mode

| raidcom modify port -selective_ack_mode | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 120E | The command cannot be executed because the iSCSI virtual port mode is ON. |

| | | Error code | | |
|---|---|---|---|---|
| **raidcom modify port -selective_ack_mode** | | | | |
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | B955 | 1223 | Selective ACK Mode cannot be changed for the specified port. |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a channel board to which the specified port belongs. Wait for a while, and then retry the command. |

## SSB codes returned by raidcom modify port -tcp_port

| | | Error code | | |
|---|---|---|---|---|
| **raidcom modify port -tcp_port** | | | | |
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 120E | The command cannot be executed because the iSCSI virtual port mode is ON. |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a channel board to which the specified port belongs. Wait for a while, and then retry the command. |

## SSB codes returned by raidcom modify port -add_vlan_id

| | | Error code | | |
|---|---|---|---|---|
| **raidcom modify port -add_vlan_id** | | | | |
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 10B2 | The invalid value is specified for the VLAN ID. |
| CMDRJE | Executing | B955 | 10CB | The number of VLANs exceeds the maximum. |

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| raidcom modify port -add_vlan_id | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B955 | 120E | The command cannot be executed because the iSCSI virtual port mode is ON. |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a channel board to which the specified port belongs. Wait for a while, and then retry the command. |

## SSB codes returned by raidcom modify port -delete_vlan_id

| raidcom modify port -delete_vlan_id | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 10B2 | The invalid value is specified for the VLAN ID. |
| CMDRJE | Executing | B955 | 120E | The command cannot be executed because the iSCSI virtual port mode is ON. |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a channel board to which the specified port belongs. Wait for a while, and then retry the command. |

## SSB codes returned by raidcom modify port -modify_vlan_id

| raidcom modify port -modify_vlan_id | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 10B2 | The invalid value is specified for the VLAN ID. |

| raidcom modify port -modify_vlan_id | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B955 | 10CD | The command cannot be executed because the specified VLAN ID is already used. |
| CMDRJE | Executing | B955 | 120E | The command cannot be executed because the iSCSI virtual port mode is ON. |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a channel board to which the specified port belongs. Wait for a while, and then retry the command. |

## SSB codes returned by raidcom modify port -vlan_tagging_mode

| raidcom modify port -vlan_tagging_mode | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 10BF | The VLAN tagging mode cannot be set because the VLAN ID has not been entered yet. |
| CMDRJE | Executing | B955 | 120E | The command cannot be executed because the iSCSI virtual port mode is ON. |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a channel board to which the specified port belongs. Wait for a while, and then retry the command. |

## SSB codes returned by raidcom modify port -window_size

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 120E | The command cannot be executed because the iSCSI virtual port mode is ON. |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a channel board to which the specified port belongs. Wait for a while, and then retry the command. |

Table header: **raidcom modify port -window_size**

## SSB codes returned by raidcom modify port -t10pi (VSP 5000 series, VSP E series, VSP Gx00 models, and VSP Fx00 models)

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| CMDRJE<br><br>Get Command Status | Executing<br><br>Async | 2E00 | 8400 | The value of the specified port is invalid. |
| CMDRJE<br><br>Get Command Status | Executing<br><br>Async | 2E00 | 8404 | The channel board of the object is not supported. |
| Get Command Status | Async | 2E10 | 8000 | The operation cannot be performed because Storage Navigator or Device Manager - Storage Navigator is in progress, another application is in progress on the SVP, or the configuration is being changed. Wait a while, and then retry the operation. |
| CMDRJE<br><br>Get Command Status | Executing<br><br>Async | 2E10 | 8400 | The specified port is blocked. |

Table header: **raidcom modify port -t10pi**

| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE<br>Get Command Status | Executing<br>Async | 2E20 | 8400 | The specified port is not installed. |
| Get Command Status | Executing<br>Async | 2E30 | 840F | LU path of the specified port or LU path of the port in the same group is defined, the T10 PI attribute of the port cannot be changed. |
| Get Command Status | Executing/ Async | 2E30 | 8411 | This command cannot be operated due to one of the following reasons:<br>▪ The specified port is used as an NVM subsystem port.<br>▪ The CHB to which the specified port belongs contains a port that is used as an NVM subsystem port.<br>This SSB error code is displayed only for VSP 5000 series and VSP E1090. |
| CMDRJE | Executing | 2E3F | 8000 | The specified operation is not supported in the current microcode version. |
| CMDRJE <br>Get Command Status | Executing <br>Async | 2ED0 | FEEC | An internal error occurred. <br>Contact customer support. |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a channel board to which the specified port belongs. Wait for a while, and then retry the command. |

*The table above is titled* **raidcom modify port -t10pi**

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| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 10B0 | The invalid value is specified for the Ethernet MTU size. |
| CMDRJE | Executing | B955 | 10B2 | The invalid value is specified for the VLAN ID. |
| CMDRJE | Executing | B955 | 10B3 | This command cannot be set due to one of the following reasons: <br><br> ▪ The network address, loop-back address, broadcast address, or the IP address beginning with 255 is set as the IPv4 address. <br><br> ▪ No option is set when a virtual port in IPv4 mode was added. See the *Command Control Interface Command Reference*. |
| CMDRJE | Executing | B955 | 10B8 | The multicast address or the loop-back address cannot be set as global address 1 for IPv6. |
| CMDRJE | Executing | B955 | 10B9 | The multicast address or the loop-back address cannot be set as the default gateway for IPv6. |
| CMDRJE | Executing | B955 | 10BE | The invalid value is specified for the Keep Alive timer. |
| CMDRJE | Executing | B955 | 10BF | The VLAN tagging mode cannot be set because the VLAN ID has not been entered yet. |
| CMDRJE | Executing | B955 | 10C8 | To disable IPv6, delete the remote path for avoiding the failure of remote copy. |
| CMDRJE | Executing | B955 | 10C9 | The same IPv6 address cannot be set to the same port redundantly. |
| CMDRJE | Executing | B955 | 10CB | The number of VLANs exceeds the maximum. |
| CMDRJE | Executing | B955 | 10CD | The command cannot be executed because the specified VLAN ID is already used. |

| raidcom modify port -add_iscsi_virtual_port | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | B955 | 10DB | This command cannot be set due to one of the following reasons:<br><br>▪ The specified value is invalid.<br><br>▪ No option is set when a virtual port in IPv4 mode was added. See the *Command Control Interface Command Reference*. |
| CMDRJE | Executing | B955 | 10FB | The attribute of the specified port is Initiator or External. |
| CMDRJE | Executing | B955 | 1201 | The command cannot be executed because the invalid virtual port number has been entered. |
| CMDRJE | Executing | B955 | 1202 | The command cannot be executed because the iSCSI virtual port mode is OFF. |
| CMDRJE | Executing | B955 | 1203 | The same IPv6 address cannot be set to the same virtual port redundantly. |
| CMDRJE | Executing | B955 | 1204 | The IPv6 global address 2 cannot be set for the ports other than virtual port 0. |
| CMDRJE | Executing | B955 | 1205 | The command cannot be executed because the RCU port or the iSCSI name of the iSCSI target for the external storage system is registered for the specified virtual port. |
| CMDRJE | Executing | B955 | 120A | An internal error occurred.<br><br>Contact customer support. |
| CMDRJE | Executing | B955 | 120B | The specified port is not a port of the package for iSCSI. |
| CMDRJE | Executing | B955 | 120C | The specified virtual port does not exist. |
| CMDRJE | Executing | B955 | 120D | The storage system is in the internal processing, or the configuration change processes are conflicting. |
| CMDRJE | Executing | B955 | 120F | The command cannot be executed because the information of the virtual port is already set for the specified port. |
| CMDRJE | Executing | B955 | 1210 | The command cannot be executed because both IPv4 mode and IPv6 mode are disabled. |

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| raidcom modify port -add_iscsi_virtual_port | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B955 | 1211 | The command cannot be executed for ports that are not registered as targets. |
| CMDRJE | Executing | B955 | 1212 | iSNS cannot be set for virtual ports. |
| CMDRJE | Executing | B955 | 1214 | The command cannot be set because the same VLAN IDs are conflicting in the physical port. |
| CMDRJE | Executing | B955 | 1215 | The command cannot be executed because the virtual ports with the same VLAN IDs and the same IPv4 addresses are conflicting in the physical port. |
| CMDRJE | Executing | B955 | 1223 | Selective ACK Mode cannot be changed for the specified port. |
| CMDRJE | Executing | B955 | 1225 | The specified operation cannot be performed because the same IP address is already set for a channel board to which the specified port belongs. |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a channel board to which the specified port belongs. Wait for a while, and then retry the command. |
| CMDRJE | Executing | B955 | 1227 | The specified operation cannot be performed because the specified port is already defined as a virtual port for which IPv6 mode is enabled. |

## SSB codes returned by raidcom modify port -modify_iscsi_virtual_port

| raidcom modify port -modify_iscsi_virtual_port | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 10B0 | The invalid value is specified for the Ethernet MTU size. |
| CMDRJE | Executing | B955 | 10B2 | The invalid value is specified for the VLAN ID. |

| raidcom modify port -modify_iscsi_virtual_port | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | B955 | 10B3 | This command cannot be set due to one of the following reasons:<br><br>▪ The network address, loop-back address, broadcast address, or the IP address beginning with 255 is set as the IPv4 address.<br><br>▪ No option is set when the port is changed to IPv4 mode. See the *Command Control Interface Command Reference*. |
| CMDRJE | Executing | B955 | 10B8 | The multicast address or the loop-back address cannot be set as global address 1 for IPv6. |
| CMDRJE | Executing | B955 | 10B9 | The multicast address or the loop-back address cannot be set as the default gateway for IPv6. |
| CMDRJE | Executing | B955 | 10BE | The invalid value is specified for the Keep Alive timer. |
| CMDRJE | Executing | B955 | 10BF | The VLAN tagging mode cannot be set because the VLAN ID has not been entered yet. |
| CMDRJE | Executing | B955 | 10C8 | To disable IPv6, delete the remote path for avoiding the failure of remote copy. |
| CMDRJE | Executing | B955 | 10C9 | The same IPv6 address cannot be set to the same port redundantly. |
| CMDRJE | Executing | B955 | 10CB | The number of VLANs exceeds the maximum. |
| CMDRJE | Executing | B955 | 10DB | This command cannot be set due to one of the following reasons:<br><br>▪ The specified value is invalid.<br><br>▪ No option is set when the port is changed to IPv4 mode. See the *Command Control Interface Command Reference*. |
| CMDRJE | Executing | B955 | 10FB | The attribute of the specified port is Initiator or External. |
| CMDRJE | Executing | B955 | 10FD | If global address 1 for IPv6 is not set, you cannot set global address 2 for IPv6 manually. |
| CMDRJE | Executing | B955 | 10FE | The multicast address or the loop-back address cannot be set as global address 2 for IPv6. |

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| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | B955 | 1201 | The command cannot be executed because the invalid virtual port number has been entered. |
| CMDRJE | Executing | B955 | 1202 | The command cannot be executed because the iSCSI virtual port mode is OFF. |
| CMDRJE | Executing | B955 | 1203 | The same IPv6 address cannot be set to the same virtual port redundantly. |
| CMDRJE | Executing | B955 | 1204 | The IPv6 global address 2 cannot be set for the ports other than virtual port 0. |
| CMDRJE | Executing | B955 | 1205 | The command cannot be executed because the RCU port or the iSCSI name of the iSCSI target for the external storage system is registered for the specified virtual port. |
| CMDRJE | Executing | B955 | 1206 | The command cannot be executed for virtual port 0. |
| CMDRJE | Executing | B955 | 120A | An internal error occurred. Contact customer support. |
| CMDRJE | Executing | B955 | 120B | The specified port is not a port of the package for iSCSI. |
| CMDRJE | Executing | B955 | 120C | The specified virtual port does not exist. |
| CMDRJE | Executing | B955 | 120D | The storage system is in the internal processing, or the configuration change processes are conflicting. |
| CMDRJE | Executing | B955 | 1210 | The command cannot be executed because both IPv4 mode and IPv6 mode are disabled. |
| CMDRJE | Executing | B955 | 1211 | The command cannot be executed for ports that are not registered as targets. |
| CMDRJE | Executing | B955 | 1212 | iSNS cannot be set for virtual ports. |
| CMDRJE | Executing | B955 | 1213 | The command cannot be executed for the ports other than virtual port 0. |
| CMDRJE | Executing | B955 | 1214 | The command cannot be set because the same VLAN IDs are conflicting in the physical port. |

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| raidcom modify port -modify_iscsi_virtual_port | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B955 | 1215 | The command cannot be executed because the virtual ports with the same VLAN IDs and the same IPv4 addresses are conflicting in the physical port. |
| CMDRJE | Executing | B955 | 1223 | Selective ACK Mode cannot be changed for the specified port. |
| CMDRJE | Executing | B955 | 1225 | The specified operation cannot be performed because the same IP address is already set for a channel board to which the specified port belongs. |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a channel board to which the specified port belongs. Wait for a while, and then retry the command. |
| CMDRJE | Executing | B955 | 1227 | The specified operation cannot be performed because the specified port is already defined as a virtual port for which IPv6 mode is enabled. |

## SSB codes returned by raidcom modify port -delete_iscsi_virtual_port

| raidcom modify port -delete_iscsi_virtual_port | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B955 | 1039 | The command device being used at the local CCI exists under the port. |
| CMDRJE | Executing | B955 | 1201 | The command cannot be executed because the invalid virtual port number has been entered. |
| CMDRJE | Executing | B955 | 1202 | The command cannot be executed because the iSCSI virtual port mode is OFF. |
| CMDRJE | Executing | B955 | 1206 | The command cannot be executed for virtual port 0. |
| CMDRJE | Executing | B955 | 120A | An internal error occurred. Contact customer support. |

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| raidcom modify port -delete_iscsi_virtual_port | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | B955 | 120B | The specified port is not a port of the package for iSCSI. |
| CMDRJE | Executing | B955 | 120C | The specified virtual port does not exist. |
| CMDRJE | Executing | B955 | 120D | The storage system is in the internal processing, or the configuration change processes are conflicting. |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a channel board to which the specified port belongs. Wait for a while, and then retry the command. |

## SSB codes returned by raidcom modify port -iscsi_virtual_port_mode

| raidcom modify port -iscsi_virtual_port_mode | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E00 | 8400 | The value of the specified port is invalid. |
| CMDRJE | Executing | 2E11 | 800F | The operation failed because multiple versions of DKCMAIN microcode are included. |
| CMDRJE | Executing | 2E11 | 8010 | The storage system is in internal process, or the configuration changing processes are conflicting. |
| CMDRJE | Executing | 2E11 | 810A | Abnormal cache status. |
| CMDRJE | Executing | 2E11 | 8403 | The operation cannot be performed because iSNS is set for the specified port or a port of the same group. |
| CMDRJE | Executing | 2E11 | 8404 | The operation cannot be performed because a virtual port is registered for the specified port or a port of the same group. |
| CMDRJE | Executing | 2E20 | 8400 | The specified port is not installed. |
| CMDRJE | Executing | 2E31 | 8301 | The specified port is not a port of the package for iSCSI. |

| raidcom modify port -iscsi_virtual_port_mode | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E3F | 8000 | The specified operation is not supported in the current microcode version. |
| CMDRJE | Executing | 2ED0 | FEEC | An internal error occurred. Contact customer support. |
| CMDRJE | Executing | B955 | 1226 | The specified operation cannot be performed because internal processing is running on a channel board to which the specified port belongs. Wait for a while, and then retry the command. |

## SSB codes returned by raidcom delete host_grp

| raidcom delete host_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B956 | 302C | The host group cannot be deleted because the host mode option 61 or 72 is set. |
| CMDRJE | Executing | B956 | 302F | The operation cannot be performed because the path to an LDEV in different virtual storage machine is defined to the specified host group. |
| CMDRJE | Executing | B956 | 304F | The program product is not installed. |
| CMDRJE | Executing | B956 | 3071 | The value of host group ID exceeds the maximum. |
| CMDRJE | Executing | B956 | 3077 | The attribute of the specified port is Initiator or External. |
| CMDRJE | Executing | B956 | 30FD | The attribute of the specified port is Initiator or External. |
| CMDRJE | Executing | B956 | 3203 | Deletion cannot be executed because the last path of ShadowImage is included in the host group. |
| CMDRJE | Executing | B956 | 320A | Deletion cannot be executed because the last path of Thin Image or Copy-on-Write Snapshot is included in the host group. |

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| | | Error code | | |
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
|---|---|---|---|---|
| CMDRJE | Executing | B956 | 3219 | The operation cannot be performed because an LDEV with the ALU attribute, to which an LDEV with the SLU attribute is bound, exists in the specified host group. |
| CMDRJE | Executing | B956 | 321E | The operation cannot be performed due to the following compound conditions:<br>▪ The specified host group is linked with Server Priority Manager.<br>▪ You do not have the Server Priority Manager authority. |
| CMDRJE | Executing | B956 | 3234 | Deletion cannot be executed because the LU which is the target of the operation is in the reserved status. |
| CMDRJE | Executing | B956 | 3239 | The command device being used at the local CCI exists under the host group. |
| CMDRJE | Executing | B956 | 3316 | The operation cannot be performed because the specified host group is used by Storage Advisor Embedded. |
| CMDRJE | Executing | B956 | 331A | The host group cannot be deleted because specific host mode options are set. For more information about the specific host mode option, see the Deleting a host group topics in the Provisioning Guide. |
| CMDRJE | Executing | B957 | B9DA | The operation cannot be performed because it is locked by another session. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS Platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the specified port is for NAS Platform (User LU). |

*(Table header: raidcom delete host_grp)*

## *SSB codes returned by raidcom add host_grp*

| raidcom add host_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B956 | 304F | The program product is not installed. |
| CMDRJE | Executing | B956 | 3071 | The value of host group ID exceeds the maximum. |
| CMDRJE | Executing | B956 | 3077 | The attribute of the specified port is Initiator or External. |
| CMDRJE | Executing | B956 | 30FD | The attribute of the specified port is Initiator or External. |
| CMDRJE | Executing | B956 | 311C | This error occurs due to one of the following reasons:<br><br>▪ The specified host group ID or iSCSI target ID already exists.<br><br>▪ Two or more of these commands were executed in parallel without specifying the host group ID or iSCSI target ID (using automatic ID assignment). |
| CMDRJE | Executing | B956 | 3173 | The same host group name is already installed in the specified port. |
| CMDRJE | Executing | B956 | 3174 | The default host group name cannot be registered for the host group ID is other than 0. |
| CMDRJE | Executing | B956 | 31D0 | The character or the number of characters of the iSCSI target name is invalid. |
| CMDRJE | Executing | B956 | 31D5 | The character or the number of characters of the iSCSI target alias is invalid. |
| CMDRJE | Executing | B956 | 31D7 | The specified iSCSI target alias is already assigned to the same port. |
| CMDRJE | Executing | B956 | 31D8 | The specified iSCSI target alias cannot be registered because the iSCSI target alias is reserved for the iSCSI target ID 00. |
| CMDRJE | Executing | B956 | 31D9 | The specified iSCSI target name is already used for the same port. |

| raidcom add host_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B956 | 31DA | The specified iSCSI target name cannot be registered because the iSCSI target name is reserved for the iSCSI target ID 00. |
| CMDRJE | Executing | B956 | 31F8 | The operation cannot be performed because the specified host group is used by Storage Advisor Embedded. |
| CMDRJE | Executing | B956 | 3204 | A remote path has been defined. |
| CMDRJE | Executing | B956 | 331F | The operation cannot be performed because the operation mode of the specified port is being changed. This SSB error code is displayed only for VSP 5000 series and VSP E1090. |
| CMDRJE | Executing | B980 | B903 | The command was rejected because the selected resource belongs to NAS_Platform_System_RSG. |

## SSB codes returned by raidcom modify host_grp

| raidcom modify host_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B956 | 304F | The program product is not installed. |
| CMDRJE | Executing | B956 | 30FD | The attribute of the specified port is Initiator or External. |
| CMDRJE | Executing | B956 | 3204 | A remote path has been defined. |
| CMDRJE | Executing | B958 | 032F | You cannot cancel the host mode option because the specified host group is associated with the LDEV in another virtual storage machine by the path definition. |
| CMDRJE | Executing | B958 | 0339 | The command device being used at the local CCI exists under the host group. |
| CMDRJE | Executing | B958 | 0350 | Changing of the host mode/ host mode option cannot be executed for the port of Initiator or External. |

| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | B958 | 0354 | The invalid host mode is specified. |
| CMDRJE | Executing | B958 | 092C | The cancellation of the host mode option 61 or 72 was suppressed. |
| CMDRJE | Executing | B958 | 0956 | The host group ID exceeds the maximum. |
| CMDRJE | Executing | B958 | 0957 | The program product is not installed. |
| CMDRJE | Executing | B958 | 0959 | The specified host group is not installed. |
| CMDRJE | Executing | B958 | 098E | When using 8FC16 or 16FE10 channel package, you cannot configure the host mode option 51 (Round Trip Set Up Option) for the host group because the host mode option 51 is not supported. |
| CMDRJE | Executing | B958 | 0C1D | The specified host mode option is not supported on ports whose operation mode is NVMe mode. This SSB error code is displayed only for VSP 5000 series and VSP E1090. |
| CMDRJE | Executing | B958 | 0C1E | The specified host mode option cannot be set to a host group. This SSB error code is displayed only for VSP 5000 series and VSP E1090. |
| CMDRJE | Executing | B958 | 2116 | The operation cannot be performed because the specified host group is used by Storage Advisor Embedded. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS Platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the specified port is for NAS Platform (User LU). |
| CMDRJE | Executing | B980 | B903 | The command was rejected because the selected resource belongs to NAS_Platform_System_RSG. |

The table title row reads: **raidcom modify host_grp**

## SSB codes returned by raidcom disconnect path

| Error message | Executing/ Async | Error code SSB1 | Error code SSB2 | Description |
|---|---|---|---|---|
| | | Error code | | |

| Error message | Executing/ Async | SSB1 | SSB2 | Description |
|---|---|---|---|---|
| CMDRJE | Executing | 2E00 | 4500 | The path group is out of the enabled range. |
| CMDRJE | Executing | 2E00 | 8400 | The value of the specified port is invalid. |
| CMDRJE | Executing | 2E02 | 8403 | The specified virtual port number is out of range. |
| Get Command Status | Async | 2E10 | 4301 | The specified external path has already disconnected the path, or is in the process of checking path. |
| CMDRJE | Executing | 2E10 | 8404 | The iSCSI virtual port mode for the specified port is disabled. |
| Get Command Status | Async | 2E11 | 001B | The target LDEV is blocked. |
| Get Command Status | Async | 2E11 | 4000 | The path for the specified external path is in the state of disconnected. |
| Get Command Status | Async | 2E11 | 4302 | This command cannot be operated due to one of the following reasons: <br> ▪ All the paths to the external volumes are blocked. <br> ▪ There will be no normal paths. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: <br> 1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands. <br> 2. Rerun the command that caused an error. <br> If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status CMDRJE | Executing/ Async | 2E20 | 4100 | There is no specified external volume. |

| raidcom disconnect path | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status<br><br>CMDRJE | Executing/ Async | 2E20 | 4300 | There is no connection path to an external volume. |
| CMDRJE | Executing | 2E20 | 4400 | WWN is not registered. |
| CMDRJE | Executing | 2E20 | 4500 | This command cannot be operated due to one of the following reasons:<br><br>▪ There is no path group.<br><br>▪ external_wwn is not defined. |
| CMDRJE | Executing | 2E20 | 8401 | The specified virtual port is not defined. |
| Get Command Status | Async | 2E30 | 001E | Online from the mainframe host. |
| CMDRJE | Executing | 2E30 | 8400 | The attribute of a port is not External(ELUN). |
| CMDRJE | Executing | 2E30 | 840E | The command cannot be executed with the specified port attribute. |
| CMDRJE | Executing | 2EDA | 00EE | The command cannot be accepted. After a while, execute the same command. |
| Get Command Status | Async | 2EDA | 0905 | An internal error occurred by the operation of a path for an external path.<br><br>Call customer support. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the specified port is for NAS platform (User LU). |

## SSB codes returned by raidcom delete path

| raidcom delete path | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 4500 | The path group is not in a effective range. |

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| raidcom delete path | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E00 | 8400 | The value of the specified port is incorrect. |
| CMDRJE | Executing | 2E02 | 8403 | The specified virtual port number is out of range. |
| Get Command Status | Async | 2E10 | 4303 | The path operations cannot be performed for the following reasons:<br><br>▪ The target of the specified path group is TagmaStore USP/TagmaStore NSC.<br><br>▪ The specified path group contains an external volume for which the reserve attribute is set by the host. |
| CMDRJE | Executing | 2E10 | 8404 | The iSCSI virtual port mode for the specified port is disabled. |
| Get Command Status | Async | 2E11 | 8011 | The operation cannot continue because the microcode is being replaced. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE | Executing | 2E20 | 4100 | There is no external volume group. |
| CMDRJE | Executing | 2E20 | 4300 | There is no external connection path. |
| CMDRJE | Executing | 2E20 | 4400 | WWN is not registered. |
| CMDRJE<br>Get Command Status | Executing/ Async | 2E20 | 4500 | There is no path group. |
| CMDRJE | Executing | 2E20 | 8401 | The specified virtual port is not defined. |

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| raidcom delete path | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE  Get Command Status | Executing/ Async | 2E23 | 4300 | Paths cannot be deleted because there are no normal paths. |
| CMDRJE | Executing | 2E30 | 8400 | The port attribute is not External (ELUN). |
| CMDRJE | Executing | 2E30 | 840E | The command cannot be executed with the specified port attribute. |
| Get Command Status | Async | 2E30 | 8410 | The specified port cannot be operated because the operation mode of the port is NVMe mode. |
| CMDRJE | Executing | 2EDA | 00EE | The command cannot be accepted. After a while, execute the same command. |
| Get Command Status | Async | 2EDA | FEEC | An internal error occurred. After a while, re-execute the failed command.  If the internal error occurs again, contact customer support. |
| Get Command Status | Async | 2EDA | FFFF | An internal error occurred. After a while, re-execute the failed command.  If the internal error occurs again, contact customer support. |
| CMDRJE | Executing | 2EDB | FEEC | An internal error occurred. After a while, re-execute the failed command.  If the internal error occurs again, contact customer support. |
| Get Command Status | Async | 2EDB | FFFF | An internal error occurred. After a while, re-execute the failed command.  If the internal error occurs again, contact customer support. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the specified port is for NAS platform (User LU). |

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## *SSB codes returned by raidcom add path*

| Error message | Executing/ Async | Error code SSB1 | Error code SSB2 | Description |
|---|---|---|---|---|
| raidcom add path |||||
| CMDRJE | Executing | 2E00 | 4500 | The path group is not in the enabled range. |
| CMDRJE | Executing | 2E00 | 8400 | The value of the specified port is incorrect. |
| CMDRJE | Executing | 2E02 | 8403 | The specified virtual port number is out of range. |
| Get Command Status | Async | 2E10 | 4303 | The path operations cannot be performed for the following reasons:<br><br>▪ The target of the specified path group is TagmaStore USP/TagmaStore NSC.<br><br>▪ The specified path group contains the external volume that is set the reserve attribute from the host. |
| Get Command Status | Async | 2E10 | 4400 | The WWN on the side of the specified external storage is not connected to an External port.<br><br>This message may be output if the migration source storage system is USP V/VM and the host mode option 2 is not set to the port that connects to the migration target storage system. |
| CMDRJE | Executing | 2E10 | 8404 | The iSCSI virtual port mode for the specified port is disabled. |
| Get Command Status | Async | 2E11 | 410E | An external volume that is the mainframe emulation type is included in the specified external path group. |
| Get Command Status | Async | 2E11 | 8011 | The operation cannot continue because the microcode is being replaced. |

| raidcom add path | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: <br><br> 1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands. <br><br> 2. Rerun the command that caused an error. <br><br> If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE | Executing | 2E20 | 4100 | There is no external volume group. |
| Get Command Status | Async | 2E20 | 4400 | Invalid WWN. |
| CMDRJE <br> Get Command Status | Executing /Async | 2E20 | 4500 | There is no path group. |
| CMDRJE | Executing | 2E20 | 8401 | The specified virtual port is not defined. |
| CMDRJE <br> Get Command Status | Executing /Async | 2E22 | 4300 | The same path has been defined already. |
| Get Command Status | Async | 2E23 | 4303 | The operation cannot be performed because the number of path in the path group exceeds 8. |
| CMDRJE | Executing | 2E30 | 8400 | The attribute of a port is not External (ELUN). |
| CMDRJE | Executing | 2E30 | 840E | The command cannot be executed with the specified port attribute. |
| CMDRJE <br> Get Command Status | Executing /Async | 2E30 | 8410 | The specified port cannot be operated because the operation mode of the port is NVMe mode. |

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| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| Get Command Status | Async | 2E31 | 4000 | The specified external storage LU is the device of not supported. |
| Get Command Status | Async | 2E31 | 4001 | The specified external storage system is not supported. |
| CMDRJE | Executing | 2EDA | 00EE | The command cannot be accepted. After a while, execute the same command. |
| Get Command Status | Async | 2EDA | FEEC | An internal error occurred. After a while, re-execute the failed command. If the internal error occurs again, contact customer support. |
| Get Command Status | Async | 2EDA | FFFF | An internal error occurred. After a while, re-execute the failed command. If the internal error occurs again, contact customer support. |
| CMDRJE | Executing | 2EDB | FEEC | An internal error occurred. After a while, re-execute the failed command. If the internal error occurs again, contact customer support. |
| Get Command Status | Async | 2EDB | FFFF | An internal error occurred. After a while, re-execute the failed command. If the internal error occurs again, contact customer support. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the specified port is for NAS platform (User LU). |

The table above has header "raidcom add path" spanning all columns.

## SSB codes returned by raidcom -logout

| Error message | Executing/ Async | Error code | | Description |
| --- | --- | --- | --- | --- |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E01 | 2200 | Failed to release the resource lock. |

## SSB codes returned by raidcom monitor pool

| Error message | Executing/ Async | Error code | | Description |
| --- | --- | --- | --- | --- |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E00 | 6000 | The value of pool ID is out of range. |
| CMDRJE | Executing | 2E10 | 6004 | Monitor cannot be started because the performance monitor is in the collecting status. |
| CMDRJE | Executing | 2E10 | 6005 | Monitor cannot be stopped because the performance monitor is stopped. |
| CMDRJE | Executing | 2E10 | 6006 | Monitor cannot start because the performance monitor is in use. Retry the operation after completing or stopping the reallocation of Tier. |
| CMDRJE | Executing | 2E10 | 6007 | There is not enough time after collecting performance monitor. |
| CMDRJE | Executing | 2E11 | 6003 | The pool is not in the state of specifying the performance monitor to start or stop. |
| CMDRJE | Executing | 2E20 | 6000 | The pool ID is not installed. |
| CMDRJE | Executing | 2E21 | 8101 | A shared memory for Dynamic Provisioning is not installed. |
| CMDRJE | Executing | 2E21 | 8102 | A shared memory for Dynamic Tiering or active flash is not installed. |
| CMDRJE | Executing | 2E21 | 9000 | The program product of Dynamic Tiering or active flash is not installed. |
| CMDRJE | Executing | 2E30 | 6002 | Start or stop of performance monitor by hand cannot be performed because it is a pool for Dynamic Provisioning or it is automatic execution mode. |

| raidcom monitor pool | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E30 | 6003 | The specified pool is the one for Thin Image or Copy-on-Write Snapshot. |
| CMDRJE | Executing | 2EE7 | FEEC | An internal error occurred. Call customer support. |

## SSB codes returned by raidcom reallocate pool

| raidcom reallocate pool | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 6000 | The value of pool ID is out of range. |
| CMDRJE | Executing | 2E10 | 6007 | There is not enough time after collecting performance monitor. |
| CMDRJE | Executing | 2E10 | 6008 | Tier reallocation cannot be started because the state of performance monitor information is not enabled. Start the performance monitor again. |
| CMDRJE | Executing | 2E10 | 6009 | Reallocation cannot be started because it is reallocating. |
| CMDRJE | Executing | 2E10 | 600A | Reallocation cannot be stopped because it is not reallocating. |
| CMDRJE | Executing | 2E10 | 6011 | The operation cannot be performed because it is being discarded pages. |
| CMDRJE | Executing | 2E10 | 6015 | The operation cannot be performed because the Tier is being deterred reallocation. |
| CMDRJE | Executing | 2E11 | 6003 | The pool is not in the status of specifying the reallocation to start or stop. |
| CMDRJE | Executing | 2E20 | 6000 | The pool ID is not installed. |
| CMDRJE | Executing | 2E21 | 8101 | A shared memory for Dynamic Provisioning is not installed. |
| CMDRJE | Executing | 2E21 | 8102 | A shared memory for Dynamic Tiering or active flash is not installed. |

| raidcom reallocate pool | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E21 | 9000 | The program product of Dynamic Tiering or active flash is not installed. |
| CMDRJE | Executing | 2E30 | 6002 | Start or stop of performance monitor by hand cannot be performed because it is a pool for Dynamic Provisioning or it is automatic execution mode. |
| CMDRJE | Executing | 2E30 | 6003 | The specified pool is the one for Thin Image or Copy-on-Write Snapshot. |
| CMDRJE | Executing | 2E31 | 6000 | Reallocation cannot be performed because there is only one Tier in the pool group. |
| CMDRJE | Executing | 2EE7 | FEEC | An internal error occurred. Call customer support. |

## SSB codes returned by raidcom extend ldev

| raidcom extend ldev | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | - | - | See the troubleshooting topics in the *Provisioning Guide* for the storage system. |
| CMDRJE | Executing | B96B | 2CF7 | The operation cannot be performed because the specified volume is a data reduction shared volume. |

## SSB codes returned by raidcom delete resource

| raidcom delete resource | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 2201 | The specified resource group cannot be operated. |

| Error message | Executing/ Async | Error code | | Description |
| --- | --- | --- | --- | --- |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E10 | 2201 | The specified resource groups cannot be deleted because the resource groups are locked by another user (or another session). Check the lock status of the resource groups. If maintenance personnel is performing maintenance operations, retry the command after confirming the completion of the operations.. |
| CMDRJE | Executing | 2E10 | 2202 | The LDEV and the host group cannot be set to the different virtual storage machine. |
| CMDRJE | Executing | 2E20 | 0100 | There is no parity group. |
| CMDRJE | Executing | 2E20 | 2200 | A resource group cannot be deleted because the specified resource group is undefined. |
| CMDRJE | Executing | 2E20 | 4100 | There is no external volume group. |
| CMDRJE | Executing | 2E21 | 9305 | The information for the virtual storage machine is set in the specified resource. |
| CMDRJE | Executing | 2E22 | 2202 | A resource group cannot be deleted because a resource belongs to the specified resource group. |
| CMDRJE | Executing | 2E22 | 2203 | A resource cannot be deleted from the resource group because the specified LDEV number is not the top LDEV number in the LUSE volume. |
| CMDRJE | Executing | 2E30 | 2201 | The operation to resource group 0 (meta_resource) cannot be performed. |
| CMDRJE | Executing | 2ECA | FEEC | An internal error occurred. Call customer support. |
| CMDRJE | Executing | 2EF3 | 1F00 | The specified operation is not supported in the current microcode version. This SSB error code is displayed only for VSP 5000 series and VSP E1090. |
| CMDRJE | Executing | B980 | B903 | The command was rejected because the selected resource belongs to NAS_Platform_System_RSG. |
| CMDRJE | Executing | B980 | B904 | The command was rejected because the selected resource group belongs to NAS_Platform_System_RSG. |

## *SSB codes returned by raidcom add resource*

| | | Error code | | |
|---|---|---|---|---|
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| CMDRJE | Executing | 2E00 | 2200 | The specified resource group name is against the naming rules. |
| CMDRJE | Executing | 2E00 | 2201 | The specified resource group cannot be operated. |
| CMDRJE | Executing | 2E00 | 2202 | The resource ID and the sub-resource ID are out of the effective range. |
| CMDRJE | Executing | 2E00 | 8000 | The machine type is invalid. |
| CMDRJE | Executing | 2E00 | 8001 | The serial number is invalid. |
| CMDRJE | Executing | 2E00 | 8400 | The value of the specified port is invalid. |
| CMDRJE | Executing | 2E10 | 2202 | The LDEV and the host group cannot be set to the different virtual storage machine. |
| CMDRJE | Executing | 2E20 | 0100 | There is no parity group. |
| CMDRJE | Executing | 2E20 | 2200 | You cannot execute this command because of either reason below.<br><br>▪ A resource cannot be added to the resource group because the specified resource group is undefined.<br><br>▪ A resource group name cannot be changed because the specified resource group is undefined. |
| CMDRJE | Executing | 2E20 | 4100 | There is no external volume group. |
| CMDRJE | Executing | 2E20 | 8400 | The specified port is not installed. |
| CMDRJE | Executing | 2E21 | 900D | The program products of Resource Partition Manager are not installed. |
| CMDRJE | Executing | 2E21 | 9305 | The information for the virtual storage machine is set in the specified resource. |
| CMDRJE | Executing | 2E21 | 930B | A virtual storage machine cannot be created because the virtual storage machine with the specified serial number already exists. |

The table title row: **raidcom add resource**

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E22 | 2200 | You cannot execute this command because of either reason below.<br><br>▪ A resource group cannot be created because the specified resource group name is duplicated.<br><br>▪ A resource group name cannot be changed because the specified resource group name is duplicated. |
| CMDRJE | Executing | 2E22 | 2201 | A resource cannot be added to a resource group because the specified resource belongs to the resource group. |
| CMDRJE | Executing | 2E22 | 2203 | A resource cannot be added to the resource group because the specified LDEV number is not the top LDEV number in the LUSE volume. |
| CMDRJE | Executing | 2E23 | 2200 | Any more resource groups cannot be created because the registered number of resource groups has reached the maximum. |
| CMDRJE | Executing | 2E23 | 2201 | A virtual storage machine cannot be created because the number of registered virtual storage machines has reached the maximum. |
| CMDRJE | Executing | 2E30 | 2201 | The operation to resource group 0 (meta_resource) cannot be performed. |
| CMDRJE | Executing | 2E30 | 8402 | The attribute of the specified port is Initiator or External. |
| CMDRJE | Executing | 2ECA | FEEC | An internal error occurred.<br><br>Call customer support. |
| CMDRJE | Executing | 2EF3 | 1F00 | The specified operation is not supported in the current microcode version. This SSB error code is displayed only for VSP 5000 series and VSP E1090. |
| CMDRJE | Executing | 2EF3 | 2202 | The specified operation cannot be performed because it is not supported. This SSB error code is displayed only for VSP 5000 series and VSP E1090. |

| raidcom add resource | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B980 | B903 | The command was rejected because the selected resource belongs to NAS_Platform_System_RSG. |
| CMDRJE | Executing | B980 | B904 | The command was rejected because the selected resource group belongs to NAS_Platform_System_RSG. |

## SSB codes returned by raidcom get resource

| raidcom get resource | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2EF0 | FEEC | An internal error occurred. Call customer support. |

## SSB codes returned by raidcom map resource

| raidcom map resource | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 0000 | The specified LDEV number or the LDEV number for the virtual volume is out of the range. |
| CMDRJE | Executing | 2E00 | 0003 | SSID is not with in the valid range. |
| CMDRJE Get Command Status* | Executing Async | 2E00 | 000E | The specified emulation type of the LDEV is not supported in this command. |
| CMDRJE | Executing | 2E00 | 002B | The specified attribute of the virtual LDEV is not supported. |
| CMDRJE | Executing | 2E00 | 002C | The specified attribute of the virtual LDEV is invalid. |

| raidcom map resource | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 2205 | You cannot execute the command because a parameter required for the virtualization was not specified. |
| CMDRJE Get Command Status* | Executing Async | 2E00 | 9301 | The specified emulation type is invalid. |
| CMDRJE Get Command Status* | Executing Async | 2E10 | 0055 | The specified LDEV cannot be operated because it belongs to the default virtual storage machine. |
| CMDRJE Get Command Status* | Executing Async | 2E10 | 0059 | The specified volume cannot be operated because the LDEV number of the specified volume does not match the LDEV number of the virtual volume. |
| CMDRJE | Executing | 2E10 | 8000 | The operation cannot be performed because Storage Navigator or Device Manager - Storage Navigator is in progress, another application is in progress on the SVP, or the configuration is being changed. Wait a while, and then retry the operation. |
| CMDRJE | Executing | 2E11 | 020F | The operation cannot be performed because the specified volumes are bound to volumes with the ALU attribute. |
| CMDRJE Get Command Status* | Executing Async | 2E21 | 9305 | The information of the virtual storage machine is already set in the specified resource. |
| CMDRJE Get Command Status* | Executing Async | 2E21 | 9307 | The specified virtual LDEV number is already exist in the virtual storage machine to which the specified LDEV belongs. |
| CMDRJE Get Command Status* | Executing Async | 2E21 | 9308 | You cannot operate the LDEV that has the LU path definition. |
| CMDRJE Get Command Status* | Executing Async | 2E22 | 0001 | The specified LDEV is already defined. |

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| raidcom map resource | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E30 | 0013 | The specified volume cannot be set because it is a LUSE volume. |
| CMDRJE<br><br>Get Command Status* | Executing<br><br>Async | 2E30 | 0088 | The specified LDEV cannot be operated because it has an attribute. |
| CMDRJE<br><br>Get Command Status* | Executing<br><br>Async | 2E30 | 0089 | The specified LDEV cannot be operated because the ldev has a reserve attribute for GAD. |
| CMDRJE<br><br>Get Command Status* | Executing<br><br>Async | 2E30 | 008A | The specified LDEV is used for aGAD pair. |
| CMDRJE<br><br>Get Command Status* | Executing<br><br>Async | 2E30 | 008C | The specified LDEV cannot be set the information of the virtual volume because it is not virtualized. |
| CMDRJE<br><br>Get Command Status* | Executing<br><br>Async | 2ECA | FEEC | An internal error occurred.<br><br>Call customer support. |
| CMDRJE | Executing | 2EF3 | 2202 | The specified operation cannot be performed because it is not supported. |
| * The error message for this SSB error code is displayed only for VSP E series (DKCMAIN firmware version 93-06-41-XX/XX or later) and VSP 5000 series (DKCMAIN firmware version 90-08-41-XX/XX or later). | | | | |

## SSB codes returned by raidcom unmap resource

| raidcom unmap resource | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E10 | 0000 | The specified LDEV number or the LDEV number for the virtual volume is out of the range. |

| raidcom unmap resource | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE<br><br>Get Command Status* | Executing<br><br>Async | 2E10 | 004F | The specified LDEV for the virtual storage machine is not defined in the specified LDEV. |
| CMDRJE<br><br>Get Command Status* | Executing<br><br>Async | 2E10 | 005E | The specified LDEV is used by the TrueCopy pair or the Universal Replicator pair. |
| CMDRJE | Executing | 2E10 | 8000 | The operation cannot be performed because Storage Navigator or Device Manager - Storage Navigator is in progress, another application is in progress on the SVP, or the configuration is being changed. Wait a while, and then retry the operation. |
| CMDRJE | Executing | 2E11 | 020F | The operation cannot be performed because the specified volumes are bound to volumes with the ALU attribute. |
| CMDRJE<br><br>Get Command Status* | Executing<br><br>Async | 2E21 | 9012 | The Resource Partition Manager is not installed. |
| CMDRJE<br><br>Get Command Status* | Executing<br><br>Async | 2E21 | 9306 | The information of the virtual storage machine is not set in the specified resource. |
| CMDRJE<br><br>Get Command Status* | Executing<br><br>Async | 2E21 | 9308 | You cannot operate the LDEV that has the LU path definition. |
| CMDRJE<br><br>Get Command Status* | Executing<br><br>Async | 2E30 | 000C | The specified LDEV is used as a quorum disk. |
| CMDRJE<br><br>Get Command Status* | Executing<br><br>Async | 2E30 | 000F | The specified LDEV is used as a journal volume. |
| CMDRJE | Executing | 2E30 | 008A | The specified LDEV is used for aGAD pair. |

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| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE  Get Command Status* | Executing  Async | 2E30 | 008B | The specified LDEV cannot be operated because it is the external volume for the online data migration. |
| CMDRJE  Get Command Status* | Executing  Async | 2E30 | 008D | The specified volume cannot be operated because it is the mainframe volume. |
| CMDRJE  Get Command Status* | Executing  Async | 2E30 | 0096 | The specified LDEV is used as an ALU. |
| CMDRJE  Get Command Status* | Executing  Async | 2E30 | 0097 | The specified LDEV is used as an SLU. |
| CMDRJE  Get Command Status* | Executing  Async | 2E30 | 9300 | The operation cannot be performed because the specified LDEV is registered as namespace in the NVM subsystem. This SSB error code is displayed only for VSP 5000 series and VSP E1090. |
| CMDRJE  Get Command Status* | Executing  Async | 2ECA | FEEC | An internal error occurred.  Call customer support. |
| CMDRJE | Executing | 2EF3 | 2202 | The specified operation cannot be performed because it is not supported. |
| * The error message for this SSB error code is displayed only for VSP E series (DKCMAIN firmware version 93-06-41-XX/XX or later) and VSP 5000 series (DKCMAIN firmware version 90-08-41-XX/XX or later). | | | | |

The title row reads: **raidcom unmap resource**

## SSB codes returned by raidcom modify resource

| raidcom modify resource | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2EF3 | 2202 | The specified operation cannot be performed because it is not supported. |

## SSB codes returned by raidcom set resource

| raidcom set resource | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2EF3 | 2202 | The specified operation cannot be performed because it is not supported. |

## SSB codes returned by raidcom reset resource

| raidcom reset resource | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2EF3 | 2202 | The specified operation cannot be performed because it is not supported. |

## SSB codes returned by raidcom lock resource

| raidcom lock resource | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2EF2 | 0009 | The command cannot be accepted because the resource group is being deleted. Wait for a while, then run the same command. |

*SSB codes returned by raidcom modify clpr*

| raidcom modify clpr | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is out of settable range. |
| CMDRJE | Executing | 2E00 | 002A | The specified LDEV is not subject to processing. |
| CMDRJE | Executing | 2E00 | 0101 | The parity group number or the external volume group number is not in the effective range. |
| CMDRJE | Executing | 2E00 | 0102 | The specified group type is not correct. |
| CMDRJE | Executing | 2E00 | 0107 | The combined parity group cannot be set across multiple CLPRs. |
| CMDRJE | Executing | 2E00 | 1300 | The item cannot be migrated to another CLPR because of either reason below.<br><br>▪ The specified parity group or external volume group has an LUSE volume.<br><br>▪ The specified volume is an LUSE volume. |
| CMDRJE | Executing | 2E00 | 7000 | The specified CLPR ID is invalid. |
| CMDRJE | Executing | 2E02 | 7001 | CLPR 0 is specified. |
| CMDRJE | Executing/ Async | 2E02 | 7002 | The number of characters of the specified CLPR name is invalid. |

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| raidcom modify clpr | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | | | | |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E02 | 7003 | The specified CLPR name contains characters other than alphanumeric characters. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E02 | 7004 | The CLPR capacity of CLPR0 is out of the range. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E02 | 7005 | The value set for the specified CLPR capacity is out of the range. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E02 | 7006 | The specified CLPR name is reserved for the storage system. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E11 | 7001 | The specified CLPR name is duplicated. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E11 | 7002 | The number of characters of the specified CLPR name is invalid. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E11 | 7003 | The capacity of the CLPR is being changed. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E11 | 7004 | The resource of the CLPR is being moved. |
| CMDRJE | Executing | 2E11 | 810A | Abnormal cache status. |
| CMDRJE | Executing | 2E13 | 0101 | The CLPR cannot be migrated because the specified parity group or the external volume group includes the pool volume that is used in the pool for Thin Image or Copy-on-Write Snapshot. |
| CMDRJE | Executing | 2E20 | 0000 | LDEV is not installed. |

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| | | Error code | | |
|---|---|---|---|---|
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| CMDRJE | Executing | 2E20 | 0100 | There is no parity group. |
| CMDRJE | Executing | 2E20 | 4100 | There is no external volume group. |
| CMDRJE Get Command Status | Executing/ Async | 2E20 | 7001 | The specified CLPR is not installed. |
| CMDRJE Get Command Status | Executing/ Async | 2E20 | 7002 | The specified CLPR is already installed. |
| CMDRJE Get Command Status | Executing/ Async | 2E23 | 7001 | The number of CLPRs that can be installed is exceeded. |
| CMDRJE | Executing | 2E30 | 0005 | CLPR cannot be transferred by either one of the following two reasons. <br>▪ Cache Residency Manager is set for the specified volume. <br>▪ The specified parity group includes the volumes for which Cache Residency Manager are set. |
| CMDRJE | Executing | 2E30 | 000F | The specified LDEV is used as a journal volume. |
| CMDRJE | Executing | 2E30 | 0083 | The specified parity group includes HDEV with the journal attribute. |
| CMDRJE | Executing | 2EE8 | 00F0 | The specified command cannot be accepted because the command is not supported. |
| CMDRJE | Executing | 2EE8 | FEEC | An internal error occurred. <br>Call customer support. |
| CMDRJE | Executing | 2EF3 | 0102 | The specified parameter is invalid. Check the *Command Control Interface Command Reference*. |
| CMDRJE | Executing | 2EF3 | 9F02 | The specified operation cannot be performed because it is not supported. |
| CMDRJE | Executing | 2EF6 | FEEC | An internal error occurred. <br>Call customer support. |

raidcom modify clpr

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| raidcom add spm_group | | | | |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | B9D4 | B9D0 | The command cannot be executed due to one of the following reasons:<br><br>▪ Server Priority Manager is being used by Storage Navigator or Device Manager - Storage Navigator. Delete all settings of Server Priority Manager using Storage Navigator or Device Manager - Storage Navigator.<br><br>▪ Server Priority Manager information for the port WWN already exists in the system. Delete Server Priority Manager information from Performance Monitor. |
| CMDRJE | Executing | B9D4 | B9D4 | Server Priority Manager program product is not installed. |
| CMDRJE | Executing | B9D4 | B9D6 | The number of Server Priority Manager groups exceeds the maximum. |
| CMDRJE | Executing | B957 | B9D8 | The WWN belonging to the specified host group is registered in another SPM group. |
| CMDRJE | Executing | B957 | B9D9 | There is no WWN belonging to the specified host group. |
| CMDRJE | Executing | B957 | B9DA | The operation cannot be performed because it is locked by another session. |
| CMDRJE | Executing | B9D4 | B9DC | SPM cannot be performed without specifying a host group because the SPM group to which the specified WWN or SPM name belongs, or the specified SPM group is linked with the host group. |
| CMDRJE | Executing | B9D4 | B9DD | The specified SPM group already exists. The specified SPM group cannot be registered because it is not linked with the host group. |

## SSB codes returned by raidcom delete spm_group

| Error message | Executing/ Async | Error code SSB1 | Error code SSB2 | Description |
|---|---|---|---|---|
| | | | | raidcom delete spm_group |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS Platform (System LU). |
| CMDRJE | Executing | B9D4 | B9D0 | The command cannot be executed due to one of the following reasons:<br><br>■ Server Priority Manager is being used by Storage Navigator or Device Manager - Storage Navigator. Delete all settings of Server Priority Manager using Storage Navigator or Device Manager - Storage Navigator.<br><br>■ Server Priority Manager information for the port WWN already exists in the system. Delete Server Priority Manager information from Performance Monitor. |
| CMDRJE | Executing | B9D4 | B9D2 | The specified WWN or nickname does not exist. |
| CMDRJE | Executing | B9D4 | B9D4 | Server Priority Manager program product is not installed. |
| CMDRJE | Executing | B957 | B9DA | The operation cannot be performed because it is locked by another session. |
| CMDRJE | Executing | B9D4 | B9DC | SPM cannot be performed without specifying a host group because the SPM group to which the specified WWN or SPM name belongs, or the specified SPM group is linked with the host group. |

## SSB codes returned by raidcom modify spm_group

| Error message | Executing/ Async | Error code SSB1 | Error code SSB2 | Description |
|---|---|---|---|---|
| | | | | raidcom modify spm_group |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS Platform (System LU). |

| raidcom modify spm_group | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B9D4 | B9D0 | The command cannot be executed due to one of the following reasons:<br><br>▪ Server Priority Manager is being used by Storage Navigator or Device Manager - Storage Navigator. Delete all settings of Server Priority Manager using Storage Navigator or Device Manager - Storage Navigator.<br><br>▪ Server Priority Manager information for the port WWN already exists in the system. Delete Server Priority Manager information from Performance Monitor. |
| CMDRJE | Executing | B9D4 | B9D3 | The specified WWN or upper limit is invalid. |
| CMDRJE | Executing | B9D4 | B9D4 | Server Priority Manager program product is not installed. |
| CMDRJE | Executing | B957 | B9DA | The operation cannot be performed because it is locked by another session. |
| CMDRJE | Executing | B9D4 | B9DC | SPM cannot be performed without specifying a host group because the SPM group to which the specified WWN or SPM name belongs, or the specified SPM group is linked with the host group. |

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## SSB codes returned by raidcom add spm_wwn

| Error message | Executing/ Async | Error code | | Description |
| --- | --- | --- | --- | --- |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | B9D4 | B9D0 | The command cannot be executed due to one of the following reasons: <br><br> ▪ Server Priority Manager is being used by Storage Navigator or Device Manager - Storage Navigator. Delete all settings of Server Priority Manager using Storage Navigator or Device Manager - Storage Navigator. <br><br> ▪ Server Priority Manager information for the port WWN already exists in the system. Delete Server Priority Manager information from Performance Monitor. |
| CMDRJE | Executing | B9D4 | B9D2 | The specified WWN does not exist. |
| CMDRJE | Executing | B9D4 | B9D4 | Server Priority Manager program product is not installed. |
| CMDRJE | Executing | B9D4 | B9D7 | The specified SPM name has already existed. |
| CMDRJE | Executing | B957 | B9DA | The operation cannot be performed because it is locked by another session. |
| CMDRJE | Executing | B9D4 | B9DC | SPM cannot be performed without specifying a host group because the SPM group to which the specified WWN or SPM name belongs, or the specified SPM group is linked with the host group. |

## SSB codes returned by raidcom delete spm_wwn

| Error message | Executing/ Async | Error code | | Description |
| --- | --- | --- | --- | --- |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS Platform (System LU). |

| raidcom delete spm_wwn | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B9D4 | B9D0 | The command cannot be executed due to one of the following reasons:<br><br>▪ Server Priority Manager is being used by Storage Navigator or Device Manager - Storage Navigator. Delete all settings of Server Priority Manager using Storage Navigator or Device Manager - Storage Navigator.<br><br>▪ Server Priority Manager information for the port WWN already exists in the system. Delete Server Priority Manager information from Performance Monitor. |
| CMDRJE | Executing | B9D4 | B9D2 | The configuration WWN or nickname does not exist. |
| CMDRJE | Executing | B9D4 | B9D4 | Server Priority Manager program product is not installed. |
| CMDRJE | Executing | B957 | B9DA | The operation cannot be performed because it is locked by another session. |
| CMDRJE | Executing | B9D4 | B9DC | SPM cannot be performed without specifying a host group because the SPM group to which the specified WWN or SPM name belongs, or the specified SPM group is linked with the host group. |

## SSB codes returned by raidcom modify spm_wwn

| raidcom modify spm_wwn | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS Platform (System LU). |

| raidcom modify spm_wwn | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B9D4 | B9D0 | The command cannot be executed due to one of the following reasons:<br><br>▪ Server Priority Manager is being used by Storage Navigator or Device Manager - Storage Navigator. Delete all settings of Server Priority Manager using Storage Navigator or Device Manager - Storage Navigator.<br><br>▪ Server Priority Manager information for the port WWN already exists in the system. Delete Server Priority Manager information from Performance Monitor. |
| CMDRJE | Executing | B9D4 | B9D1 | The number of WWNs exceeds the maximum that can be set in the system. |
| CMDRJE | Executing | B9D4 | B9D3 | The specified WWN or upper limit is invalid. |
| CMDRJE | Executing | B9D4 | B9D4 | Server Priority Manager program product is not installed. |
| CMDRJE | Executing | B9D4 | B9D5 | The number of WWNs exceeds the maximum that can be set to the port. |
| CMDRJE | Executing | B957 | B9DA | The operation cannot be performed because it is locked by another session. |
| CMDRJE | Executing | B9D4 | B9DC | SPM cannot be performed without specifying a host group because the SPM group to which the specified WWN or SPM name belongs, or the specified SPM group is linked with the host group. |

## SSB codes returned by raidcom modify spm_ldev

| raidcom modify spm_ldev | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 9B01 | The specified iSCSI name is incorrect. |

| raidcom modify spm_ldev | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE | Executing | 2E21 | 8301 | The specified operation cannot be performed because of no iSCSI package. |
| CMDRJE | Executing | 2E22 | 9B04 | The iSCSI name cannot be registered because the number of iSCSI names that can be registered in the system exceeded the maximum number. |
| CMDRJE | Executing | 2E3F | 8000 | The specified operation is not supported in the current microcode version. |
| CMDRJE | Executing | B9D3 | B9D0 | The operation cannot be performed because internal processing is in progress. Wait a while, and then retry the command. If maintenance personnel is performing maintenance operations, retry the command after confirming the completion of the maintenance operations. |
| CMDRJE | Executing | B9D3 | B9D1 | The Server Priority Manager information for the port WWN already exists in the system. |
| CMDRJE | Executing | B9D3 | B9D2 | The LDEV cannot be registered because the number of LDEVs that can be registered in the system exceeded the maximum number. |
| CMDRJE | Executing | B9D3 | B9D3 | The WWN cannot be registered because the number of WWNs that can be registered in the system exceeded the maximum number. |
| CMDRJE | Executing | B9D3 | B9D4 | The WWN cannot be registered because the number of WWNs that can be registered in the LDEV exceeded the maximum number. |

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| raidcom modify spm_ldev | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B9D3 | B9D5 | The specified LDEV is not defined. |
| CMDRJE | Executing | B9D3 | B9D7 | Server Priority Manager is being used by Storage Navigator or Device Manager - Storage Navigator. |
| CMDRJE | Executing | B9D3 | B9D8 | The iSCSI name cannot be registered because an invalid WWN is registered. Invalid WWNs are WWNs which are not in the WWN format defined by IEEE. See Cautions about using Server Priority Manager for details. |
| CMDRJE | Executing | B9D3 | B9D9 | The specified operation cannot be performed because of no iSCSI package. |
| CMDRJE | Executing | B9D7 | B9D7 | The specified WWN, iSCSI name, or upper limit is incorrect. |
| CMDRJE | Executing | B9D8 | B9D8 | The specified LDEV does not have the WWN or iSCSI name. |
| CMDRJE | Executing | B9D9 | B9D9 | The Server Priority Manager program product is not installed. |

## SSB codes returned by raidcom delete spm_ldev

| raidcom delete spm_ldev | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 9B01 | The specified iSCSI name is incorrect. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: <br><br> 1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands. <br> 2. Rerun the command that caused an error. |

| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| | | | | If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE | Executing | 2E3F | 8000 | The specified operation is not supported in the current microcode version. |
| CMDRJE | Executing | B9D3 | B9D0 | The operation cannot be performed because internal processing is in progress. Wait a while, and then retry the command. If maintenance personnel is performing maintenance operations, retry the command after confirming the completion of the maintenance operations. |
| CMDRJE | Executing | B9D3 | B9D9 | The specified operation cannot be performed because of no iSCSI package. |
| CMDRJE | Executing | B9D7 | B9D7 | The specified WWN or iSCSI name is incorrect. |
| CMDRJE | Executing | B9D8 | B9D8 | The specified LDEV does not have the WWN or iSCSI name. |

*(table title:* **raidcom delete spm_ldev** *)*

## SSB codes returned by raidcom monitor spm_ldev

| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | 2E00 | 9B01 | The specified iSCSI name is incorrect. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: 1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands. 2. Rerun the command that caused an error. |

*(table title:* **raidcom monitor spm_ldev** *)*

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| raidcom monitor spm_ldev | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| | | | | If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE | Executing | 2E3F | 8000 | The specified operation is not supported in the current microcode version. |
| CMDRJE | Executing | B9D3 | B9D0 | The operation cannot be performed because internal processing is in progress. Wait a while, and then retry the command. If maintenance personnel is performing maintenance operations, retry the command after confirming the completion of the maintenance operations. |
| CMDRJE | Executing | B9D7 | B9D7 | The specified WWN or iSCSI name is incorrect. |

## SSB codes returned by raidcom get spm_ldev

| raidcom get spm_ldev | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E00 | 9B01 | The specified iSCSI name is incorrect. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE | Executing | 2E3F | 8000 | The specified operation is not supported in the current microcode version. |

| raidcom get spm_ldev | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B9D3 | B9D0 | The operation cannot be performed because internal processing is in progress. Wait a while, and then retry the command. If maintenance personnel is performing maintenance operations, retry the command after confirming the completion of the maintenance operations. |
| CMDRJE | Executing | B9D7 | B9D7 | The specified WWN or iSCSI name is incorrect. |

## SSB codes returned by raidcom modify ldev -capacity_saving/-capacity_saving_mode/-compression_acceleration

| raidcom modify ldev -capacity_saving/-capacity_saving_mode/-compression_acceleration | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is out of the valid range. |
| Get Command Status | Async | 2E00 | 0013 | The operation cannot be performed because there are not enough cache management devices. |
| Get Command Status | Async | 2E10 | 001F | The operation cannot be performed because the total capacity of virtual volumes for Dynamic Tiering or active flash in the system exceeds the maximum. |
| Get Command Status | Async | 2E10 | 002D | The operation cannot be performed because the specified LDEV is a journal volume. |
| Get Command Status | Async | 2E10 | 0207 | The specified LDEV cannot be operated because it is a Universal Replicator P-VOL and is being copied. |
| Get Command Status | Async | 2E10 | 0208 | The specified LDEV cannot be operated because its pages are being released. |
| Get Command Status | Async | 2E10 | 020B | The specified LDEV cannot be operated because the deduplication function is enabled. |
| Get Command Status | Async | 2E10 | 020C | The specified LDEV cannot be operated because deduplicated data exists. |

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| raidcom modify ldev -capacity_saving/-capacity_saving_mode/-compression_acceleration | | | | |
|---|---|---|---|---|
| | Executing/ | Error code | | |
| Error message | Async | SSB1 | SSB2 | Description |
| Get Command Status | Async | 2E10 | 020D | The specified LDEV cannot be operated because it is in the status where the capacity saving setting cannot be disabled. |
| Get Command Status | Async | 2E10 | 020E | The specified LDEV is not in the status where the capacity saving setting can be enabled. |
| Get Command Status | Async | 2E10 | 020F | The specified LDEV is not in the status where the capacity saving setting can be changed. |
| Get Command Status | Async | 2E10 | 0214 | The operation cannot be performed because the specified volume is being used by Volume Migration. |
| Get Command Status | Async | 2E10 | 0215 | The operation cannot be performed because the specified volume is being used by Quick Restore of ShadowImage. |
| Get Command Status | Async | 2E10 | 0219 | The tiering policy is enabled for the specified LDEV. |
| Get Command Status | Async | 2E10 | 0232 | The operation cannot be performed because the capacity saving setting for a data reduction shared volume is not supported. |
| Get Command Status | Async | 2E10 | 6020 | The deduplication function cannot be used in the pool linked with the specified LDEV. |
| Get Command Status | Async | 2E10 | 6022 | The operation cannot be performed because the deduplication system data volume of the pool associated with the specified LDEV is blocked. Alternatively, the pool associated with the specified LDEV contains a pool volume that is not in the normal status. Contact customer support. |
| Get Command Status | Async | 2E10 | 6026 | The specified virtual volume cannot be operated because the used capacity of the pool associated with the specified virtual volume exceeds the depletion threshold. |
| Get Command Status | Async | 2E10 | 602D | The operation cannot be performed because the deduplication system data volume defined for the pool linked with the specified LDEV is in the process of changing the configuration. Wait a while, then retry the operation. If this problem occurs again, contact customer support. |

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| raidcom modify ldev -capacity_saving/-capacity_saving_mode/-compression_acceleration | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| Get Command Status | Async | 2E10 | 602E | The deduplication system data volume defined for the pool linked with the specified LDEV is not in the normal status. |
| Get Command Status | Async | 2E10 | 602F | The operation cannot be performed because there are not enough LDEV numbers available for the deduplication system data volume defined for the pool linked with the specified LDEV. |
| Get Command Status | Async | 2E10 | 6032 | The operation cannot be performed because the system capacity used by the deduplication system data volume (data store) of the pool linked with the specified LDEV exceeds the upper limit. |
| Get Command Status | Async | 2E10 | 6037 | The operation cannot be performed because the subscription limit of the pool linked with the specified LDEV is not unlimited. |
| Get Command Status | Async | 2E10 | 8B01 | The ACLF is unavailable.* |
| Get Command Status | Async | 2E11 | 001B | The specified LDEV is blocked. Alternatively, the pool associated with the specified LDEV contains a pool volume that is not in the normal status. If either of the following conditions is met, contact customer support: ▪ The pool contains a pool volume that is not in the normal status. ▪ The LDEV cannot be restored. |
| Get Command Status | Async | 2E11 | 0209 | The operation cannot be performed due to a cache memory failure or maintenance work being performed. |
| Get Command Status | Async | 2E11 | 6008 | The operation cannot be performed because the pool linked with the specified LDEV is in unusable status. |

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| raidcom modify ldev -capacity_saving/-capacity_saving_mode/-compression_acceleration | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E20 | 0000 | The specified LDEV is not installed. |
| Get Command Status | Async | 2E20 | 8B01 | The ACLF is not installed on some BKMFs.* |
| Get Command Status | Async | 2E21 | 8103 | The operation cannot be performed because the capacity of shared memory is insufficient. |
| Get Command Status | Async | 2E21 | 810A | The shared memory is not installed. |
| Get Command Status | Async | 2E21 | 9000 | The program product is not installed. |
| Get Command Status | Async | 2E30 | 0086 | The operation cannot be performed because the specified volume is not a DP-VOL. |
| Get Command Status | Async | 2E30 | 0099 | The specified LDEV is set that the Data Direct Mapping attribute is enabled. |
| Get Command Status | Async | 2E30 | 009B | The operation cannot be performed because the page reservation is set for the specified LDEV. |
| Get Command Status | Async | 2E30 | 0206 | The operation cannot be performed because the specified LDEV is a deduplication system data volume. |

| raidcom modify ldev -capacity_saving/-capacity_saving_mode/-compression_acceleration | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| Get Command Status | Async | 2E30 | 6014 | VSP 5000 series, VSP G1x00 and VSP F1500: The operation cannot be performed because the pool linked with the specified LDEV is for active flash. |
| | | | | VSP G200, G400, G600, G800 and VSP F400, F600, F800, VSP G/F350, G/F370, G/F700, G/F900, and VSP E series: The operation cannot be performed because the pool linked with the specified LDEV is for Dynamic Tiering. |
| Get Command Status | Async | 2E3F | 8000 | The specified operation is not supported in the current microcode version. |
| CMDRJE | Executing | 2EBE | 9E01 | The specified parameter is incorrect. |
| CMDRJE Get Command Status | Executing/ Async | 2EE8 | FEEC | An internal error occurred. Contact customer support. |
| *ACLF: Module that implements compression accelerator. | | | | |

## SSB codes returned by raidcom replace quorum

| raidcom replace quorum | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is out of settable range. |
| CMDRJE | Executing | 2E00 | A001 | The quorum disk ID is out of settable range. |
| CMDRJE | Executing | 2E10 | 0005 | The specified LDEV is used for Volume Migration. |
| CMDRJE | Executing | 2E10 | 0057 | The specified LDEV cannot be configured because the LDEV is a virtual volume. |
| CMDRJE | Executing | 2E10 | 0201 | The operation failed because the T10 PI attribute of the specified LDEV is enabled. |
| CMDRJE | Executing | 2E10 | 0202 | The specified volume belongs to the resource group of NAS_Platform_System_RSG. |

| raidcom replace quorum | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E10 | A003 | The specified quorum disk is in processing. |
| CMDRJE | Executing | 2E10 | A006 | The specified LDEV is used as the quorum disk. |
| CMDRJE | Executing | 2E10 | A008 | The operation cannot be performed because the LDEV set for the quorum disk is not blocked. |
| CMDRJE | Executing | 2E10 | A009 | The quorum disk cannot be replaced because no LDEV is set for the specified quorum disk. |
| CMDRJE | Executing | 2E11 | 001B | The specified LDEV is blocked. |
| CMDRJE | Executing | 2E11 | 800F | The operation failed because multiple versions of DKCMAIN microcode are included. |
| CMDRJE | Executing | 2E13 | 0001 | The specified LDEV is not the first LDEV that belongs to the external volume group. |
| CMDRJE | Executing | 2E20 | 000E | The specified LDEV is not an external volume. |
| CMDRJE | Executing | 2E20 | A001 | The specified quorum disk is not defined. |
| CMDRJE | Executing | 2E21 | 810A | The shared memory is not installed. |
| CMDRJE | Executing | 2E30 | 0005 | Cache Residency Manager is set to the specified volume. |
| CMDRJE | Executing | 2E30 | 0007 | A path is defined to the specified volume. |
| CMDRJE | Executing | 2E30 | 000E | The specified LDEV is used as a pool volume. |
| CMDRJE | Executing | 2E30 | 000F | The specified LDEV is used as a journal volume. |
| CMDRJE | Executing | 2E30 | 0010 | The specified volume is used as a command device. |
| CMDRJE | Executing | 2E30 | 004E | Data Retention Utility is set to the specified volume. |
| CMDRJE | Executing | 2E30 | 0074 | The specified LDEV cannot be operated because it is an external volume mapped for online data migration. |
| CMDRJE | Executing | 2E30 | 008E | The emulation type of the specified LDEV is not OPEN-V. |
| CMDRJE | Executing | 2E30 | 0092 | The specified LDEV cannot be used because the size of the LDEV is less than the minimum capacity of the quorum disk. |

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| raidcom replace quorum | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E30 | 0099 | The specified LDEV is a volume of which the Data Direct Mapping attribute is enabled. |
| CMDRJE | Executing | 2E30 | 020E | The operation cannot be performed because the specified LDEV is registered as namespace in the NVM subsystem. This SSB error code is displayed only for VSP 5000 series and VSP E1090. |
| CMDRJE | Executing | 2EB9 | FEEC | An internal error occurred. Contact customer support. |

## SSB codes returned by raidcom modify remote_replica_opt

| raidcom modify remote replica opt | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 7100 | The specified CU number exceeds the valid range. |
| CMDRJE | Executing | 2E02 | 9D03 | The specified maximum number of initial copies exceeds the valid range. |
| CMDRJE | Executing | 2E02 | 9D04 | The specified path block watch exceeds the valid range. |
| CMDRJE | Executing | 2E02 | 9D05 | The specified path block SIM watch exceeds the valid range. |
| CMDRJE | Executing | 2E11 | 020D | The operation cannot be performed because there is a TrueCopy pair being copied in the storage system. |
| CMDRJE | Executing | 2E21 | 8105 | The shared memory for Universal Replicator is not installed. |
| CMDRJE | Executing | 2E3F | 8000 | The specified operation is not supported in the current microcode version. |
| CMDRJE | Executing | 2EBE | 9E01 | The specified parameter is incorrect. |

| raidcom modify remote replica opt | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2EBE | 9E02 | The combination of the specified parameters is incorrect. |

## SSB codes returned by raidcom modify quorum

| raidcom modify quorum | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | A001 | The specified quorum disk ID is out of the valid range. |
| CMDRJE | Executing | 2E00 | A002 | The specified value for Read Response Guaranteed Time When Quorum Monitoring Stopped is not in the valid range. |
| CMDRJE | Executing | 2E20 | A001 | The specified quorum disk is not defined. |
| CMDRJE | Executing | 2EE8 | FEEC | An internal error occurred. Contact customer support. |
| CMDRJE | Executing | 2EF3 | 9F02 | The specified operation cannot be performed because it is not supported. |

## SSB codes returned by raidcom modify path

| raidcom modify path | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E02 | 4301 | The specified queue depth value is invalid. |
| CMDRJE | Executing | 2E02 | 4302 | The specified I/O timeout value is invalid. |
| CMDRJE | Executing | 2E02 | 4303 | The specified blocked path monitoring is invalid. |
| CMDRJE | Executing | 2E11 | 8010 | The storage system is in internal process, or the configuration changing processes are conflicting. |

| raidcom modify path | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E20 | 4400 | WWN is not used. |
| CMDRJE | Executing | 2EDA | 00F1 | The specified command cannot be accepted because the command is not supported. |
| CMDRJE | Executing | 2EDA | FEEC | An internal error occurred. Contact customer support. |

## SSB codes returned by raidcom add hba_iscsi

| raidcom add hba_iscsi | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B957 | 404F | The program product is not installed. |
| CMDRJE | Executing | B957 | 408F | The specified command is not supported for the FC port. |
| CMDRJE | Executing | B957 | 40FD | The attribute of the specified port is Initiator or External. |
| CMDRJE | Executing | B957 | 44E0 | The invalid character or the invalid number of characters is specified for the initiator iSCSI name. |
| CMDRJE | Executing | B957 | 44E4 | The specified iSCSI target is not registered. |
| CMDRJE | Executing | B957 | 44E7 | The iSCSI name cannot be added because the number of iSCSI names that can be used for this port has already reached the maximum value. |
| CMDRJE | Executing | B957 | 4916 | The operation cannot be performed because the specified iSCSI target is used by Storage Advisor Embedded. |
| CMDRJE | Executing | B957 | 4918 | For the specified host group, HBAs have been defined to the upper limit of Storage Advisor Embedded. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS platform (System LU). |

| raidcom add hba_iscsi | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the specified port is for NAS platform (User LU). |

## SSB codes returned by raidcom delete hba_iscsi

| raidcom delete hba_iscsi | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B957 | 404F | The program product is not installed. |
| CMDRJE | Executing | B957 | 408F | The specified command is not supported for the FC port. |
| CMDRJE | Executing | B957 | 40FD | The attribute of the specified port is Initiator or External. |
| CMDRJE | Executing | B957 | 44E0 | The invalid character or the invalid number of characters is specified for the initiator iSCSI name. |
| CMDRJE | Executing | B957 | 44E4 | The specified iSCSI target is not registered. |
| CMDRJE | Executing | B957 | 4916 | The operation cannot be performed because the specified iSCSI target is used by Ops Center Administrator Embedded. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the specified port is for NAS platform (User LU). |

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## SSB codes returned by raidcom set hba_iscsi

| raidcom set hba_iscsi | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B957 | 404F | The program product is not installed. |
| CMDRJE | Executing | B957 | 408F | The specified command is not supported for the FC port. |
| CMDRJE | Executing | B957 | 40FD | The attribute of the specified port is Initiator or External. |
| CMDRJE | Executing | B957 | 45E0 | The character or the number of characters that cannot be specified for the initiator iSCSI name is specified. |
| CMDRJE | Executing | B957 | 45E2 | The character or the number of characters that cannot be specified for the initiator iSCSI nickname is specified. |
| CMDRJE | Executing | B957 | 45E3 | The specified iSCSI name is not registered. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the specified port is for NAS platform (User LU). |

## SSB codes returned by raidcom reset hba_iscsi

| raidcom reset hba_iscsi | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the specified port is for NAS platform (User LU). |

## SSB codes returned by raidcom add chap_user

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | B957 | 404F | The program product is not installed. |
| CMDRJE | Executing | B957 | 408F | The specified command is not supported for the FC port. |
| CMDRJE | Executing | B957 | 40FD | The attribute of the specified port is Initiator or External. |
| CMDRJE | Executing | B957 | 46E4 | The specified iSCSI target is not registered. |
| CMDRJE | Executing | B957 | 46E8 | The character used for the user ID, or the number of characters is invalid. |
| CMDRJE | Executing | B957 | 46EB | The specified CHAP user name is already used for the same port. |
| CMDRJE | Executing | B957 | 46EF | The CHAP user ID cannot be added because the number of CHAP user IDs that can be set for this port has already reached the maximum value. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the specified port is for NAS platform (User LU). |

## SSB codes returned by raidcom delete chap_user

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | B957 | 404F | The program product is not installed. |
| CMDRJE | Executing | B957 | 408F | The specified command is not supported for the FC port. |
| CMDRJE | Executing | B957 | 40FD | The attribute of the specified port is Initiator or External. |
| CMDRJE | Executing | B957 | 46E4 | The specified iSCSI target is not registered. |

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| raidcom delete chap_user | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B957 | 46E8 | The character used for the user ID, or the number of characters is invalid. |
| CMDRJE | Executing | B957 | 46EC | The specified CHAP user name is not registered. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the specified port is for NAS platform (User LU). |

## SSB codes returned by raidcom set chap_user

| raidcom set chap_user | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | B957 | 404F | The program product is not installed. |
| CMDRJE | Executing | B957 | 408F | The specified command is not supported for the FC port. |
| CMDRJE | Executing | B957 | 40FD | The attribute of the specified port is Initiator or External. |
| CMDRJE | Executing | B957 | 47E4 | The specified iSCSI target is not registered. |
| CMDRJE | Executing | B957 | 47E8 | The character used for the user ID, or the number of characters is invalid. |
| CMDRJE | Executing | B957 | 47EA | The specified password for CHAP authentication is incorrect. |
| CMDRJE | Executing | B957 | 47EC | The specified CHAP user name is not registered. |
| CMDRJE | Executing | B957 | 47EE | The iSCSI target cannot be set because the user authentication of the iSCSI target is invalid. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the specified port is for NAS platform (User LU). |

## SSB codes returned by raidcom reset chap_user

| Error message | Executing/ Async | Error code SSB1 | Error code SSB2 | Description |
|---|---|---|---|---|
| raidcom reset chap_user | | | | |
| CMDRJE | Executing | B957 | 404F | The program product is not installed. |
| CMDRJE | Executing | B957 | 408F | The specified command is not supported for the FC port. |
| CMDRJE | Executing | B957 | 40FD | The attribute of the specified port is Initiator or External. |
| CMDRJE | Executing | B957 | 47E4 | The specified iSCSI target is not registered. |
| CMDRJE | Executing | B957 | 47E8 | The character used for the user ID, or the number of characters is invalid. |
| CMDRJE | Executing | B957 | 47EC | The specified CHAP user name is not registered. |
| CMDRJE | Executing | B957 | 47EE | The iSCSI target cannot be set because the user authentication of the iSCSI target is invalid. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the specified port is for NAS platform (User LU). |

## SSB codes returned by raidcom send ping

| Error message | Executing/ Async | Error code SSB1 | Error code SSB2 | Description |
|---|---|---|---|---|
| raidcom send ping | | | | |
| CMDRJE | Executing | 2E00 | 8400 | The value of the specified port is invalid. |
| CMDRJE | Executing | 2E02 | 8403 | The specified virtual port number is out of range. |
| CMDRJE | Executing | 2E10 | 8400 | The specified port is blocked. |
| CMDRJE | Executing | 2E10 | 8404 | The iSCSI virtual port mode for the specified port is disabled. |
| CMDRJE | Executing | 2E10 | 8405 | The IP version of the specified IP address is not enabled. |

| raidcom send ping | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E11 | 8004 | The operation cannot be performed because the internal processing is in progress. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE | Executing | 2E20 | 8400 | The specified port is not installed. |
| CMDRJE | Executing | 2E20 | 8401 | The specified virtual port is not defined. |
| CMDRJE | Executing | 2E3F | 8000 | The specified operation is not supported in the current microcode version. |

## SSB codes returned by raidcom add rcu_iscsi_port

| raidcom add rcu_iscsi_port | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E00 | 3005 | The product ID is invalid. |
| CMDRJE | Executing | 2E02 | 9C01 | The specified IP address is invalid. |
| CMDRJE | Executing | 2E20 | 3000 | The serial number or product ID of the target storage system is incorrect. |
| CMDRJE | Executing | 2E21 | 810A | The shared memory is not installed. |
| CMDRJE | Executing | 2E22 | 3202 | The specified RCU port is already registered. |

| raidcom add rcu_iscsi_port | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E22 | 9B02 | The total number of registered iSCSI targets and RCU ports in the storage system reached the maximum. |
| CMDRJE | Executing | 2E22 | 9B03 | The total number of registered iSCSI targets and RCU ports per port reached the maximum. |
| CMDRJE | Executing | 2E30 | 840A | The port attribute is not Initiator (MCU). |
| CMDRJE | Executing | 2E31 | 8301 | The specified port is not a port of the package for iSCSI. |
| CMDRJE | Executing | 2EF3 | 8304 | The specified operation cannot be performed because the RCU port setting is not supported for the specified port. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS Platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the specified port is for NAS Platform (User LU). |

## SSB codes returned by raidcom delete rcu_iscsi_port

| raidcom delete rcu_iscsi_port | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E20 | 3000 | The serial number, product ID, or SSID of the target storage system is incorrect. |
| CMDRJE | Executing | 2E20 | 3201 | The specified RCU port is not registered. |
| CMDRJE | Executing | 2E21 | 3201 | Deletion cannot be executed because the RCU path is defined. |
| CMDRJE | Executing | B980 | B901 | The command was rejected because the specified port is for NAS Platform (System LU). |
| CMDRJE | Executing | B980 | B902 | The command was rejected because the specified port is for NAS Platform (User LU). |

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## SSB codes returned by raidcom add external_iscsi_name

| Error message | Executing/ Async | Error code SSB1 | Error code SSB2 | Description |
|---|---|---|---|---|
| raidcom add external_iscsi_name | | | | |
| CMDRJE | Executing | 2E00 | 9B01 | The specified iSCSI name is invalid. |
| CMDRJE | Executing | 2E02 | 8403 | The specified virtual port number is out of range. |
| CMDRJE | Executing | 2E02 | 9C01 | The specified IP address is invalid. |
| CMDRJE | Executing | 2E10 | 8404 | The iSCSI virtual port mode for the specified port is disabled. |
| CMDRJE | Executing | 2E20 | 8401 | The specified virtual port is not defined. |
| CMDRJE | Executing | 2E21 | 810A | The shared memory is not installed. |
| CMDRJE | Executing | 2E22 | 8401 | The specified target information is registered for another virtual port under the specified physical port. |
| CMDRJE | Executing | 2E22 | 9B01 | The specified iSCSI target is already registered. |
| CMDRJE | Executing | 2E22 | 9B02 | The total number of registered iSCSI target and RCU port in the storage system reached the maximum. |
| CMDRJE | Executing | 2E22 | 9B03 | The total number of registered iSCSI targets and RCU ports per port reached the maximum. |
| CMDRJE | Executing | 2E30 | 8400 | The port attribute is not External (ELUN). |
| CMDRJE | Executing | 2E31 | 8301 | The specified port is not a port of the package for iSCSI. |
| CMDRJE | Executing | 2EF3 | 8302 | The specified operation cannot be performed because the iSCSI initiator name setting is not supported for the specified port. |

## SSB codes returned by raidcom check external_iscsi_name

| Error message | Executing/ Async | Error code SSB1 | Error code SSB2 | Description |
|---|---|---|---|---|
| raidcom check external_iscsi_name | | | | |
| CMDRJE | Executing | 2E02 | 8403 | The specified virtual port number is out of range. |

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| raidcom check external_iscsi_name | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E10 | 8404 | The iSCSI virtual port mode for the specified port is disabled. |
| CMDRJE | Executing | 2E11 | 9B01 | An error occurred. Review the configuration. After a while, re-execute the failed command. If the error occurs again, contact customer support. |
| CMDRJE | Executing | 2E14 | 9B01 | An error occurred. Review the configuration. After a while, re-execute the failed command. If the error occurs again, contact customer support. |
| CMDRJE | Executing | 2E20 | 8401 | The specified virtual port is not defined. |
| CMDRJE | Executing | 2E20 | 9B01 | The specified iSCSI target is not registered. |
| CMDRJE | Executing | 2EBF | FEEC | An error occurred. Review the configuration. After a while, re-execute the failed command. If the error occurs again, contact customer support. |

## SSB codes returned by raidcom delete external_iscsi_name

| raidcom delete external_iscsi_name | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E02 | 8403 | The specified virtual port number is out of range. |
| CMDRJE | Executing | 2E10 | 8404 | The iSCSI virtual port mode for the specified port is disabled. |
| CMDRJE | Executing | 2E20 | 8401 | The specified virtual port is not defined. |
| CMDRJE | Executing | 2E20 | 9B01 | The specified iSCSI target is not registered. |
| CMDRJE | Executing | 2E11 | 4304 | The operation cannot be performed because the specified iSCSI target is defined to the external path. |

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## SSB codes returned by raidcom discover external_iscsi_name

| Error message | Executing/ Async | Error code SSB1 | Error code SSB2 | Description |
|---|---|---|---|---|
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E02 | 8403 | The specified virtual port number is out of range. |
| CMDRJE | Executing | 2E10 | 8404 | The iSCSI virtual port mode for the specified port is disabled. |
| CMDRJE | Executing | 2E11 | 9B01 | Failed to search the iSCSI target. Check the setting of input parameter or the network connection. |
| CMDRJE | Executing | 2E14 | 9B01 | The processing failed because multiple searches for the iSCSI target were executed. |
| CMDRJE | Executing | 2E20 | 8401 | The specified virtual port is not defined. |
| CMDRJE | Executing | 2E30 | 8400 | The port attribute is not External (ELUN). |
| CMDRJE | Executing | 2E31 | 8301 | The specified port is not a port of the package for iSCSI. |
| CMDRJE | Executing | 2EF3 | 8301 | The specified operation cannot be performed because Discover iSCSI Targets is not supported for the specified port. |

## SSB codes returned by raidcom modify external_chap_user

| Error message | Executing/ Async | Error code SSB1 | Error code SSB2 | Description |
|---|---|---|---|---|
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 9B02 | The specified CHAP user or CHAP secret is invalid. |
| CMDRJE | Executing | 2E02 | 8403 | The specified virtual port number is out of range. |
| CMDRJE | Executing | 2E02 | 9C01 | The specified IP address is invalid. |
| CMDRJE | Executing | 2E10 | 8404 | The iSCSI virtual port mode for the specified port is disabled. |
| CMDRJE | Executing | 2E20 | 8401 | The specified virtual port is not defined. |
| CMDRJE | Executing | 2E20 | 9B01 | The specified iSCSI target is not registered. |

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| raidcom modify external_chap_user | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E21 | 810A | The shared memory is not installed. |
| CMDRJE | Executing | 2E30 | 8400 | The port attribute is not External (ELUN). |
| CMDRJE | Executing | 2EF3 | 8303 | The specified operation cannot be performed because the initiator CHAP authentication information setting is not supported for the specified port. |

## SSB codes returned by raidcom modify initiator_chap_user

| raidcom modify initiator_chap_user | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E00 | 9B02 | The specified CHAP user or CHAP secret is invalid. |
| CMDRJE | Executing | 2E11 | 4305 | The operation cannot be performed because the specified port is defined to the external path. |
| CMDRJE | Executing | 2E21 | 810A | The shared memory is not installed. |
| CMDRJE | Executing | 2E31 | 8301 | The specified port is not a port of the package for iSCSI. |

## SSB codes returned by raidcom initialize parity_grp (VSP 5000 series, VSP E series, VSP Gx00 models, and VSP Fx00 models)

| raidcom initialize parity_grp | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E00 | 0101 | The parity group number is not in the effective range. |
| CMDRJE | Executing | 2E00 | 0102 | The operation cannot be performed because it is not a parity group. |

| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| Get Command Status | Async | 2E10 | 0000 | LDEV is used as a ShadowImage pair volume. |
| Get Command Status | Async | 2E10 | 0001 | LDEV is used as a TrueCopy pair volume or Universal Replicator pair volume. |
| Get Command Status | Async | 2E10 | 0003 | LDEV is used as a Compatible FlashCopy® V2 relationship. |
| Get Command Status | Async | 2E10 | 0004 | LDEV is used as a Thin Image pair volume or a Copy-on-Write Snapshot pair volume. |
| Get Command Status | Async | 2E10 | 0008 | LDEV is used as a system disk. |
| Get Command Status | Async | 2E10 | 0010 | LDEV is not blocked. |
| Get Command Status | Async | 2E10 | 0062 | LDEV is used as the primary volume of a global-active device (GAD) pair. |
| Get Command Status | Async | 2E10 | 0063 | LDEV is used as the secondary volume of a global-active device (GAD) pair. |
| Get Command Status | Async | 2E10 | 0100 | The formatting operation cannot be performed because the encryption value of the key number that is set to encryption ECC is invalid. |
| Get Command Status | Async | 2E10 | 0101 | The formatting operation cannot be performed because the checksum of the encryption key does not match. |
| Get Command Status | Async | 2E10 | 0210 | The operation cannot be performed because the capacity saving status of LDEV is Failed. |
| Get Command Status | Async | 2E10 | 6022 | The operation cannot be performed because the deduplication system data volume of the pool linked with an LDEV is blocked. |
| Get Command Status | Async | 2E11 | 0007 | LDEV is in shredding. |
| Get Command Status | Async | 2E11 | 0009 | The operation cannot be performed because LDEV is now expanding. |
| Get Command Status | Async | 2E11 | 001E | The operation cannot be performed because the virtual disk space is blocked. |

| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| | | raidcom initialize parity_grp | | |
| Get Command Status | Async | 2E11 | 010A | The target parity group is in the state of correction copy. |
| Get Command Status | Async | 2E11 | 6004 | The operation of Dynamic Provisioning V-VOL cannot be performed because there is a blocked pool. |
| Get Command Status | Async | 2E11 | 6006 | The operation of Dynamic Provisioning V-VOL cannot be performed because there is a blocked pool volume. |
| Get Command Status | Async | 2E11 | 8004 | The operation cannot be performed because the internal processing is in progress. |
| Get Command Status | Async | 2E11 | 8010 | The operation cannot be performed because the internal processing is in progress. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE<br><br>Get Command Status | Executing<br><br>Async | 2E13 | 0102 | The operation cannot be performed because there is no LDEV in the parity group. |
| Get Command Status | Async | 2E14 | 0000 | The processing stopped because aborting processing is required. |
| Get Command Status | Async | 2E20 | 0000 | LDEV is not installed. |
| CMDRJE<br><br>Get Command Status | Executing<br><br>Async | 2E20 | 0100 | There is no parity group. |

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| Error message | Executing/ Async | Error code SSB1 | Error code SSB2 | Description |
|---|---|---|---|---|
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E30 | 000A | LDEV is used as a Dynamic Provisioning. |
| Get Command Status | Async | 2E30 | 000C | LDEV is used as a quorum disk. |
| Get Command Status | Async | 2E30 | 000E | LDEV is used as a pool volume. |
| Get Command Status | Async | 2E30 | 000F | LDEV is used as a journal volume. |
| Get Command Status | Async | 2E30 | 001A | Volume Security is set to LDEV. |
| Get Command Status | Async | 2E30 | 004E | The Data Retention Utility/Volume Retention Manager attribute of LDEV is enabled. |
| Get Command Status | Async | 2E30 | 0061 | LDEV is a pool volume and the pool volume include the Dynamic Provisioning volume that is not in the blocked status. |
| Get Command Status | Async | 2E30 | 0074 | LDEV cannot be operated because it is an external volume mapped for online data migration. |
| Get Command Status | Async | 2E30 | 0206 | The operation cannot be performed because the LDEV is a deduplication system data volume. |
| Get Command Status | Async | 2E31 | 0001 | Maintenance work cannot be performed because the LDEV is a quorum disk. |
| CMDRJE | Executing | 2EB1 | A301 | The specified password is not correct. |
| CMDRJE  Get Command Status | Executing  Async | 2ECF | FEEC | An internal error occurred. Call customer support. |
| CMDRJE | Executing | 2EF3 | 0102 | The specified parameter is invalid. Check the *Command Control Interface Command Reference*. |

## SSB codes returned by raidcom add parity_grp (VSP E series, VSP Gx00 models, and VSP Fx00 models)

| | | Error code | | |
|---|---|---|---|---|
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| CMDRJE  Get Command Status | Executing/ Async | 2E00 | 000D | The emulation type is incorrect. |
| CMDRJE  Get Command Status | Executing/ Async | 2E00 | 0101 | The parity group number is not in the effective range. |
| Get Command Status | Async | 2E02 | 0104 | The specified parity group ID cannot be used for the specified drive location. For details about the parity group ID, see the *Provisioning Guide*. |
| CMDRJE  Get Command Status | Executing/ Async | 2E00 | 0108 | The RAID type of the specified parity group is not correct. |
| CMDRJE  Get Command Status | Executing/ Async | 2E00 | 7000 | The specified CLPR ID is out of the range. |
| CMDRJE | Executing | 2E00 | 8500 | The specified drive box or drive is not correct. |
| Get Command Status | Async | 2E02 | 0101 | A parity group in which encryption and accelerated compression are enabled cannot be created. |
| Get Command Status | Async | 2E02 | 8501 | The specified drive has different drive type codes. |
| Get Command Status | Async | 2E02 | 850B | A parity group cannot be created using drives in different CBX pairs. |
| Get Command Status | Async | 2E02 | 8509 | The specified operation cannot be performed because the combination of drive locations is not correct. |
| Get Command Status | Async | 2E10 | 0109 | The parity group cannot be created because the parity group which is specified to be combined contains parity groups that do not support accelerated compression. |

| raidcom add parity_grp |
|---|

| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| Get Command Status | Async | 2E10 | 010A | The specified operation cannot be performed because the parity group does not support accelerated compression. |
| Get Command Status | Async | 2E10 | 8003 | The specified operation cannot be performed because the storage system is being turned off. |
| Get Command Status | Async | 2E10 | 8500 | The specified operation cannot be performed because the drive copy is in process. |
| Get Command Status | Async | 2E10 | 8501 | The specified operation cannot be performed because the drive is blocked. |
| Get Command Status | Async | 2E10 | 8503 | The specified drive is already used. |
| Get Command Status | Async | 2E10 | 8505 | The parity group cannot be created because some of the specified drives do not support accelerated compression. |
| Get Command Status | Async | 2E10 | 8506 | The specified operation cannot be performed because the drive's firmware version does not support accelerated compression. |
| Get Command Status | Async | 2E11 | 0001 | The specified operation cannot be performed because the LDEV is being verified. |
| Get Command Status | Async | 2E11 | 0056 | The specified operation cannot be performed because data in the cache is corrupted. |
| Get Command Status | Async | 2E11 | 0057 | The specified operation cannot be performed because the LDEV is under format, shredding, or quick format. |
| Get Command Status | Async | 2E11 | 0109 | The entered parity group ID is already used. |
| Get Command Status | Async | 2E11 | 8012 | The specified operation cannot be performed because the power condition of the drive box is abnormal. |
| Get Command Status | Async | 2E11 | 8013 | The specified operation cannot be performed because storage system is in process. |
| Get Command Status | Async | 2E11 | 8102 | The specified operation cannot be performed because cache memory is blocked. |

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| | | Error code | | |
|---|---|---|---|---|
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| Get Command Status | Async | 2E11 | 810A | The specified operation cannot be performed because the cache status is abnormal. |
| Get Command Status | Async | 2E11 | 8200 | The specified operation cannot be performed because the MP unit status is being changed. |
| Get Command Status | Async | 2E11 | 8201 | The specified operation cannot be performed because the MP unit is blocked. |
| Get Command Status | Async | 2E11 | 8301 | The specified operation cannot be performed because DKB is being transferred. |
| Get Command Status | Async | 2E11 | 8302 | The specified operation cannot be performed because CHB is being transferred. |
| Get Command Status | Async | 2E11 | 830D | The specified operation cannot be performed because the SAS port is blocked. |
| Get Command Status | Async | 2E11 | 8311 | The specified operation cannot be performed because DKB is blocked. |
| Get Command Status | Async | 2E11 | 8312 | The specified operation cannot be performed because CHB is blocked. |
| Get Command Status | Async | 2E11 | 8400 | The specified operation cannot be performed because the port is blocked. |
| Get Command Status | Async | 2E11 | 8901 | X-path is blocked. |
| Get Command Status | Async | 2E11 | 8A01 | HIE (Interconnect Channel Board) is blocked. |
| Get Command Status | Async | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: 1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands. 2. Rerun the command that caused an error. If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |

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| | | Error code | | |
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| --- | --- | --- | --- | --- |
| | | spanning | | raidcom add parity_grp |

| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| --- | --- | --- | --- | --- |
| Get Command Status | Async | 2E11 | 9A00 | The encryption key cannot be obtained from the key management server. |
| Get Command Status | Async | 2E11 | 9A01 | The specified operation cannot be performed because the unused encryption keys have run out. |
| Get Command Status | Async | 2E11 | 9A02 | The specified operation cannot be performed because the encryption environmental settings have not completed correctly. Initialize the encryption environmental settings, and then reconfigure the encryption environmental settings. |
| Get Command Status | Async | 2E14 | 8001 | The encryption environment is not set. |
| Get Command Status | Async | 2E20 | 7001 | The specified CLPR is not installed. |
| Get Command Status | Async | 2E20 | 8501 | The specified drive is not installed. |
| Get Command Status | Async | 2E21 | 9015 | The software of the encryption license key is not installed. |
| Get Command Status | Async | 2E30 | 010B | Accelerated compression cannot be enabled because the emulation type is not OPEN-V. |
| Get Command Status | Async | 2E3F | 8000 | The current microcode version does not support the specified operation. |
| CMDRJE | Executing | 2EB1 | A301 | The specified password is not correct. |
| Get Command Status | Async | 2E21 | 8300 | The emulation type for mainframe system cannot be specified because CHB for mainframe system is not installed. |
| Get Command Status | Async | 2E21 | 8302 | The emulation type for open system cannot be specified because CHB for open system is not installed. |
| CMDRJE Get Command Status | Executing/ Async | 2EC4 | FEEC | An internal error occurred. Contact customer support. |

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| raidcom add parity_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2EF3 | 0101 | The specified operation cannot be performed because the setting for disabling copy back mode is not supported. |

**SSB codes returned by raidcom delete parity_grp (VSP 5000 series, VSP E series, VSP Gx00 models, and VSP Fx00 models)**

| raidcom delete parity_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE Get Command Status | Executing/ Async | 2E00 | 0101 | The parity group number is not within the valid range. |
| Get Command Status | Async | 2E02 | 0103 | More than one request to delete the same parity group was received. |
| Get Command Status | Async | 2E10 | 0000 | The specified parity group contains LDEVs used by another program product. |
| Get Command Status | Async | 2E10 | 0001 | The specified parity group contains an LDEV used as a TrueCopy or Universal Replicator pair. |
| Get Command Status | Async | 2E10 | 0012 | The specified parity group contains an LDEV used as the concurrent copy or XRC. |
| Get Command Status | Async | 2E10 | 0062 | The specified parity group contains an LDEV used as the P-VOL of a GAD pair. |
| Get Command Status | Async | 2E10 | 0063 | The specified parity group contains an LDEV used as the S-VOL of a GAD pair. |
| Get Command Status | Async | 2E02 | 0100 | The specified operation cannot be performed because the encryption value of the key number that is set to encryption ECC is invalid. |
| Get Command Status | Async | 2E10 | 0101 | The specified operation cannot be performed because the checksum of the encryption key is not coincident. |

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| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| Get Command Status | Async | 2E10 | 8003 | The specified operation cannot be performed because the storage system is being turned off. |
| Get Command Status | Async | 2E10 | 8500 | The specified operation cannot be performed because the drive copy is in process. |
| Get Command Status | Async | 2E10 | 8501 | The specified operation cannot be performed because the drive is blocked. |
| Get Command Status | Async | 2E11 | 0001 | The specified operation cannot be performed because the LDEV is being verified. |
| Get Command Status | Async | 2E11 | 0056 | The specified operation cannot be performed because data in the cache is corrupted. |
| Get Command Status | Async | 2E11 | 0057 | The specified operation cannot be performed because the LDEV is under format, shredding, or quick format. |
| Get Command Status | Async | 2E11 | 0058 | The specified operation cannot be performed because the specified parity group is using a spare drive. |
| Get Command Status | Async | 2E11 | 2206 | You do not have the operation authority to operate the target resource group. Specify the resource group that is allocated to the user group as the operation target, or set the operation authority to the user group in order to operate the target resource group. |
| Get Command Status | Async | 2E11 | 8012 | The specified operation cannot be performed because the power condition of the drive box is abnormal. |
| Get Command Status | Async | 2E11 | 8013 | The specified operation cannot be performed because storage system is in process. |
| Get Command Status | Async | 2E11 | 8102 | The specified operation cannot be performed because cache memory is blocked. |
| Get Command Status | Async | 2E11 | 810A | The specified operation cannot be performed because the cache status is abnormal. |
| Get Command Status | Async | 2E11 | 8200 | The specified operation cannot be performed because the MP unit status is being changed. |

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| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E11 | 8201 | The specified operation cannot be performed because the MP unit is blocked. |
| Get Command Status | Async | 2E11 | 8301 | The specified operation cannot be performed because DKB is being transferred. |
| Get Command Status | Async | 2E11 | 8302 | The specified operation cannot be performed because CHB is being transferred. |
| Get Command Status | Async | 2E11 | 830D | The specified operation cannot be performed because the SAS port is blocked. |
| Get Command Status | Async | 2E11 | 8311 | The specified operation cannot be performed because DKB is blocked. |
| Get Command Status | Async | 2E11 | 8312 | The specified operation cannot be performed because CHB is blocked. |
| Get Command Status | Async | 2E11 | 8400 | The specified operation cannot be performed because the port is blocked. |
| Get Command Status | Async | 2E11 | 8901 | X-path is blocked. |
| Get Command Status | Async | 2E11 | 8A01 | HIE (Interconnect Channel Board) is blocked. |
| Get Command Status | Async | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: <br><br> 1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands. <br> 2. Rerun the command that caused an error. <br><br> If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E11 | 9A00 | The encryption key cannot be obtained from the key management server. |

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| Get Command Status | Async | 2E11 | 9A01 | The specified operation cannot be performed because the unused encryption keys have run out. |
| Get Command Status | Async | 2E14 | 0101 | The operation cannot be continued because an error occurred while the command for deleting a parity group was being executed. Check if the parity group is deleted. If it is not deleted, execute the command again. If this problem occurs again, contact customer support. |
| Get Command Status | Async | 2E20 | 0100 | The parity group is not found. |
| Get Command Status | Async | 2E30 | 0007 | The specified parity group contains LDEVs for which LU path is already defined. |
| Get Command Status | Async | 2E30 | 000E | The operation failed because the specified parity group contains a pool volume of Dynamic Provisioning. |
| Get Command Status | Async | 2E30 | 000F | The specified parity group contains an LDEV which is already used as a journal volume or a data volume. |
| Get Command Status | Async | 2E30 | 001A | The specified parity group cannot be deleted because it contains an LDEV that Volume Security is set. |
| Get Command Status | Async | 2E30 | 001E | The specified parity group cannot be deleted because it contains an LDEV that is used online from the mainframe host. |
| Get Command Status | Async | 2E30 | 004E | The specified parity group contains a Data Retention Utility/Volume Retention Manager attribute device. |
| Get Command Status | Async | 2E30 | 0053 | The specified parity group cannot be deleted because it contains an LDEV that Volume Retention Manager is set. |
| Get Command Status | Async | 2E30 | 0060 | The LDEV in the specified parity group is used as a command device that is used in the extended consistency group. |

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| raidcom delete parity_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E30 | 0095 | The specified parity group cannot be deleted because it contains the remote command device which is used for the mirror of the journal group. |
| Get Command Status | Async | 2E30 | 020E | The operation cannot be performed because the specified parity group contains an LDEV registered as namespace in the NVM subsystem. This SSB error code is displayed only for VSP 5000 series and VSP E1090. |
| CMDRJE | Executing | 2EB1 | A301 | The specified password is not correct. |
| CMDRJE Get Command Status | Executing/ Async | 2EC4 | FEEC | An internal error occurred. Contact customer support. |

## SSB codes returned by raidcom get parity_grp

| raidcom get parity_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2ECF | 00F1 | The operation cannot be executed because the operation is not supported. |

## SSB codes returned by raidcom modify parity_grp

| raidcom modify parity_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE Get Command Status | Executing/ Async | 2E00 | 0101 | The parity group number or the external volume group number is not within a valid range. |
| CMDRJE | Executing | 2E00 | 0102 | The specified group type is not correct. |

| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| Get Command Status | Async | 2E10 | 0103 | The specified operation cannot be performed because the collection copy is in process. |
| Get Command Status | Async | 2E10 | 0104 | The specified operation cannot be performed because the dynamic sparing is in process. |
| Get Command Status | Async | 2E10 | 0105 | The specified operation cannot be performed because the copy back is in process. |
| Get Command Status | Async | 2E10 | 0107 | The specified operation cannot be performed because the collection access is in process. |
| Get Command Status | Async | 2E10 | 0108 | The specified parity group is a RAID configuration which cannot be used as the pool vol. |
| Get Command Status | Async | 2E10 | 010A | The specified operation cannot be performed because the parity group does not support accelerated compression. |
| Get Command Status | Async | 2E10 | 010B | The operation cannot be performed because data remains in a expanded space of the parity group. Format parity groups. |
| Get Command Status | Async | 2E10 | 010C | The specified operation cannot be performed because the encryption is enabled. |
| Get Command Status | Async | 2E10 | 010D | The operation cannot be performed because the specified parity group contains pool volumes in a pool whose subscription limit is not set to Unlimited. |
| Get Command Status | Async | 2E10 | 8500 | The specified operation cannot be performed because the drive copy is in process. |
| Get Command Status | Async | 2E10 | 8501 | The specified operation cannot be performed because the drive is blocked. |
| Get Command Status | Async | 2E10 | 8506 | The specified operation cannot be performed because the drive's firmware does not support accelerated compression. |
| Get Command Status | Async | 2E11 | 0057 | The specified operation cannot be performed because the LDEV is under format, shredding, or quick format. |

| raidcom modify parity_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E11 | 005A | The specified operation cannot be performed because the pool is used as the pool which is full allocated. |
| Get Command Status | Async | 2E11 | 005B | The specified operation cannot be performed because the LDEV in the parity group is dispersed in several pools. |
| Get Command Status | Async | 2E11 | 005C | There is a volume which Data Retention Utility is set in the specified parity group. |
| Get Command Status | Async | 2E11 | 005D | The specified operation cannot be performed because the LDEV is created in the expanded space of the parity group. |
| Get Command Status | Async | 2E11 | 005E | The specified operation cannot be performed because the LDEV belongs in the blocked pool. |
| Get Command Status | Async | 2E11 | 0208 | The operation cannot be performed because the specified parity group contains an LDEV that is not a pool volume. |
| Get Command Status | Async | 2E11 | 800F | The operation failed because the DKCMAIN microcode version is mixed. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: <br><br> 1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands. <br> 2. Rerun the command that caused an error. <br><br> If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE <br><br> Get Command Status | Executing/ Async | 2E20 | 0100 | There is no parity group. |

| raidcom modify parity_grp | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| Get Command Status | Async | 2E30 | 0005 | The volume which Cache Residency Manager is configured is available in the specified parity group. |
| Get Command Status | Async | 2E30 | 0007 | The LDEV of which path is defined is available. |
| Get Command Status | Async | 2E30 | 000F | The LDEV in the specified parity group is used as the journal volume. |
| Get Command Status | Async | 2E30 | 0038 | The LDEV of which size is smaller than the possible value that can be registered to the pool is in the specified parity group. |
| Get Command Status | Async | 2E30 | 010B | Accelerated compression cannot be enabled because the emulation type is not OPEN-V. |
| Get Command Status | Async | 2E30 | 020E | The operation cannot be performed because the specified parity group contains an LDEV registered as namespace in the NVM subsystem. This SSB error code is displayed only for VSP 5000 series and VSP E1090. |
| Get Command Status | Async | 2E31 | 0001 | The LDEV in the specified parity group is used as the quorum disk. |
| Get Command Status | Async | 2E31 | 0201 | The LDEV in the specified parity group is used as the pair volume. |
| Get Command Status | Async | 2E31 | 0202 | The LDEV in the specified parity group is mapped for the online data migration. |
| Get Command Status | Async | 2E3F | 8000 | The current microcode version does not support the specified operation. |
| CMDRJE Get Command Status | Executing/ Async | 2ECF | FEEC | Internal error occurred. Contact customer support. |
| CMDRJE | Executing | 2EF3 | 0102 | The specified operation cannot be performed because the operation is not supported. |

## SSB codes returned by raidcom get local_replica_opt

| Error message | Executing/ Async | Error code SSB1 | SSB2 | Description |
|---|---|---|---|---|
| | | raidcom get local_replica_opt | | |
| CMDRJE | Executing | 2E3F | 8000 | The specified operation is not supported in the current microcode version. |
| CMDRJE | Executing | 2EBD | FEEC | An internal error occurred. Contact customer support. |

## SSB codes returned by raidcom modify local_replica_opt

| Error message | Executing/ Async | Error code SSB1 | SSB2 | Description |
|---|---|---|---|---|
| | | raidcom modify local_replica_opt | | |
| CMDRJE | Executing | 2E02 | 9D01 | Multiple option IDs cannot be specified. |
| CMDRJE | Executing | 2E02 | 9D02 | The specified option ID is out of the effective range. |
| CMDRJE | Executing | 2E10 | 8000 | The operation cannot be performed because Storage Navigator or Device Manager - Storage Navigator is in progress, another application is in progress on the SVP, or the configuration is being changed. Wait a while, and then retry the operation. |
| CMDRJE | Executing | 2E11 | 8019 | Shadow Initialize is running. |
| CMDRJE | Executing | 2E21 | 810A | A shared memory is not installed. |
| CMDRJE | Executing | 2E3F | 8000 | The specified operation is not supported in the current microcode version. |
| CMDRJE | Executing | 2EBD | FEEC | Internal error occurred. Contact customer support. |
| CMDRJE | Executing | 2EBE | 9E01 | The specified parameter is invalid. |

## SSB codes returned by raidcom add license (VSP 5000 series, VSP E series, VSP Gx00 models, and VSP Fx00 models)

| raidcom add license | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2EC0 | 0009 | No program product is supported. |
| CMDRJE | Executing | 2EC0 | 0030 | The program product cannot be installed because the history of the trial for the Temporary key remains. |
| CMDRJE | Executing | 2EC0 | 0051 | To install this program product, install or enable the related program products first. |
| CMDRJE | Executing | 2EC0 | 0052 | This program product cannot be installed because it is pre-installed. |
| CMDRJE | Executing | 2EC0 | 0060 | The program product is already installed. |
| CMDRJE | Executing | 2EC0 | 0081 | The specified program product ID is invalid. |
| CMDRJE | Executing | 2EC0 | 0090 | The specified license key code is invalid. |
| CMDRJE | Executing | 2EC0 | 0091 | The serial number is not correct. |
| CMDRJE | Executing | 2EC0 | 0101 | The current DKCMAIN firmware version does not support this program product. |
| CMDRJE | Executing | 2EC0 | 0102 | This program product requires a higher-version hardware product. |
| CMDRJE | Executing | 2EC0 | 0103 | To use this program product, increase the shared memory allocation, and enable the program product. |
| CMDRJE | Executing | 2EC0 | 0108 | This program product requires another type of DKC. |
| CMDRJE | Executing | 2EC0 | 010D | The specified program product is not supported. |
| CMDRJE | Executing | 2EC0 | 0130 | The model information for the license key code is not correct. |
| CMDRJE | Executing | 2EC0 | 0200 | The specified number of extended days is shorter than the number of trial days. |
| CMDRJE | Executing | 2EC0 | 0201 | The program product cannot be enabled because the license capacity is insufficient. |

| raidcom add license | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2EC0 | 0204 | The license capacity is insufficient. The program product is installed, but it will be invalid if the license capacity is not increased before the contract period expires. |
| CMDRJE | Executing | 2EC0 | 0206 | The status of the specified license is already changed or incorrect. |
| CMDRJE | Executing | 2EC0 | 050C | With the current DKCMAIN firmware version, the program product cannot be installed. |
| CMDRJE | Executing | 2EC0 | 2E01 | The specified operation is not supported in the current microcode version. |

*SSB codes returned by raidcom delete license (VSP 5000 series, VSP E series, VSP Gx00 models, and VSP Fx00 models)*

| raidcom delete license | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2EC1 | 0009 | No program product is supported. |
| CMDRJE | Executing | 2EC1 | 0051 | To remove this program product, remove or disable the related program products first. |
| CMDRJE | Executing | 2EC1 | 0081 | The specified program product ID is invalid. |
| CMDRJE | Executing | 2EC1 | 0104 | To remove this program product, the configuration must be changed. |
| CMDRJE | Executing | 2EC1 | 0105 | This program product cannot be removed because it is being used. |
| CMDRJE | Executing | 2EC1 | 0106 | To remove this program product, another program product must be removed or disabled first. |
| CMDRJE | Executing | 2EC1 | 0107 | To remove this program product, another program product must be removed or disabled first. |
| CMDRJE | Executing | 2EC1 | 010C | Data Retention Utility cannot be deleted because secondary volume rejection or reservation settings remain. |

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| raidcom delete license | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2EC1 | 010D | The specified program product is not supported. |
| CMDRJE | Executing | 2EC1 | 0206 | The status of the specified license is already changed or incorrect. |
| CMDRJE | Executing | 2EC1 | 0501 | The specified program product is already removed. |
| CMDRJE | Executing | 2EC1 | 050C | With the current DKCMAIN firmware version, the program product cannot be removed. |
| CMDRJE | Executing | 2EC1 | 0602 | The operation cannot be performed because the license cannot be removed. |

## *SSB codes returned by raidcom modify license (VSP 5000 series, VSP E series, VSP Gx00 models, and VSP Fx00 models)*

| raidcom modify license | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2EC0 | 0400 | A permanent license is required to be installed before installing the meter license. |
| CMDRJE | Executing | 2EC0 | 0401 | This license cannot be installed because a meter license has been installed. |
| CMDRJE | Executing | 2EC1 | 0600 | The operation cannot be performed because the software is pre-installed. |
| CMDRJE | Executing | 2EC2 | 0009 | No program product is supported. |
| CMDRJE | Executing | 2EC2 | 0051 | To enable or disable this program product, enable or disable the related program products first. |
| CMDRJE | Executing | 2EC2 | 0081 | The specified program product ID is invalid. |
| CMDRJE | Executing | 2EC2 | 0101 | The current DKCMAIN firmware version does not support this program product. |
| CMDRJE | Executing | 2EC2 | 0102 | This program product requires a higher-version hardware product. |

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| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| --- | --- | --- | --- | --- |
| | | **raidcom modify license** | | |
| CMDRJE | Executing | 2EC2 | 0103 | To use this program product, increase the shared memory allocation, and enable the program product. |
| CMDRJE | Executing | 2EC2 | 0105 | This program product cannot be removed because it is being used. |
| CMDRJE | Executing | 2EC2 | 0106 | To disable this program product, another program product must be removed or disabled first. |
| CMDRJE | Executing | 2EC2 | 0107 | To disable this program product, another program product must be removed or disabled first. |
| CMDRJE | Executing | 2EC2 | 0108 | This program product requires another type of DKC. |
| CMDRJE | Executing | 2EC2 | 010C | Data Retention Utility cannot be deleted because secondary volume rejection or reservation settings remain. |
| CMDRJE | Executing | 2EC2 | 010D | The specified program product is not supported. |
| CMDRJE | Executing | 2EC2 | 0205 | The program product was removed because the Term license had expired. |
| CMDRJE | Executing | 2EC2 | 0206 | The status of the specified license is already changed or incorrect. |
| CMDRJE | Executing | 2EC2 | 0503 | The specified operation cannot be performed because the key type is incorrect. |
| CMDRJE | Executing | 2EC2 | 050C | The current DKCMAIN firmware version cannot enable or disable the program product. |
| CMDRJE | Executing | 2EC2 | 0600 | The operation cannot be performed because the software is pre-installed. |
| CMDRJE | Executing | 2EC2 | 0602 | The operation cannot be performed because the license cannot be disabled. |

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| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | **SSB1** | **SSB2** | |
| **raidcom initialize pool** | | | | |
| CMDRJE | Executing | 2E00 | 6000 | The value of the specified ID is out of range. |
| Get Command Status | Async | 2E10 | 0001 | The volume defined in specified pool is used as a TrueCopy pair. |
| Get Command Status | Async | 2E10 | 0002 | The volume defined in specified pool is used as a Universal Replicator pair. |
| Get Command Status | Async | 2E10 | 0004 | The volume defined in specified pool is used as a Thin Image pair. |
| Get Command Status | Async | 2E10 | 0005 | The volume defined in specified pool is used as a Volume Migration volume. |
| Get Command Status | Async | 2E10 | 0213 | The volume defined in specified pool is used as a global-active device (GAD) pair. |
| Get Command Status | Async | 2E10 | 0216 | The volume defined in specified pool is used as a ShadowImage pair. |
| Get Command Status | Async | 2E10 | 600B | The specified pool is blocked. |
| Get Command Status | Async | 2E10 | 600D | The specified pool is shrinking. |
| Get Command Status | Async | 2E10 | 6020 | The specified pool is in deduplication disabled. |
| Get Command Status | Async | 2E10 | 6023 | The specified pool is being created or expanded. |
| Get Command Status | Async | 2E10 | 6024 | The specified pool is being deleted. |
| Get Command Status | Async | 2E10 | 6031 | The operation cannot be performed because the deduplication system data volume defined in the specified pool is being deleted. |
| Get Command Status | Async | 2E11 | 0204 | The deduplication system data volume defined in the specified pool or the volume for which the deduplication function is enabled is not blocked. |

| raidcom initialize pool | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE<br><br>Get Command Status | Executing / Async | 2E20 | 6000 | The specified pool is not installed. |
| Get Command Status | Async | 2E21 | 8101 | The control memory or shared memory for Dynamic Provisioning is not installed. |
| Get Command Status | Async | 2E30 | 000F | The volume defined in specified pool is used as a journal volume. |
| CMDRJE | Executing | 2EE7 | 00F0 | The specified command cannot be accepted because the command is not supported. |
| CMDRJE<br><br>Get Command Status | Executing / Async | 2EE7 | FEEC | An internal error occurred. After a while, reexecute the failed command. If the internal error occurs again, contact customer support. |

## SSB codes returned by raidcom reset command_status command

| raidcom reset command_status | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing/ Async | 2EF1 | 000C | The operation cannot be performed because the internal processing is in progress. After a while, perform the operation again. |

| | | Error code | | |
|---|---|---|---|---|
| **raidcom reset command_status** | | | | |
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| Get Command Status | | | | |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2EF1 | 000E | The specified request ID is invalid. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2EF1 | 000F | The operation cannot be performed because a request ID managed by another session is specified. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2EF1 | 0010 | The operation cannot be performed because the specified request ID is being executed. |

## SSB codes returned by the raidcom add clpr command

| | | Error code | | |
|---|---|---|---|---|
| **raidcom add clpr** | | | | |
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | 2E02 | 7001 | CLPR 0 is specified. |
| CMDRJE /<br><br>Get Command Status | Executing/ Async | 2E02 | 7002 | The number of characters of the specified CLPR name is invalid. |
| CMDRJE /<br><br>Get Command Status | Executing/ Async | 2E02 | 7003 | The specified CLPR name contains characters other than alphanumeric characters. |
| CMDRJE /<br><br>Get Command Status | Executing/ Async | 2E02 | 7004 | The CLPR capacity of CLPR0 is out of the range. |
| CMDRJE /<br><br>Get Command Status | Executing/ Async | 2E02 | 7005 | The value set for the specified CLPR capacity is out of the range. |

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| raidcom add clpr | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE / Get Command Status | Executing/ Async | 2E02 | 7006 | The specified CLPR name is reserved for the storage system. |
| CMDRJE / Get Command Status | Executing/ Async | 2E11 | 7001 | The specified CLPR name is duplicated. |
| CMDRJE / Get Command Status | Executing/ Async | 2E11 | 7002 | The number of characters of the specified CLPR name is invalid. |
| CMDRJE / Get Command Status | Executing/ Async | 2E11 | 7003 | The capacity of the CLPR is being changed. |
| CMDRJE / Get Command Status | Executing/ Async | 2E11 | 7004 | The resource of the CLPR is being moved. |

## SSB codes returned by the raidcom delete clpr command

| raidcom delete clpr | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E02 | 7001 | CLPR 0 is specified. |
| CMDRJE / Get Command Status | Executing/ Async | 2E02 | 7002 | The number of characters of the specified CLPR name is invalid. |
| CMDRJE / Get Command Status | Executing/ Async | 2E02 | 7003 | The specified CLPR name contains characters other than alphanumeric characters. |
| CMDRJE / | Executing/ Async | 2E11 | 7002 | The number of characters of the specified CLPR name is invalid. |

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| raidcom delete clpr | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | | | | |
| CMDRJE / Get Command Status | Executing/ Async | 2E11 | 7003 | The capacity of the CLPR is being changed. |
| CMDRJE / Get Command Status | Executing/ Async | 2E11 | 7004 | The resource of the CLPR is being moved. |
| CMDRJE / Get Command Status | Executing/ Async | 2E13 | 7001 | A parity group or virtual volume is allocated to the specified CLPR. |
| CMDRJE / Get Command Status | Executing/ Async | 2E20 | 7001 | The specified CLPR is not installed. |
| CMDRJE / Get Command Status | Executing/ Async | 2E20 | 7002 | The specified CLPR is already installed. |
| CMDRJE / Get Command Status | Executing/ Async | 2E23 | 7001 | The number of CLPRs that can be installed is exceeded. |

## *SSB codes returned by raidcom add server*

| raidcom add server | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing/ Async | 2E3F | 8000 | The operation cannot be performed because the current microcode version does not support the operation. |

| raidcom add server | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | | | | |
| Get Command Status | Async | 2EAC | 0102 | The operation cannot be performed because the specified port is not installed on the package to be operated. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E3F | 8000 | The operation cannot be performed because the current microcode version does not support the operation. |
| Get Command Status | Async | 2EAC | 0102 | The operation cannot be performed because the specified port is not installed on the package to be operated. |
| Get Command Status | Async | 2EAC | 0D01 | The operation cannot be performed because the target of the operation is busy. After a while, re-execute the command. |
| Get Command Status | Async | 2EAC | 0D04 | The software required for the operation is not installed. |
| Get Command Status | Async | 2EAC | 0D05 | The specified port does not exist. Review the parameters and execute the command again. |
| Get Command Status | Async | 2EAD | 8001 | The microcode is being changed in the storage system or multiple microcode versions are used. |
| Get Command Status | Async | 2EAD | 8201 | The operation cannot be performed because the target of the operation is busy. After a while, re-execute the command. |
| Get Command Status | Async | 2EAD | A427 | The operation cannot be performed because the number of servers that can be created in the system has reached the maximum. |
| Get Command Status | Async | 2EAD | A428 | The operation cannot be performed because the target of the operation is busy. After a while, re-execute the command. |
| Get Command Status | Async | 2EAD | A42B | The specified server name has already been used and cannot be operated. |
| Get Command Status | Async | 2EAD | A43E | The operation cannot be performed because a host group is not added to the specified server. |

| raidcom add server | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2EAD | B101 | The operation cannot be performed because the target of the operation is busy. After a while, re-execute the command. |
| Get Command Status | Async | 2EAD | B102 | The operation cannot be performed because the target of the operation is busy. After a while, re-execute the command. |
| Get Command Status | Async | 2EAD | B103 | The system is locked by another user. After a while, re-execute the command. |
| Get Command Status | Async | 2EAD | B104 | The resource group to which the object to be operated belongs is locked by another user. Check the lock status of the resource group. |
| Get Command Status | Async | 2EAD | B105 | The operation cannot be performed because the user has already logged out. |
| Get Command Status | Async | 2EAD | B201 | The operation cannot be performed because the status of the specified server is invalid. |
| Get Command Status | Async | 2EAD | B202 | The operation cannot be performed because internal processing is in progress. After a while, re-execute the command. |
| Get Command Status | Async | 2EAD | B203 | An internal error occurred. After a while, re-execute the command. If this problem still occurs, contact customer support. |
| Get Command Status | Async | 2EAD | B205 | The operation cannot be performed because the operation on the specified server is prohibited. |
| Get Command Status | Async | 2EAD | B301 | An internal error occurred. After a while, re-execute the command. If this problem still occurs, contact customer support. |
| Get Command Status | Async | 2EAD | B402 | The operation cannot be performed because internal processing is in progress in the storage system. Wait for "RCV" to disappear from the server status with the `raidcom get server -key opt` command, and then re-execute the `raidcom add server` command. |
| Get Command Status | Async | 2EAE | 8001 | The microcode is being changed in the storage system or multiple microcode versions are used. |

Chapter 9: Troubleshooting

| raidcom add server | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2EAE | 9402 | The operation cannot be performed because the target of the operation is busy. After a while, re-execute the command. |
| CMDRJE | Executing | 2EAE | 9404 | The operation cannot be performed because the target of the operation is busy. After a while, re-execute the command. |
| CMDRJE | Executing | 2EAE | 9E28 | The specified client type is not supported. |
| CMDRJE | Executing | 2EAE | 9E2A | The specified server ID is out of range. Review the values and re-execute the command. |
| CMDRJE | Executing | 2EAE | 9E2B | The server name is not specified. Review the parameters and re-execute the command. |
| CMDRJE | Executing | 2EAE | A401 | The specified server does not exist. Review the parameters and re-execute the command. |
| CMDRJE | Executing | 2EAE | B002 | The operation cannot be performed because the target of the operation is busy. After a while, re-execute the command. |
| CMDRJE Get Command Status | Executing/ Async | 2EAE | B103 | The operation cannot be performed because the target of the operation is busy. After a while, re-execute the command. |
| CMDRJE | Executing | 2EFF | FF00 | The operation cannot be performed because the current microcode version does not support the command. |

*SSB codes returned by raidcom delete server*

| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE Get Command Status | Executing/ Async | 2E3F | 8000 | The operation cannot be performed because the current microcode version does not support the operation. |
| Get Command Status | Async | 2EAC | 0102 | The operation cannot be performed because the specified port is not installed on the package to be operated. |
| Get Command Status | Async | 2EAC | 090A | The operation cannot be performed because the OS type option 60 is valid. |
| Get Command Status | Async | 2EAC | 0D01 | The operation cannot be performed because the target of the operation is busy. After a while, re-execute the command. |
| Get Command Status | Async | 2EAC | 0D04 | The software required for the operation is not installed |
| Get Command Status | Async | 2EAC | 0D05 | The specified port does not exist. Review the parameters and execute the command. |
| Get Command Status | Async | 2EAD | 8001 | The microcode is being changed in the storage system or multiple microcode versions are used. |
| Get Command Status | Async | 2EAD | 8201 | The operation cannot be performed because the target of the operation is busy. After a while, re-execute the command. |
| Get Command Status | Async | 2EAD | A43E | The operation cannot be performed because a host group is not added to the specified server. |
| Get Command Status | Async | 2EAD | B101 | The operation cannot be performed because the target of the operation is busy. After a while, re-execute the command. |
| Get Command Status | Async | 2EAD | B102 | The operation cannot be performed because the target of the operation is busy. After a while, re-execute the command. |
| Get Command Status | Async | 2EAD | B103 | The system is locked by another user. Check the lock status of the resource group. |
| Get Command Status | Async | 2EAD | B104 | The resource group to which the object to be operated belongs is locked by another user. Check the lock status of the resource group. |

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| raidcom delete server | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| Get Command Status | Async | 2EAD | B105 | The operation cannot be performed because the user has already logged out. |
| Get Command Status | Async | 2EAD | B201 | The operation cannot be performed because the status of the specified server is invalid. |
| Get Command Status | Async | 2EAD | B202 | The operation cannot be performed because internal processing is in progress. After a while, re-execute the command. |
| Get Command Status | Async | 2EAD | B203 | An internal error occurred. After a while, re-execute the command. If this problem still occurs, contact customer support. |
| Get Command Status | Async | 2EAD | B205 | The operation cannot be performed because the operation on the specified server is prohibited. |
| Get Command Status | Async | 2EAD | B301 | An internal error occurred. After a while, re-execute the command. If this problem still occurs, contact customer support. |
| Get Command Status | Async | 2EAD | B402 | The operation cannot be performed because internal processing is in progress in the storage system. Wait for "RCV" to disappear from the server status with the `raidcom get server -key opt` command, and then re-execute the `raidcom delete server` command. |
| Get Command Status | Async | 2EAE | 8001 | The microcode is being changed in the storage system or multiple microcode versions are used. |
| CMDRJE | Executing | 2EAE | 9402 | The operation cannot be performed because the target of the operation is busy. After a while, re-execute the command. |
| CMDRJE | Executing | 2EAE | 9404 | The operation cannot be performed because the target of the operation is busy. After a while, re-execute the command. |
| CMDRJE | Executing | 2EAE | 9E28 | The specified client type is not supported. |
| CMDRJE | Executing | 2EAE | 9E2A | The specified server ID is out of range. Review the values and re-execute the command. |
| CMDRJE | Executing | 2EAE | 9E2B | The server name is not specified. Review the parameters and re-execute the command. |

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| raidcom delete server | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2EAE | A401 | The specified server does not exist. Review the parameters and re-execute the command. |
| CMDRJE | Executing | 2EAE | B002 | The operation cannot be performed because the target of the operation is busy. After a while, re-execute the command. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2EAE | B103 | The operation cannot be performed because the target of the operation is busy. After a while, re-execute the command. |
| CMDRJE | Executing | 2EFF | FF00 | The operation cannot be performed because the current microcode version does not support the operation. |

*SSB codes returned by raidcom modify server*

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E3F | 8000 | The operation cannot be performed because the current microcode version does not support the operation. |
| Get Command Status | Async | 2EAC | 0101 | The operation cannot be performed because the LUN security for the specified port is invalid. |
| Get Command Status | Async | 2EAC | 0102 | The operation cannot be performed because the specified port is not installed on the package to be operated. |
| Get Command Status | Async | 2EAC | 0D01 | The operation cannot be performed because the target of the operation is busy. After a while, re-execute the command. |
| Get Command Status | Async | 2EAC | 0D04 | The software required for the operation is not installed. |
| Get Command Status | Async | 2EAC | 0D05 | The specified port does not exist. Review the parameters and execute the command again. |
| Get Command Status | Async | 2EAD | 0205 | The operation cannot be performed because an LU path to an unsupported LDEV exists in the specified host group or iSCSI target. |
| Get Command Status | Async | 2EAD | 1001 | The operation cannot be performed because another host group or iSCSI target on the same port as the one used for the specified host group or iSCSI target has already been registered on the specified server. |
| Get Command Status | Async | 2EAD | 1002 | The operation cannot be performed because the specified host group or iSCSI target is already used by another server. |
| Get Command Status | Async | 2EAD | 1003 | The specified host group or iSCSI target does not exist. Review the parameters and re-execute the command. |
| Get Command Status | Async | 2EAD | 2501 | The operation cannot be performed because the specified port uses a different protocol from the server. |
| Get Command Status | Async | 2EAD | 8001 | The microcode is being changed in the storage system or multiple microcode versions are used. |

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| raidcom modify server | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2EAD | 8201 | The operation cannot be performed because the target of the operation is busy. After a while, re-execute the command again. |
| Get Command Status | Async | 2EAD | 8401 | The specified port cannot be operated because the operation mode of the port is NVMe mode. |
| Get Command Status | Async | 2EAD | A43A | The operation cannot be performed because the number of host WWNs or iSCSI names that can be registered on the specified server has reached the maximum number. |
| Get Command Status | Async | 2EAD | A43E | The operation cannot be performed because a host group is not added to the specified server. |
| Get Command Status | Async | 2EAD | B101 | The operation cannot be performed because the target of the operation is busy. After a while, re-execute the command. |
| Get Command Status | Async | 2EAD | B102 | The operation cannot be performed because the target of the operation is busy. After a while, re-execute the command. |
| Get Command Status | Async | 2EAD | B103 | The system is locked by another user. After a while, execute the command again. |
| Get Command Status | Async | 2EAD | B104 | The resource group to which the object to be operated belongs is locked by another user. Check the lock status of the resource group. |
| Get Command Status | Async | 2EAD | B105 | The operation cannot be performed because the user has already logged out. |
| Get Command Status | Async | 2EAD | B201 | The operation cannot be performed because the status of the specified server is invalid. |
| Get Command Status | Async | 2EAD | B202 | The operation cannot be performed because internal processing is in progress. After a while, re-execute the command. |
| Get Command Status | Async | 2EAD | B203 | An internal error occurred. After a while, re-execute the command. If this problem still occurs, contact customer support. |
| Get Command Status | Async | 2EAD | B205 | The operation cannot be performed because the operation on the specified server is prohibited. |

| raidcom modify server | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2EAD | B301 | An internal error occurred. After a while, re-execute the command. If this problem still occurs, contact customer support. |
| Get Command Status | Async | 2EAD | B402 | The operation cannot be performed because internal processing is in progress in the storage system. Wait for "RCV" to disappear from the server status with the `raidcom get server -key opt` command, and then re-execute the `raidcom modify server` command. |
| Get Command Status | Async | 2EAE | 8001 | The microcode is being changed in the storage system or multiple microcode versions are used. |
| CMDRJE | Executing | 2EAE | 9402 | The operation cannot be performed because the target of the operation is busy. After a while, re-execute the command. |
| CMDRJE | Executing | 2EAE | 9404 | The operation cannot be performed because the target of the operation is busy. After a while, re-execute the command. |
| CMDRJE | Executing | 2EAE | 9E28 | The specified client type is not supported. |
| CMDRJE | Executing | 2EAE | 9E2A | The specified server ID is out of range. Review the values and re-execute the command. |
| CMDRJE | Executing | 2EAE | 9E2B | The server name is not specified. Review the parameters and re-execute the command. |
| CMDRJE | Executing | 2EAE | 9E2F | The operation cannot be performed because I D of the specified host group or iSCSI target is 0. |
| CMDRJE | Executing | 2EAE | 9E30 | The specified host group or iSCSI target is invalid. Review the values and re-execute the command. |
| CMDRJE | Executing | 2EAE | 9E31 | The specified port ID is invalid. Review the parameters and re-execute the command. |
| CMDRJE | Executing | 2EAE | A401 | The specified server does not exist. Review the parameters and re-execute the command. |
| CMDRJE | Executing | 2EAE | B002 | The operation cannot be performed because the target of the operation is busy. After a while, re-execute the command. |

| raidcom modify server | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2EAE | B103 | The operation cannot be performed because the target of the operation is busy. After a while, re-execute the command. |
| CMDRJE | Executing | 2EFF | FF00 | The operation cannot be performed because the current microcode version does not support the operation. |

## SSB codes returned by raidcom add quorum

| raidcom add quorum | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is out of settable range. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E00 | 8000 | The device type is invalid. |
| CMDRJE | Executing | 2E00 | 8001 | The serial number is invalid. |
| CMDRJE | Executing | 2E00 | A001 | The quorum disk ID is out of settable range. |
| Get Command Status | Async | 2E02 | 0103 | More than one request to delete the same parity group was received. |
| Get Command Status | Async | 2E10 | 0004 | The specified LDEV is used for a Thin Image pair or a Copy-on-Write Snapshot pair. |
| Get Command Status | Async | 2E10 | 0005 | The specified LDEV is used for Volume Migration. |
| Get Command Status | Async | 2E10 | 0057 | The specified LDEV cannot be configured because the LDEV is a virtual volume. |
| Get Command Status | Async | 2E10 | 0201 | The operation failed because the T10 PI attribute of the specified LDEV is enabled. |
| Get Command Status | Async | 2E10 | A001 | The specified quorum disk ID is being used. |

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| raidcom add quorum | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| Get Command Status | Async | 2E10 | A003 | The specified quorum disk is in processing. |
| Get Command Status | Async | 2E10 | A005 | The specified quorum disk is used as the quorum disk of the different device. |
| Get Command Status | Async | 2E10 | A006 | The specified LDEV is used as the quorum disk. |
| Get Command Status | Async | 2E10 | A007 | The operation failed because the quorum disk was inaccessible. |
| Get Command Status | Async | 2E11 | 001B | The specified LDEV is blocked. |
| CMDRJE | Executing | 2E11 | 0053 | The specified LDEV is used for other operation. |
| Get Command Status | Async | 2E11 | 410B | The external volume is inaccessible. |
| Get Command Status | Async | 2E11 | 410C | An unformatted external volume is used. Format the external volume, then retry the operation. |
| Get Command Status | Async | 2E13 | 0001 | The specified LDEV is not the first LDEV that belongs to the external volume group. |
| CMDRJE | Executing | 2E20 | 0000 | The specified LDEV is not installed. |
| Get Command Status | Async | 2E20 | 000E | The specified LDEV is not an external volume. |
| Get Command Status | Async | 2E21 | 810A | The shared memory is not installed. |
| Get Command Status | Async | 2E30 | 0005 | Cache Residency Manager is set to the specified volume. |
| Get Command Status | Async | 2E30 | 0007 | A path is defined to the specified volume. |
| Get Command Status | Async | 2E30 | 000E | The specified LDEV is used as a pool volume. |
| Get Command Status | Async | 2E30 | 000F | The specified LDEV is used as a journal volume. |
| Get Command Status | Async | 2E30 | 0010 | The specified volume is used as a command device. |

| raidcom add quorum | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E30 | 004E | Data Retention Utility is set to the specified volume. |
| Get Command Status | Async | 2E30 | 0074 | The specified LDEV cannot be operated because it is an external volume mapped for online data migration. |
| Get Command Status | Async | 2E30 | 008E | The emulation type of the specified LDEV is not OPEN-V. |
| Get Command Status | Async | 2E30 | 0092 | The specified LDEV cannot be used because the size of the LDEV is less than the minimum capacity of the quorum disk. |
| Get Command Status | Async | 2E30 | 0099 | The specified LDEV is a volume on which the Data Direct Mapping attribute is enabled. |
| Get Command Status | Async | 2E30 | 020E | The operation cannot be performed because the specified LDEV is registered as namespace in the NVM subsystem. This SSB error code is displayed only for VSP 5000 series and VSP E1090. |
| CMDRJE Get Command Status | Executing/ Async | 2EB9 | FEEC | An internal error occurred. Contact customer support. |
| CMDRJE Get Command Status | Executing/ Async | 2EE8 | FEEC | An internal error occurred. Contact customer support. |

## SSB codes returned by raidcom delete quorum

| raidcom delete quorum | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | A001 | The quorum disk ID is out of settable range. |
| Get Command Status | Async | 2E10 | A003 | The specified quorum disk is in processing. |

| raidcom delete quorum | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E10 | A004 | The specified quorum disk is already used by a GAD pair. |
| Get Command Status | Async | 2E10 | A007 | Settings of the quorum disk were canceled, but the operation failed. After canceling settings of the specified quorum disk, if you use the `raidcom get ldev` command to display the LDEV information, QRD indicating the quorum disk is not displayed in VOL_ATTR. But the management information might remain in the external volume. Do not reuse the external volume containing the management information as a quorum disk. If you do, an error occurs. You need to format the external volume before using it again as a quorum disk. |
| Get Command Status | Async | 2E21 | 810A | The shared memory is not installed. |
| CMDRJE Get Command Status | Executing/ Async | 2EB9 | FEEC | An internal error occurred. Contact customer support. |
| CMDRJE Get Command Status | Executing/ Async | 2EE8 | FEEC | An internal error occurred. Contact customer support. |

## SSB codes returned by raidcom modify drive

| raidcom modify drive | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 8500 | The specified drive box or drive is not correct. |
| Get Command Status | Async | 2E02 | 850A | The spare drive cannot be set in the specified drive location. |
| Get Command Status | Async | 2E10 | 8003 | The specified operation cannot be performed because the storage system is being turned off. |
| Get Command Status | Async | 2E10 | 8500 | The specified operation cannot be performed because the drive copy is in process |

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| raidcom modify drive | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E10 | 8501 | The specified operation cannot be performed because the drive is blocked. |
| Get Command Status | Async | 2E10 | 8502 | The operation cannot be performed because the number of drives has exceeded the maximum number of drives that can be set as spare drives. |
| Get Command Status | Async | 2E10 | 8503 | The specified drive is already used. |
| Get Command Status | Async | 2E10 | 8504 | The specified drive is not a spare drive. |
| Get Command Status | Async | 2E11 | 0001 | The specified operation cannot be performed because the LDEV is being verified. |
| Get Command Status | Async | 2E11 | 8004 | The specified operation cannot be performed because data in the cache is corrupted. |
| Get Command Status | Async | 2E11 | 0057 | The specified operation cannot be performed because the LDEV is under format, shredding, or quick format. |
| Get Command Status | Async | 2E11 | 0058 | The specified operation cannot be performed because the specified drive is used as a spare drive. |
| Get Command Status | Async | 2E11 | 8012 | The specified operation cannot be performed because the power condition of the drive box is abnormal. |
| Get Command Status | Async | 2E11 | 8013 | The specified operation cannot be performed because storage system is in process. |
| Get Command Status | Async | 2E11 | 8102 | The specified operation cannot be performed because cache memory is blocked. |
| Get Command Status | Async | 2E11 | 810A | The specified operation cannot be performed because the cache status is abnormal. |
| Get Command Status | Async | 2E11 | 8200 | The specified operation cannot be performed because the MP unit is being transferred. |
| Get Command Status | Async | 2E11 | 8201 | The specified operation cannot be performed because the MP unit is blocked. |
| Get Command Status | Async | 2E11 | 8301 | The specified operation cannot be performed because DKB is being transferred. |

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| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| Get Command Status | Async | 2E11 | 8302 | The specified operation cannot be performed because CHB is being transferred. |
| Get Command Status | Async | 2E11 | 830D | The specified operation cannot be performed because the SAS port is blocked. |
| Get Command Status | Async | 2E11 | 8311 | The specified operation cannot be performed because DKB is blocked. |
| Get Command Status | Async | 2E11 | 8312 | The specified operation cannot be performed because CHB is blocked. |
| Get Command Status | Async | 2E11 | 8400 | The specified operation cannot be performed because the port is blocked |
| Get Command Status | Async | 2E11 | 8901 | X-path is blocked. |
| Get Command Status | Async | 2E11 | 8A01 | HIE (Interconnect Channel Board) is blocked. |
| Get Command Status | Async | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E11 | 9A00 | The encryption key cannot be obtained from the key management server. |
| Get Command Status | Async | 2E11 | 9A01 | The specified operation cannot be performed because the unused encryption keys have run out. |
| Get Command Status | Async | 2E20 | 8501 | The specified drive is not installed. |
| CMDRJE | Executing | 2EB1 | A301 | The specified password is not correct. |

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| raidcom modify drive | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2EC3 | FEEC | An internal error occurred. Contact customer support. |

## SSB codes returned by raidcom add qos_grp (VSP 5000 series and VSP E1090 only)

| SSB codes returned by raidcom add qos_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E02 | A701 | The specified QoS group ID is out of the valid range. |
| Get Command Status | Async | 2E11 | 800E | The operation cannot be performed because the internal processing is in progress. Wait for a while and retry the operation. |
| Get Command Status | Async | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E20 | A701 | The specified QoS group ID is already defined. |
| Get Command Status | Async | 2E91 | FEEC | An internal error occurred. Take the following actions:<br><br>1. The number of asynchronous commands might have exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: |

| | | Error code | | |
|---|---|---|---|---|
| | **Executing/** | **SSB1** | **SSB2** | |
| **Error message** | **Async** | | | **Description** |
| SSB codes returned by raidcom add qos_grp (title spanning) | | | | |

| | | **Error code** | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| | | | | a. Run the raidcom `get command_status` command to wait for completion of the running asynchronous commands.<br>b. Rerun the command that caused an error.<br>2. If the same error occurs in action 1, other users might be running commands. Wait for a while, and then rerun the command that caused an error.<br>3. If action 2 repeatedly fails with the same error, contact customer support. |
| CMDRJE | Executing | 2EF3 | 9F02 | The specified operation cannot be performed because it is not supported. |

*SSB codes returned by raidcom delete qos_grp*

| SSB codes returned by raidcom delete qos_grp | | | | |
|---|---|---|---|---|
| | | **Error code** | | |
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | 2E02 | A701 | The specified QoS group ID is out of the valid range. |
| Get Command Status | Async | 2E10 | A701 | The operation cannot be performed because an LDEV has been set for the specified QoS group. |
| Get Command Status | Async | 2E11 | 800E | The operation cannot be performed because the internal processing is in progress. Wait for a while and retry the operation. |

| SSB codes returned by raidcom delete qos_grp | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E20 | A702 | The QoS group cannot be deleted because the specified QoS group ID is not defined. |
| Get Command Status | Async | 2E91 | FEEC | An internal error occurred. Take the following actions:<br><br>1. The number of asynchronous commands might have exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>  a. Run the raidcom `get command_status` command to wait for completion of the running asynchronous commands.<br>  b. Rerun the command that caused an error.<br><br>2. If the same error occurs in action 1, other users might be running commands. Wait for a while, and then rerun the command that caused an error.<br>3. If action 2 repeatedly fails with the same error, contact customer support. |
| CMDRJE | Executing | 2EF3 | 9F02 | The specified operation cannot be performed because it is not supported. |

*SSB codes returned by raidcom add qos_grp -ldev_id*

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| | | Error code | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is o ut of the valid range. |
| CMDRJE | Executing | 2E02 | A701 | The specified QoS group ID is out of the valid range. |
| CMDRJE | Executing | 2E02 | A705 | The priority for a QoS group, and the lower limit of throughput per second or the lower limit of the data transfer volume (MB) per second for an LDEV in a QoS group cannot be set in combination. |
| Get Command Status | Async | 2E10 | A702 | The operation cannot be performed because either of the following conditions is met:<br><br>▪ The upper limit of the throughput per second of the specified LDEV exceeds the upper limit of the throughput per second in the specified QoS group.<br><br>▪ The upper limit of the data transfer volume (MB) per second of the specified LDEV exceeds the upper limit of the data transfer volume (MB) per second in the specified QoS group. |
| Get Command Status | Async | 2E11 | 800E | The operation cannot be performed because the internal processing is in progress. Wait for a while and retry the operation. |
| Get Command Status | Async | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E20 | 0000 | The specified LDEV is not implemented. |

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| SSB codes returned by raidcom add qos_grp -ldev_id | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E20 | A703 | An LDEV cannot be set because the specified QoS group ID is not defined. |
| Get Command Status | Async | 2E22 | A701 | The specified LDEV is set for the QoS group whose QoS group ID is not specified. |
| Get Command Status | Async | 2E23 | A701 | A new LDEV cannot be set because the maximum number of LDEVs that can be set for the specified QoS group is exceeded. |
| Get Command Status | Async | 2E30 | 0010 | The specified LDEV is a command device. |
| Get Command Status | Async | 2E91 | FEEC | An internal error occurred. Take the following actions: <br><br> 1. The number of asynchronous commands might have exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: <br><br>   a. Run the raidcom `get command_status` command to wait for completion of the running asynchronous commands. <br>   b. Rerun the command that caused an error. <br><br> 2. If the same error occurs in action 1, other users might be running commands. Wait for a while, and then rerun the command that caused an error. <br><br> 3. If action 2 repeatedly fails with the same error, contact customer support. |
| CMDRJE | Executing | 2EF3 | 9F02 | The specified operation cannot be performed because it is not supported. |

## *SSB codes returned by raidcom delete qos_grp -ldev_id*

| | Executing/ | Error code | | |
|---|---|---|---|---|
| Error message | Async | SSB1 | SSB2 | Description |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is o ut of the valid range. |
| CMDRJE | Executing | 2E02 | A701 | The specified QoS group ID is out of the valid range. |
| Get Command Status | Async | 2E11 | 800E | The operation cannot be performed because the internal processing is in progress. Wait for a while and retry the operation. |
| Get Command Status | Async | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the **`raidcom get command_status`** command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E20 | A704 | The LDEV cannot be deleted because the specified QoS group ID is not defined. |
| Get Command Status | Async | 2E91 | FEEC | An internal error occurred. Take the following actions:<br><br>1. The number of asynchronous commands might have exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>  a. Run the raidcom **`get command_status`** command to wait for completion of the running asynchronous commands. |

*Title: SSB codes returned by raidcom delete qos_grp -ldev_id*

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| | | Error code | | |
|---|---|---|---|---|
| **SSB codes returned by raidcom delete qos_grp -ldev_id** | | | | |
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| | | | | b. Rerun the command that caused an error. |
| | | | | 2. If the same error occurs in action 1, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| | | | | 3. If action 2 repeatedly fails with the same error, contact customer support. |
| CMDRJE | Executing | 2EF3 | 9F02 | The specified operation cannot be performed because it is not supported. |

## SSB codes returned by raidcom modify qos_grp -upper_throughput_io

| | | Error code | | |
|---|---|---|---|---|
| **SSB codes returned by raidcom modify qos_grp -upper_throughput_io** | | | | |
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | 2E02 | A701 | The specified QoS group ID is out of the valid range. |
| CMDRJE | Executing | 2E02 | A708 | The specified upper limit of the throughput per second is out of the valid range. |
| Get Command Status | Async | 2E10 | A703 | The operation cannot be performed because either of the following conditions is met: ▪ The upper limit of the throughput per second in the specified QoS group is less than the upper limit of the throughput per second of any LDEV included in the specified QoS group. ▪ The upper limit of the data transfer volume (MB) per second in the specified QoS group is less than the upper limit of the data transfer volume (MB) per second of any LDEV included in the specified QoS group. |
| Get Command Status | Async | 2E11 | 800E | The operation cannot be performed because the internal processing is in progress. Wait for a while and retry the operation. |

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| SSB codes returned by raidcom modify qos_grp -upper_throughput_io | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E20 | A705 | The upper limit of the throughput per second and the upper limit of the data transfer volume (MB) per second cannot be set because the specified QoS group ID is not defined. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E91 | FEEC | An internal error occurred. Take the following actions:<br><br>1. The number of asynchronous commands might have exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br>   a. Run the raidcom `get command_status` command to wait for completion of the running asynchronous commands.<br>   b. Rerun the command that caused an error.<br>2. If the same error occurs in action 1, other users might be running commands. Wait for a while, and then rerun the command that caused an error.<br>3. If action 2 repeatedly fails with the same error, contact customer support. |
| CMDRJE | Executing | 2EBE | A701 | The specified operation cannot be performed because it is not supported. |

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| SSB codes returned by raidcom modify qos_grp -upper_throughput_io | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2EF3 | 9F02 | The specified operation cannot be performed because it is not supported. |

## SSB codes returned by raidcom modify qos_grp -upper_data_trans_mb

| SSB codes returned by raidcom modify qos_grp -upper_data_trans_mb | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E02 | A701 | The specified QoS group ID is out of the valid range. |
| CMDRJE | Executing | 2E02 | A709 | The specified upper limit of the data transfer volume (MB) per second is out of the valid range. |
| Get Command Status | Async | 2E10 | A703 | The operation cannot be performed because either of the following conditions is met:<br><br>▪ The upper limit of the throughput per second in the specified QoS group is less than the upper limit of the throughput per second of any LDEV included in the specified QoS group.<br><br>▪ The upper limit of the data transfer volume (MB) per second in the specified QoS group is less than the upper limit of the data transfer volume (MB) per second of any LDEV included in the specified QoS group. |
| Get Command Status | Async | 2E11 | 800E | The operation cannot be performed because the internal processing is in progress. Wait for a while and retry the operation. |
| Get Command Status | Async | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br><br>2. Rerun the command that caused an error. |

| SSB codes returned by raidcom modify qos_grp -upper_data_trans_mb | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code SSB1 | SSB2 | Description |
| | | | | If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E20 | A705 | The upper limit of the throughput per second or the upper limit of the data transfer volume (MB) per second cannot be set because the specified QoS group ID is not defined. |
| CMDRJE Get Command Status | Executing/ Async | 2E91 | FEEC | An internal error occurred. Take the following actions:<br><br>1. The number of asynchronous commands might have exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br> a. Run the raidcom `get command_status` command to wait for completion of the running asynchronous commands.<br> b. Rerun the command that caused an error.<br>2. If the same error occurs in action 1, other users might be running commands. Wait for a while, and then rerun the command that caused an error.<br>3. If action 2 repeatedly fails with the same error, contact customer support. |
| CMDRJE | Executing | 2EBE | A701 | The specified operation cannot be performed because it is not supported. |
| CMDRJE | Executing | 2EF3 | 9F02 | The specified operation cannot be performed because it is not supported. |

*SSB codes returned by raidcom modify qos_grp -upper_alert_time*

| | | Error code | | |
|---|---|---|---|---|
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| CMDRJE | Executing | 2E02 | A701 | The specified QoS group ID is out of the valid range. |
| CMDRJE | Executing | 2E02 | A70D | The specified alert notification time (second) is out of the valid range. |
| Get Command Status | Async | 2E10 | A722 | Because the upper limit of the throughput per second or the upper limit of the data transfer volume (MB) per second is not set in the specified QoS group, the alert notification time when the upper limit is exceeded cannot be set. |
| Get Command Status | Async | 2E11 | 800E | The operation cannot be performed because the internal processing is in progress. Wait for a while and retry the operation. |
| Get Command Status | Async | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E20 | A706 | The alert notification time when the upper limit is exceeded cannot be set because the specified QoS group ID is not defined. |
| CMDRJE<br>Get Command Status | Executing/ Async | 2E91 | FEEC | An internal error occurred. Take the following actions:<br><br>1. The number of asynchronous commands might have exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>   a. Run the raidcom `get command_status` command to wait for completion of the running asynchronous commands. |

**SSB codes returned by raidcom modify qos_grp -upper_alert_time**

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| Error message | Executing/ Async | Error code | | Description |
| SSB codes returned by raidcom modify qos_grp -upper_alert_time | | | | |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| | | | | b. Rerun the command that caused an error. |
| | | | | 2. If the same error occurs in action 1, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| | | | | 3. If action 2 repeatedly fails with the same error, contact customer support. |
| CMDRJE | Executing | 2EBE | A701 | The specified operation cannot be performed because it is not supported. |
| CMDRJE | Executing | 2EF3 | 9F02 | The specified operation cannot be performed because it is not supported. |

## *SSB codes returned by raidcom modify ldev -upper_throughput_io (VSP 5000 series, VSP E series, VSP G/F350, G/F370, G/F700, G/F900)*

| Error message | Executing/ Async | Error code | | Description |
| raidcom modify ldev -upper_throughput_io | | | | |
|---|---|---|---|---|
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is out of settable range. |
| CMDRJE | Executing | 2E02 | 0208 | The specified upper limit of the throughput per second exceeds the valid range. |
| Get Command Status | Async | 2E02 | 0210 | The specified value for the already set upper limit value or lower limit value is invalid. |

| raidcom modify ldev -upper_throughput_io | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| Get Command Status | Async | 2E02 | 0211 | The operation cannot be performed because either of the following conditions is met:<br><br>▪ The specified upper limit of the throughput per second cannot be set because it exceeds the upper limit of the throughput per second in the QoS group including the specified LDEV.<br><br>▪ The specified upper limit of the data transfer volume (MB) per second cannot be set because it exceeds the upper limit of the data transfer volume (MB) per second in the QoS group including the specified LDEV. |
| Get Command Status | Async | 2E11 | 800E | The operation cannot be performed because internal processing is in progress. After a while, re-execute the command. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE | Executing | 2E20 | 0000 | The specified LDEV is not installed. |
| Get Command Status | Async | 2E30 | 0010 | The specified LDEV is a command device. |
| Get Command Status | Async | 2E3F | 8000 | The specified operation cannot be performed because it is not supported. |
| CMDRJE<br>Get Command Status | Executing/ Async | 2E91 | FEEC | An internal error occurred. Take the following actions:<br><br>1. The number of asynchronous commands might have exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: |

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | **SSB1** | **SSB2** | |
| **raidcom modify ldev -upper_throughput_io** | | | | |

| Error message | Executing/ Async | SSB1 | SSB2 | Description |
|---|---|---|---|---|
| | | | | **a.** Run the raidcom `get command_status` command to wait for completion of the running asynchronous commands. |
| | | | | **b.** Rerun the command that caused an error. |
| | | | | **2.** If the same error occurs in action 1, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| | | | | **3.** If action 2 repeatedly fails with the same error, contact customer support. |
| CMDRJE Get Command Status | Executing/ Async | 2EBE | 9E01 | The specified parameter is incorrect. |
| CMDRJE | Executing | 2EBE | 9E02 | The combination of the specified parameters is incorrect. |
| CMDRJE | Executing | 2EF3 | 9F02 | The specified operation cannot be performed because it is not supported. |

## SSB codes returned by raidcom modify ldev -upper_data_trans_mb (VSP 5000 series, VSP E series, VSP G/F350, G/F370, G/F700, G/F900)

| Error message | Executing/ Async | Error code | | Description |
|---|---|---|---|---|
| | | **SSB1** | **SSB2** | |
| **SSB codes returned by raidcom modify ldev -upper_data_trans_mb** | | | | |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is out of settable range. |
| CMDRJE | Executing | 2E02 | 0209 | The specified upper limit of the data transfer volume (MB) per second exceeds the valid range. |

| Error message | Executing/ Async | Error code SSB1 | SSB2 | Description |
|---|---|---|---|---|
| Get Command Status | Async | 2E02 | 0211 | The operation cannot be performed because either of the following conditions is met:<br><br>▪ The specified upper limit of the throughput per second cannot be set because it exceeds the upper limit of the throughput per second in the QoS group including the specified LDEV.<br><br>▪ The specified upper limit of the data transfer volume (MB) per second cannot be set because it exceeds the upper limit of the data transfer volume (MB) per second in the QoS group including the specified LDEV. |
| Get Command Status | Async | 2E02 | 0210 | The specified value for the already set upper limit value or lower limit value is invalid. |
| Get Command Status | Async | 2E11 | 800E | The operation cannot be performed because internal processing is in progress. After a while, retry the operation. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE | Executing | 2E20 | 0000 | The specified LDEV is not installed. |
| Get Command Status | Async | 2E30 | 0010 | The specified LDEV is a command device. |
| Get Command Status | Async | 2E3F | 8000 | The specified operation cannot be performed because it is not supported. |

The table title spanning the top: **SSB codes returned by raidcom modify ldev -upper_data_trans_mb**

| SSB codes returned by raidcom modify ldev -upper_data_trans_mb | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2E91 | FEEC | An internal error occurred. Take the following actions:<br><br>1. The number of asynchronous commands might have exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>   a. Run the raidcom `get command_status` command to wait for completion of the running asynchronous commands.<br><br>   b. Rerun the command that caused an error.<br><br>2. If the same error occurs in action 1, other users might be running commands. Wait for a while, and then rerun the command that caused an error.<br><br>3. If action 2 repeatedly fails with the same error, contact customer support. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2EBE | 9E01 | The specified parameter is incorrect. |
| CMDRJE | Executing | 2EBE | 9E02 | The combination of the specified parameters is incorrect. |
| CMDRJE | Executing | 2EF3 | 9F02 | The specified operation cannot be performed because it is not supported. |

## SSB codes returned by raidcom modify ldev -upper_alert_time (VSP 5000 series, VSP E series, VSP G/F350, G/F370, G/F700, G/F900)

| raidcom modify ldev -upper_alert_time | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is out of settable range. |

| raidcom modify ldev -upper_alert_time | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E02 | 020D | The specified alert notification time (second) exceeds the valid range. |
| Get Command Status | Async | 2E10 | 0222 | Any value other than the following values is set for the specified LDEV (VSP 5000 series, VSP G130, G/F350, G/F370, G/F700, G/F900): <br><br> ▪ Upper limit of the throughput <br><br> ▪ Upper limit of the data transfer volume per second (MB) <br><br> VSP G130, G/F350, G/F370, G/F700, G/F900 <br><br> ▪ Lower limit of the throughput <br><br> ▪ Lower limit of the data transfer volume per second (MB) <br><br> ▪ I/O processing priority |
| Get Command Status | Async | 2E11 | 800E | The operation cannot be performed because internal processing is in progress. After a while, re-execute the command. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: <br><br> 1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands. <br><br> 2. Rerun the command that caused an error. <br><br> If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE | Executing | 2E20 | 0000 | The specified LDEV is not installed. |
| Get Command Status | Async | 2E30 | 0010 | The specified LDEV is a command device. |
| CMDRJE <br><br> Get Command Status | Executing/ Async | 2E91 | FEEC | An internal error occurred. Take the following actions: <br><br> 1. The number of asynchronous commands might have exceeded the maximum number |

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| | | Error code | | |
|---|---|---|---|---|
| | | **raidcom modify ldev -upper_alert_time** | | |
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| | | | | of acceptable asynchronous commands. Perform the following steps: <br><br> a. Run the raidcom `get command_status` command to wait for completion of the running asynchronous commands. <br><br> b. Rerun the command that caused an error. <br><br> 2. If the same error occurs in action 1, other users might be running commands. Wait for a while, and then rerun the command that caused an error. <br><br> 3. If action 2 repeatedly fails with the same error, contact customer support. |
| CMDRJE<br><br>Get Command Status | Executing/ Async | 2EBE | 9E01 | The specified parameter is incorrect. |
| CMDRJE | Executing | 2EBE | 9E02 | The combination of the specified parameters is incorrect. |
| CMDRJE | Executing | 2EF3 | 9F02 | The specified operation cannot be performed because it is not supported. |

*SSB codes returned by raidcom modify ldev -lower_throughput_io (VSP 5000 series, VSP E series, VSP G/F350, G/F370, G/F700, G/F900)*

| raidcom modify ldev -lower_throughput_io | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is outside the available range. |
| CMDRJE | Executing | 2E02 | 020A | The specified lower limit of the throughput per second is outside the valid range. |
| Get Command Status | Async | 2E02 | 0210 | The specified value for the already set upper limit value or lower limit value is invalid. |
| Get Command Status | Async | 2E02 | 0212 | (VSP 5000 series) The priority for a QoS group and the lower limit of throughput per second for an LDEV in a QoS group cannot be set in combination. |
| Get Command Status | Async | 2E11 | 800E | The operation cannot be performed because internal processing is running. Wait for a while, then rerun the command. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: 1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands. 2. Rerun the command that caused an error. If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE | Executing | 2E20 | 0000 | The specified LDEV is not installed. |

| raidcom modify ldev -lower_throughput_io | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| Get Command Status | Async | 2E30 | 0010 | The specified LDEV is a command device. |
| CMDRJE Get Command Status | Executing Async | 2E91 | FEEC | An internal error occurred. Take the following actions:<br><br>1. The number of asynchronous commands might have exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>   a. Run the raidcom `get command_status` command to wait for completion of the running asynchronous commands.<br><br>   b. Rerun the command that caused an error.<br><br>2. If the same error occurs in action 1, other users might be running commands. Wait for a while, and then rerun the command that caused an error.<br><br>3. If action 2 repeatedly fails with the same error, contact customer support. |
| CMDRJE Get Command Status | Executing Async | 2EBE | 9E01 | The specified parameter is not valid. |
| CMDRJE | Executing | 2EBE | 9E02 | The current microcode version does not support the specified operation. |
| CMDRJE | Executing | 2EF3 | 9F02 | The specified operation cannot be performed because it is not supported. |

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## SSB codes returned by raidcom modify ldev -lower_data_trans_mb (VSP 5000 series, VSP E series, VSP G/F350, G/F370, G/F700, G/F900)

| raidcom modify ldev -lower_data_trans_mb | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is outside the available range. |
| CMDRJE | Executing | 2E02 | 020B | The specified lower limit of the data transfer capacity (MB) per second is outside the valid range. |
| Get Command Status | Async | 2E02 | 0210 | The specified value for the already set upper limit value or lower limit value is invalid. |
| Get Command Status | Async | 2E02 | 0212 | (VSP 5000 series) The priority for a QoS group and the lower limit of the data transfer volume (MB) per second for an LDEV cannot be set in combination. |
| Get Command Status | Async | 2E11 | 800E | The operation cannot be performed because internal processing is running. Wait for a while, then rerun the command. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: <br> 1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands. <br> 2. Rerun the command that caused an error. |

| raidcom modify ldev -lower_data_trans_mb | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| | | | | If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE | Executing | 2E20 | 0000 | The specified LDEV is not installed. |
| Get Command Status | Async | 2E30 | 0010 | The specified LDEV is a command device. |
| CMDRJE Get Command Status | Executing Async | 2E91 | FEEC | An internal error occurred. Take the following actions:<br><br>1. The number of asynchronous commands might have exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>  a. Run the raidcom `get command_status` command to wait for completion of the running asynchronous commands.<br>  b. Rerun the command that caused an error.<br><br>2. If the same error occurs in action 1, other users might be running commands. Wait for a while, and then rerun the command that caused an error.<br><br>3. If action 2 repeatedly fails with the same error, contact customer support. |
| CMDRJE Get Command Status | Executing Async | 2EBE | 9E01 | The specified parameter is not valid. |

| raidcom modify ldev -lower_data_trans_mb | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2EBE | 9E02 | The current microcode version does not support the specified operation. |
| CMDRJE | Executing | 2EF3 | 9F02 | The specified operation cannot be performed because it is not supported. |

*SSB codes returned by raidcom modify ldev -lower_alert_time (VSP 5000 series, VSP E series, VSP G/F350, G/F370, G/F700, G/F900)*

| raidcom modify ldev -lower_alert_time | | | | |
| --- | --- | --- | --- | --- |
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is outside the available range. |
| CMDRJE | Executing | 2E02 | 020E | The specified alert notification time (second) when the lower limit is not reached is outside the valid range. |
| Get Command Status | Async | 2E10 | 0222 | Any value other than the following values is set for the specified LDEV:<br>▪ Upper limit of the throughput<br>▪ Upper limit of the data transfer volume (MB)<br>▪ Lower limit of the throughput<br>▪ Lower limit of the data transfer volume (MB)<br>▪ I/O processing priority |
| Get Command Status | Async | 2E11 | 800E | The operation cannot be performed because internal processing is running. Wait for a while, then rerun the command. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |

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| raidcom modify ldev -lower_alert_time | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E20 | 0000 | The specified LDEV is not installed. |
| Get Command Status | Async | 2E30 | 0010 | The specified LDEV is a command device. |
| CMDRJE | Async | 2E91 | FEEC | An internal error occurred. Take the following actions:<br><br>1. The number of asynchronous commands might have exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>  a. Run the raidcom `get command_status` command to wait for completion of the running asynchronous commands.<br>  b. Rerun the command that caused an error.<br><br>2. If the same error occurs in action 1, other users might be running commands. Wait for a while, and then rerun the command that caused an error.<br>3. If action 2 repeatedly fails with the same error, contact customer support. |
| CMDRJE Get Command Status | Executing Async | 2EBE | 9E01 | The specified parameter is not valid. |
| CMDRJE | Executing | 2EBE | 9E02 | The current microcode version does not support the specified operation. |
| CMDRJE | Executing | 2EF3 | 9F02 | The specified operation cannot be performed because it is not supported. |

## SSB codes returned by raidcom modify ldev -response_alert_time (VSP 5000 series, VSP E series, VSP G/F350, G/F370, G/F700, G/F900)

| raidcom modify ldev -response_alert_time | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is outside the available range. |
| CMDRJE | Executing | 2E02 | 020F | The specified alert notification time (second) when the target response time is not reached is outside the valid range. |
| Get Command Status | Async | 2E10 | 0222 | Any value other than the following values is set for the specified LDEV: <br> ▪ Upper limit of the throughput <br> ▪ Upper limit of the data transfer volume (MB) <br> ▪ Lower limit of the throughput <br> ▪ Lower limit of the data transfer volume (MB) <br> ▪ I/O processing priority |
| Get Command Status | Async | 2E11 | 800E | The operation cannot be performed because internal processing is running. Wait for a while, then rerun the command. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: <br> 1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands. <br> 2. Rerun the command that caused an error. |

| raidcom modify ldev -response_alert_time | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| | | | | If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE | Executing | 2E20 | 0000 | The specified LDEV is not installed. |
| Get Command Status | Async | 2E30 | 0010 | The specified LDEV is a command device. |
| CMDRJE Get Command Status | Executing Async | 2E91 | FEEC | An internal error occurred. Take the following actions:<br><br>1. The number of asynchronous commands might have exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>  a. Run the raidcom `get command_status` command to wait for completion of the running asynchronous commands.<br><br>  b. Rerun the command that caused an error.<br><br>2. If the same error occurs in action 1, other users might be running commands. Wait for a while, and then rerun the command that caused an error.<br><br>3. If action 2 repeatedly fails with the same error, contact customer support. |
| CMDRJE Get Command Status | Executing Async | 2EBE | 9E01 | The specified parameter is not valid. |
| CMDRJE | Executing | 2EBE | 9E02 | The current microcode version does not support the specified operation. |

| raidcom modify ldev -response_alert_time | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | Error code | | Description |
| | | SSB1 | SSB2 | |
| CMDRJE | Executing | 2EF3 | 9F02 | The specified operation cannot be performed because it is not supported. |

**SSB codes returned by raidcom modify ldev -response_priority (VSP 5000 series, VSP E series, VSP G/F350, G/F370, G/F700, G/F900)**

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| | | Error code | | |
|---|---|---|---|---|
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is outside the available range. |
| CMDRJE | Executing | 2E02 | 020C | The specified I/O processing priority is outside the valid range. |
| Get Command Status | Async | 2E02 | 0212 | (VSP 5000 series) The priority for a QoS group and the lower limit of throughput per second for an LDEV in a QoS group, or the priority for a QoS group and the lower limit of the data transfer volume (MB) per second for an LDEV in a QoS group cannot be set in combination. |
| Get Command Status | Async | 2E11 | 800E | The operation cannot be performed because internal processing is running. Wait for a while, then rerun the command. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: <br><br> 1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands. <br> 2. Rerun the command that caused an error. <br><br> If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE | Executing | 2E20 | 0000 | The specified LDEV is not installed. |
| Get Command Status | Async | 2E30 | 0010 | The specified LDEV is a command device. |

*(table title: raidcom modify ldev -response_priority)*

| raidcom modify ldev -response_priority | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **Error code** | | **Description** |
| | | **SSB1** | **SSB2** | |
| CMDRJE Get Command Status | Executing Async | 2E91 | FEEC | An internal error occurred. Take the following actions:<br><br>1. The number of asynchronous commands might have exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>   a. Run the raidcom `get command_status` command to wait for completion of the running asynchronous commands.<br>   b. Rerun the command that caused an error.<br><br>2. If the same error occurs in action 1, other users might be running commands. Wait for a while, and then rerun the command that caused an error.<br><br>3. If action 2 repeatedly fails with the same error, contact customer support. |
| CMDRJE Get Command Status | Executing Async | 2EBE | 9E01 | The specified parameter is not valid. |
| CMDRJE | Executing | 2EBE | 9E02 | The current microcode version does not support the specified operation. |
| CMDRJE | Executing | 2EF3 | 9F02 | The specified operation cannot be performed because it is not supported. |

*SSB codes returned by raidcom modify user_system_opt*

| raidcom modify user_system_opt | | | | |
|---|---|---|---|---|
| | | Error code | | |
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| CMDRJE | Executing | 2E02 | 9D07 | The specified option ID of the advanced system settings is outside the available range. |
| CMDRJE | Executing | 2E9E | FEEC | An internal error occurred. Contact customer support. |

## SSB codes returned by raidcom modify port -port_mode (VSP 5000 series, VSP E1090)

| raidcom modify port -port_mode | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| CMDRJE / Get Command Status | Executing/ Async | 2E00 | 8400 | The value of the specified port is not valid. |
| Get Command Status | Async | 2E02 | 8405 | The port attribute of the specified port is not Target. |
| Get Command Status | Async | 2E10 | 8406 | The specified port does not support NVMe Mode. |
| Get Command Status | Async | 2E10 | 8407 | The current microcode version for CHB does not support NVMe mode. |
| Get Command Status | Async | 2E10 | 8408 | The operation mode of the specified port cannot be changed because there is a host group whose host group ID is other than 0. |
| Get Command Status | Async | 2E10 | 8409 | The operation mode of the specified port cannot be changed because an LU path exists. |
| Get Command Status | Async | 2E10 | 840A | The operation mode of the port cannot be changed because there is a path for a TrueCopy, Universal Replicator, or global-active device pair using the specified port. |
| Get Command Status | Async | 2E10 | 840B | The operation mode of the port cannot be changed because the specified port has an external VOL path. |

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| raidcom modify port -port_mode | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| Get Command Status | Async | 2E10 | 840C | The operation mode of the port cannot be changed because there is a path for a TrueCopy, Universal Replicator, or global-active device pair using the specified port. |
| Get Command Status | Async | 2E10 | 840D | The operation mode of the port cannot be changed because there is a path for a TrueCopy, Universal Replicator, or global-active device pair using the specified port. |
| Get Command Status | Async | 2E10 | 840F | The operation mode of the port cannot be changed because the specified port is being used as an NVM subsystem port. |
| Get Command Status | Async | 2E11 | 8411 | The operation cannot be performed because the port belongs to the resource group in which the virtual storage machine is set. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br><br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| CMDRJE | | 2E20 | 8400 | The specified port is not mounted. |
| CMDRJE | Executing | 2E3F | 8000 | The specified operation is not supported in the current microcode version. |
| Get Command Status | Executing | 2ED0 | 84FC | An internal error occurred. Contact customer support. |
| Get Command Status | Async | 2ED0 | FEEC | An internal error occurred. Contact customer support. |

*SSB codes returned by raidcom modify port -delete_login_host_nqn (VSP 5000 series, VSP E1090)*

| raidcom modify port -delete_login_host_nqn | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| CMDRJE | Executing | 2E00 | 8400 | The value of the specified port is not valid. |
| CMDRJE | Executing | 2E9F | FEEC | An internal error occurred. Contact customer support. |

## SSB codes returned by raidcom add nvm_subsystem (VSP 5000 series, VSP E1090)

| raidcom add nvm_subsystem | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| CMDRJE | Executing | 2E00 | 2202 | The specified resource ID is out of the effective range. |
| CMDRJE | Executing | 2E02 | 1F01 | The specified NVM subsystem ID is out of the effective range. |
| CMDRJE / Get Command Status | Executing/ Async | 2E02 | 1F02 | This command cannot be operated due to one of the following reasons:<br><br>▪ An unavailable character is included in the name of the specified NVM subsystem.<br><br>▪ The NVM subsystem name is not specified. |
| CMDRJE | Executing | 2E02 | 1F03 | The NVM subsystem name is not specified. |
| Get Command Status | Async | 2E02 | 1F04 | The specified host mode is not supported. |
| Get Command Status | Async | 2E02 | 1F05 | The specified host mode option is not supported. |
| CMDRJE | Executing | 2E02 | 1F06 | A default NVM subsystem name cannot be specified for the NVM subsystem. |
| Get Command Status | Async | 2E02 | 1F07 | The specified parameter is incorrect. |
| Get Command Status | Async | 2E02 | 1F08 | The specified NVM subsystem already exists. |

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| | | | | **raidcom add nvm_subsystem** |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| Get Command Status | Async | 2E10 | 1F01 | The operation cannot be performed because the number of NVM subsystems that can be created in the system exceeds the upper limit. |
| Get Command Status | Async | 2E11 | 1F01 | The command cannot be accepted. After a while, execute the same command again. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E30 | 1F02 | The specified NVM subsystem name is used. |
| Get Command Status | Async | 2E30 | 1F03 | The operation cannot be performed because there is no NVM subsystem ID available in the system or resource group. |
| Get Command Status | Async | 2E9F | FEEC | An internal error occurred. Contact customer support. |
| Get Command Status | Async | 2EBE | 1F02 | The operation cannnot be performed because the specified host mode option includes a option that cannot be set to the NVM subsystem. |
| CMDRJE<br><br>Get Command Status (VSP E1090 only) | Executing/ Async | 2EF3 | 1F00 | The specified operation is not supported in the current microcode version. |

*SSB codes returned by raidcom delete nvm_subsystem (VSP 5000 series, VSP E1090)*

| raidcom delete nvm_subsystem | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| CMDRJE | Executing | 2E02 | 1F01 | The specified NVM subsystem ID is out of the effective range. |
| CMDRJE | Executing | 2E02 | 1F02 | This command cannot be operated due to one of the following reasons:<br><br>▪ An unavailable character is included in the name of the specified NVM subsystem.<br><br>▪ The NVM subsystem name is not specified. |
| CMDRJE | Executing | 2E02 | 1F03 | The NVM subsystem name is not specified. |
| Get Command Status | Async | 2E02 | 1F0A | The specified parameter is incorrect. |
| Get Command Status | Async | 2E10 | 1F03 | Namespace is set for the specified NVM subsystem. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E31 | 1F03 | The specified NVM subsystem cannot be deleted because it is conected to the host. |
| Get Command Status | Async | 2E9F | FEEC | An internal error occurred. Contact customer support. |
| CMDRJE | Executing | 2EF3 | 1F00 | The specified operation is not supported in the current microcode version. |

*SSB codes returned by raidcom modify nvm_subsystem (VSP 5000 series, VSP E1090)*

| Error message | Executing/ Async | SSB1 | SSB2 | Description |
|---|---|---|---|---|
| CMDRJE | Executing | 2E02 | 1F01 | The specified NVM subsystem ID is out of the effective range. |
| CMDRJE / Get Command Status | Executing/ Async | 2E02 | 1F02 | This command cannot be operated due to one of the following reasons:<br>▪ An unavailable character is included in the name of the specified NVM subsystem.<br>▪ The NVM subsystem name is not specified. |
| CMDRJE | Executing | 2E02 | 1F03 | The NVM subsystem name is not specified. |
| Get Command Status | Async | 2E02 | 1F04 | The specified host mode is not supported. |
| Get Command Status | Async | 2E02 | 1F05 | The specified host mode optioin is not supported. |
| CMDRJE | Executing | 2E02 | 1F06 | A default NVM subsystem name cannot be specified for the NVM subsystem. |
| Get Command Status | Async | 2E02 | 1F09 | The specified parameter is incorrect. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E21 | 1F01 | The specified NVM subsystem is not created. |
| Get Command Status | Async | 2E30 | 1F02 | The specified NVM subsystem name is used. |

| raidcom modify nvm_subsystem | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| Get Command Status | Async | 2E31 | 1F01 | The T10PI attribute of the specified NVM subsystem cannot be disabled because an LDEV with the T10PI attribute enabled is assigned as namespace. |
| Get Command Status | Async | 2E31 | 1F04 | The T10PI attribute of the specified NVM subsystem cannot be changed because an NVM subsystem port exists. |
| Get Command Status | Async | 2E9F | FEEC | An internal error occurred. Contact customer support. |
| Get Command Status | Async | 2EBE | 1F05 | The specified host mode option cannot be set on the NVM subsystem. |
| CMDRJE | Executing | 2EF3 | 1F00 | The specified operation is not supported in the current microcode version. |

## SSB codes returned by raidcom add nvm_subsystem_port (VSP 5000 series, VSP E1090)

| raidcom add nvm_subsystem_port | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | 2E00 | 8400 | The value of the specified port is not valid. |
| Get Command Status | Async | 2E02 | 1E01 | The specified parameter is incorrect. |
| CMDRJE | Executing | 2E02 | 1F01 | The specified NVM subsystem ID is out of the effective range. |
| CMDRJE | Executing | 2E02 | 1F02 | This command cannot be operated due to one of the following reasons:<br><br>▪ An unavailable character is included in the name of the specified NVM subsystem.<br><br>▪ The NVM subsystem name is not specified. |
| CMDRJE | Executing | 2E02 | 1F03 | The NVM subsystem name is not specified. |
| Get Command Status | Async | 2E10 | 1E01 | The T10PI attributes of the specified port and NVM subsystem do not match. |

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| | raidcom add nvm_subsystem_port | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| Get Command Status | Async | 2E11 | 1E01 | The command cannot be accepted. After a while, execute the same command again. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: 1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands. 2. Rerun the command that caused an error. If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E12 | 1E01 | The operation mode of the specified port is not NVMe mode. |
| Get Command Status | Async | 2E12 | 1E02 | The specified port does not support NVMe protocol. |
| Get Command Status | Async | 2E21 | 1F01 | The specified NVM subsystem is not created. |
| Get Command Status | Async | 2E23 | 1E02 | The operation cannot be performed because the number of namespaces that can be accessed from the specified port exceeds the upper limit. |
| Get Command Status | Async | 2E23 | 1E03 | The operation cannot be performed because the maximum number of NVM subsystems associated with the specified port exceeds the maximum. |
| Get Command Status | Async | 2E23 | 1E04 | The operation cannot be performed because the number of NVM subsystem ports that can be set for the specified NVM subsystem exceeds the upper limit. |
| Get Command Status | Async | 2E9F | FEEC | An internal error occurred. Contact customer support. |
| CMDRJE | Executing | 2EF3 | 1F00 | The specified operation is not supported in the current microcode version. |

## *SSB codes returned by raidcom delete nvm_subsystem_port (VSP 5000 series, VSP E1090)*

| | raidcom delete nvm_subsystem_port | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | 2E00 | 8400 | The value of the specified port is not valid. |
| Get Command Status | Async | 2E02 | 1E02 | The specified parameter is incorrect. |
| CMDRJE | Executing | 2E02 | 1F01 | The specified NVM subsystem ID is out of the effective range. |
| CMDRJE | Executing | 2E02 | 1F02 | This command cannot be operated due to one of the following reasons:<br><br>▪ An unavailable character is included in the name of the specified NVM subsystem.<br><br>▪ The NVM subsystem name is not specified. |
| CMDRJE | Executing | 2E02 | 1F03 | The NVM subsystem name is not specified. |
| Get Command Status | Async | 2E10 | 1E02 | The subsystem port cannot be deleted because the last path of the TrueCopy pair volume or GAD pair volume is included under the specified NVM subsystem port. |
| Get Command Status | Async | 2E10 | 1E03 | The subsystem port cannot be deleted because the last path of the UR pair volume is included under the specified NVM subsystem port. |
| Get Command Status | Async | 2E10 | 1E04 | The subsystem port cannot be deleted because the last path of the ShadowImage pair volume is included under the specified NVM subsystem port. |
| Get Command Status | Async | 2E10 | 1E05 | The subsystem port cannot be deleted because the last path of the Thin Image/Copy-on-Write Snapshot is included under the specified NVM subsystem port. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error. |

| raidcom delete nvm_subsystem_port | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| | | | | If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E21 | 1F01 | The specified NVM subsystem is not created. |
| Get Command Status | Async | 2E31 | 1E01 | The subsystem port cannot be deleted because host I/O is being executed using the specified NVM subsystem port. |
| Get Command Status | Async | 2E9F | FEEC | An internal error occurred. Contact customer support. |
| CMDRJE | Executing | 2EF3 | 1F00 | The specified operation is not supported in the current microcode version. |

## SSB codes returned by raidcom add host_nqn (VSP 5000 series, VSP E1090)

| raidcom add host_nqn | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| Get Command Status | Async | 2E02 | 1D01 | This command cannot be operated due to one of the following reasons:<br><br>▪ The format of the specified host NQN is invalid.<br><br>▪ An unavailable character is included in the specified host NQN. |
| CMDRJE | Executing | 2E02 | 1D04 | Host NQN is not specified. |
| Get Command Status | Async | 2E02 | 1D06 | The specified parameter is incorrect. |
| CMDRJE | Executing | 2E02 | 1F01 | The specified NVM subsystem ID is out of the effective range. |

| raidcom add host_nqn | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE / Get Command Status | Executing/ Async | 2E02 | 1F02 | This command cannot be operated due to one of the following reasons:<br><br>▪ An unavailable character is included in the name of the specified NVM subsystem.<br><br>▪ The NVM subsystem name is not specified. |
| CMDRJE | Executing | 2E02 | 1F03 | The NVM subsystem name is not specified. |
| Get Command Status | Async | 2E10 | 1D01 | The operation cannot be performed because the number of host NQNs that can be registered in the system exceeds the upper limit. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E21 | 1F01 | The specified NVM subsystem is not created. |
| Get Command Status | Async | 2E9F | FEEC | An internal error occurred. Contact customer support. |
| CMDRJE | Executing | 2EF3 | 1F00 | The specified operation is not supported in the current microcode version. This SSB error code is displayed only for VSP 5000 series. |

*SSB codes returned by raidcom delete host_nqn (VSP 5000 series, VSP E1090)*

| raidcom delete host_nqn | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| CMDRJE | Executing | 2E02 | 1D04 | Host NQN is not specified. |
| Get Command Status | Async | 2E02 | 1D08 | The specified parameter is incorrect. |
| CMDRJE | Executing | 2E02 | 1F01 | The specified NVM subsystem ID is out of the effective range. |
| CMDRJE | Executing | 2E02 | 1F02 | This command cannot be operated due to one of the following reasons:<br><br>▪ An unavailable character is included in the name of the specified NVM subsystem.<br><br>▪ The NVM subsystem name is not specified. |
| CMDRJE | Executing | 2E02 | 1F03 | The NVM subsystem name is not specified. |
| Get Command Status | Async | 2E10 | 1D02 | The specified host NQN cannot be operated because the namespace is defined. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br><br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E21 | 1F01 | The specified NVM subsystem is not created. |
| Get Command Status | Async | 2E30 | 1D06 | The specified host NQN cannot be operated because it is connecting to the NVM subsystem. |
| Get Command Status | Async | 2E9F | FEEC | An internal error occurred. Contact customer support. |
| CMDRJE | Executing | 2EF3 | 1F00 | The specified operation is not supported in the current microcode version. |

| raidcom modify host_nqn | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| Get Command Status | Async | 2E02 | 1D01 | This command cannot be operated due to one of the following reasons:<br>▪ The format of the specified host NQN is invalid.<br>▪ An unavailable character is included in the specified host NQN. |
| CMDRJE | Executing | 2E02 | 1D04 | Host NQN is not specified. |
| Get Command Status | Async | 2E02 | 1D05 | This command cannot be operated due to one of the following reasons:<br>▪ An unavailable character is included in the specified host NQN nickname.<br>▪ The host NQN nickname is not specified. |
| Get Command Status | Async | 2E02 | 1D07 | The specified parameter is incorrect. |
| CMDRJE | Executing | 2E02 | 1F01 | The specified NVM subsystem ID is out of the effective range. |
| CMDRJE | Executing | 2E02 | 1F02 | This command cannot be operated due to one of the following reasons:<br>▪ An unavailable character is included in the name of the specified NVM subsystem.<br>▪ The NVM subsystem name is not specified. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |

| raidcom modify host_nqn | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| Get Command Status | Async | 2E21 | 1D01 | The specified host NQN is not defined. |
| Get Command Status | Async | 2E21 | 1F01 | The specified NVM subsystem is not created. |
| Get Command Status | Async | 2E30 | 1D06 | The specified host NQN cannot be operated because it is connecting to NVM subsystem. |
| Get Command Status | Async | 2E9F | FEEC | An internal error occurred. Contact customer support. |
| CMDRJE | Executing | 2EF3 | 1F00 | The specified operation is not supported in the current microcode version. |

## SSB codes returned by raidcom add namespace_path (VSP 5000 series, VSP E1090)

| raidcom add namespace_path | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| Get Command Status | Async | 2E02 | 1B01 | The specified parameter is incorrect. |
| CMDRJE | Executing | 2E02 | 1C01 | The specified Namespace ID is out of the effective range. |
| CMDRJE | Executing | 2E02 | 1D04 | Host NQN is not specified. |
| CMDRJE | Executing | 2E02 | 1F01 | The specified NVM subsystem ID is out of the effective range. |
| CMDRJE | Executing | 2E02 | 1F02 | This command cannot be operated due to one of the following reasons:<br><br>▪ An unavailable character is included in the name of the specified NVM subsystem.<br><br>▪ The NVM subsystem name is not specified. |
| CMDRJE | Executing | 2E02 | 1F03 | The NVM subsystem name is not specified. |

| raidcom add namespace_path | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: <br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E21 | 1C01 | The specified namespace is not created. |
| Get Command Status | Async | 2E21 | 1D01 | The specified host NQN is not defined. |
| Get Command Status | Async | 2E21 | 1F01 | The specified NVM subsystem is not created. |
| Get Command Status | Async | 2E9F | FEEC | An internal error occurred. Contact customer support. |
| CMDRJE | Executing | 2EF3 | 1F00 | The specified operation is not supported in the current microcode version. |

*SSB codes returned by raidcom delete namespace_path (VSP 5000 series, VSP E1090)*

| raidcom delete namespace_path | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| Get Command Status | Async | 2E02 | 1B02 | The specified parameter is incorrect. |
| CMDRJE | Executing | 2E02 | 1C01 | The specified namespace ID is out of the effective range. |
| CMDRJE | Executing | 2E02 | 1D04 | Host NQN is not specified. |

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| raidcom delete namespace_path | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| CMDRJE | Executing | 2E02 | 1F01 | The specified NVM subsystem ID is out of the effective range. |
| CMDRJE | Executing | 2E02 | 1F02 | This command cannot be operated due to one of the following reasons: ▪ An unavailable character is included in the name of the specified NVM subsystem. ▪ The NVM subsystem name is not specified. |
| CMDRJE | Executing | 2E02 | 1F03 | The NVM subsystem name is not specified. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: 1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands. 2. Rerun the command that caused an error. If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E21 | 1D01 | The specified host NQN is not defined. |
| Get Command Status | Async | 2E21 | 1F01 | The specified NVM subsystem is not created. |
| Get Command Status | Async | 2E31 | 1B01 | The namespace path cannot be deleted because the specified host NQN and namespace are executing host I/O. |
| Get Command Status | Async | 2E9F | FEEC | An internal error occurred. Contact customer support. |
| CMDRJE | Executing | 2EF3 | 1F00 | The specified operation is not supported in the current microcode version. |

**SSB codes returned by raidcom add namespace (VSP 5000 series, VSP E1090)**

| raidcom add namespace | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | 2E00 | 0000 | The LDEV number is out of the valid range. |
| CMDRJE | Executing | 2E02 | 1C01 | The specified namespace ID is out of the effective range. |
| Get Command Status | Async | 2E02 | 1C02 | The specified namespace is already used. |
| Get Command Status | Async | 2E02 | 1C03 | The specified LDEV number is already used as namespace. |
| Get Command Status | Async | 2E02 | 1C04 | The specified LDEV cannot be operated because the LU path is defined. |
| Get Command Status | Async | 2E02 | 1C05 | The specified LDEV cannot be used as namespace. |
| Get Command Status | Async | 2E02 | 1C07 | The specified parameter is incorrect. |
| Get Command Status | Async | 2E02 | 1C0A | The operation cannot be performed because the capacity saving setting for the specified volume is not configured correctly. For details, see the *Hitachi Thin Image Advanced User Guide*. |
| CMDRJE | Executing | 2E02 | 1F01 | The specified NVM subsystem ID is out of the effective range. |
| CMDRJE / Get Command Status | Executing/ Async | 2E02 | 1F02 | This command cannot be operated due to one of the following reasons:<br>▪ An unavailable character is included in the name of the specified NVM subsystem.<br>▪ The NVM subsystem name is not specified. |
| CMDRJE | Executing | 2E02 | 1F03 | The NVM subsystem name is not specified. |
| Get Command Status | Async | 2E10 | 1C01 | The specified LDEV is a virtual LDEV. |
| Get Command Status | Async | 2E11 | 1C01 | The command cannot be accepted. After a while, execute the same command again. |

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| raidcom add namespace | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E21 | 1F01 | The specified NVM subsystem is not created. |
| Get Command Status | Async | 2E23 | 1C01 | The operation cannot be performed because the number of namespaces in the specified NVM subsystem exceeds the upper limit. |
| Get Command Status | Async | 2E23 | 1E01 | The operation cannot be performed because the number of ports* associated with an NVM subsystem port on the specified NVM subsystem exceeds the maximum number of accessible namespaces. |
| Get Command Status | Async | 2E9F | FEEC | An internal error occurred. Contact customer support. |
| CMDRJE | Executing | 2EF3 | 1F00 | The specified operation is not supported in the current microcode version. |
| * Note these ports might be associated with non-NVM subsystems. | | | | |

*SSB codes returned by raidcom delete namespace (VSP 5000 series, VSP E1090)*

| | | | | raidcom delete namespace |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | 2E02 | 1C01 | The specified namespace ID is out of the effective range. |
| Get Command Status | Async | 2E02 | 1C08 | The specified parameter is incorrect. |
| CMDRJE | Executing | 2E02 | 1F01 | The specified NVM subsystem ID is out of the effective range. |
| CMDRJE | Executing | 2E02 | 1F02 | This command cannot be operated due to one of the following reasons:<br><br>▪ An unavailable character is included in the name of the specified NVM subsystem.<br><br>▪ The NVM subsystem name is not specified. |
| CMDRJE | Executing | 2E02 | 1F03 | The NVM subsystem name is not specified. |
| Get Command Status | Async | 2E10 | 1C02 | The specified namespace is being used as a TrueCopy or GAD pair. |
| Get Command Status | Async | 2E10 | 1C03 | The specified namespace is being used as a Universal Replicator pair. |
| Get Command Status | Async | 2E10 | 1C04 | The specified namespace is being used as a ShadowImage pair. |
| Get Command Status | Async | 2E10 | 1C05 | The specified namespace is being used as a Thin Image/Copy-on-Write Snapshot pair. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br><br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E21 | 1F01 | The specified NVM subsystem is not created. |

| raidcom delete namespace | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| Get Command Status | Async | 2E31 | 1C01 | The specified namespace cannot be operated because host NQN and namespace path are defined. |
| Get Command Status | Async | 2E31 | 1C02 | The namespace cannot be deleted because the specified namespace is executing host I/O. |
| Get Command Status | Async | 2E9F | FEEC | An internal error occurred. Contact customer support. |
| CMDRJE | Executing | 2EF3 | 1F00 | The specified operation is not supported in the current microcode version. |

*SSB codes returned by raidcom modify namespace (VSP 5000 series, VSP E1090)*

| raidcom modify namespace | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| CMDRJE | Executing | 2E02 | 1C01 | The specified Namespace ID is out of the effective range. |
| Get Command Status | Async | 2E02 | 1C06 | This command cannot be operated due to one of the following reasons:<br>▪ A non-alphanumeric character is included in the specified host NQN nickname.<br>▪ An unavailable character is included in the specified host NQN nickname. |
| Get Command Status | Async | 2E02 | 1C09 | The specified parameter is incorrect. |
| CMDRJE | Executing | 2E02 | 1F01 | The specified NVM subsystem ID is out of the effective range. |
| CMDRJE | Executing | 2E02 | 1F02 | This command cannot be operated due to one of the following reasons:<br>▪ An unavailable character is included in the name of the specified NVM subsystem.<br>▪ The NVM subsystem name is not specified. |

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| raidcom modify namespace | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | 2E02 | 1F03 | The NVM subsystem name is not specified. |
| CMDRJE | Executing | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: <br><br> 1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands. <br> 2. Rerun the command that caused an error. <br><br> If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E21 | 1C01 | The specified namespace is not created. |
| Get Command Status | Async | 2E21 | 1F01 | The specified NVM subsystem is not created. |
| Get Command Status | Async | 2E9F | FEEC | An internal error occurred. Contact customer support. |
| CMDRJE | Async | 2EF3 | 1F00 | The specified operation is not supported in the current microcode version. |

## SSB codes returned by raidcom modify qos_grp -response_priority (VSP 5000 series)

| raidcom modify qos_grp -response_priority | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | 2E02 | A701 | The specified Qos group ID is out of the effective range. |
| CMDRJE | Executing | 2E02 | A702 | The specified priority for I/O processing is out of the effective range. |

| raidcom modify qos_grp -response_priority | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| Get Command Status | Async | 2E02 | A704 | The lower limit of throughput per second, or the lower limit of the data transfer volume (MB) per second is set for an LDEV in the specified QoS group. |
| Get Command Status | Async | 2E11 | 800E | The operation cannot be performed because the internal processing is in progress. Wait for a while and retry the operation. |
| Get Command Status | Async | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: <br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands. <br><br>2. Rerun the command that caused an error. <br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |
| Get Command Status | Async | 2E20 | A705 | The priority for I/O processing cannot be set because the specified QoS group ID is not defined. |
| CMDRJE Get Command Status | Executing Async | 2E91 | FEEC | An internal error occurred. Take the following actions: <br><br>1. The number of asynchronous commands might have exceeded the |

| raidcom modify qos_grp -response_priority | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
|  |  |  |  | maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>  a.  Run the raidcom `get command_status` command to wait for completion of the running asynchronous commands.<br><br>  b.  Rerun the command that caused an error.<br><br>2.  If the same error occurs in action 1, other users might be running commands. Wait for a while, and then rerun the command that caused an error.<br><br>3.  If action 2 repeatedly fails with the same error, contact customer support. |
| CMDRJE | Executing | 2EBE | A701 | The specified operation cannot be performed because it is not supported. |
| CMDRJE | Executing | 2EF3 | 9F02 | The specified operation cannot be performed because it is not supported. |

*SSB codes returned by raidcom modify qos_grp -response_alert_time (VSP 5000 series)*

| | | | | **raidcom modify qos_grp -response_alert_time** |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE | Executing | 2E02 | A701 | The specified QoS group ID is out of the effective range. |
| CMDRJE | Executing | 2E02 | A703 | The specified alert notification time (second) is out of the effective range. |
| Get Command Status | Async | 2E10 | A723 | The alert notification time (second) cannot be set because the one of the following items is not defined for the specified QoS group.<br><br>▪ The upper limit of the throughput per second<br><br>▪ The upper limit of the data transfer volume (MB) per second<br><br>▪ The priority of I/O processing |
| Get Command Status | Async | 2E11 | 800E | The operation cannot be performed because the internal processing is in progress. Wait for a while and retry the operation. |
| Get Command Status | Async | 2E11 | 9400 | The number of asynchronous commands exceeded the maximum number of acceptable asynchronous commands. Perform the following steps:<br><br>1. Run the `raidcom get command_status` command to wait for completion of the running asynchronous commands.<br>2. Rerun the command that caused an error.<br><br>If the same error occurs in these steps, other users might be running commands. Wait for a while, and then rerun the command that caused an error. |

| raidcom modify qos_grp -response_alert_time | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| Get Command Status | Async | 2E20 | A705 | The priority for I/O processing cannot be set because the specified QoS group ID is not defined. |
| CMDRJE  Get Command Status | Executing  Async | 2E91 | FEEC | An internal error occurred. Take the following actions: 1. The number of asynchronous commands might have exceeded the maximum number of acceptable asynchronous commands. Perform the following steps: a. Run the raidcom `get command_status` command to wait for completion of the running asynchronous commands. b. Rerun the command that caused an error. 2. If the same error occurs in action 1, other users might be running commands. Wait for a while, and then rerun the command that caused an error. 3. If action 2 repeatedly fails with the same error, contact customer support. |
| CMDRJE | Executing | 2EBE | A701 | The specified operation cannot be performed because it is not supported. |
| CMDRJE | Executing | 2EF3 | 9F02 | The specified operation cannot be performed because it is not supported. |

*SSB codes returned by raidcom modify ldev -ese (VSP 5000 series)*

| raidcom modify ldev -ese | | | | |
|---|---|---|---|---|
| Error message | Executing/ Async | SSB1 | SSB2 | Description |
| Get Command Status | Async | 2E10 | 8000 | The operation cannot be performed because Device Manager - Storage Navigator is in progress, another application is in progress on the SVP, or the configuration is being changed. Wait a while, and then retry the operation. |
| Get Command Status | Async | 2E11 | 8010 | The storage system is in internal process, or the configuration changing processes are conflicting. |
| CMDRJE | Executing | 2E30 | 000B | The specified LDEV is not DP-VOL. |
| CMDRJE | Executing | 2E30 | 0075 | The specified LDEV is used as the TSE-VOL. |
| CMDRJE Get Command Status | Executing Async | 2E31 | 020E | The operation cannot be performed on the LDEV with the specified emulation type. |
| CMDRJE Get Command Status | Executing Async | 2E31 | 0210 | The operation cannot be performed for the combination of the CU number of the specified LDEV and the POOL associated with the LDEV. See the Provisioning Guide for Mainframe Systems. |
| Get Command Status | Async | 2E31 | 0211 | The specified operation failed because of one of the following reasons:<br><br>▪ LDEV is not implemented.<br><br>▪ LDEV is blocked.<br><br>▪ LDEV is being formatted. |

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| raidcom modify ldev -ese | | | | |
|---|---|---|---|---|
| **Error message** | **Executing/ Async** | **SSB1** | **SSB2** | **Description** |
| CMDRJE<br><br>Get Command Status | Executing<br><br>Async | 2E31 | 9005 | The operation cannot be performed because ESE Volume, User Directed Space Release is not enabled for the mainframe system function. Enable ESE Volume, User Directed Space Release, and then rerun the operation. For details, see the Provisioning Guide for Mainframe Systems. |
| Get Command Status | Async | 2EE8 | FEEC | An internal error occurred.<br><br>Contact customer support. |

## Other SSB codes indicating internal errors

The error codes (SSB1) listed below in the table indicate internal errors. For your confirmation, contact customer support.

| Error codes | | Description |
|---|---|---|
| **SSB1** | **SSB2** | **Description** |
| 2EB3 | XXXX | An internal error occurred. Contact customer support. |
| 2EB4 | XXXX | An internal error occurred. Contact customer support. |
| 2EBB | XXXX | An internal error occurred. Contact customer support. |
| 2EBD | XXXX | An internal error occurred. Contact customer support. |
| 2EBE | XXXX | An internal error occurred. Contact customer support. |
| 2EBF | XXXX | An internal error occurred. Contact customer support. |
| 2EC3 | XXXX | An internal error occurred. Contact customer support. |
| 2EC4 | XXXX | An internal error occurred. Contact customer support. |
| 2EC5 | XXXX | An internal error occurred. Contact customer support. |
| 2EC6 | XXXX | An internal error occurred. Contact customer support. |
| 2EC8 | XXXX | An internal error occurred. Contact customer support. |
| 2EC9 | XXXX | An internal error occurred. Contact customer support. |

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| Error codes | | Description |
|---|---|---|
| **SSB1** | **SSB2** | |
| 2ECA | XXXX | An internal error occurred. Contact customer support. |
| 2ECC | XXXX | An internal error occurred. Contact customer support. |
| 2ECD | XXXX | An internal error occurred. Contact customer support. |
| 2ECE | XXXX | An internal error occurred. Contact customer support. |
| 2ECF | XXXX | An internal error occurred. Contact customer support. |
| 2ED0 | XXXX | An internal error occurred. Contact customer support. |
| 2ED6 | XXXX | An internal error occurred. Contact customer support. |
| 2EDA | XXXX | An internal error occurred. Contact customer support. |
| 2EDB | XXXX | An internal error occurred. Contact customer support. |
| 2EE4 | XXXX | An internal error occurred. Contact customer support. |
| 2EE6 | XXXX | An internal error occurred. Contact customer support. |
| 2EE7 | XXXX | An internal error occurred. Contact customer support. |
| 2EE8 | XXXX | An internal error occurred. Contact customer support. |
| 2EEA | XXXX | An internal error occurred. Contact customer support. |
| 2EEC | XXXX | An internal error occurred. Contact customer support. |
| 2EEE | XXXX | An internal error occurred. Contact customer support. |
| 2EEF | XXXX | An internal error occurred. Contact customer support. |
| 2EF0 | XXXX | An internal error occurred. Contact customer support. |
| 2EF6 | XXXX | An internal error occurred. Contact customer support. |
| 2EXX | FEEC | An internal error occurred. Contact customer support. |

## CCI log collection

If an error that cannot be solved by troubleshooting occurs in CCI, collect the logs and contact customer support.

The details of the logs to be collected are shown below. Collect logs as a root user or a user with administrator authority. Duplicate the collected logs on media and give it to maintenance personnel.

- The configuration definition file of the target instance

  - In case of CCI for Windows, the storage location of the configuration definition file is `C:\Windows` (by default).

  - In case of CCI for UNIX, the storage location of the configuration definition file is `/etc` (by default).

- Device dump file

  A dump file is required to investigate an error that occurs on CCI in detail. Collect the dump file after the error occurred on CCI.

  When you provide the dump file to customer support or maintenance personnel, make sure that the dump file was collected after the error occurred on CCI. See the System Administrator Guide for collecting dump files.

- Executed command history information (screenshot and so on)

- Windows event log (system, application, security, and so on)

- Syslog file (CCI for UNIX only)

For Provisioning and replication operations, collect the following log files as well.

- Target instance trace file and log file (provisioning operation only)

- System configuration diagram in which detailed configuration information of group names and logical volume names in pairs are specified (Replication operation only)

- Trace file and log file of each target instance on the primary servers and the secondary servers (Replication operation only)

  The locations of trace files and log files (by default) are as follows.

  CCI for Windows:

  - `C:\HORCM\log*complete directory` (*=instance number)

  - `C:\HORCM\log\raidcom.log`

  CCI for UNIX:

  - `/HORCM/log*complete directory` (*=instance number)

  - `/HORCM/log/raidcom.log`

## CCI logging of a configuration using VMware vCenter Site Recovery Manager and RM Storage Replicator Adaptor

If an error that cannot be solved by CCI configured with SRM and RMSRA occurs, collect the logs and contact customer support.

The details of the logs to be collected are shown below. Collect logs as a root user or a user with administrator authority. Duplicate the collected logs on media and give it to maintenance personnel.

- Log files (`vmware-dr-number.log`) that contain SRM operation information on both the protected site and the recovery site.

  The location of the log files are as follows:

  `C:\ProgramData\VMware\VMware vCenter Site Recovery Manager\Logs`

- Trace files and log files for target instances on both the protected site and the recovery site.

  - In case of CCI for Windows, collect the CCI trace files and log files in the SRM server.

    The location of each file (by default) is as follows:

    `C:\HORCM\log*complete directory` (*=instance number)

    `C:\HORCM\log\raidcom.log`

  - In case of CCI for UNIX, collect the CCI trace files and log files in the CCI server.

    The location of each file (by default) is as follows:

    `/HORCM/log*complete directory` (*=instance number)

    `/HORCM/log/raidcom.log`

# Calling customer support

If you need to contact customer support, please provide as much information about the problem as possible, including:

- The circumstances surrounding the error or failure.

- The exact content of any error messages displayed on the host systems.

- The exact content of any error messages displayed by Storage Navigator.

- The Storage Navigator configuration information (use the Dump Tool).

- The data in the CCI error log file and trace data (all files in the HORCM_LOG directory).

- The service information messages (SIMs), including reference codes and severity levels, displayed by Storage Navigator.

The Hitachi Vantara customer support staff is available 24 hours a day, seven days a week. To contact technical support, log on to Hitachi Vantara Support Connect for contact information: https://support.hitachivantara.com/en_us/contact-us.html

Chapter 9: Troubleshooting

**Hitachi Vantara**