HITACHI
DATA SYSTEMS

HiCommand® Replication Monitor
User's Guide

MK-94HC093-04

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Preface

This manual provides an overview of HiCommand Replication Monitor (abbreviated throughout as *Replication Monitor*), explains its features and operation, and provides troubleshooting information.

Intended Readers

This manual is intended for users who use Replication Monitor to operate and manage systems that include a storage subsystem (magnetic disk array device).

This manual is intended for the following users:

- First-time users of Replication Monitor, as well as those who have installed a system and are interested in a general overview of Replication Monitor
- Those who want to learn how to operate the Replication Monitor GUI
- Those who want to learn how to handle problems that might occur while Replication Monitor is being used

This manual assumes that readers have knowledge of the following:

Knowledge of storage subsystems and related software

- A basic knowledge of SANs (Storage Area Networks) and management software used to operate storage subsystems
- Knowledge of storage subsystem volume replication functionality (such as ShadowImage or TrueCopy)

Knowledge of prerequisite products

- Ability to use a prerequisite operating system and a Web browser
- A basic knowledge of Device Manager
- A basic knowledge of Business Continuity Manager (when managing on a mainframe system)

Software Version

This document revision applies to HiCommand® Replication Monitor version 5.7.

Convention for Storage Capacity Values

Storage capacity values displayed by HiCommand Replication Monitor are calculated based on the following values:

1 KB (kilobyte) = 1,024 bytes
1 MB (megabyte) = $1,024^2$ bytes
1 GB (gigabyte) = $1,024^3$ bytes
1 TB (terabyte) = $1,024^4$ bytes

Referenced Documents

- *HiCommand™ Device Manager Server Installation and Configuration Guide*, MK-91HC002
- *HiCommand™ Device Manager Agent Installation Guide*, MK-92HC019
- *HiCommand™ Device Manager Web Client User's Guide*, MK-92HC001
- *HiCommand™ Device Manager Error Codes*, MK-92HC016

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Chapter 1 Overview

This chapter provides an overview of Replication Monitor for first-time users, as well as for those considering installing Replication Monitor. It also provides an overview of the hardware and software elements that constitute a typical system, using sample configurations.

- About Replication Monitor (see section 1.1)
- System Configuration Examples (see section 1.2)

1.1 About Replication Monitor

Replication Monitor is software that supports management operations for storage administrators. Replication Monitor can be used to check the configuration, as well as change the status, of copy pair setups using the volume replication functionality of the Hitachi disk array subsystem of magnetic disk array devices.

1.1.1 Replication Monitor Features

With the rapidly increasing volume of data handled by corporate information systems, the way in which storage subsystems are used has been evolving from stand-alone storage subsystems running in a single location, to linked storage subsystems at multiple data centers. Additionally, to prevent loss of data due to unforeseen accidents or disasters and stoppage of provided application services, more importance has been placed on preparing environments for *disaster recovery*. This is implemented by linking a number of data centers for the purpose of protecting data and enabling system recovery.

To manage such large systems, you must have a clear understanding of the configuration of the multiple copy pairs set up across a number of storage subsystems, and you must monitor them to ensure that every copy pair maintains the appropriate status. You must also have a clear understanding of the configuration of the hosts connected to the storage subsystems, and you must be able to quickly isolate the affected area when a failure occurs.

Replication Monitor is a software product that helps you manage these types of complex systems. Replication Monitor provides you with the following capabilities:

- Ability to check the copy pair (copy group) configurations

  Replication Monitor enables you to visually check the configuration of copy pairs set up across multiple storage subsystems, from the viewpoints of hosts, storage subsystems, and copy pair configuration definitions.

  Replication Monitor also enables you to display a list of linked copy pairs in complex copy pair configurations, such as multi-target configurations (in which one volume is copied to multiple volumes) and cascade configurations (in which volume copy relationships span multiple levels).

- Ability to check copy pair (copy group) status

  Replication Monitor enables you to display a listing of the pair statuses for copy pairs and copy groups. You can check the status by using the six general classifications defined in Replication Monitor (error, suspend, copying, sync, simplex, and unknown), or by using the detailed classifications that are based on the pair statuses used in Device Manager, CCI, and Business Continuity Manager. In addition to the pair status, you can check the copy progress.

  You can also obtain and view the summary copy pair status in a higher-level unit that includes a copy group or copy pair. For example, you can obtain the summary copy pair status in a host or storage subsystem. This enables you to isolate failures by beginning with a general view of copy pair statuses throughout the system, and then successively narrowing down the view to the location where the problem has occurred.

- Ability to monitor and notify users of copy pair (copy group) status

  By pre-specifying a monitoring setting (called an **alert**) for specific copy pairs, you can set up Replication Monitor to notify users of copy pair status changes that occur (for reasons such as an error). You can inform the users by email or by way of SNMP traps. You can also use the Dashboard (a Replication Monitor window that displays important information) to check the latest alerts and display alert history in list form.

- Ability to acquire transfer delay statuses related to volume replication functions

  When you use an asynchronous remote copy product (when you use TrueCopy Async or Universal Replicator), and a primary volume is updated, there is a time lag (transfer delay) before a secondary volume is updated. With Replication Monitor, you can check the copy pair transfer delay time and the usage ratio of the storage subsystem cache area (side file and journal volume) used during copying. This enables you to proactively predict and take action against problems such as transfer performance degradation due to insufficient network bandwidth and pair blockage due to cache overflow.

- Ability to provide centralized management of heterogeneous systems

  Replication Monitor enables you to centrally manage from a single window different types of storage subsystems (TagmaStore USP, TagmaStore AMS, etc.) and various hosts (Windows, Solaris, and mainframe systems).

  This means that you do not need to use different tools nor do you have to learn separate operations for each system.

Figure 1.1 shows the Replication Monitor window layout.

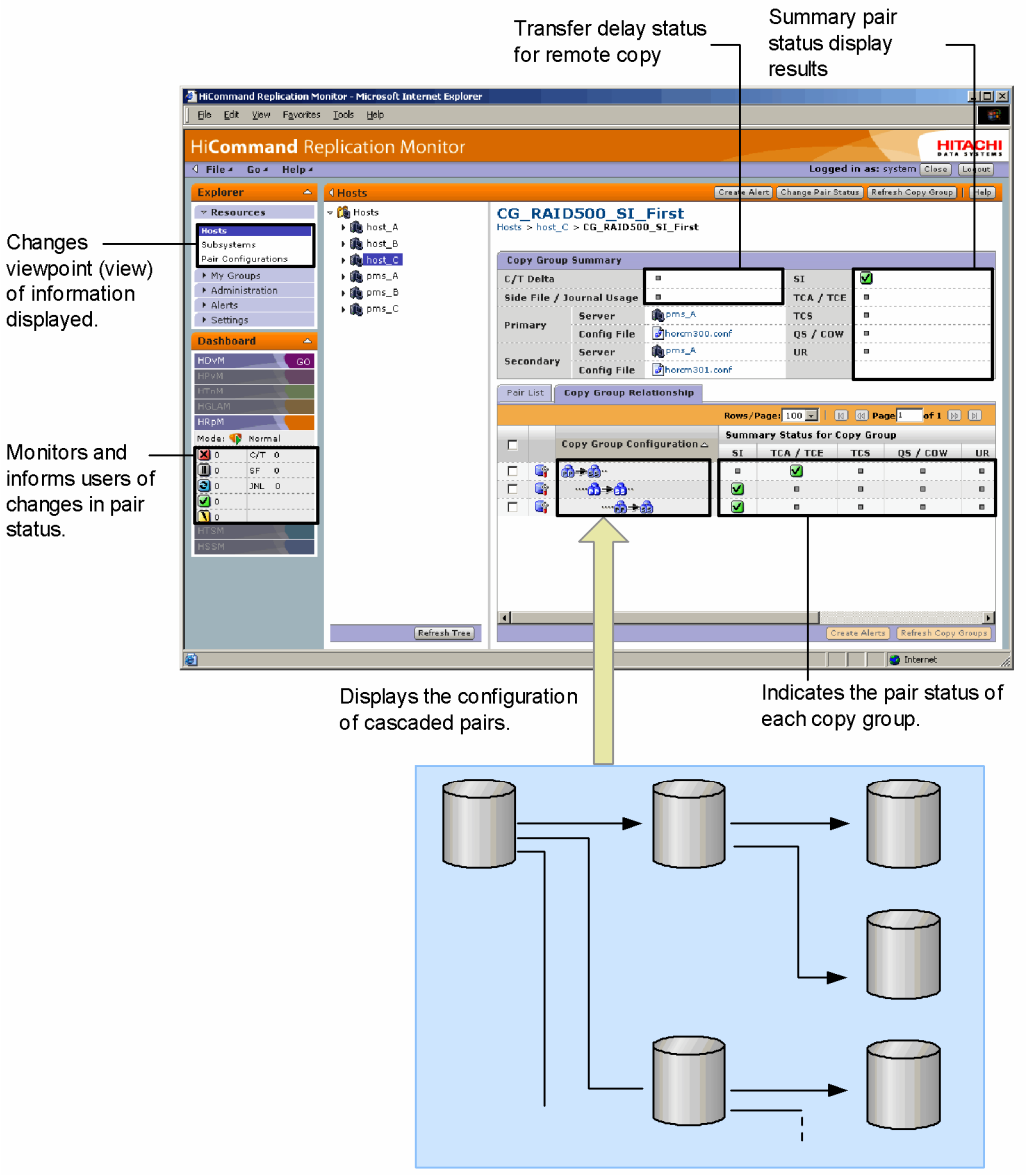


Figure 1.1 Replication Monitor Window Layout

1.1.2 Target Users

Replication Monitor was developed for storage administrators and other users who manage storage subsystem volume replication functions. More specifically, it was designed for users who are in charge of the following operations:

- Troubleshooting volume replication functions

  For those in charge of troubleshooting copy pair status errors, Replication Monitor provides the following benefits:

  – By presetting alerts, you can automate monitoring for copy pair errors.

- By using different views, you can check copy pair statuses from a variety of viewpoints, which helps you isolate the location and affected scope of errors that occur.

- Monitoring volume replication function performance

  For those who measure the performance of storage subsystem volume replication functions to monitor system performance problems, Replication Monitor provides the following benefits:

  - You can check performance information related to volume replication, such as the transfer delay status of remote copies. Also, by exporting to CSV files the logs that contain performance information accumulated during a certain period of time, you can use the performance information to create analyses and reports.
  - You can automatically monitor the performance information against failures by presetting alerts.

- Using volume replication functions to create backup systems

  For those who use a storage subsystem volume replication function to create copy pairs for backing up data, Replication Monitor provides the following benefit:

  - By visually displaying the copy pair configuration, you can confirm that the copy pairs have been configured as intended.

- Using volume replication functions to operate and maintain backups

  For those who initiate regular backup operations, and who have to make sure that backup plans are being executed as intended, Replication Monitor provides the following benefits:

  - You can specify copy pairs and copy pair groups, and manually change a pair status (splitting and resynchronizing).
  - You can make sure there are no abnormalities by displaying the pair configuration and the pair status.
  - By presetting alerts, you can check the alert history to make sure that changes in a pair status are being carried out as planned.
  - You can check the copy progress by displaying the copy progress rate.

1.1.3 Important Terms

This section explains the key terms and concepts that must be understood when using Replication Monitor.

- LDEV (Logical DEVice)

  A volume created in an enterprise-class storage subsystem. This is also called a **logical device**.

- LU (Logical Unit)

  A volume created in a midrange storage subsystem. This is also called a **logical unit**.

  When an LDEV volume created in an enterprise-class storage subsystem is used from an open system host, it is treated as an LU.

- LUN (Logical Unit Number)

  A management number assigned to LUs in a storage subsystem.

  A LUN is a number assigned to identify LUs for the port in the storage system to which the LU is connected, either by port or by host group assigned to the port. An open system host uses a LUN to access a particular LU.

- DEVN (DEVice Number)

  A device number that is assigned to identify an LDEV when it is being used by a mainframe system. A DEVN is expressed as a four-digit hexadecimal number.

- CU (Control Unit)

  A virtual control unit created in an enterprise-class storage subsystem. This is also called a **CU image**.

  The LDEVs created in a storage subsystem are connected to a single CU, and this number is assigned to each CU for identifying the LDEVs. Therefore, volumes (LDEVs) in a storage subsystem are specified by the CU number (CU#) and LDEV number.

- Storage subsystem volume replication functionality

  A general name for functionality (such as ShadowImage and TrueCopy) that provides high-speed replication of volumes in a storage subsystem. The mirroring control functionality provided by the storage subsystem is used to create volume replicas quickly, without going through the LAN.

- Primary volume (P-VOL)

  The volume from which replication is performed, when the volume replication functionality of the storage subsystem is used to perform copying to another volume.

- Secondary volume (S-VOL)

  The volume to which replication is performed, when the volume replication functionality of the storage subsystem is used to copy from the primary volume.

- Secondary-primary volume (SP-VOL)

  A volume placed between the primary volume and secondary volume, when a cascade configuration is used by the volume replication functionality of the storage subsystem. This indicates the secondary volume for an upper copy pair, and the primary volume for a lower copy pair.

- Copy pair

  A pairing of a primary volume and a secondary volume, linked by the volume replication functionality of the storage subsystem. This is also called a **pair volume**. In this manual, *copy pair* may be written simply as *pair*.

- Copy group

  A group containing multiple copy pairs. A copy group enables operations such as pair status changes to be batch-applied to multiple copy pairs.

- Prefix

The name of the prefix portion of the copy group definition file (*prefix*.GRP. *copy-group-id*) created by Business Continuity Manager. Replication Monitor uses the prefix as a unique name to identify copy group definition files created by Business Continuity Manager.

1.2 System Configuration Examples

Replication Monitor works by linking with programs such as Device Manager and Business Continuity Manager. This section provides examples of typical system configurations in which Replication Monitor is used.

A system in which Replication Monitor is used can also be configured in a variety of ways other than those described in this section. Moreover, although this section describes configuration examples of an open system host and a mainframe system host separately, you can use Replication Monitor in mixed environments that include both of these host types.

For details about specific types of system configurations when using Replication Monitor and their requirements, see the *HiCommand Replication Monitor Installation and Configuration Guide*.

1.2.1 Open System Configuration Example

Figure 1.2 shows an example of a system configuration when the host using the storage subsystem is an open system (Windows, Solaris, AIX, HP-UX, or Linux).

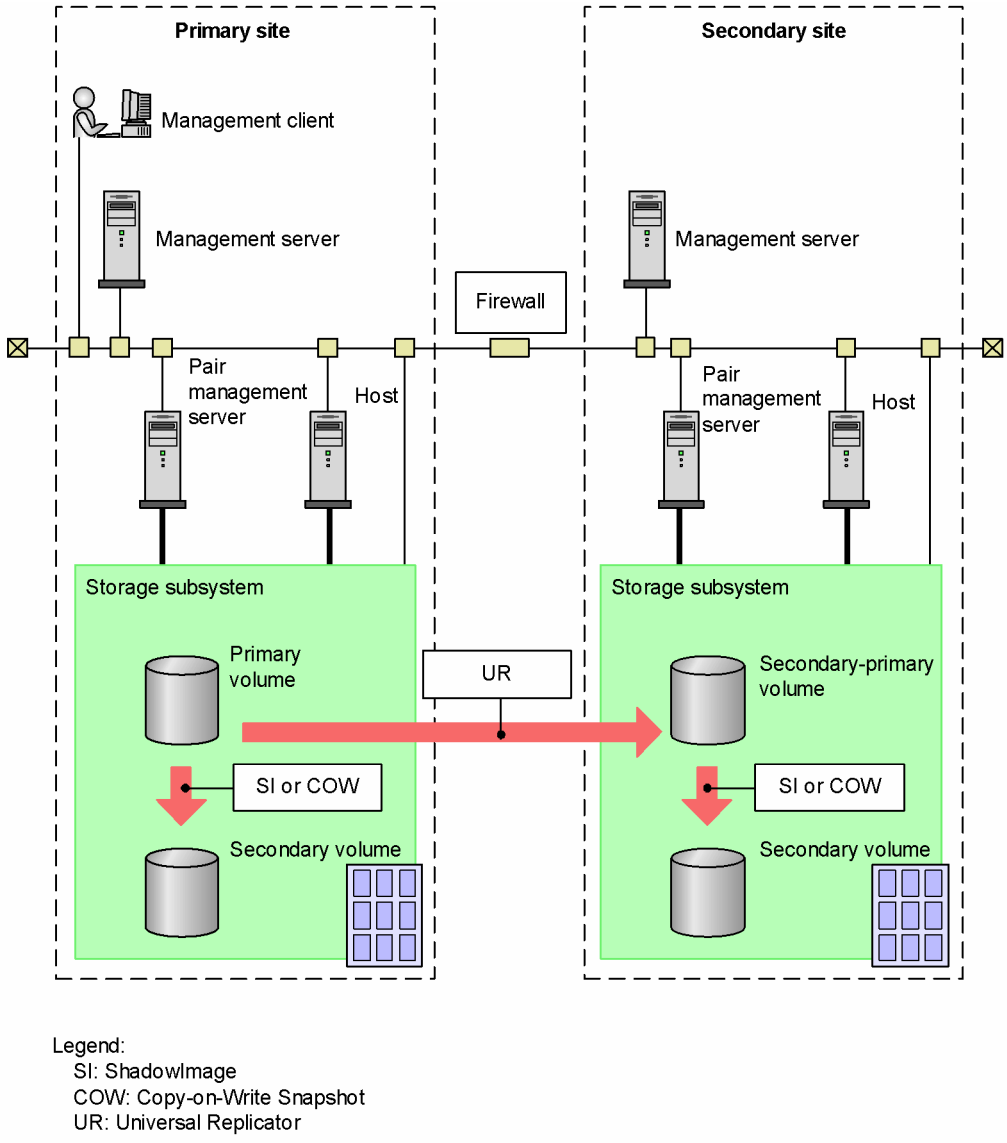


Figure 1.2 Example System Configuration for an Open System

Each of the configuration elements in a typical open system is described below.

Management client

The machine on which Web Client for Replication Monitor runs. This machine issues instructions to Replication Monitor on the management server, to perform the main functions of Replication Monitor, such as viewing pair configurations, as well as monitoring and changing pair statuses. Since Web Client for Replication Monitor runs in a Web browser, no application needs to be installed on the management client.

Management server

The machine on which the Replication Monitor server and its prerequisite program, the Device Manager server, are installed. The management server requests configuration information or pair status information from each host or pair management server and provides the information collected to the management client.

Pair management server

A server that is used to collect system information, such as the copy pair status and the transfer delay state of remote copies. You install a Replication Monitor agent, a Device Manager agent, and a CCI on this server.

When you have installed a Replication Monitor agent, a Device Manager agent, and CCI on a host, you can use that machine as a pair management server. However, due to the load on the host imposed by collection of system information, we recommend that you set up the pair management server independently, as shown in Figure 1.2

Host (application server)

A machine on which application programs are installed. The host application server uses a storage subsystem as an external storage device. By installing a Device Manager agent on the hosts, you can use Replication Monitor to view such information as each host's IP address, mount point, and linked copy groups.

Storage subsystem

An external storage device (Hitachi disk array subsystem) connected to a host. Normally, several copy pairs of the volumes in the storage subsystem are set up by using a volume replication function (for example, ShadowImage or TrueCopy). The main function of Replication Monitor is to display the configuration and copy status of these copy pairs.

Storage subsystem information is provided to Replication Monitor in the following two ways:

- The management server collects information directly from the storage subsystems.
- The pair management server collects the storage subsystem information and then transfers it to the management server.

1.2.2 Mainframe System Configuration Example

Figure 1.3 shows an example of a system configuration when the host using the storage subsystem is a mainframe system (OS/390 or z/OS).

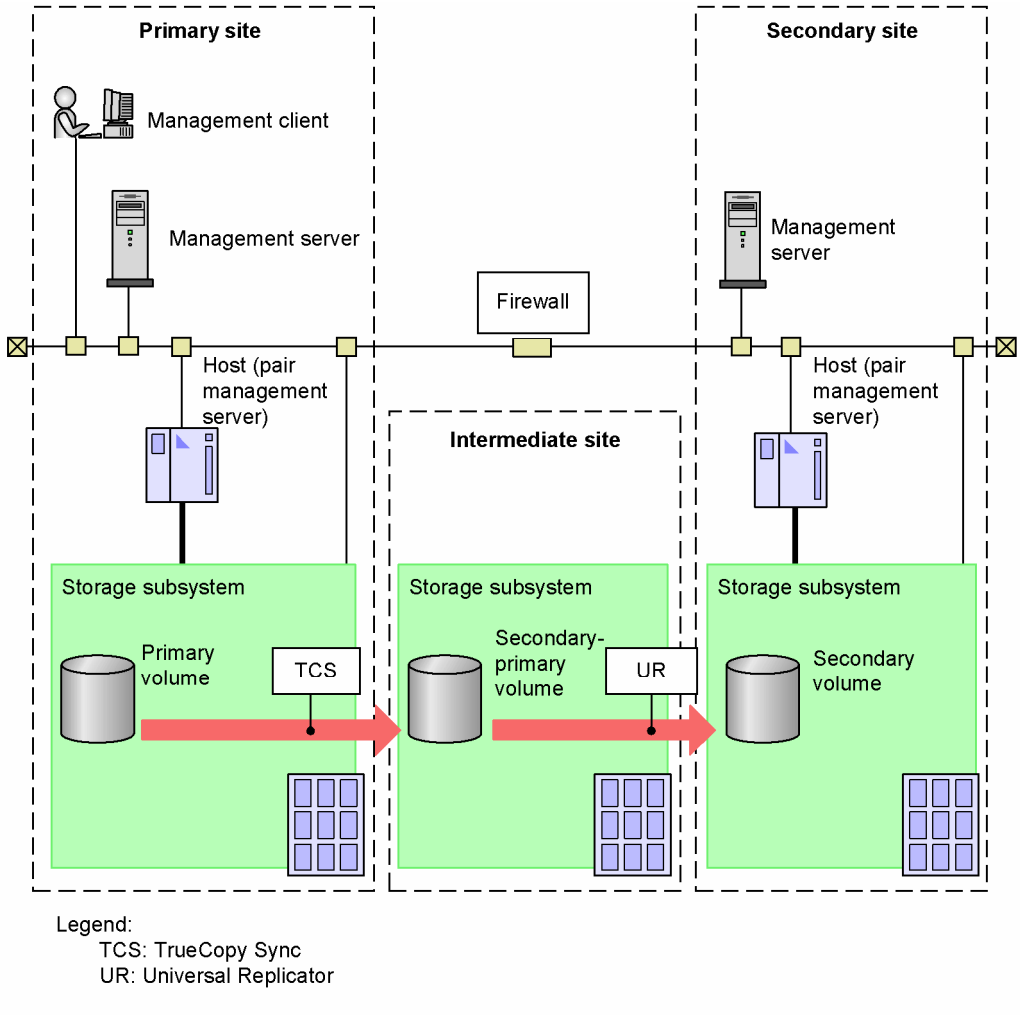


Figure 1.3 Example System Configuration for a Mainframe System

Each of the configuration elements in a typical mainframe system is described below.

Management client

The machine on which Web Client for Replication Monitor runs. This machine issues instructions to Replication Monitor on the management server, to perform the main functions of Replication Monitor, such as viewing pair configurations, as well as monitoring and changing pair statuses. Since Web Client for Replication Monitor runs in a Web browser, no application needs to be installed on the management client.

Management server

The machine on which the Replication Monitor server and its prerequisite program, the Device Manager server, are installed. The management server requests storage subsystem information from the Business Continuity Manager on the host and provides the information collected to the management client.

Host (application server)

A machine on which application programs are installed. The host application server uses the storage subsystem as an external storage device and runs the application programs.

In response to management server requests, the mainframe system host also plays a role similar to that of a pair management server in an open system, in that it collects information on itself and its storage subsystems and provides this information to the management server. Because of this, mainframe system hosts are sometimes called **pair management servers**.

Business Continuity Manager must be installed on the host.

Storage subsystem

An external storage device (Hitachi disk array subsystem) connected to a host. Normally, several copy pairs of the volumes in the storage subsystem are set up by using a volume replication functionality (for example, ShadowImage or TrueCopy). The main function of Replication Monitor is to display the configuration and copy status of these copy pairs.

The pair management server collects the storage subsystem information and then transfers it to Replication Monitor on the management server.

Only Universal Storage Platform V, TagmaStore USP, and Lightning 9900V series systems can be connected to a mainframe system host.

Chapter 2 Replication Monitor Functions

This chapter explains the display formats you must understand in order to use Replication Monitor effectively, and provides an overview of the Replication Monitor functions.

Replication Monitor provides functions for checking copy pair information and for identifying and analyzing errors.

- List of Replication Monitor Functions (see section 2.1)
- Displaying Copy Pair Status and Configurations (see section 2.2)
- Displaying Copy Pair Status, States, and Copy Progress (see section 2.3)
- Determining the Summary Pair Status (see section 2.4)
- Displaying the Transfer Delay State of Remote Copies (see section 2.5)
- Displaying My Copy Groups (see section 2.6)
- Refresh Function (see section 2.7)
- Alert Function (see section 2.8)
- Changing the Status of a Copy Pair (see section 2.9)
- Calling Other HiCommand Products (see section 2.10)

2.1 List of Replication Monitor Functions

Table 2.1 provides an overview of the functions provided by Replication Monitor with cross-references to the section in which each function is explained.

Table 2.1 List of Replication Monitor Functions

Function	Overview	Reference
Displaying Copy Pair Status and Configurations	Displays the status and configurations of copy pairs as viewed from hosts, storage subsystems, or pair configurations.	See section *2.2*
Displaying Copy Pair Status, States and Copy Progress	Displays copy pair status, copy pair states, and copy progress as copy pair-related information.	See section *2.3*
Determining the Summary Pair Status	When the copy pair status is displayed for high-level entities that contain copy pairs (hosts in Hosts view, storage subsystems in Subsystems view, etc.), this function displays the summary (highest priority) of these copy pair statuses.	See section *2.4*
Displaying the Transfer Delay State of Remote Copies	If the copy type is a TrueCopy Async, TrueCopy Extended Distance or Universal Replicator copy group, this function displays the transfer delay state of remote copies.	See section *2.5*
My Copy Groups	Lists the status and configurations of registered copy pair groups.	See section *2.6*
About the Refresh Function	Updates the database information (pair configuration, copy pair status, etc.) maintained by Replication Monitor server.	See section *2.7*
About the Alert Function	Enables you to specify that copy pairs are to be monitored periodically and that a notification is to be sent if a copy pair or the performance information changes to a particular status.	See section *2.8*
Changing the Status of a Copy Pair	Changes copy pair status by splitting or resynchronizing copy pairs (in a forward or reverse direction).	See section *2.9*
Calling Other HiCommand Products	Starts other HiCommand products from the Replication Monitor Web Client, and displays them in a separate window.	See section *2.10*

2.2 Displaying Copy Pair Status and Configurations

You can use Replication Monitor to display the status and configurations of all copy pairs managed by Device Manager and Business Continuity Manager, as viewed from hosts, storage subsystems, or pair configurations.

You can use Replication Monitor to manage copy groups as well as copy pairs. Replication Monitor can display a list of all the copy pairs included in a copy group, enabling you to quickly check the status and configurations of all copy pairs included in a copy group.

Similarly, Replication Monitor can display a list of managed copy pairs and copy groups, even when they have a cascade configuration, enabling you to quickly check the status and configurations of all copy pairs and copy groups that are associated in a cascade configuration.

This section explains how copy pair status and configurations are displayed.

2.2.1 Displaying Copy Pair Status and Configurations by View

Replication Monitor helps you identify and analyze errors by displaying the status and configurations of copy pairs in the following three views:

- Hosts view
- Subsystems view
- Pair Configurations view

The following sections describe the features of the Hosts view, the Subsystems view, and the Pair Configurations view.

For details about how to check the copy pair status by using a view, see section 3.4. For details about how to check copy pair configurations by using a view, see section 3.5

2.2.1.1 Hosts View

The Hosts view is a display format used to check the status and configurations of copy pairs from a list of hosts (application servers) that use copy pair volumes. In the same view, you can check the status and configurations of specified copy pairs that have been set in a cascade configuration. You can also check the status and configuration of each copy group.

The Hosts view facilitates checking for those operating and managing hosts, such as system administrators. Figure 2.1 shows the conceptual layout of the Hosts view.

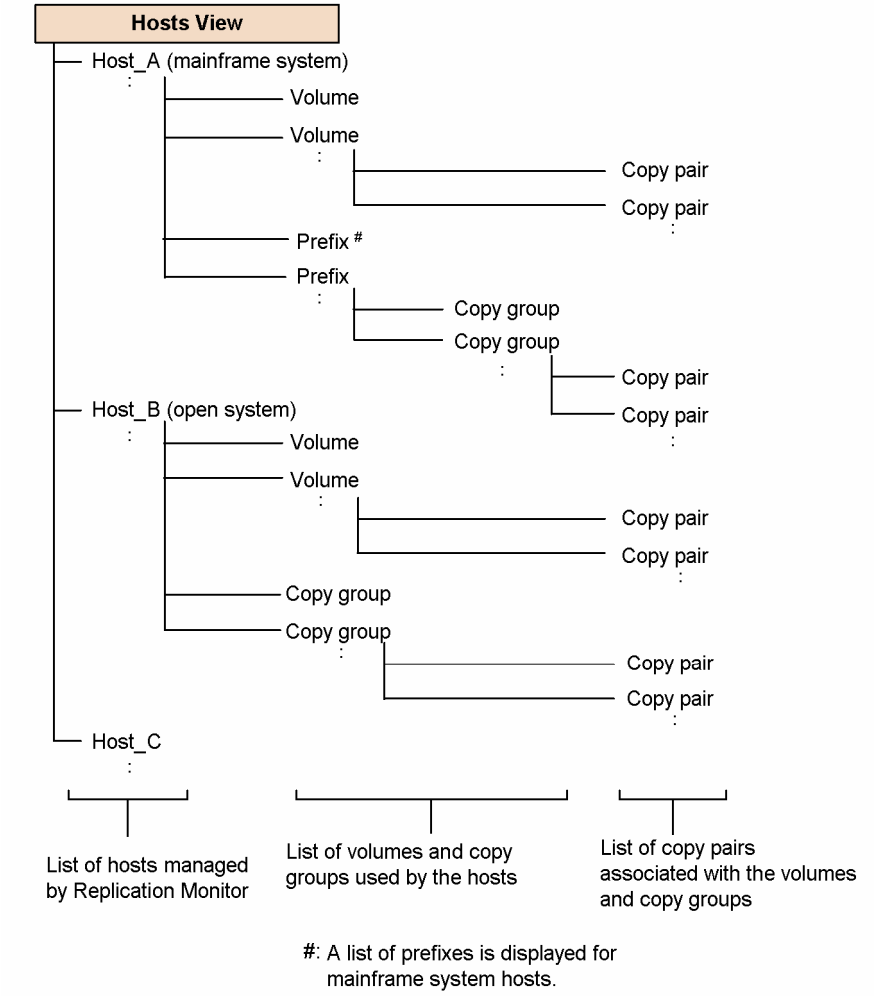


Figure 2.1 Conceptual Layout of the Hosts View

The Hosts view displays copy pair information (hosts and volumes) that satisfies both of the following conditions:

- The volumes are being used by a host, and are either the primary or secondary volumes.
- The copy pairs are being managed by information source Device Manager or Business Continuity Manager.

Figure 2.2 and Figure 2.3 show examples of windows displaying a list of LUNs or a list of copy groups, in the Hosts view.

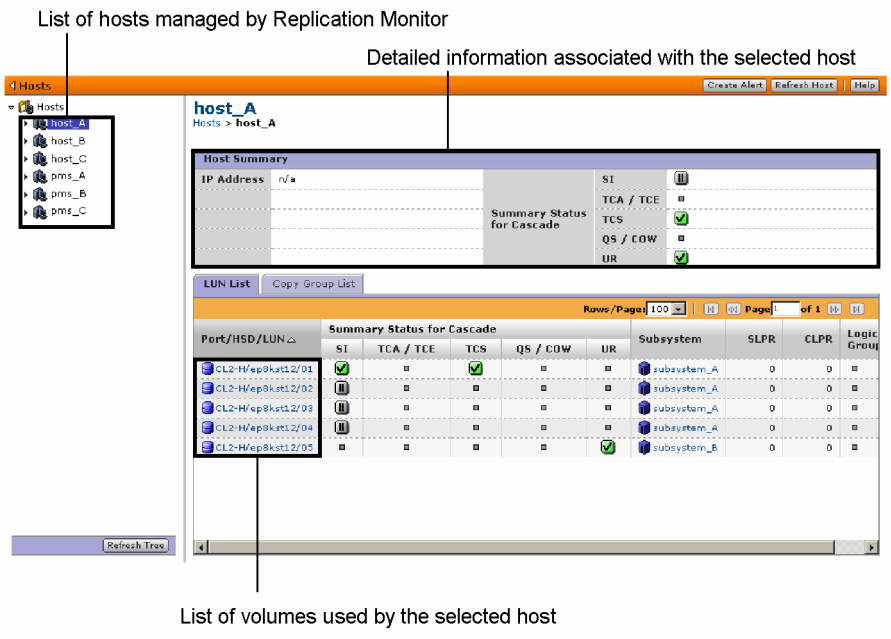


Figure 2.2 Example Window Display for the Hosts View (List of Volumes Used by a Host)

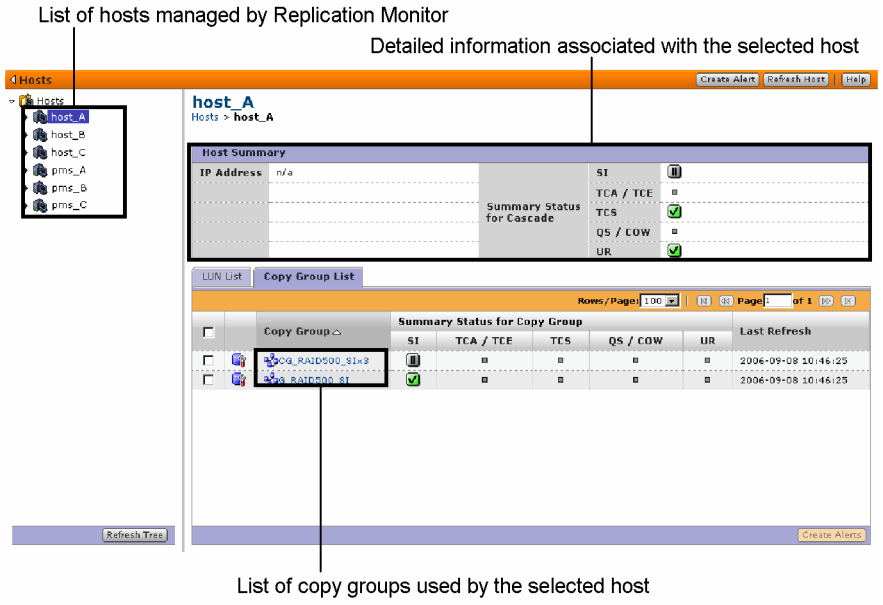


Figure 2.3 Example Window Display for the Hosts View (List of Copy Groups Used by a Host)

2.2.1.2 Subsystems View

The Subsystems view is a display format used to check the status and configurations of copy pairs from a list of storage subsystems that include copy pair volumes. In the same view, you can check the status and configurations of specified copy pairs that have been set in a cascade configuration.

The Subsystems view facilitates checking for those operating and monitoring storage subsystems, such as storage administrators. Figure 2.4 shows the conceptual layout of the Subsystems view.

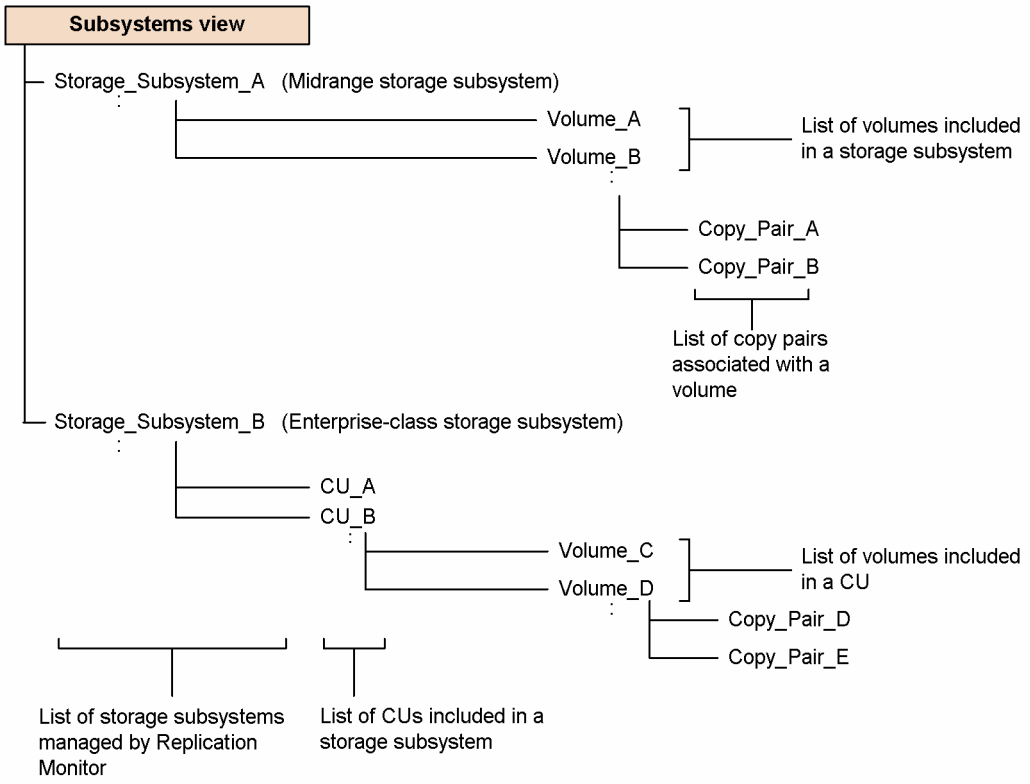


Figure 2.4 Conceptual Layout of the Subsystems View

The Subsystems view displays copy pair information (storage subsystems and volumes) that satisfies both of the following conditions:

- The volumes are on a storage subsystem and are either the primary or secondary volumes.
- The copy pairs are being managed by information source Device Manager or Business Continuity Manager.

Figure 2.5 shows an example window display for the Subsystems view.

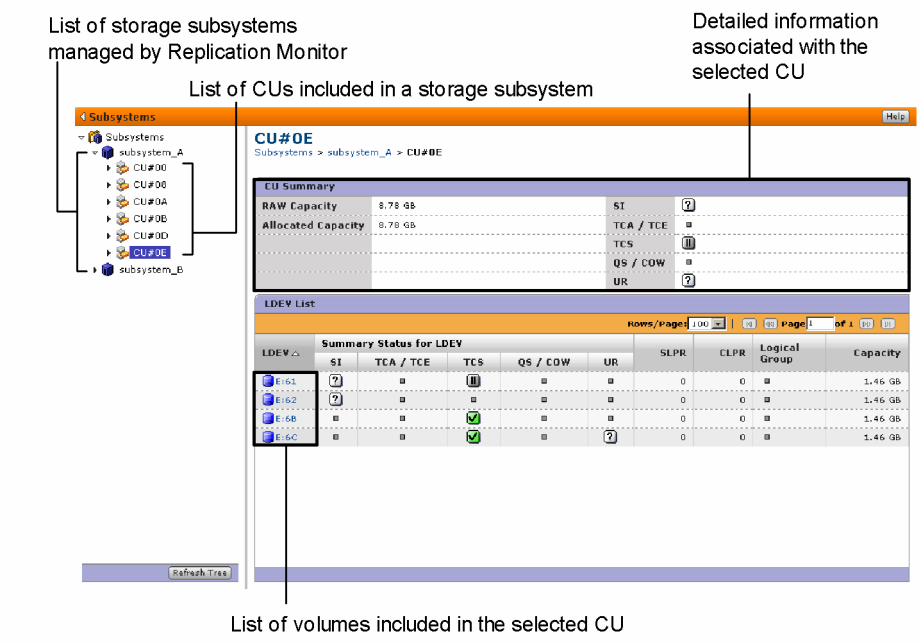


Figure 2.5 Example Window Display for the Subsystems View

2.2.1.3 Pair Configurations View

The Pair Configurations view is a display format used to check the status and configurations of copy pairs from a list of pair management servers or copy pair definition information. In the same view, you can check the status and configurations of specified copy pairs that have been set in a cascade configuration.

The Pair Configurations view facilitates checking for those operating and monitoring a pair management server in a configuration where an independent pair management server is used, such as storage administrators. Figure 2.6 shows the conceptual layout of the Pair Configurations view.

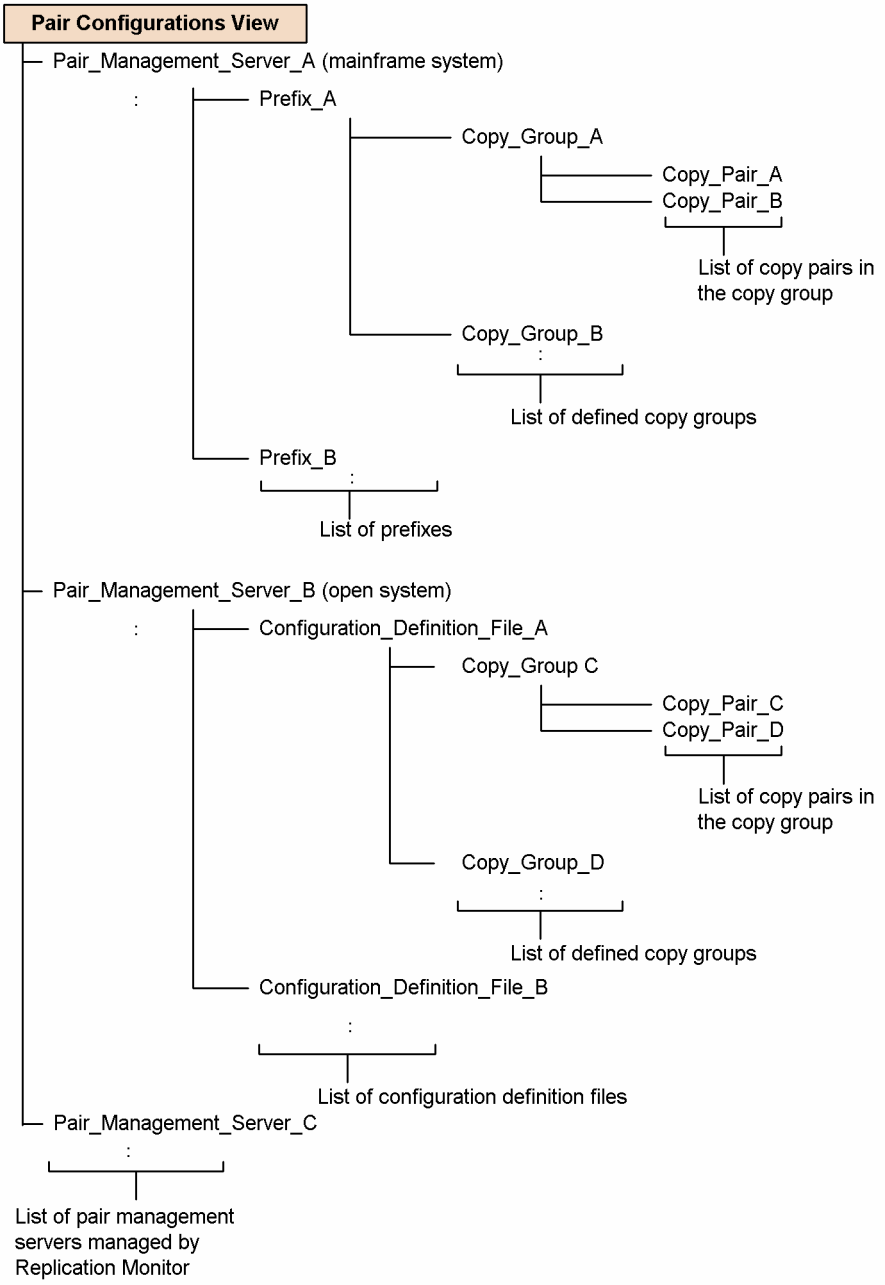


Figure 2.6 Conceptual Layout of the Pair Configurations View

The Pair Configurations view displays copy pair information (pair management servers and configuration definition files) that satisfies both of the following conditions:

- For an open system, the copy pair configuration definition files are being recognized correctly by information source Device Manager.
- For a mainframe system, the copy pairs are being managed by information source Business Continuity Manager.

Figure 2.7 shows an example window display for the Pair Configurations view.

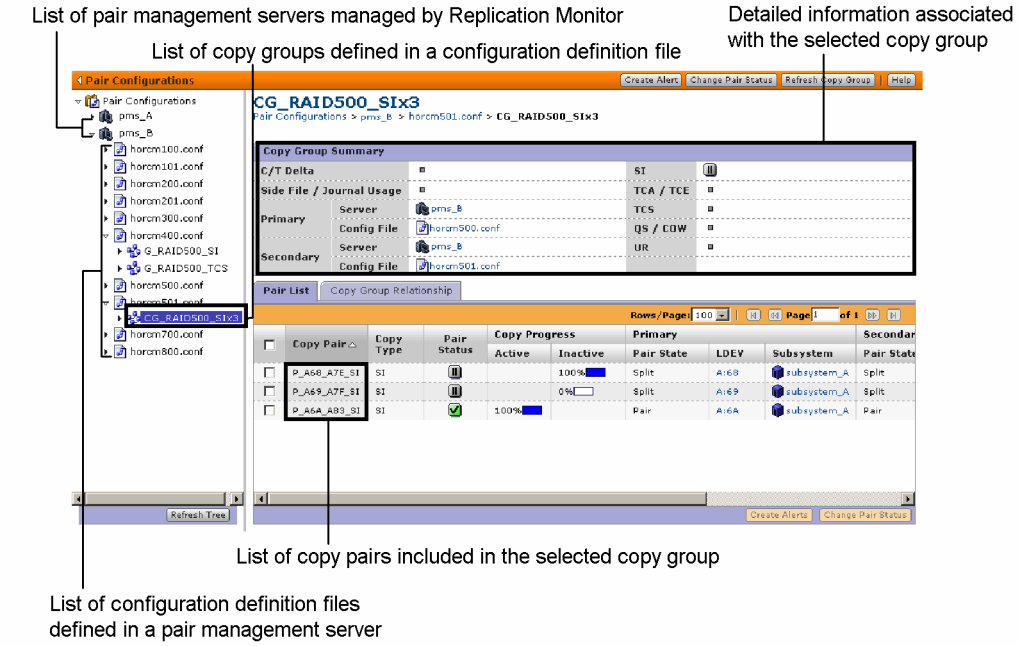


Figure 2.7 Example Window Display for the Pair Configurations View

2.2.2 Information Displayed in the Views

This section describes the information that Replication Monitor displays when you use the Hosts view, the Subsystems view, or the Pair Configurations view.

Figures are used to help explain the information displayed by Replication Monitor when you use a view, as well as the relationships between the subwindows in which the information is displayed. The term *subwindow* refers to windows in which detailed information managed by Replication Monitor is displayed. For details about window naming, see section 3.3.

2.2.2.1 Information Displayed in the Hosts View

Figure 2.8 shows the information displayed in Replication Monitor when you use the Hosts view, as well as the relationships between the subwindows in which the information is displayed.

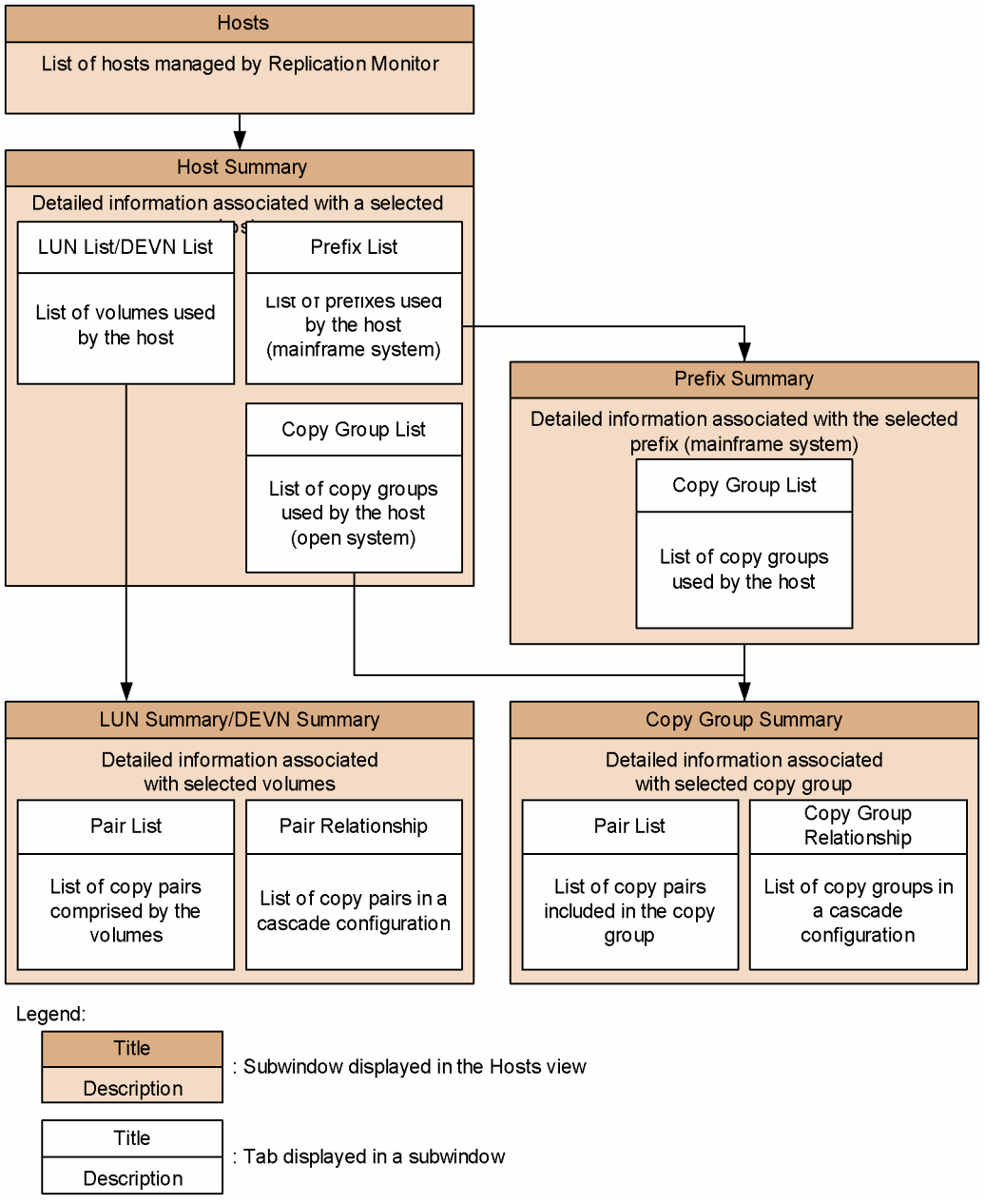


Figure 2.8 Information Displayed in the Hosts View

2.2.2.2 Information Displayed in the Subsystems View

Figure 2.9 shows the information displayed in Replication Monitor when you use the Subsystems view, as well as the relationships between the subwindows in which the information is displayed.

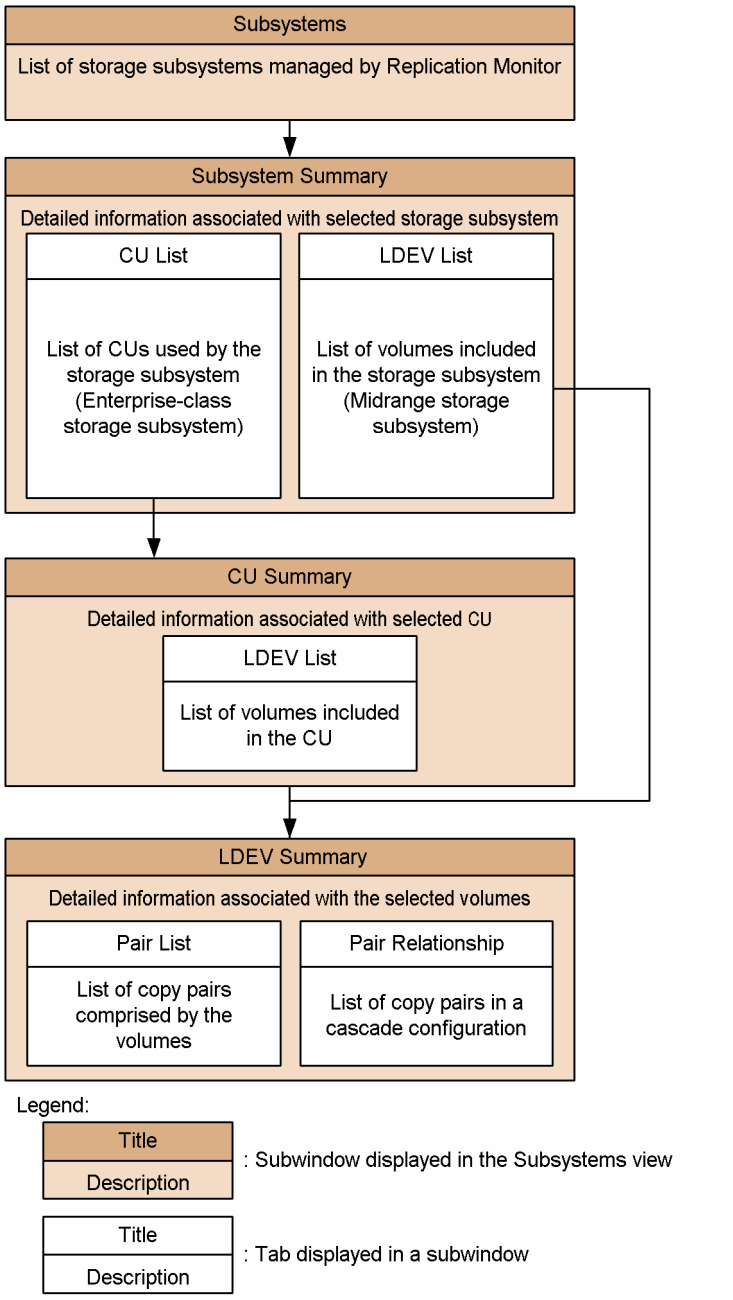


Figure 2.9 Information Displayed in the Subsystems View

2.2.2.3 Information Displayed in the Pair Configurations View

Figure 2.10 shows the information displayed in Replication Monitor when you use the Pair Configurations view, as well as the relationships between the subwindows in which the information is displayed.

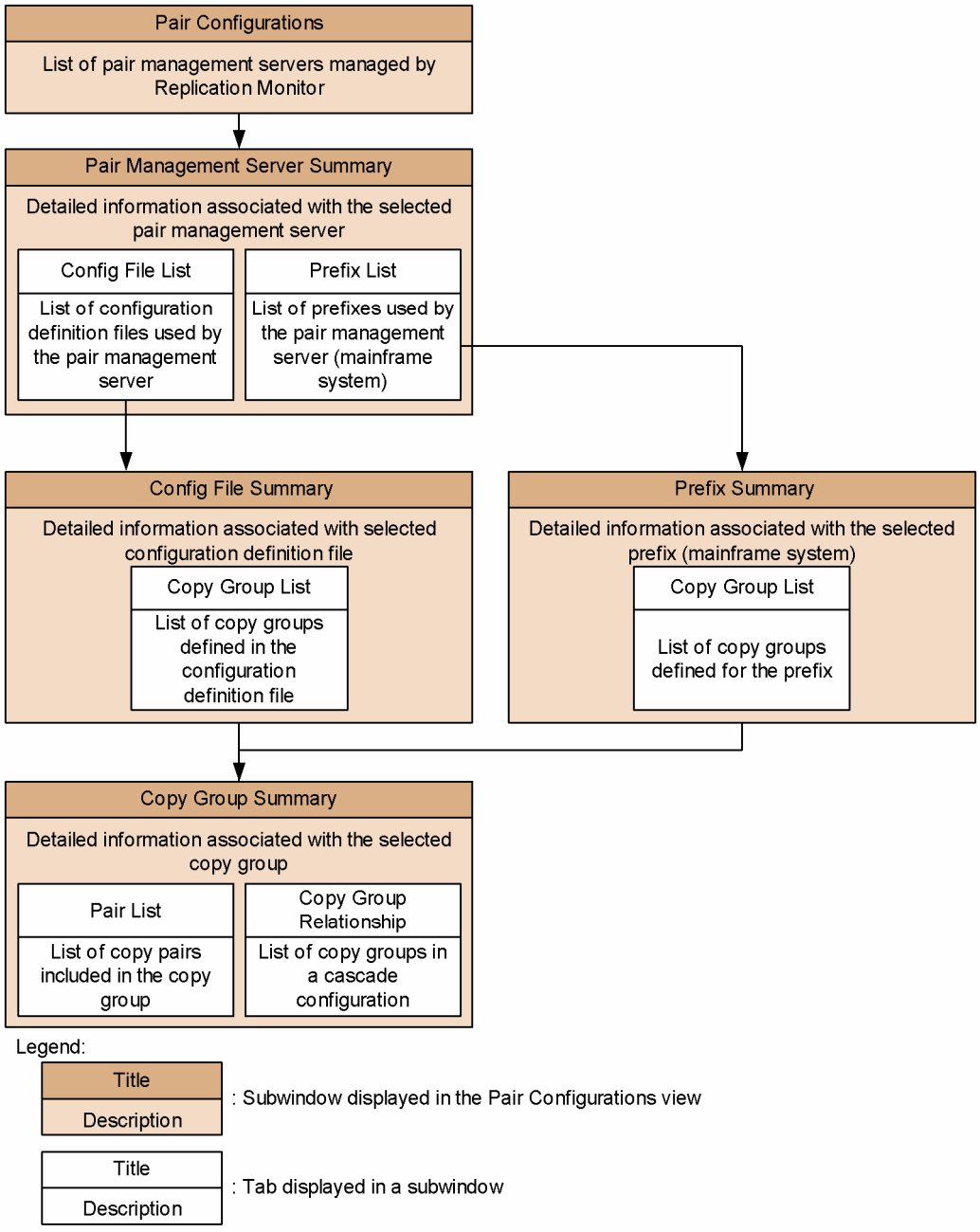


Figure 2.10 Information Displayed in the Pair Configurations View

2.3 Displaying Copy Pair Status, States, and Copy Progress

Replication Monitor displays the following three types of copy pair information:

Copy pair status

The copy pair statuses include six Replication Monitor statuses condensed from the copy pair states. Each copy pair status is represented by a distinctive icon.

Copy pair state

Copy pair states represent detailed statuses based on the pair statuses used in Device Manager, CCI, and Business Continuity Manager.

Copy progress

The copy progress indicator represents the status of copying performed by the storage subsystem volume replication functions.

Each item is described below.

2.3.1 Pair Status

Copy pair status is the format defined in Replication Monitor for displaying the statuses of copy pairs. Replication Monitor uses six icons to display the following six copy pair statuses: error, suspend, copying, sync, simplex, and unknown.

Table 2.2 lists and describes the copy pair statuses.

Table 2.2 Copy Pair Statuses Provided by Replication Monitor

Icon	Pair Status	Description
	error	An error has occurred in the copy pair.
	suspend	The copy pair has been split.
	copying	Copy processing is being performed on the copy pair, in either the forward or the reverse direction.
	sync	Copy pair has been synchronized.
	simplex	Copy pair does not actually exist, even though the copy pair definition information does exist.
	unknown	Replication Monitor cannot determine the pair status due to any of the following reasons: ▪ The settings are set not to acquire any copy pair status. ▪ The configuration does not allow the copy pair status to be acquired. ▪ The configuration information has already been acquired, but the copy pair information has not.

2.3.2 Pair State

The copy pair statuses in Device Manager, CCI, and Business Continuity Manager are mapped to copy pair states.

Table 2.3 shows the correspondences of the copy pair statuses to these copy pair states.

Table 2.3 Correspondence of Copy Pair Statuses to Copy Pair States

Pair Status		Copy Pair State	Display in Device Manager	Display in CCI	Display in Business Continuity Manager
Icon	Pair Status				
	error	Invalid	--	--	INVALID
		Suspended	Suspended	PSUE	--
		Suspended (ER)	--	--	SUSPER[#1]
		Suspended (CU)	--	--	SUSPCU[#3]
		Suspended (HOLDER)[#2]	Suspended	PSUE	HOLDER
		Error in LUSE	Error in LUSE	PDUB	--
		Split (Full)	Split	PFUS, SSUS	--
		Split (NODELTA)[#2]	--	--	NODELTA
	suspend	Split (SW)	--	SSWS	SWAPPING
		Split (SP)	--	--	SUSPVS
		Split (SUSPOP)	--	--	SUSPOP
		Split (HOLD)[#2]	Split	PSUS, SSUS	HOLD
		Split	Split	PSUS, SSUS	--
	copying	Split (CHKJNL)[#4]	--	--	CHKJNL
		Split (HOLDTRNS)[#2]	--	--	HOLDTRNS
		Copying	Copying	COPY	PENDING[#5]
		Copying (Reverse)	Reverse-Copying	RCPY	REVRSY
		Trans	--	--	TRANS
		Suspending	Suspending	--	--
		Deleting	Deleting	--	--
	sync	Pair	Pair	PAIR	DUPLEX
		Pair (Full)	Pair	PFUL	--
	simplex	Simplex	Simplex	SMPL	SIMPLEX
	unknown	Unknown	Unknown(default)	--	--

Legend:

--: Not applicable.

#1

Even when SUSPER is displayed by a command of Business Continuity Manager 5.0, Split (SW) might be displayed for the copy pair state in Replication Monitor (when the primary volume is SUSPER and the secondary volume is SWAPPING).

#2

This copy pair state is only displayed for the 3DC Multi-Target configurations that use the delta resync function.

#3

Even when SUSPCU is displayed by a command of Business Continuity Manager 5.0, Split (SW) might be displayed for the copy pair state in Replication Monitor (when the primary volume is SUSPCU and the secondary volume is SWAPPING).

#4

This copy pair state is displayed only when you use Business Continuity Manager whose version is earlier than 5.0C.

#5

Even when PENDING is displayed by a command of Business Continuity Manager 5.0, Split (SW) might be displayed for the copy pair state in Replication Monitor (when the primary volume is DUPLEX and the secondary volume is SWAPPING).

2.3.3 Relationship between Copy Pair Status and State

The copy pair status displayed in Replication Monitor is determined by the combination of copy pair states of the primary and secondary volumes. Replication Monitor summarizes the copy pair states into six copy pair statuses. Therefore, the same copy pair status might be displayed for a different combination of primary and secondary volume copy pairs.

For details about the copy pair statuses displayed in Replication Monitor and the combination of primary and secondary volume copy pair states, see *Appendix A*.

2.3.4 Example Window Display of Copy Pair Statuses and States

Figure 2.11 shows an example window display of copy pair statuses and copy pair states.

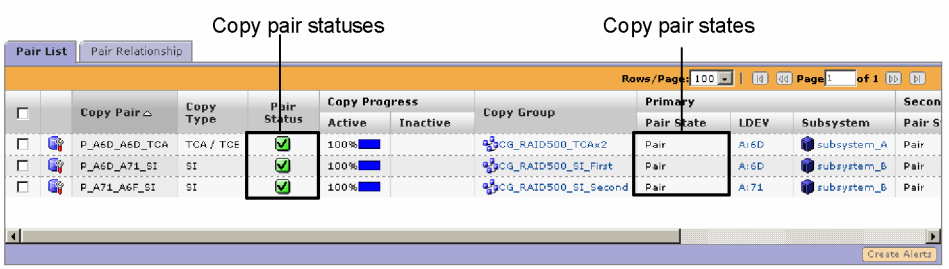


Figure 2.11 Example Window Display of Copy Pair Statuses and States

2.3.5 Copy Progress

The copy progress indicator represents the status of volume replication functions performed by the storage subsystem. Replication Monitor displays the copy progress for the items that are **Active** or **Inactive** according to the copy pair status. For **Active** items, the copy progress is displayed when the copy pair status is `copying` or `sync`. For **Inactive** items, the copy progress is displayed when the copy pair status is `error` or `suspend`.

Figure 2.12 shows an example window display of copy progress.

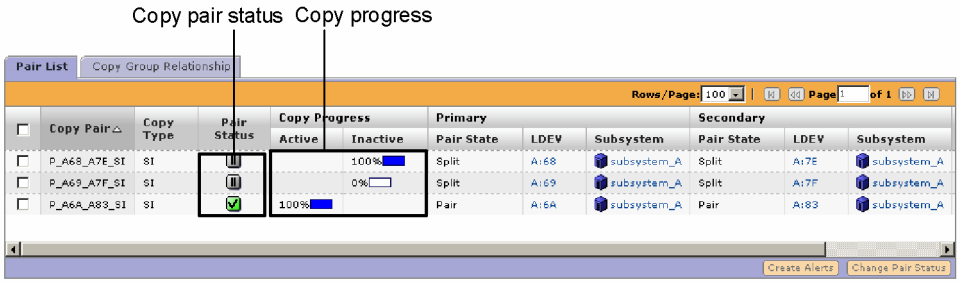


Figure 2.12 Example Window Display of Copy Progress

Depending on the copy type and copy pair status, the copy progress might or might not be displayed, and the meaning of displayed value might differ. The following table lists these relationships.

Table 2.4 Display of the Copy Progress

Copy type	Copy pair status				
	error	**suspend**	**copying**	**sync**	**simplex**
▪ ShadowImage ▪ QuickShadow or Copy-on-Write Snapshot	CP	CP or BM	CP	CP	--
▪ TrueCopy Sync	BM	BM	CP	BM	--
▪ TrueCopy Async ▪ TrueCopy Extended Distance ▪ Universal Replicator	BM	BM	CP	--	--

Legend:

CP: Copy progress (copy pair matching rate)

BM: Differential bitmap matching rate

--: Not displayed

2.4 Determining the Summary Pair Status

When you display the statuses of copy pairs, you can quickly identify problems that might occur in managed copy pairs, because for each high-level entity (hosts in Hosts view, storage subsystems in Subsystems view, etc.) that includes copy pairs, Replication Monitor *determines and displays the summary copy pair status (the highest priority copy pair status)*. This action is performed for each copy type, such as ShadowImage and TrueCopy.

The following lists the copy pair status priority (from highest to lowest) that is used for determining and displaying the summary copy pair status:

1. error
2. suspend
3. copying
4. sync
5. simplex
6. unknown

By checking the summary copy pair status that is displayed, the user can determine the highest priority problem that needs to be resolved.

Figure 2.13 illustrates the concept of determining the summary pair status.

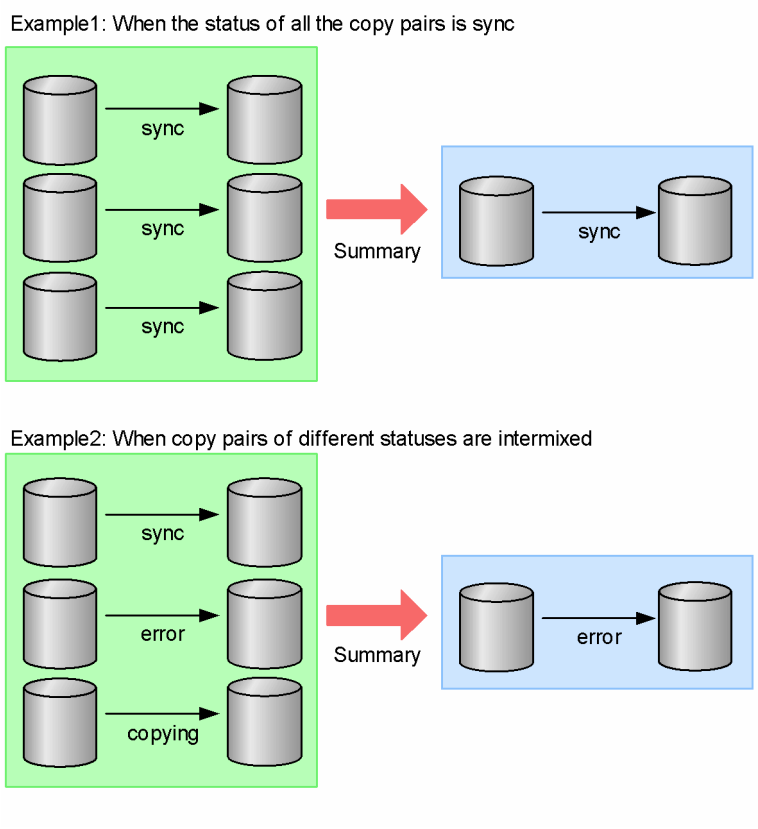


Figure 2.13 Concept of Determining the Summary Pair Status

For example 1, the copy pair statuses of all the copy pairs are `sync`. Therefore, **sync** is displayed as it is, as the summary copy pair status. For example 2, there are copy pairs whose statuses are `sync`, copy pairs whose statuses are `error`, and copy pairs whose statuses are `copying`. In this case, **error** is displayed as the summary pair status because the order of priority is: error, copying, sync.

Figure 2.14 shows an example window display of the summary copy pair status.

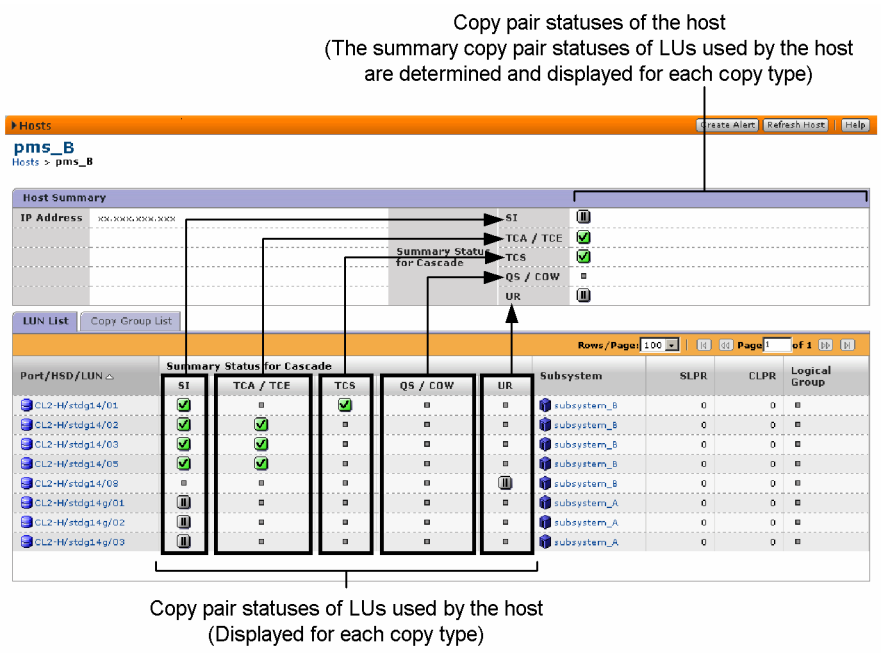


Figure 2.14 Example Window Display of the Summary Copy Pair Status (in Hosts View)

The summary pair status is determined for each view: the Hosts view, Subsystems view, and the Pair Configurations view. The following explains the scope for determining the summary pair status in each view.

2.4.1 Scope Checked in Hosts View To Determine the Summary Copy Pair Status

Replication Monitor determines the summary status for all copy pairs related to the host, including the cascaded copy pairs.

The following shows the areas checked to determine the summary copy pair status in the Hosts view:

In an open system

- For hosts

  The copy pairs of all LUs associated with the hosts

- For LUs

  All copy pairs associated with the LUs (for LU copy pairs in a cascaded configuration, the copy pairs of all LDEVs included in that cascade configuration)

- For copy groups

  The copy pairs of all LDEVs making up the copy groups

In a mainframe system

- For hosts

  The copy pairs of all DEVNs associated with the hosts

- For DEVNs

  All copy pairs associated with the DEVNs (for DEVN copy pairs in a cascaded configuration, the copy pairs of all DEVNs included in that cascade configuration)

- For prefixes

  All copy pairs of DEVNs constituting the copy groups included in the prefixes

- For copy groups

  The copy pairs of all DEVNs constituting the copy groups

Figure 2.15 shows an example of the summary copy pair statuses determined for hosts.

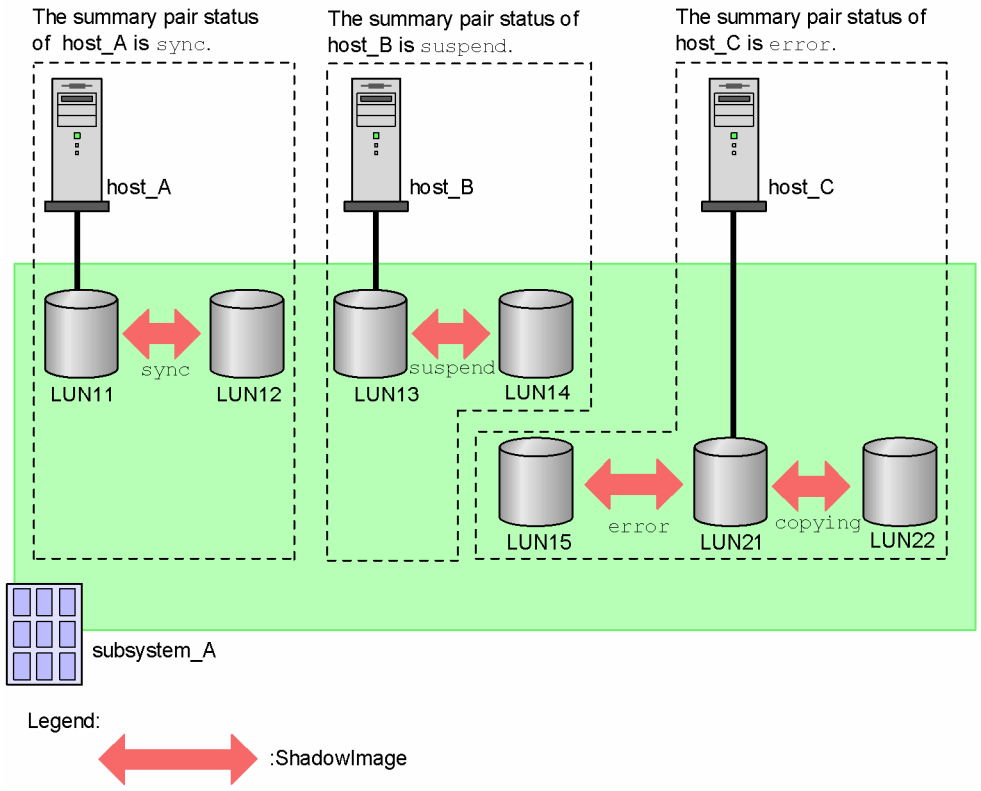


Figure 2.15 Scope Checked To Determine the Summary Copy Pair Status (in Hosts View)

2.4.2 Scope Checked in Subsystems View To Determine the Summary Copy Pair Status

Replication Monitor determines the summary pair status amongst all copy pairs related to the subsystem. The summary pair status is determined for all cascaded copy pairs whose primary or secondary volumes reside in the subsystem.

The following shows the areas checked to determine the summary copy pair status in the Subsystems view:

- For storage subsystems

  The copy pairs of all LDEVs associated with the storage subsystems

- For CUs

  The copy pairs of all LDEVs associated with the CUs used by enterprise-class storage subsystems.

- For LDEVs

  The copy pairs that hold the LDEVs as primary or secondary volumes

Figure 2.16 shows an example of the summary copy pair statuses determined for storage subsystems.

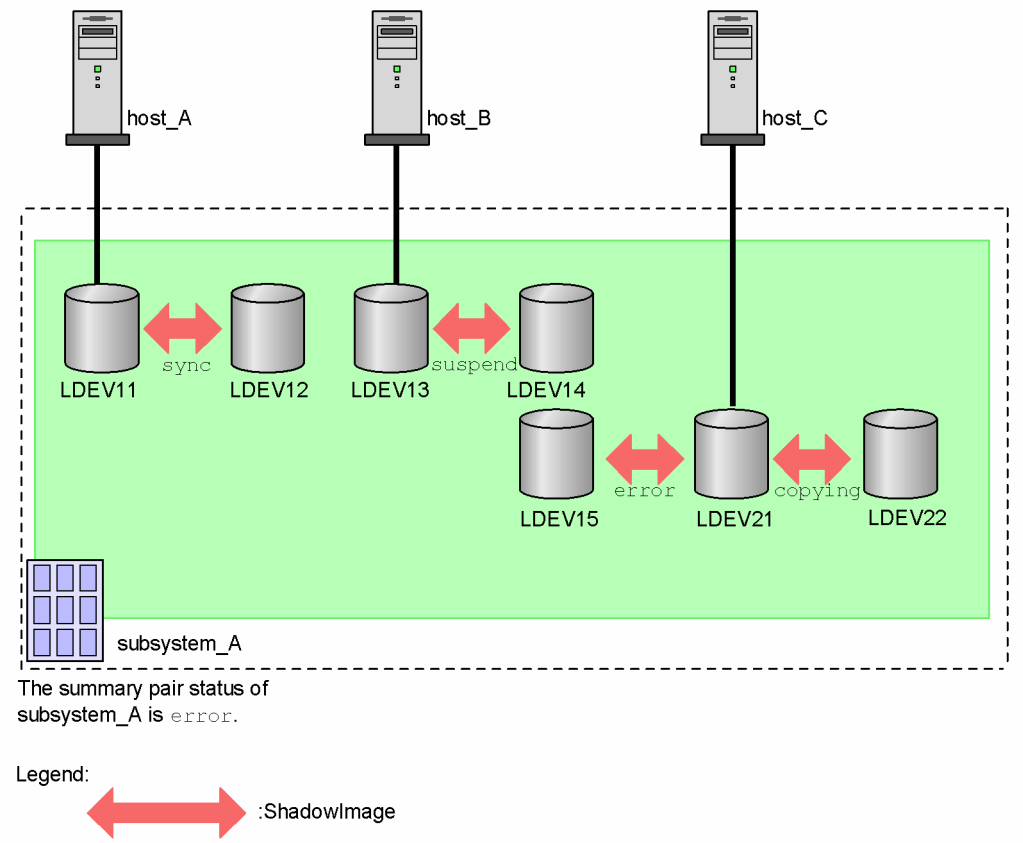


Figure 2.16 Scope Checked To Determine the Summary Copy Pair Status (in Subsystems View)

2.4.3 Scope Checked in Pair Configurations View To Determine the Summary Copy Pair Status

Replication Monitor determines the summary pair status amongst all copy pairs related to the pair configurations, including the cascaded copy pairs and the copy pairs in the same copy group.

The following shows the areas checked to determine the summary copy pair status in the Pair Configurations view:

- For pair management servers

  All copy pairs associated with the pair management servers

- For prefixes (mainframe systems)

  All copy pairs included in the definition information prefixes

- For copy pair configuration definition files (open systems)

  All copy pairs associated with the copy pair configuration definition files

- For copy groups

  All copy pairs included in the copy groups

Figure 2.17 shows an example of the summary copy pair statuses determined for pair management servers and copy pair configuration definition files.

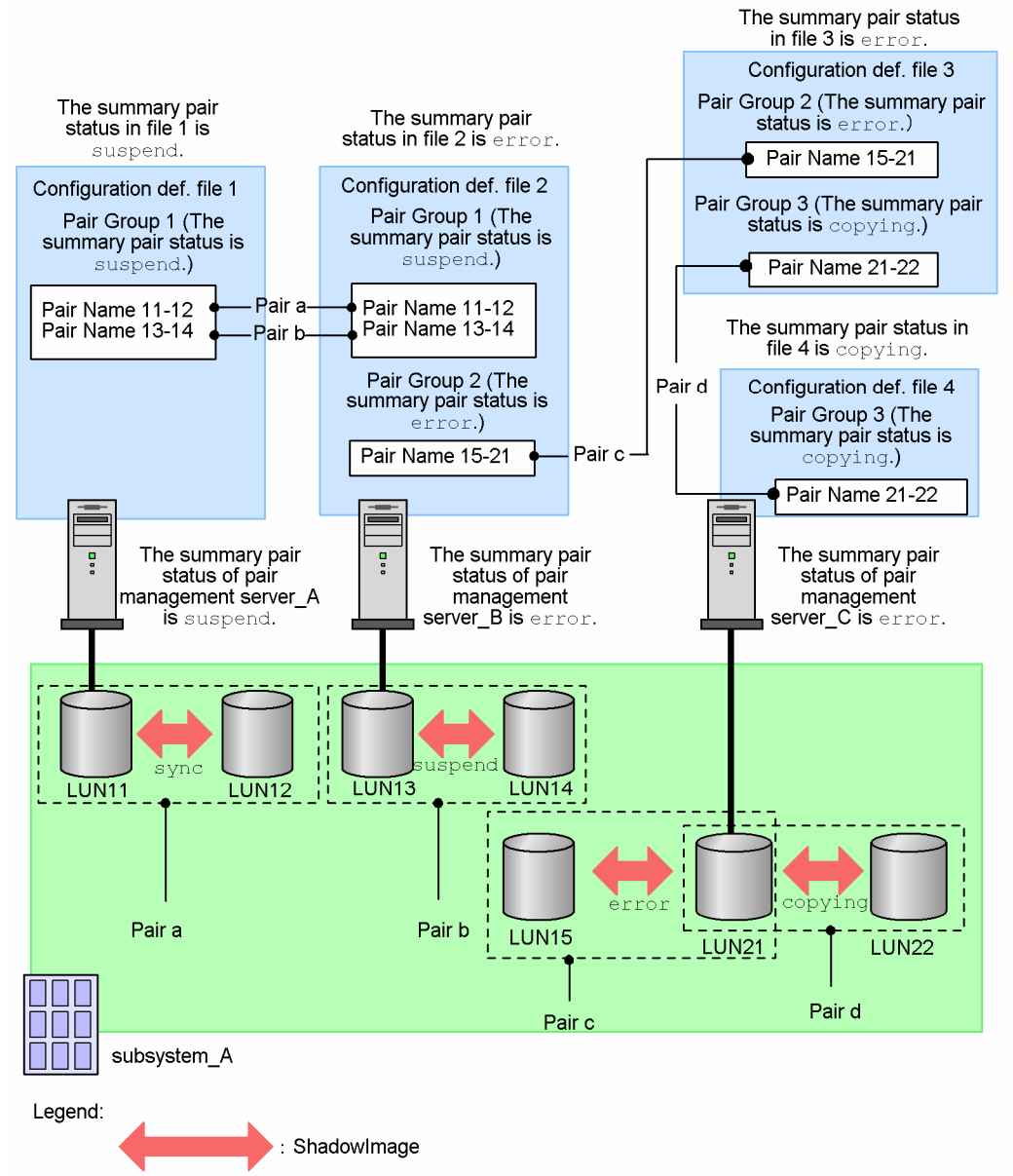


Figure 2.17 Example of Scope Checked to Determine the Summary Copy Pair Status (in Pair Configurations View)

2.5 Displaying the Transfer Delay State of Remote Copies

To facilitate monitoring of the performance and progress of remote copies, Replication Monitor displays the transfer delay state between the primary and secondary volumes for each copy group. This function monitors asynchronous remote copying when TrueCopy Async, TrueCopy Extended Distance, or Universal Replicator is used.

Transfer delay state of remote copies displays the following two types of information:

- Usage of side files and journal volumes
- Write delay time (C/T delta)

The following sections explain how this information is displayed. For details about how to check this information, see section 3.8

2.5.1 Displaying the Usage of Side Files and Journal Volumes

During an asynchronous remote copy operation, data being updated is stored temporarily in either a side file (TrueCopy Async) or a journal volume (Universal Replicator). When you use Replication Monitor, you can check the maximum usage on the primary volume side for the managed consistency groups (copy groups). You can also check details of the usage of both the primary and secondary volumes.

Figure 2.18 shows an example of how this information is displayed.

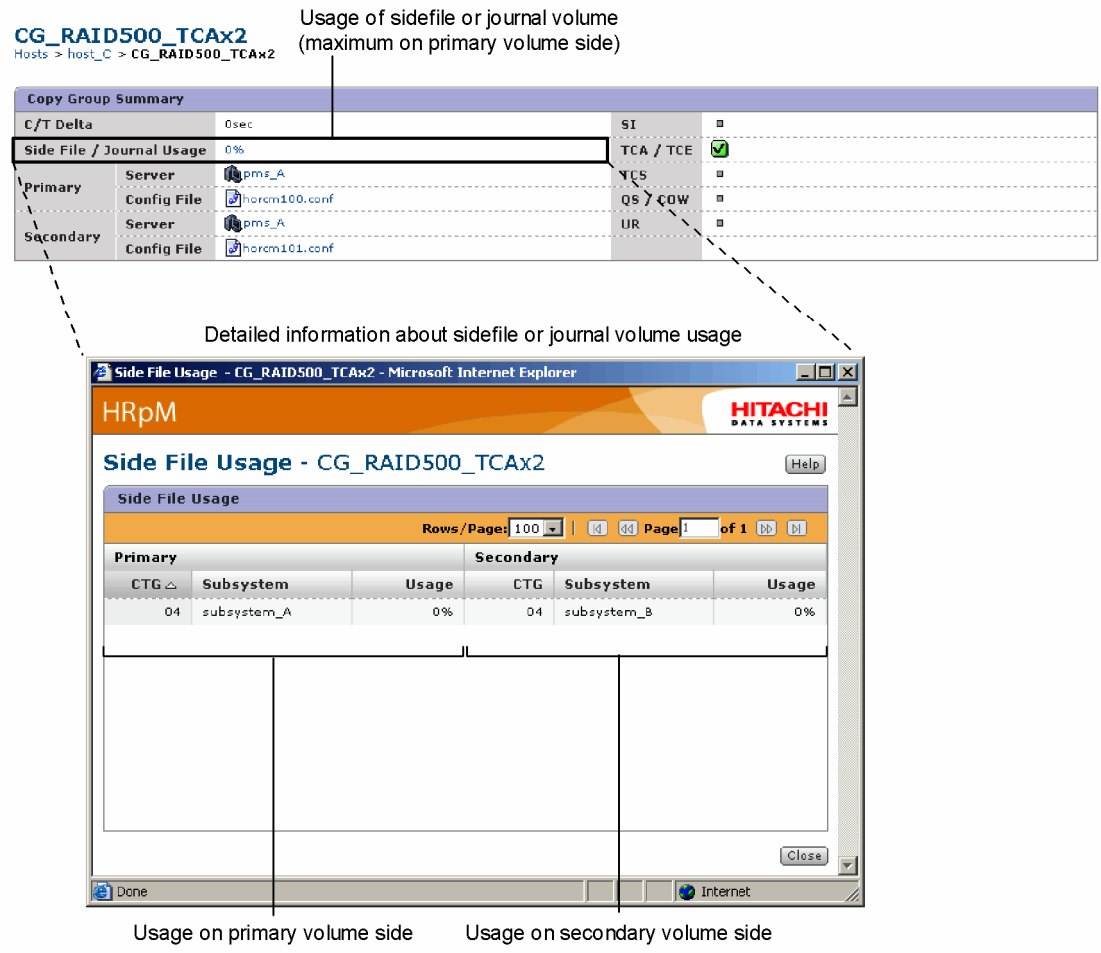


Figure 2.18 Example Window Display of Side File and Journal Volume Usage

You can also export the usage history of a side file or journal volume that is kept by Replication Monitor in CSV or HTML format.

2.5.2 Displaying the Write Delay Time (C/T Delta)

The write delay time information indicates how long it took before two volumes were made consistent in an asynchronous remote copy operation (i.e., the difference between the time the data was written on the primary volume and the time the data was written on the secondary volume). This information is called the **consistency time delta** (**C/T delta**). Replication Monitor enables you to check the write delay time (C/T delta) of each copy group (in seconds).

On an open system

The difference in time between when data is written on the primary volume and when the data is written on the secondary volume is displayed.

On a mainframe system

For each consistency group, the difference between the group consistency time for the secondary volume and the current system time is displayed.

Figure 2.19 shows an example of how this information is displayed.

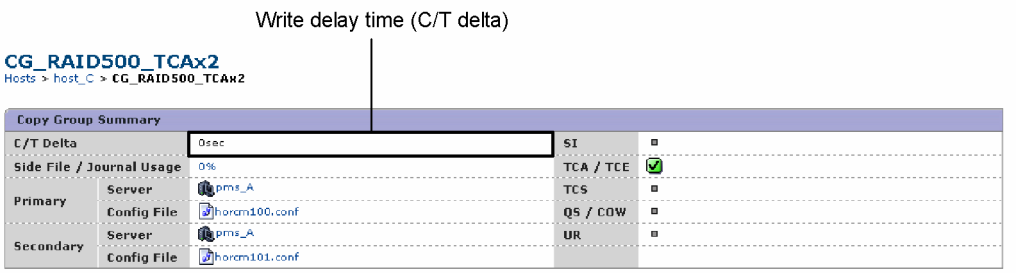


Figure 2.19 Example Window Display of Write Delay Time (C/T Delta)

You can also output in CSV or HTML format a history of the write delay times that is maintained by Replication Monitor, as shown in the example in Figure 2.20

Export C/T Delta - G_RAID500_UR

Date / Time	Pair Management Server	Configuration File	Copy Group	C/T Delta (sec)
2006-03-29 12:12:41	pms_A	horcm700.conf	G_RAID500_UR	7
2006-03-29 12:15:41	pms_A	horcm700.conf	G_RAID500_UR	7
2006-03-29 12:18:40	pms_A	horcm700.conf	G_RAID500_UR	7
2006-03-29 12:21:41	pms_A	horcm700.conf	G_RAID500_UR	7
2006-03-29 12:24:41	pms_A	horcm700.conf	G_RAID500_UR	7
2006-03-29 12:27:41	pms_A	horcm700.conf	G_RAID500_UR	7

Figure 2.20 Example of a History of Write Delay Times (C/T Delta) Output in HTML Format

2.6 Displaying My Copy Groups

Replication Monitor uses icons to display in a single window the volume associations, configurations, and copy pair statuses of copy groups selected by the user. This function is called **My Copy Groups**.

You can register multiple copy groups into My Copy Groups. In the My Copy Groups window, you can check more detailed status information for each copy group and you can refresh the pair statuses for all displayed copy groups. By registering into My Copy Groups the particularly critical copy groups that you want to monitor, you can monitor all of these copy groups from a single window.

Information displayed in the My Copy Groups subwindow is refreshed at five-minute intervals. If you want to monitor the statuses of certain copy groups continuously, it is useful to register those copy groups in My Copy Groups.

Figure 2.21 shows an example of how copy groups are displayed in My Copy Groups.

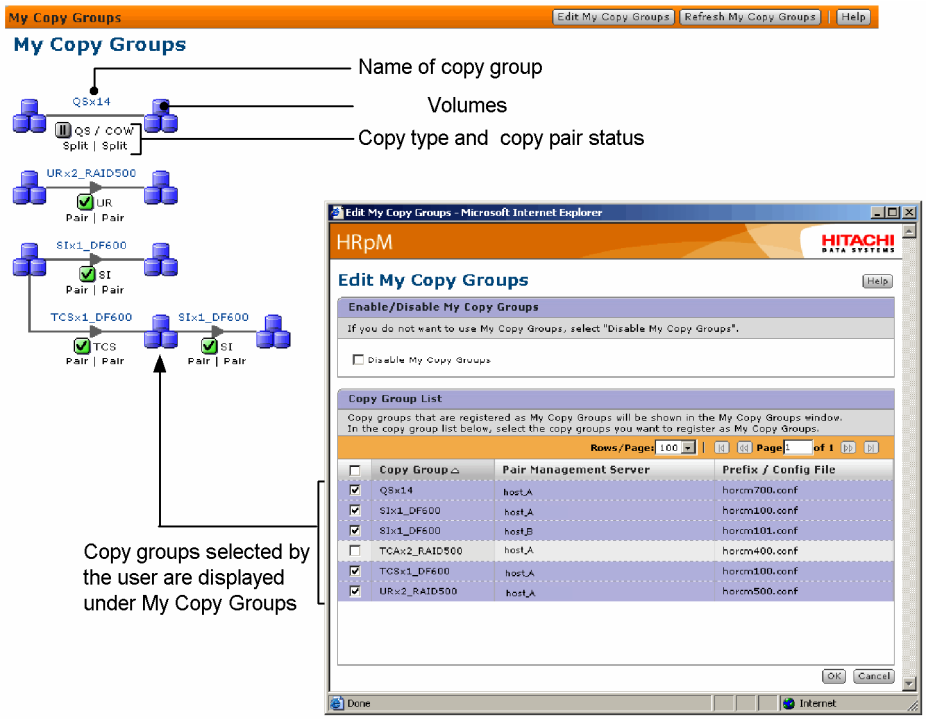


Figure 2.21 Example Window Display for Copy Groups in My Copy Groups

For details about how to use My Copy Groups, see section 3.9.

2.7 About the Refresh Function

The term *refresh* refers to updating the database that is maintained by the Replication Monitor server, by using the most recent information. This database stores copy pair configuration information and copy pair status-related information obtained from information sources, the Device Manager server, and Business Continuity Manager.

Note that Replication Monitor agents and Device Manager agents might also be used to obtain the above information.

To refresh means to replace copy pair-related information maintained in the Replication Monitor server database with the most recent information. The following two types of copy pair-related information are refreshed:

- Information indicating the copy pair status

  In the following explanations, refreshing of information indicating a copy pair status is referred to as *refreshing the copy pair status*.

- Copy pair configuration information

  In the following explanations, refreshing of copy pair configuration information is referred to as *refreshing pair configurations*.

2.7.1 Refresh Functionality Provided in Replication Monitor

For refreshing a copy pair status and for refreshing pair configurations, Replication Monitor provides both automatic refreshing and user-initiated manual refreshing. When you perform manual refreshing, the information displayed in the window is refreshed synchronously with refreshing of the Replication Monitor server database.

2.7.1.1 Refreshing the Copy Pair Status

When copy pair status information is refreshed, information indicating the status of the copy pairs targeted for refreshing is collected from the storage subsystems.

The path by which the Replication Monitor server collects the most recent information depends on the types of the targeted copy pairs, as shown in Table 2.5.

Table 2.5 Variable Paths for Collecting the Most Recent Information

System	Targeted Copy Pairs	Path Used for Information Collection
Open System	Copy pairs managed by a pair management server (pairs defined in a CCI configuration definition file)#1	If the Replication Monitor agent can be used, the information is collected via the Replication Monitor agent.#2
		If the Replication Monitor agent cannot be used, the information is collected from Device Manager databases.#3 A Device Manager refresh operation is performed at this time.#4
	Copy pairs not managed by a pair management server	Information is collected from the Device Manager server database.#3 A Device Manager refresh operation is performed at this time.#4
Mainframe System	Copy pairs managed by a Business Continuity Manager	Information is collected via Business Continuity Manager.#2

#1 If the pair management server cannot properly recognize the configuration definition file, information for the corresponding copy pairs is not displayed in the Pair Configurations view.

#2 In addition to copy pair status information, information about the transfer delay state of remote copies (C/T delta, sidefile usage, and journal volume usage), and copy progress are also collected.

#3 Information about the transfer delay state of remote copies and copy progess are not collected. In this case, `Unknown` is displayed for the detailed copy pair status of the secondary volume.

#4 A setting can be specified that suppresses Device Manager refresh operations when a user-initiated manual refresh is performed. Specifying this setting can reduce the time required to refresh the copy pair status. Note that if this setting is specified, the statuses will not be refreshed for the copy pairs whose statuses cannot be collected via the Replication Monitor agent.

The following summarizes the user operations for refreshing the copy pair status:

- To refresh the copy pair status manually

  To refresh the copy pair status at any time, in a subwindow of Replication Monitor that displays managed objects, click the appropriate button that refreshes the copy pair status information (**Refresh Host**, **Refresh Subsystem**, or **Refresh LUN** button).

  For details, see section 3.4

- To set up automatic refreshing of the copy pair status

  By using the Replication Monitor refresh settings, you can specify that a copy pair status is to be refreshed automatically and specify an interval for the automatic refreshing. You can specify an information collection interval for each pair management server and for each information source Device Manager server (in an open system), or for each Business Continuity Manager (in a mainframe system).

  For details, see the explanation of the interval settings for collecting copy pair status information in the *HiCommand Replication Monitor Installation and Configuration Guide*.

Note: In a mainframe system, copy pair status refreshing might fail depending on the status of Business Continuity Manager. If **Last Refresh** for a copy pair has not been updated at the time specified for automatic refreshing, or when manual refreshing is performed, please check the status of Business Continuity Manager.

2.7.1.2 Refreshing Pair Configurations

In an open system, information about the configurations of copy pairs targeted for refreshing is collected from Device Manager server databases and Device Manager agents. During collection, the Device Manager server refresh function is not executed.

In a system that is comprised of multiple Device Managers, information about copy pair configurations is collected by using the Device Manager agents at each site.

In a mainframe system, information about the configurations of copy pairs targeted for refreshing is collected from Business Continuity Manager.

The following summarizes the user operations for refreshing pair configurations:

- To refresh pair configurations manually

  To refresh pair configurations at any time, select an information source (a Device Manager server or Business Continuity Manager) from a Replication Monitor refresh setting window, and then click the **Refresh Configuration** button.

  For details, see section 3.10.

- To set up automatic refreshing of pair configurations

  By using the Replication Monitor refresh settings, you can specify that pair configurations are to be refreshed automatically and specify an interval for the automatic refreshing. The refresh settings enable you to specify an information collection interval for each information source (a Device Manager server or Business Continuity Manager).

  For details, see the explanation of the interval settings for collecting copy pair configuration information in the *HiCommand Replication Monitor Installation and Configuration Guide*.

If the copy pair information stored in the Device Manager server database is not current, the copy pair configuration information collected by Replication Monitor will also not be current. To avoid this situation, when you set the refreshing interval information for the pair configurations, also consider the interval at which Device Manager's refresh processing is performed.

Replication Monitor can be set to automatically obtain synchronized processing with the Device Manager server database when the Device Manager server database is changed. For details on setting, see the explanation of the properties file in the *HiCommand Replication Monitor Installation Configuration Guide*.

2.7.2 Copy Pair Status Refresh Processing

The processing to refresh the copy pair status varies depending on whether this operation is performed on an open system or a mainframe system. This section describes the processing to refresh the copy pair status on each system.

2.7.2.1 Open System Copy Pair Status Refresh Processing

- If the Replication Monitor agent can be used:

  If the targeted copy pairs have been defined in a pair management server (CCI configuration definition file) and the Replication Monitor agent has been installed on the pair management server, the Replication Monitor server can use the Replication Monitor agent to refresh the copy pair status. The following figure shows the flow of pair information for copy pair statuses when the Replication Monitor agent can be used.

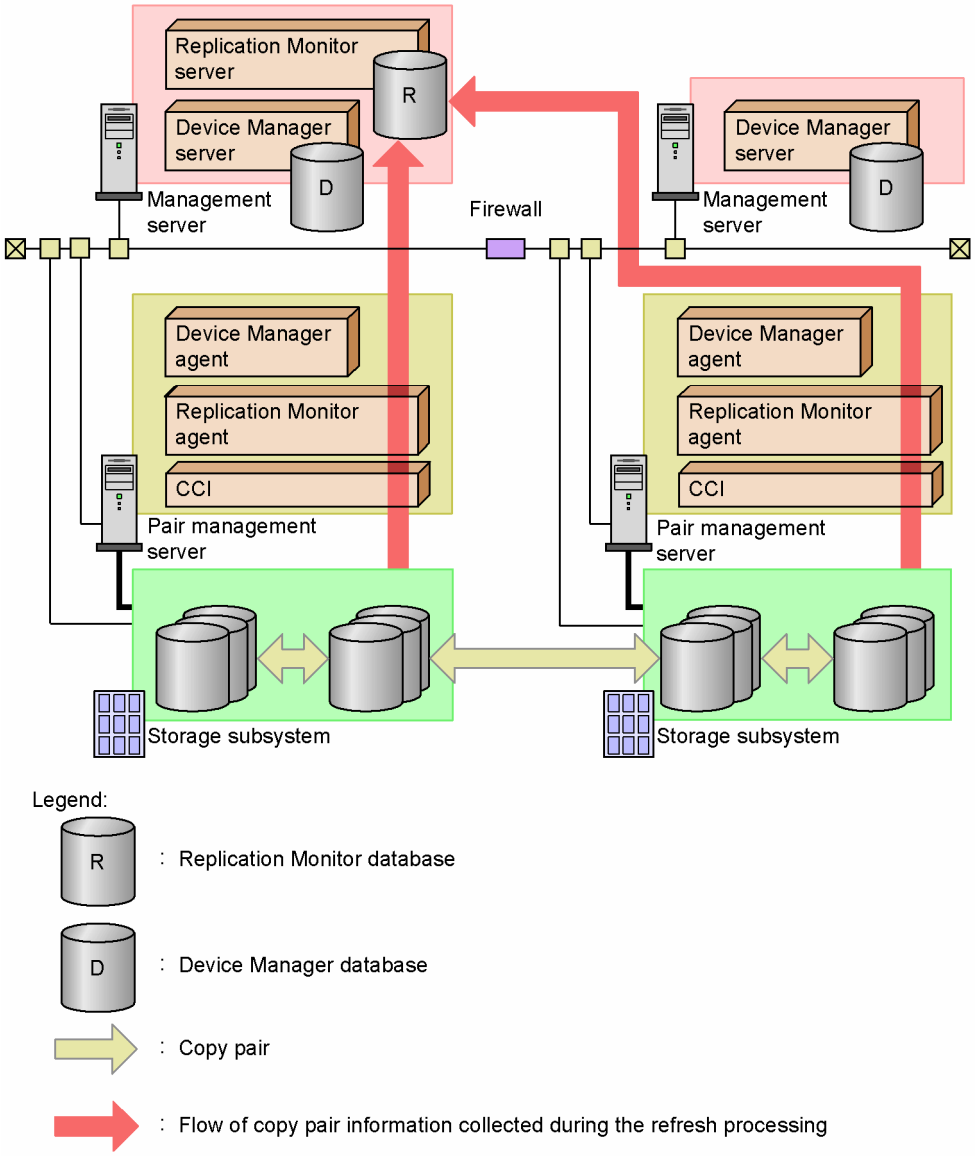


Figure 2.22 Copy Pair Status Refresh Processing (When Replication Monitor Agent Can Be Used)

The advantage to using the Replication Monitor agent is that copy pair status information is refreshed relatively quickly (in normal circumstances, over a period of between 3 and 30 minutes). In addition to the copy pair status information, information about the transfer delay state of remote copies can also be refreshed.

- If the Replication Monitor agent cannot be used:

  In the following cases, the Replication Monitor server uses the refresh function for the Device Manager server to obtain information indicating the copy pair status, from the Device Manager server:

  - When the target copy pair is not defined on the pair management server (CCI configuration definition file)
  - When the target copy pair (CCI configuration definition file) cannot be properly recognized by the pair management server
  - When a Replication Monitor agent is not installed on the pair management server

The following figure shows the flow of pair information for copy pair statuses when the Replication Monitor agent cannot be used.

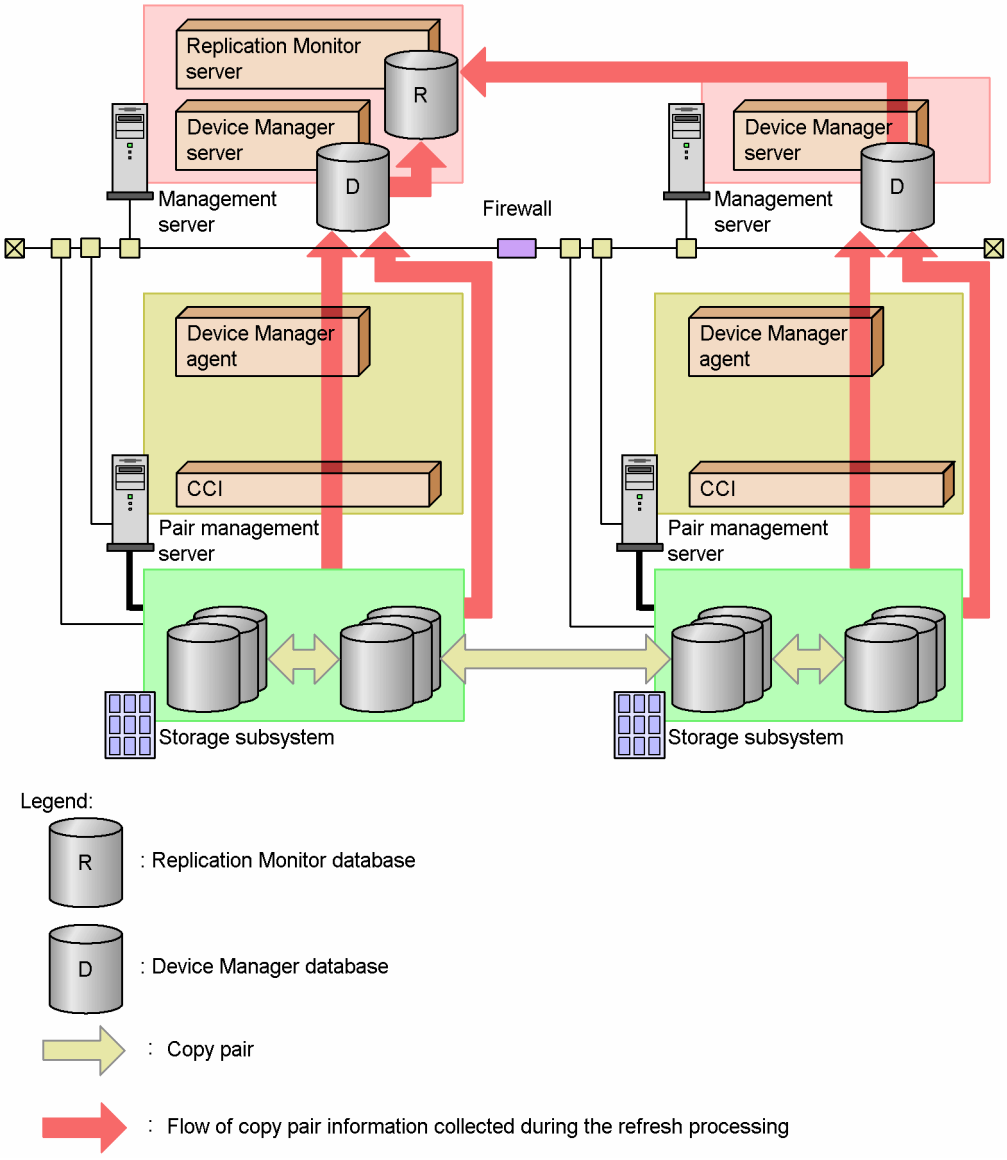


Figure 2.23 Copy Pair Status Refresh Processing (When Replication Monitor Agent Cannot Be Used)

When you use the Device Manager server refresh function, it takes a considerable amount of time to refresh copy pair status information (ordinarily, an interval between 30 minutes and several hours). Moreover, when you use this method, you cannot refresh information about the transfer delay state of remote copies (C/T delta, sidefile usage, journal volume usage) and copy progress. Note that `Unknown` is displayed for the detailed copy pair status of the secondary volume.

2.7.2.2 Mainframe System Copy Pair Status Refresh Processing

On a mainframe system, the Replication Monitor server refreshes the copy pair status by collecting the most recent copy pair status information from Business Continuity Manager. The applicable copy pairs must be managed by a pair management server on which Business Continuity Manager has been installed. The following figure shows the flow of pair information for copy pair statuses on a mainframe system.

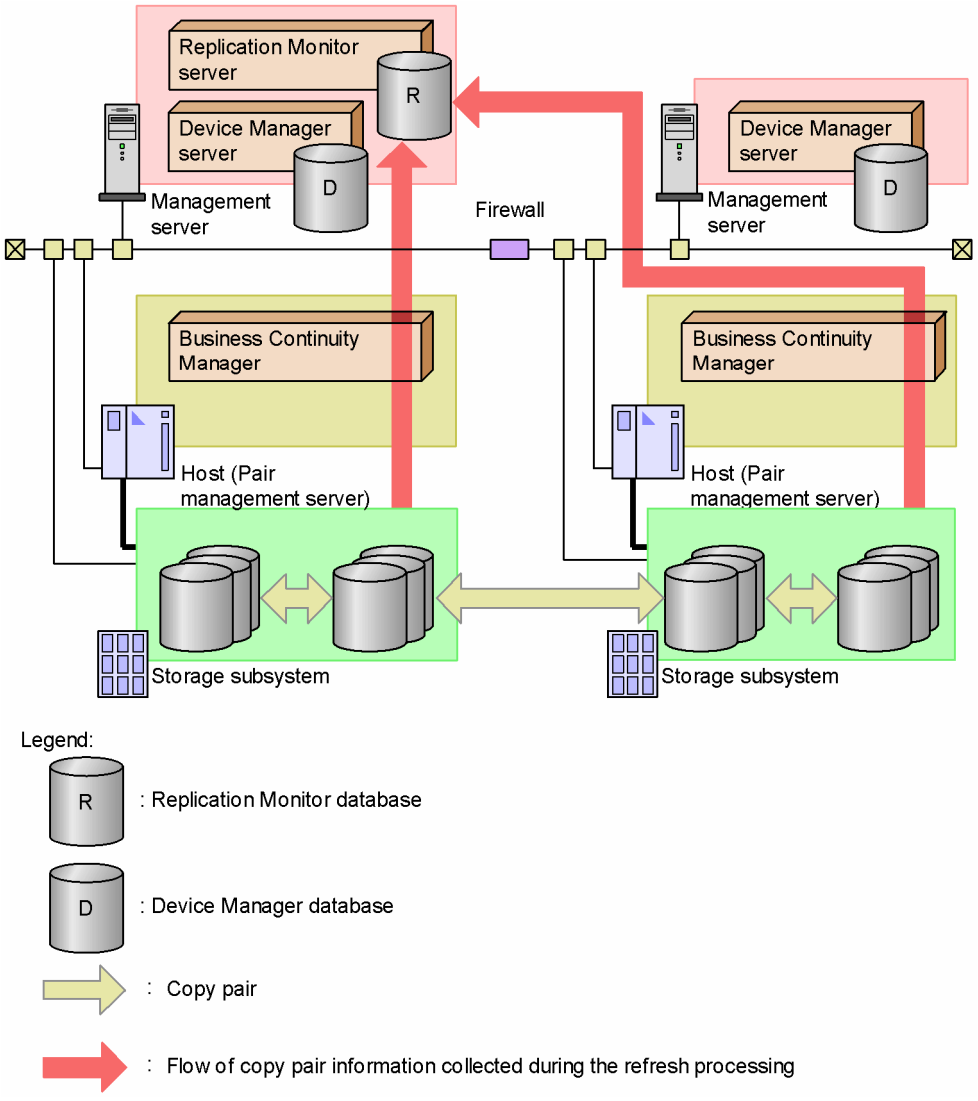


Figure 2.24 Copy Pair Status Refresh Processing (Mainframe System)

On a mainframe system, copy pair status information that is managed by Business Continuity Manager can be refreshed relatively quickly (in normal circumstances, over a period of between 3 and 30 minutes). In addition to copy pair status information, information about the transfer delay state of remote copies can also be refreshed.

2.7.3 Pair Configuration Refresh Processing

The processing to refresh pair configurations depends on whether the processing is performed on an open system or a mainframe system, as explained below.

2.7.3.1 Open System Pair Configuration Refresh Processing

On an open system, the Replication Monitor server refreshes pair configurations based on copy pair information maintained in the Device Manager server database as well as that collected from the Device Manager agent. In this case, the Device Manager server's refresh function is not executed.

In a system that is comprised of multiple Device Managers, pair configurations are refreshed based on copy pair information collected by using the Device Manager agents at each site.

The following figure shows the flow of pair information for copy pair configuration on an open system.

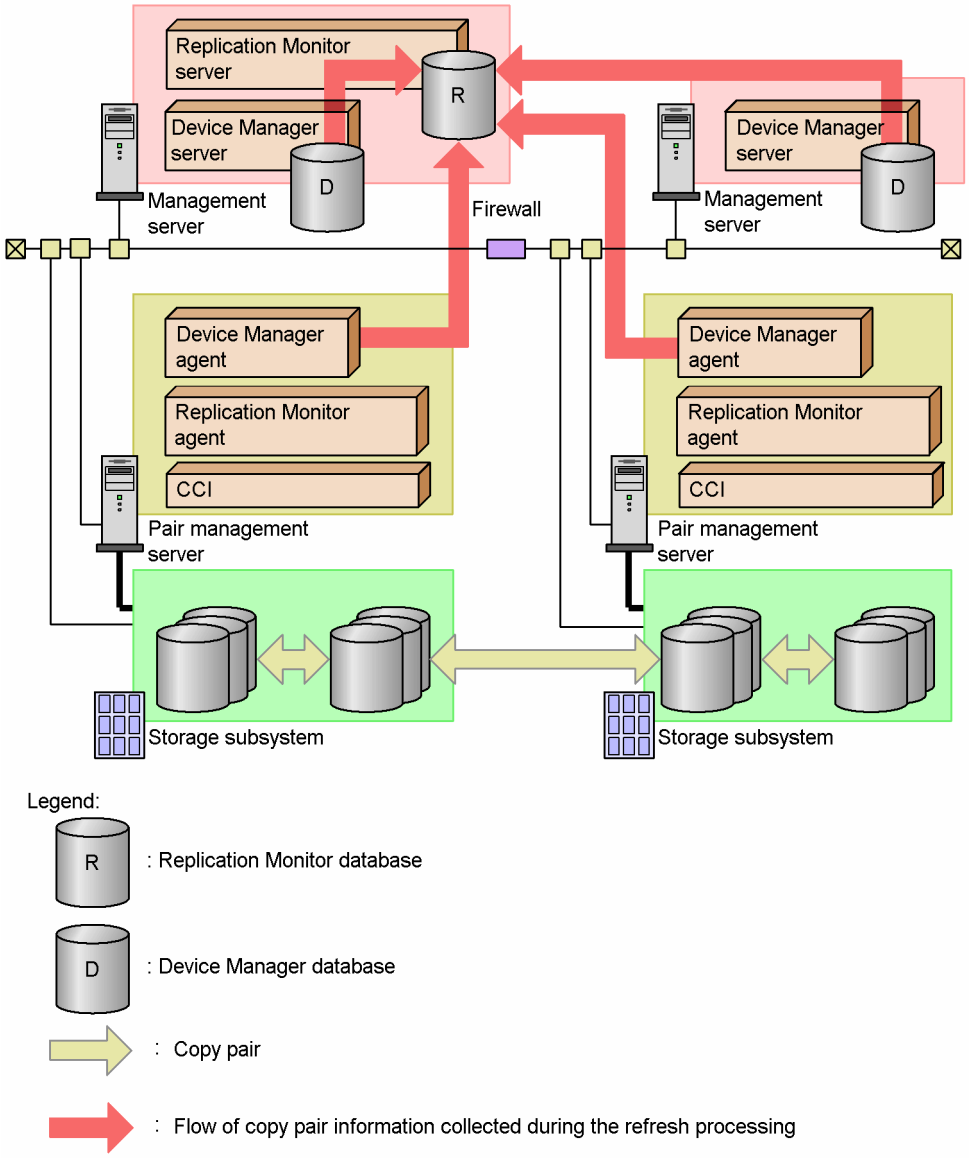


Figure 2.25 Pair Configuration Refresh Processing (Open System)

The above figure assumes that the Device Manager server is already installed on both the primary and secondary sites. In this case, pair configurations are refreshed based on copy pair information collected by using the Device Manager agents on both sites.

On an open system, copy pair configuration information is refreshed relatively quickly (normally, from several minutes to less than an hour).

2.7.3.2 Mainframe System Pair Configuration Refresh Processing

On a mainframe system, the Replication Monitor server refreshes the copy pair configuration by collecting the most recent copy pair configuration information from Business Continuity Manager. The applicable copy pairs must be managed by a pair management server on which Business Continuity Manager has been installed. The flow of pair information for copy pair configurations on a mainframe system is the same as the refresh processing for copy pair statuses. See Figure 2.24

On a mainframe system, copy pair configuration information is refreshed relatively quickly (normally, from several minutes to less than an hour).

2.8 About the Alert Function

Replication Monitor includes a function that provides user notification whenever a preset monitoring target enters a specific status. For notification conditions, you can specify the copy pair status and performance information threshold value. Notification can be performed by email or SNMP traps. This function enables you to monitor the copy pair status and performance information without having to log in to Replication Monitor.

When setting the copy pair status conditions, you can set the alert function to monitor for entities such as hosts, subsystems, and copy groups in addition to copy pairs. For example, if you set an alert to monitor a host, a notification will be sent whenever any copy pair associated with the host satisfies the specified condition.

When monitoring performance information, a message will be reported if the performance information exceeds the threshold value. You can set a copy group as a monitoring target.

To facilitate even more effective monitoring of the copy pair status and performance information, the alert function also provides the following capabilities:

Templates

This function enables you to store as a template the settings created when you set a new alert. This eliminates the need to repeatedly enter the same alert settings when you are managing many targets.

Alert history display

This function displays a listing of alerts that have been issued. From the alert history, you can check details about the alerts that have been set as well as their targets. Also, you can output the alert history in HTML or CSV format.

For details about setting alerts, see section 3.6.2. For details about checking the copy pair status after an alert has been issued, see section 3.6.4.

2.9 Changing the Status of a Copy Pair

When a problem occurs in a managed copy pair, resolve the problem by changing the copy pair status. On an open system, you can change the copy pair status for a copy group or for a copy pair.

Before you change the pair status of copy pairs comprising a copy group, you must be aware of all the pairs associated with the copy pairs to be changed. With Replication Monitor, you can have a list of all associated copy pairs displayed automatically simply by clicking one copy pair that you want to change. From this list of copy pairs, you can select all the copy pairs that need to be changed.

A wizard is also provided to help you change a copy pair status. The wizard divides the complex setting operations into a number of discrete steps and guides you through each step. For example, selection of copy pairs and specification of copy pair statuses are separated into two steps in the procedure for changing a copy pair status, and the wizard guides you through each of them. This makes it possible to change a copy pair status by simply following the step-by-step guidance provided by the wizard.

For details about changing a copy pair status, see section 3.7.

2.10 Calling Other HiCommand Products

If you want to use a function provided by a different HiCommand product, you can call the desired product from Web Client. If necessary, you can call other HiCommand products from Web Client to help eliminate the cause of an error. For example, if Replication Monitor discovers a copy pair error, you can start Device Manager in order to resolve the error by re-creating or deleting the copy pair.

If other HiCommand products are installed on the same management server, you can skip the logon step and start them with a single sign-on. You can also call HiCommand products installed on other management servers.

For details about calling other HiCommand products, see section 3.6.5.

Chapter 3 Using Replication Monitor

This chapter describes window configurations of Web Client, and explains how to operate Web Client for each user task. Operating methods are described along with a usage example for Replication Monitor, so you can check the procedure for functions that corresponds to the usage example.

- Before Using Web Client (see section 3.1)
- Starting and Stopping Web Client (see section 3.2)
- About the Web Client Window (see section 3.3)
- Checking the Status of Copy Pairs (see section 3.4)
- Checking the Configuration of a Copy Pair (see section 3.5)
- Using Alerts to Handle Errors (see section 3.6)
- Changing the Pair Status of a Copy Pair or Copy Group (see section 3.7)
- Checking the Transfer Delay State in Remote Copy Operations (see section 3.8)
- Using My Copy Groups to Check Copy Groups (see section 3.9)
- Refreshing the Copy Pair Configuration Information (see section 3.10)
- Supplement on Web Client (see section 3.11)

3.1 Before Using Web Client

This section describes what you have to know before using Web Client.

The following operations of Replication Monitor's Web Client are prohibited. If any of the following operations is performed, processing might not be completed successfully:

- Using a tool bar, menu bar, or link bar provided by a Web browser

  Do not use a tool bar, menu bar, or link bar provided by a Web browser to perform operations such as migrating, updating, or stopping a read. You can however print a window or change the font size from the menu bar.

- Using a Web browser's context menu

  Do not use a Web browser's context menu, which is displayed by an operation such as right-clicking on the mouse.

- Using a short-cut key or function key

  Do not perform Web browser operations, such as **Back**, **New**, or **Refresh**.

- Repeated button operations

  Do not repeatedly click the buttons provided by Replication Monitor's Web Client. Repeated clicking of a button might result in an unexpected Replication Monitor operation or excessive workload on the server.

3.1.1 Configuring a Browser When Pop-up Blocking Is Enabled

If you use Web Client on a browser for which pop-up blocking is enabled, configure the browser so that pop-ups of Replication Monitor are not blocked.

For example, when using Internet Explorer for Windows XP Service Pack2 or Windows 2003 Service Pack1, you can configure the browser in either of the following ways:

- Choose Tools, and then Internet Options. In the Internet Options dialog box, choose the Security tab, and then add the URL for Replication Monitor to Trusted Site.

  Specify the URL in the following format:

  - URL used for communicating with Replication Monitor

    `http://`*`Replication-Monitor-address`*`:`*`port-number`*`/ReplicationMonitor/`

    For Replication-Monitor-address, specify the IP address or name of the host on which Replication Monitor is running.

    The following gives examples when the default value is specified for the port number:

    For non-SSL:

    `http://`*`Replication-Monitor-address`*`:23015/ReplicationMonitor/`

    For SSL:

https://*Replication-Monitor-address*:23016/ReplicationMonitor/

- When a pop-up is blocked and a warning message is displayed, select Always Allow Pop-Ups From This Site.

3.1.2 About Changing a Storage Subsystem Configuration

When a storage subsystem configuration is changed after starting Replication Monitor, information about the change is not updated to Replication Monitor. If you have changed a storage subsystem configuration as described below, refresh the configuration information for the management target from Replication Monitor.

- The storage subsystem is changed (for example, a new disk drive is added)
- A storage subsystem configuration is changed (for example, a user creates a pair or performs an operation on a pair) by using Device Manager, Storage Navigator, DAMP, or CCI.
- When the configuration for the host or pair management server is changed (such as when a Replication Monitor agent is added)

For details about how to refresh configuration information for the management target, see section 3.10.

3.2 Starting and Stopping Web Client

This section describes how to start and stop Replication Monitor's Web Client.

3.2.1 Starting Web Client

There are two ways to start Web Client:

- Logging in from Replication Monitor's Login window
- Logging in to another HiCommand product and then calling Replication Monitor

3.2.1.1 Logging in From the Replication Monitor Login Window

If no other HiCommand product is active on the management client, you log in by entering your user ID and password in Replication Monitor's Login window.

When you use Replication Monitor for the first time after installation, you must register the license information. Click the **License** button to register the license information, and then log in. For details about the registration of license information, see the *HiCommand Replication Monitor Installation and Configuration Guide*.

To log in from Replication Monitor's Login window:

1. Specify the Replication Monitor URL in the browser.

   `http://`*Replication-Monitor-address*`:` *port-number*`/ReplicationMonitor/`

   In *Replication-Monitor-address*, specify the IP address or host name of Replication Monitor.

   In *port-number*, specify the port number for HBase Storage Mgmt Web Service (default is `23015`).

   The values of *Replication-Monitor-address* and *port-number* are those specified at installation.

   Entering URL displays the Start Replication Monitor window and the Login window.

   Notes:

   To log in to an environment where SSL is used, use `https` instead of `http`, and use the port `23016` (default) for *port-number*.

2. In the Login window, enter the user ID and password, and then click the **Login** button.

   Web Client's main window appears.

   Notes:

   If multiple successive login attempts fail, the user account may become locked. If this occurs, contact the system administrator.

If necessary, you can display a warning message in the Login window. For details about the settings, see the *HiCommand Replication Monitor Installation and Configuration Guide*.

3.2.1.2 Logging in to Another HiCommand Product Before Calling Replication Monitor

If another HiCommand product is running on the management client, call Replication Monitor from that product.

In the **Dashboard** menu, choose the **Go** link for **HRpM**. Web Client's main window appears. There is no need to enter a user ID or password.

3.2.2 Terminating Web Client

To stop Web Client, click the **Logout** or **Close** button in the global tasks bar area. When Replication Monitor operation has been completed, click the **Logout** button, not the **Close** button. When Web Client is stopped, the window displaying the Replication Monitor title remains. To log in again, click the **Login** button in this window.

Logout button

Clicking this button logs you out of Replication Monitor.

To prevent unauthorized accesses to Replication Monitor, make sure that you log out from Replication Monitor after you finish the operation.

Clicking the **Logout** button logs you out of all HiCommand products. To use another HiCommand product again, you must log in again.

Close button

Clicking this button stops Replication Monitor Web Client. It does not log you out of Replication Monitor or any active HiCommand product.

3.3 About the Web Client Window

Replication Monitor's Web Client provides a main window and pop-up dialog boxes. This section describes the items that are displayed in the main window and dialog boxes.

3.3.1 Configuration of the Main Window

This section describes the configuration of the main window and the items that are displayed. The following shows the configuration of the main window:

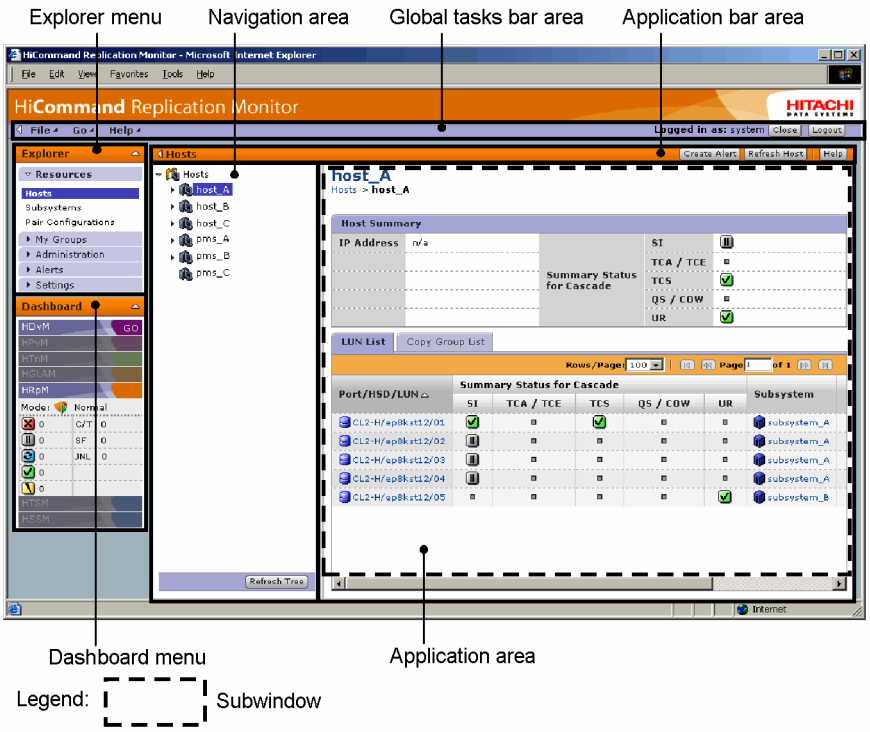


Figure 3.1 Configuration of the Main Window

Usually, the user chooses items in the main window from left (**Explorer** menu) to right (navigation area or application area) to display desired information. Replication Monitor's management target is displayed in the application area, which is located in the right of the main window.

3.3.1.1 About the Global Tasks Bar

The global tasks bar is used to manipulate applications and windows, and to display help. This area displays the user ID that is currently logged in (if you registered the full name of the user during user registration, the full name is displayed). To view or hide the **Explorer** and **Dashboard** menus, click the triangular icon in the global tasks bar area. The following items are displayed in the global tasks bar:

File

Stops Replication Monitor and other active HiCommand products. Choosing **File** displays the following items:

Close

Closes only the applicable window without logging the user out of Replication Monitor or any other active HiCommand product.

Logout

Logs the user out of Replication Monitor. Choosing this item also logs you out of all other HiCommand products.

Go

Specifies settings for downloading Replication Monitor agents and calls other HiCommand products. Choosing **Go** displays the following items:

Download

Displays a dialog box for downloading a Replication Monitor agent.

Links

Displays a dialog box for starting a product previously specified. This also enables you to start a non-HiCommand product.

Help

Displays the Replication Monitor Help and license information. Choosing **Help** displays the following items:

Online Manual

Displays the table of contents for the Replication Monitor Help.

About

Displays a dialog box for checking the version information and registering license information. This dialog box enables you to change the registered license key and license file.

Close button

Closes only the applicable window without logging the user out of Replication Monitor or any other active HiCommand product.

Logout button

Logs the user out of Replication Monitor. Clicking this button also logs you out of all other HiCommand products.

3.3.1.2 About the Explorer Menu

The **Explorer** menu displays the operation items that Replication Monitor can execute. When an item is chosen from the **Explorer** menu, the corresponding information is displayed in the navigation area or in the application area. To view or hide the **Explorer** menu, click the triangular icon in the **Explorer** menu. The following describes the items that are displayed in the **Explorer** menu:

Resources

Displays Replication Monitor's management targets (hosts, copy pairs, etc). In **Resources**, the following items are displayed:

Hosts

Displays the information for Replication Monitor's management targets in the Hosts view.

Subsystems

Displays the information for Replication Monitor's management targets in the Subsystems view.

Pair Configurations

Displays the information for Replication Monitor's management targets in the Pair Configurations view.

My Groups

In **My Groups**, the following item is displayed:

My Copy Groups

Displays a list of My Copy Groups. This item provides a single window that lets you view the relationship between volumes, the cascade structure, and the copy pair status for a specific copy group that has been registered.

Administration

Displays information used for managing Replication Monitor. In **Administration**, the following items are displayed:

Users and Permissions

Sets the user information. Choosing this item enables you to do the following:

- Create new user accounts and delete existing user accounts
- Set user permissions
- Change users' passwords

Security

Sets the security information. Choosing this item enables you to do the following:

- Set and manage passwords

- Set account locks
- Set warning banners

Event Logs

Displays the Replication Monitor activity log information that affects operation.

Maintenance

Displays a subwindow for switching Replication Monitor's operation mode.

Alerts

In **Alerts**, the following item is displayed:

Alerts

Displays a subwindow for alerts. This item enables you to perform alert-related operations, such as checking alert settings and history, and changing alert settings.

Settings

Specifies the settings related to Replication Monitor operations, such as profiles and license information. In **Settings**, the following items are displayed:

User Profile

Enables you to check and edit user information.

License Info

Registers a license.

Information Source

Sets the information source.

Refresh Setting

Specifies refresh settings.

Data Retention

Sets the data retention period.

3.3.1.3 About the Dashboard Menu

In the **Dashboard** menu, names of the HiCommand products are listed. Choosing the **GO** link to the right of a product name starts the corresponding HiCommand product. If a product displayed in the **Dashboard** menu has not been installed on the same server as Replication Monitor, its **GO** link is disabled.

The **Dashboard** menu displays important information about the HiCommand products for which users are currently logged in. Replication Monitor is displayed as **HRpM**. Under **HRpM**, the current mode is displayed, and the number of alerts reported to Replication Monitor is displayed for each copy pair status. Of all the alert notifications, the numbers of those that have not been read are displayed.

To view or hide the **Dashboard** menu, click the triangular icon in the **Dashboard** menu.

3.3.1.4 About the Application Bar

The application bar displays buttons that vary depending on the information in the application area. The application bar enables you to perform operations on the information in the application area, such as refreshing and changing settings.

Clicking the **Help** button in the application bar displays Help for the items displayed in the application area.

3.3.1.5 About the Navigation Area

The navigation area is displayed when the target chosen in the **Explorer** menu has a hierarchical structure.

To change the view/hide settings for the navigation area, choose the triangular icon in the application bar area.

In the navigation area, the following items are displayed:

Object tree

Objects are listed in a tree format. This is called the **object tree**. Choosing an object from the object tree displays information about the object in the application area.

Refresh Tree button

Redisplays the information in the object tree and the application area.

3.3.1.6 About the Application Area

The application area displays the information that corresponds to the item selected in the **Explorer** menu and the object tree. In the application area, you can check information about copy pairs and copy groups that are Replication Monitor's management target.

A window in the application area is called an *object-name* subwindow.

3.3.2 Web Client Dialog Boxes

A dialog box is displayed as a pop-up by using a window operation. Dialog boxes are displayed when new settings are to be added or existing settings are to be changed for the target being managed by Replication Monitor. The following shows an example of a dialog box:

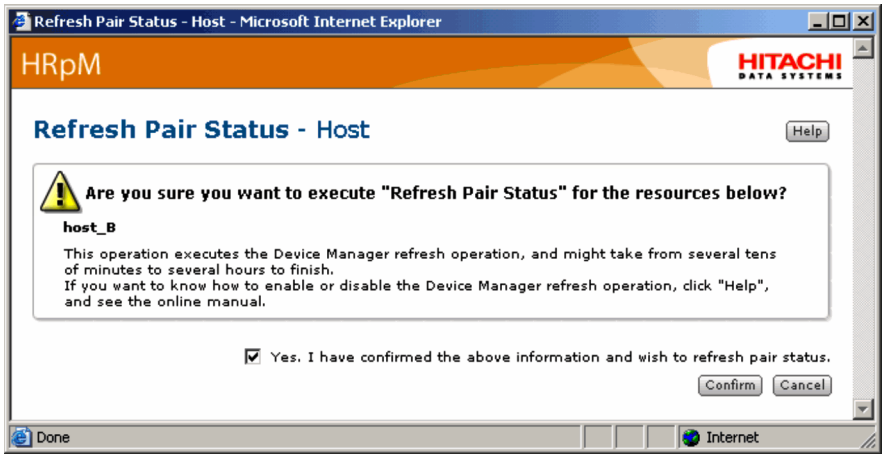


Figure 3.2 Example of Dialog Box

In the dialog box, clicking the **Help** button displays Help for the items displayed in the dialog box.

3.3.3 Icons Displayed in a Web Client Window

This section describes the icons that are displayed in a Web Client window, specifically the following icons:

- Icons representing the management target
- Icons representing the copy pair status
- Icons representing the relationship between a volume and copy group
- Icons for executing operations
- Icons for messages

3.3.3.1 Icons Representing the Management Target

The icons representing the management target are displayed in the navigation area and the application area. The following table lists and describes the icons that represent the management target:

Table 3.1 Icons Representing the Management Target

Icon	Description
	Indicates a root node in the Hosts view.
	Indicates a host in a mainframe system.
	Indicates a host in an open system.
	Indicates a root node in the Subsystems view.
	Indicates a storage subsystem in a mainframe system.
	Indicates a storage subsystem in an open system.
	Indicates a CU.
	Indicates a prefix.
	Indicates a copy group.
	Indicates a root node in the Pair Configurations view.
	Indicates a configuration definition file for the Command Control Interface (CCI).
	Indicates a copy pair.
	Indicates an LU.
	Indicates an LDEV.

3.3.3.2 Icons Representing the Copy Pair Status

Replication Monitor uses icons to indicate the copy pair status. The following table lists and describes the icons that represent the copy pair status:

Table 3.2 Icons Representing the Copy Pair Status

Icon	Copy Pair Status	Description
	error	An error has occurred in the copy pair.
	suspend	The copy pair is in the split status.
	copying	The copy pair is under forward or backward copy processing.
	sync	The copy pair is synchronized.
	simplex	There is copy pair definition information, but there is no actual copy pair configuration.
	unknown	Replication Monitor cannot determine the pair status due to any of the following reasons: ▪ The settings are set not to acquire any copy pair status. ▪ The configuration does not allow the copy pair status to be acquired. ▪ The configuration information has already been acquired, but the copy pair information has not.

3.3.3.3 Icons Representing the Relationship Between a Volume and Copy Group

Replication Monitor uses the icons representing volumes and copy groups and icons representing the direction (such as arrows) to indicate the relationship between a volume and a copy group. The following table lists and describes the icons that represent the relationship between a volume and a copy group:

Table 3.3 Icons Representing the Relationship between a Volume and Copy Group

Icon	Description
	Indicates the primary volume. When an organization of related volumes is displayed, the currently selected volume is highlighted.
	Indicates the secondary volume. When an organization of related volumes is displayed, the currently selected volume is highlighted.
	Indicates the primary copy group. When an organization of related volumes is displayed, the currently selected volume is highlighted.
	Indicates the secondary copy group. When an organization of related volumes is displayed, the currently selected volume is highlighted.
	Indicates the presence of a suspended status or an error status.
	Indicates that copy processing is underway in the direction indicated by the arrow.
	
	There is another copy pair connected in the cascade format to the copy pair's primary volume.
	There is another copy pair connected in the cascade format to the copy pair's secondary volume.

The following shows a pair configuration and an example of its display in the actual window:

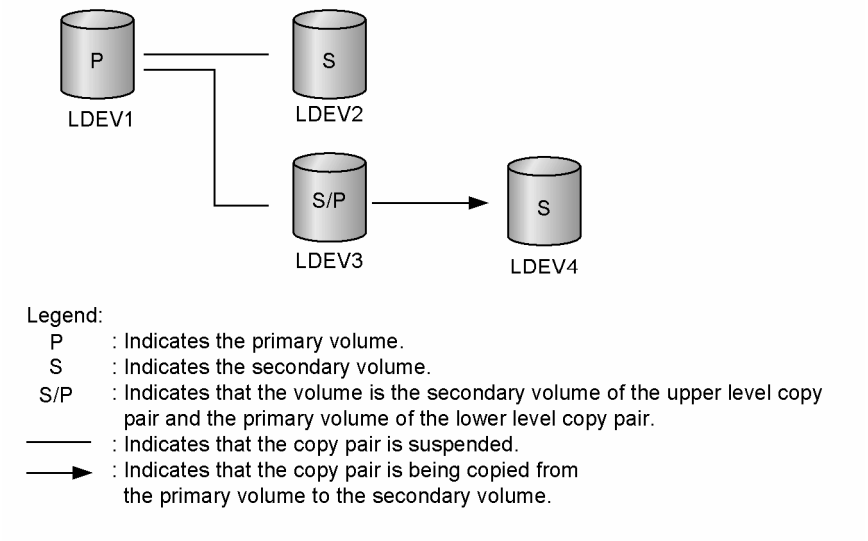


Figure 3.3 Pair Configuration (Copy Pair in the Cascade Format)

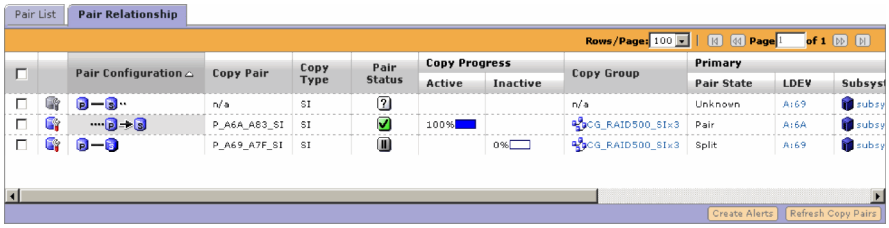


Figure 3.4 Example of Display in Actual Window

3.3.3.4 Icons for Executing Operations

Clicking an icon for executing an operation displays a dialog box or wizard. The following table lists and describes the icons for executing operations:

Table 3.4 Icons for Executing Operations

Icon	Description
	Starts a wizard for changing the pair status. This icon is disabled when the pair status cannot be changed. The icon is called the **Change Pair Status**.
	Displays a dialog box for editing the settings. This icon is disabled when the settings cannot be edited. The icon is called the **Edit**.
	Displays a dialog box for checking alert settings and detailed event log information. The icon is called the **Detail**.

3.3.3.5 Icons for Messages

The icons displayed with messages show the severity of those messages. The following table lists and describes the icons for messages.

Table 3.5 Icons for Messages

Icon	Severity	Description
	Error	Indicates that the message describes an error related to the operation that was performed.
	Warning	Indicates that the message shows a warning or confirmation for the operation that was performed or that is to be performed.
	Information	Indicates that the message shows the processing status or result of the operation that was performed.

The severities of messages are ranked in the following decreasing order: Error, Warning, and Information.

3.4 Checking the Status of Copy Pairs

This section describes how to check the status of copy pairs being managed by Replication Monitor.

Replication Monitor enables you to check the overall copy pair status of a host, storage subsystem, and copy group.

Table 3.6 describes different methods for checking the copy pair status.

Table 3.6 Different Methods for Checking the Copy Pair Status

Method for Checking the Copy Pair Status	Purpose	See
Checking the copy pair status of a host	Checking a list of copy pair statuses that affect a specific host	See section 3.4.2
Checking the copy pair status of a storage subsystem	Checking a list of copy pair statuses existing in a specific subsystem	See section 3.4.3
Checking the copy pair status of a copy group	Checking a list of copy groups that affect a specific copy group	See section 3.4.4

3.4.1 Before Checking the Status of a Copy Pair

The two types of information that indicate the status of a copy pair in Replication Monitor are the copy pair status and the copy pair state. For details, see section 3.4

This section describes the points to be noted before you start checking the status of a copy pair.

3.4.1.1 Views used to check the status of copy pairs

To check the copy pair status of a host, or of a copy group used by hosts, use Replication Monitor's Hosts view. For details about the Hosts view, see section 2.2.1.1.

To check the copy pair status of a storage subsystem, use Replication Monitor's Subsystems view. For details about the Subsystems view, see section 2.2.1.2.

To check the copy pair status of a copy group defined by pair management servers, use Replication Monitor's Pair Configurations view. For details about the Pair Configurations view, see section 2.2.1.3.

3.4.1.2 Types of information indicating the status of a copy pair

The three types of information that indicate the status of a copy pair in Replication Monitor are the copy pair status, the copy pair state, and the copy progress. For details, see section 2.3.

3.4.1.3 Copy Pair Status Acquisition Route and Performance

In an open system, the copy pair status is normally acquired from a Replication Monitor agent on the pair management server. If the copy pair status cannot be acquired from the Replication Monitor agent, it is acquired from the Device Manager server. However, this takes more time than acquisition from the Replication Monitor agent.

For copy pairs that have a pair status that needs to be checked frequently, we recommend that you prepare the environment so it satisfies the following conditions:

- The corresponding copy pair is defined in CCI's configuration definition file on the pair management server.
- A Replication Monitor agent has been installed for the pair management server.

3.4.2 Checking the Copy Pair Status of a Host

By viewing the copy pair status of a host, you can obtain the following information:

- For each host, summarized information indicating the copy pair status associated with all volumes being used by the host
- For each volume, summarized information indicating the status of all copy pairs associated with each volume (LUN or DEVN) being used by the host
- Copy pair status, copy pair state, and copy progress of each copy pair for all copy pairs associated with each volume (LUN or DEVN) being used by the host

To check the copy pair status of a host, use Replication Monitor's Hosts view. The following describes how to check the copy pair status of a host and how to use the Hosts view.

3.4.2.1 Procedure for checking copy pair status

The following describes how to check the copy pair status of a host.

To check the copy pair status of a host:

1. In the **Explorer** menu, choose **Resources**, and then **Hosts**.

   A list of hosts is displayed in the navigation area. The numbers shown in the following figure indicate the corresponding steps.

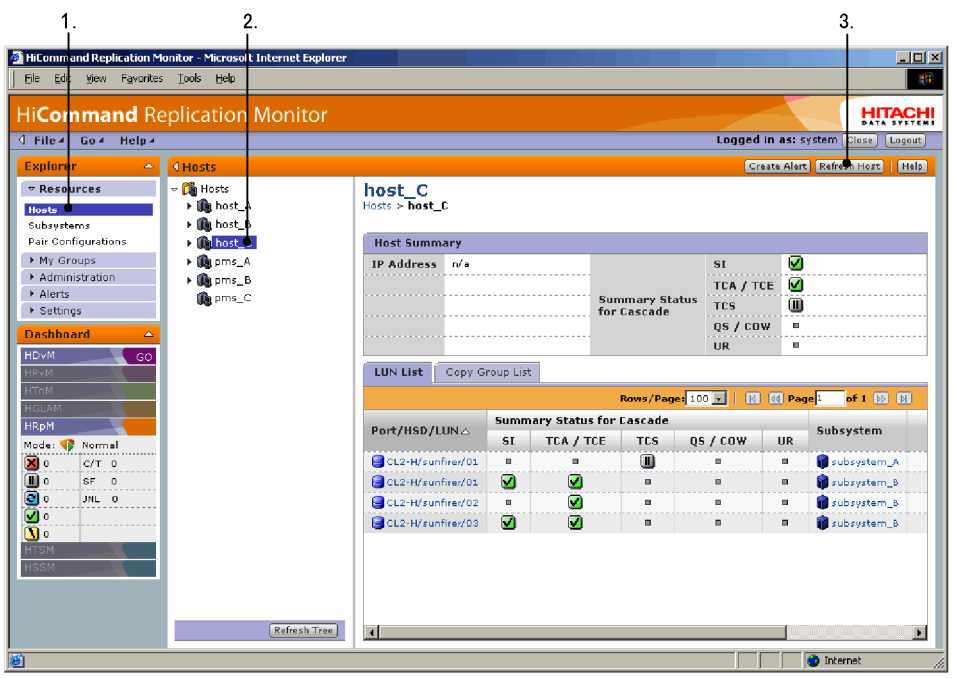


Figure 3.5 Management Target Selection (Copy Pair Status Check for a Host)

2. From the list of hosts, select a host to check its status.

   The application area displays the detailed information about the selected host and a list of volumes (LUNs or DEVNs) used by the host.

3. Click the **Refresh Host** button.

   A dialog box is displayed asking whether to refresh the pair status for all copy pairs used by the host.

   Supplementary explanation:

   > Refreshing of the pair status is not necessary immediately after automatic refreshing or if a similar refresh operation was executed immediately beforehand. Proceed to the explanation of Figure 3.6 or Figure 3.7 in 3.4.2.2.

4. Check the information displayed in the dialog box, select the **Yes. I have confirmed the above information and wish to refresh pair status.** Check box, and then click the **Confirm** button.

   Refreshing of the copy pair status begins. When the copy pair status has been refreshed, a dialog box to that effect is displayed.

5. Click the **Close** button to close the dialog box.

   The copy pair status displayed in the application area has been updated.

3.4.2.2 Using the Hosts view

The following describes the copy pair status that you can check in the application area of the Hosts view.

Copy pair status of the volumes used by a host

From the information displayed in the application area, you can check the copy pair status of the volumes used by a host. Figure 3.6 shows the information displayed in an open system and Figure 3.7 shows the information displayed in a mainframe system.

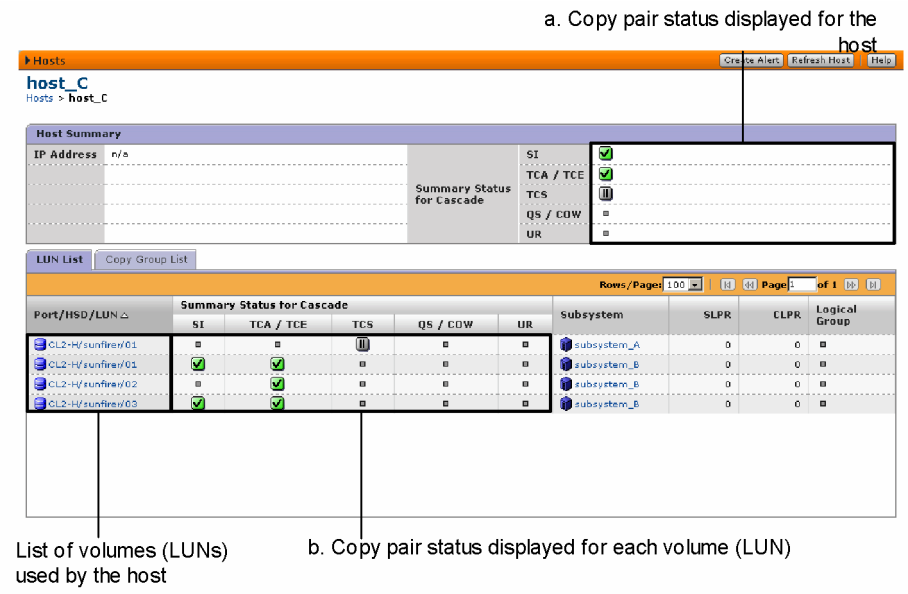


Figure 3.6 Copy Pair Status of the Volumes (LUNs) in Use by a Host (Open System)

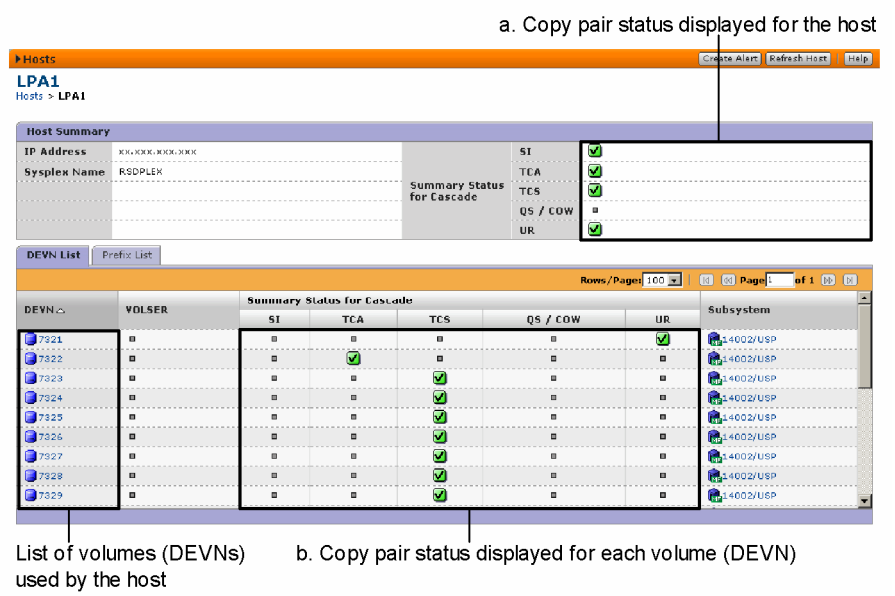


Figure 3.7 Copy Pair Status of the Volumes (DEVNs) in Use by a Host (Mainframe System)

a. Copy pair status displayed for the host

This information is displayed in the **Summary Status for Cascade** column of **Host Summary**. It indicates the summary pair status in the host.

b. Copy pair status displayed for each volume (LUN or DEVN)

This information is displayed in the **Summary Status for Cascade** column in the **LUN List** or **DEVN List** page. It indicates the summary pair status in the copy pairs associated with each volume.

Status of copy pairs composed of a selected volume

By choosing a volume from the list of volumes (LUNs or DEVNs), you can check the status of copy pairs related to the selected volume. Figure 3.8 shows the information displayed in an open system and Figure 3.9 shows the information displayed in a mainframe system.

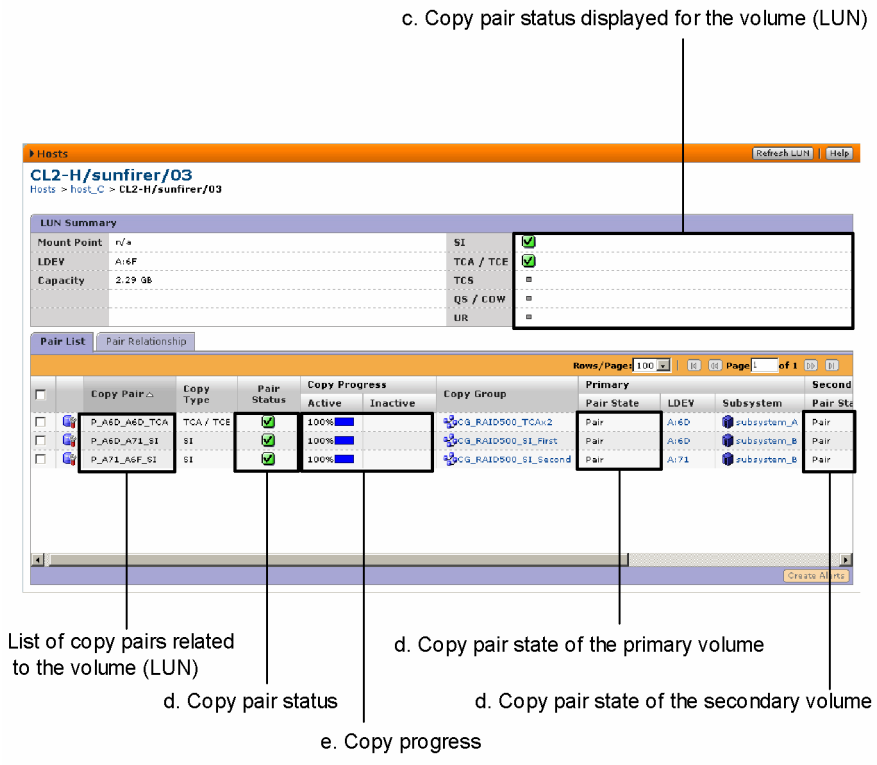


Figure 3.8 Status of Copy Pairs Composed of a Volume (LUN) (Open System)

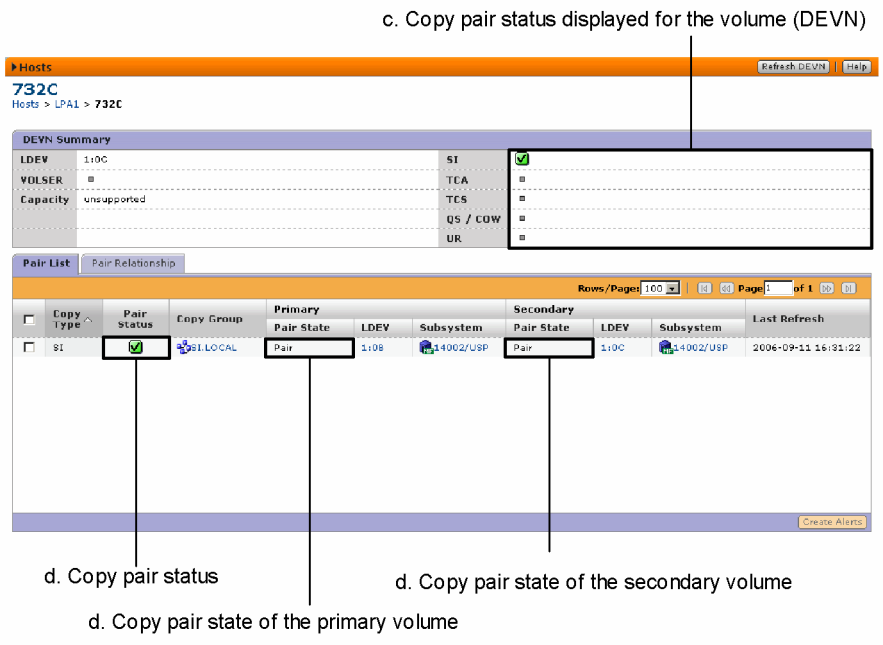


Figure 3.9 Status of Copy Pairs Composed of a Volume (DEVN) (Mainframe System)

c. Copy pair status displayed for the selected volume (LUN or DEVN)

This information is displayed in each copy type column of **LUN Summary** or **DEVN Summary**. It indicates the summary pair status of the copy pairs associated with the selected volume. The information is the same as information displayed in *b* in Figure 3.6 and Figure 3.7.

d. Copy pair status and copy pair state of a copy pair

This information is displayed on the **Pair List** page. It indicates the pair status of each copy pair that is associated with the selected volume.

e. Copy progress

This information is displayed on the **Pair List** page. It indicates the copy progress of each copy pair that is associated with the selected volume.

3.4.3 Checking the Copy Pair Status of a Storage Subsystem

By viewing the copy pair status of a subsystem, you can obtain the following information:

- For each LDEV contained in the subsystem, information summarized by subsystem indicating the status of all copy pairs composed of the LDEV
- For each LDEV contained in the CU (for enterprise-class storage subsystems), information summarized by CU indicating the status of all copy pairs composed of the LDEV
- The copy pair status, copy pair state, and copy progress of each copy pair, for all copy pairs composed of the LDEVs contained in the subsystem

To check the copy pair status of a subsystem, use Replication Monitor's Subsystems view. The following describes how to check the copy pair status of a subsystem and how to use the Subsystems view.

3.4.3.1 Procedure for checking copy pair status

The following describes how to check the copy pair status of a subsystem.

To check the copy pair status of a subsystem:

1. In the **Explorer** menu, choose **Resources**, and then **Subsystems**.

   A list of subsystems is displayed in the navigation area. The numbers shown in the following figure indicate the corresponding steps.

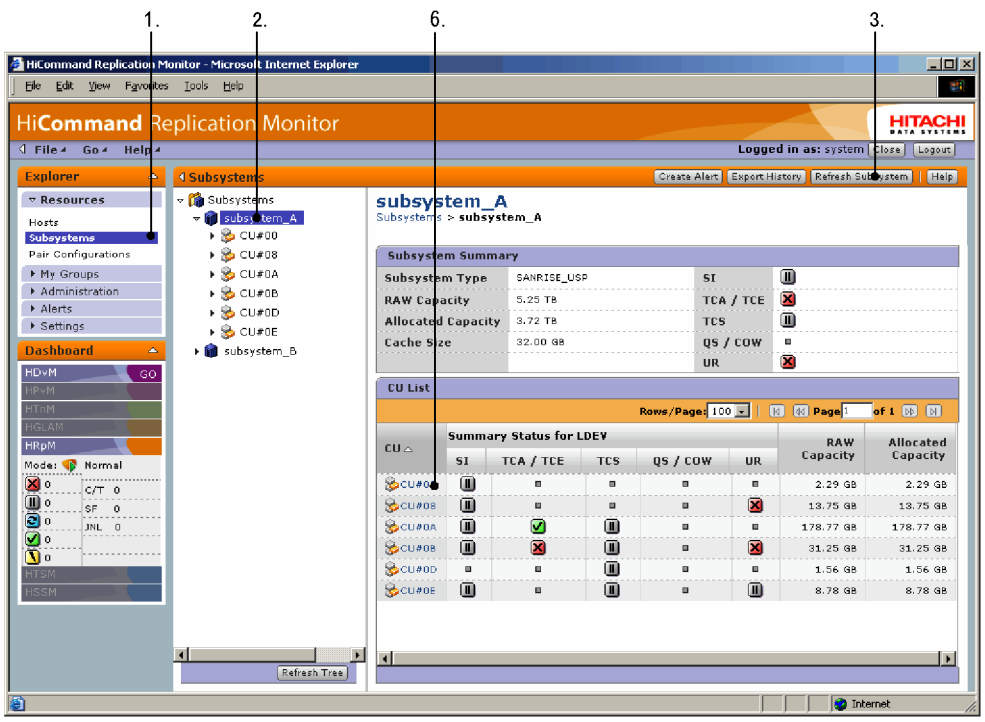


Figure 3.10 Management Target Selection (Copy Pair Status Check for a Storage Subsystem)

2. From the list of subsystems, select a subsystem to check its status.

   For enterprise-class storage subsystems, detailed information about the selected subsystem, and a list of CUs contained in the subsystem, are displayed in the application area.

   For midrange storage subsystems, detailed information about the selected subsystem, and a list of LDEVs contained in the subsystem, are displayed in the application area.

3. Click the **Refresh Subsystem** button.

   A dialog box is displayed asking whether to refresh the pair status for all copy pairs contained in the subsystem.

Supplementary Explanation:

Refreshing of the pair status is not necessary immediately after automatic refreshing or if a similar refresh operation was executed immediately beforehand. Proceed to step 6.

4. Check the information displayed in the dialog box, select the **Yes. I have confirmed the above information and wish to refresh pair status.** check box, and then click the **Confirm** button.

   Refreshing of the copy pair status begins. When the copy pair status has been refreshed, a dialog box to that effect is displayed.

5. Click the **Close** button to close the dialog box.

   The copy pair status displayed in the application area has been updated.

6. For enterprise-class storage subsystems, select a CU from the list to check its status.

   Detailed information about the selected CU, and a list of LDEVs contained in the CU, are displayed in the application area.

3.4.3.2 Using the Subsystems view

The following describes the copy pair status that you can check in the application area of the Subsystems view.

Copy pair status of an LDEV

You can check the copy pair status from the information displayed in the application area. Figure 3.11 and Figure 3.12 show the information displayed in an open system, and Figure 3.13 in a mainframe system.

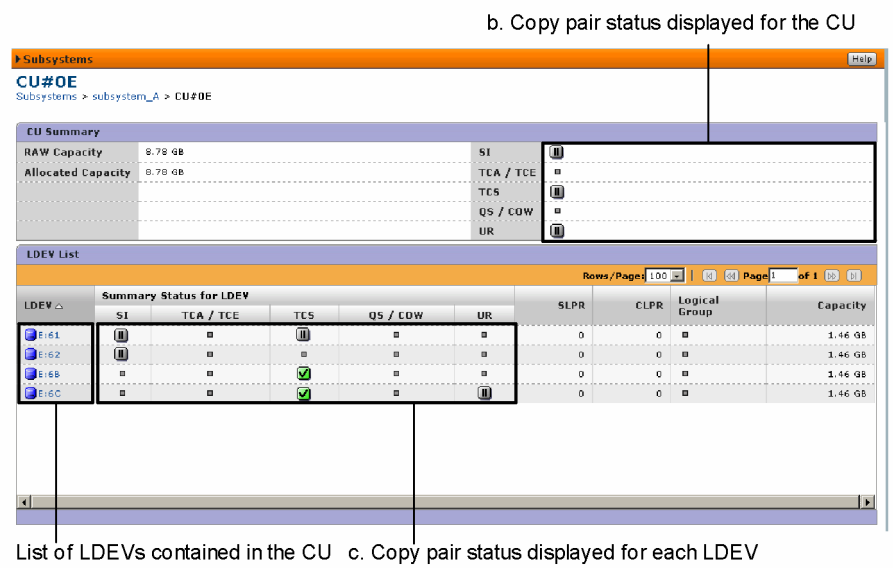


Figure 3.11 Copy Pair Status of an LDEV contained in a CU (Enterprise-class storage)

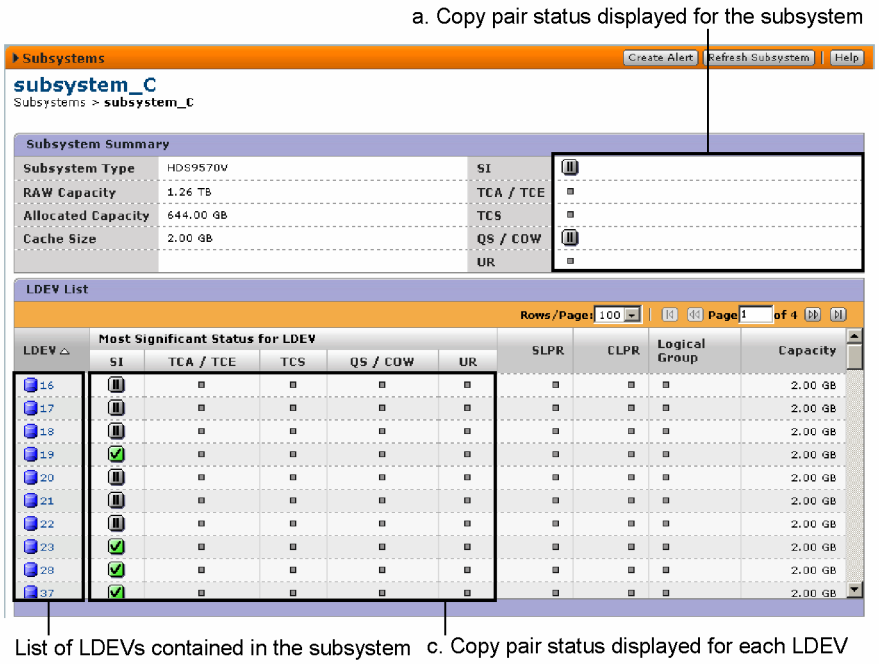


Figure 3.12 Copy Pair Status of an LDEV contained in a Subsystem (Midrange storage)

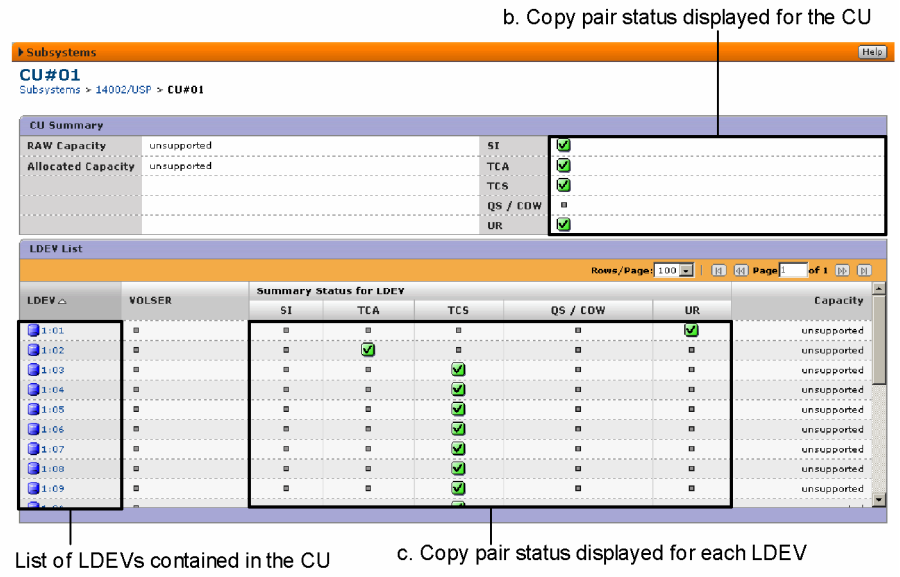


Figure 3.13 Copy Pair Status of an LDEV contained in a CU (Mainframe System)

a. Copy pair status displayed for the subsystem

This information is displayed in each copy type column of **Subsystem Summary**. It indicates the summary pair status in the subsystem.

b. Copy pair status displayed of a CU

This information is displayed in each copy type column of **CU Summary**. It indicates the summary pair status in the copy pairs associated with the CU.

c. Copy pair status displayed of a LDEV

This information is displayed in the **Summary Status for LDEV** column in **LDEV List**. It indicates the summary pair status in the copy pairs associated with each LDEV.

Status of copy pairs composed of a selected LDEV

By choosing an LDEV from the list, you can check the status of copy pairs composed of the LDEV. Figure 3.14 shows the information displayed in an open system and Figure 3.15 shows the information displayed in a mainframe system.

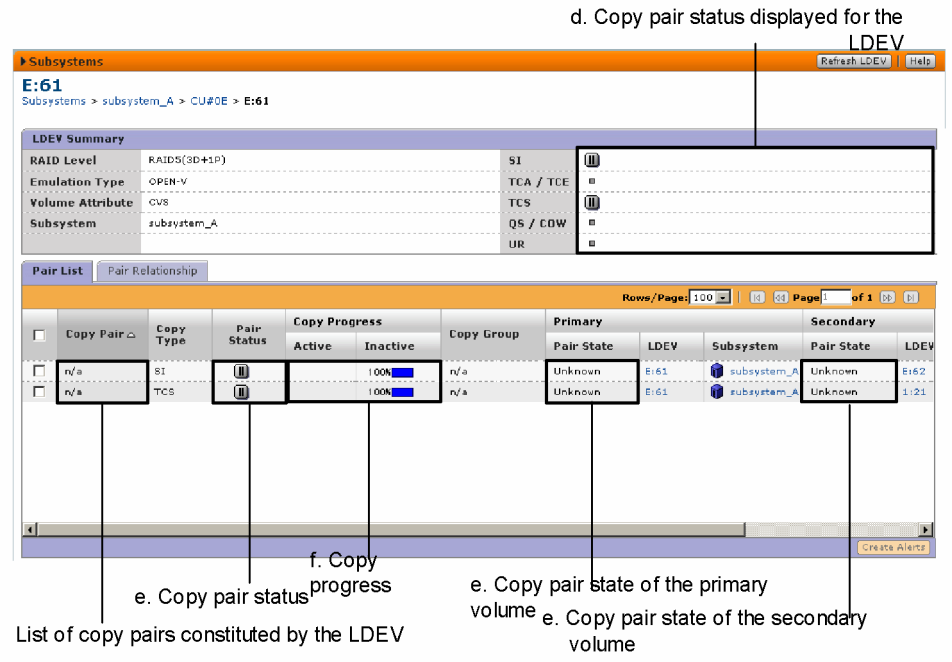


Figure 3.14 Status of Copy Pairs Composed of an LDEV (Open System)

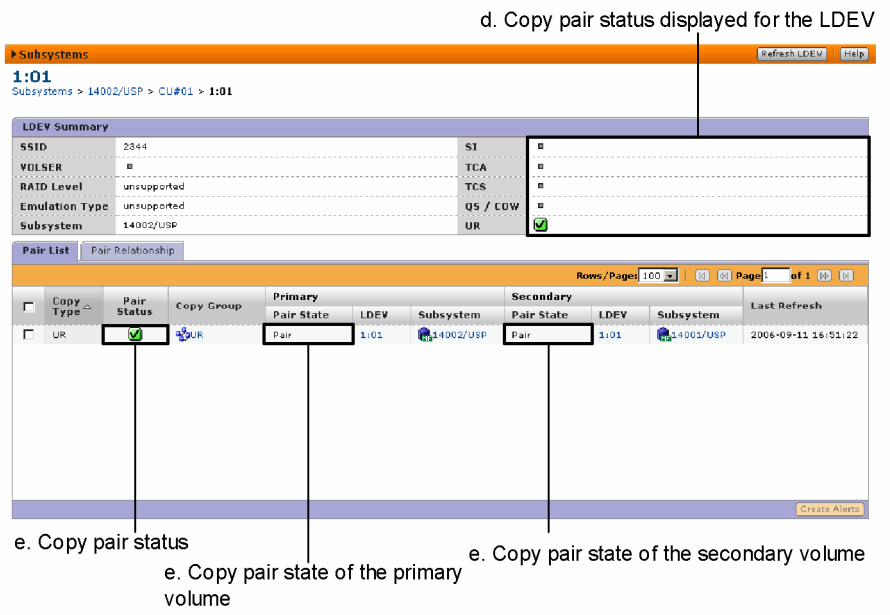


Figure 3.15 Status of Copy Pairs Composed of an LDEV (Mainframe System)

d. Copy pair status displayed for the selected LDEV

This information is displayed in each copy type column of **LDEV Summary**. It indicates the summary pair status of the copy pairs composed of the selected LDEV. The information is the same as information displayed in *c* in Figure 3.11, Figure 3.12, and Figure 3.13

e. Copy pair status and copy pair state by copy pair

This information is displayed on the **Pair List** page. It indicates the pair status of each copy pair composed of the selected LDEV.

f. Copy progress

This information is displayed on the **Pair List** page. It indicates the copy progress of each copy pair composed of the selected LDEV.

3.4.4 Checking the Copy Pair Status of a Copy Group

By viewing the copy pair status of a copy group, you can obtain the following information:

- For each pair management server, summarized information indicating the copy pair status contained in all copy groups defined in the pair management server
- For each CCI configuration definition file or prefix defined in the pair management server, summarized information indicating the status of all copy pairs contained in the CCI configuration definition file or prefix
- Copy pair status, copy pair state, and copy progress of each copy pair for all copy pairs contained in each copy group defined in the pair management server

The following describes how to use Replication Monitor's Pair Configurations view to check and view the pair status of a copy group.

3.4.4.1 Procedure for checking copy pair status of a copy group

The following describes how to check the copy pair status of a copy group.

To check the copy pair status of a copy group:

1. In the **Explorer** menu, choose **Resources**, and then **Pair Configurations**.

   A list of pair management servers is displayed in the navigation area. The numbers shown in the following figure indicate the corresponding steps.

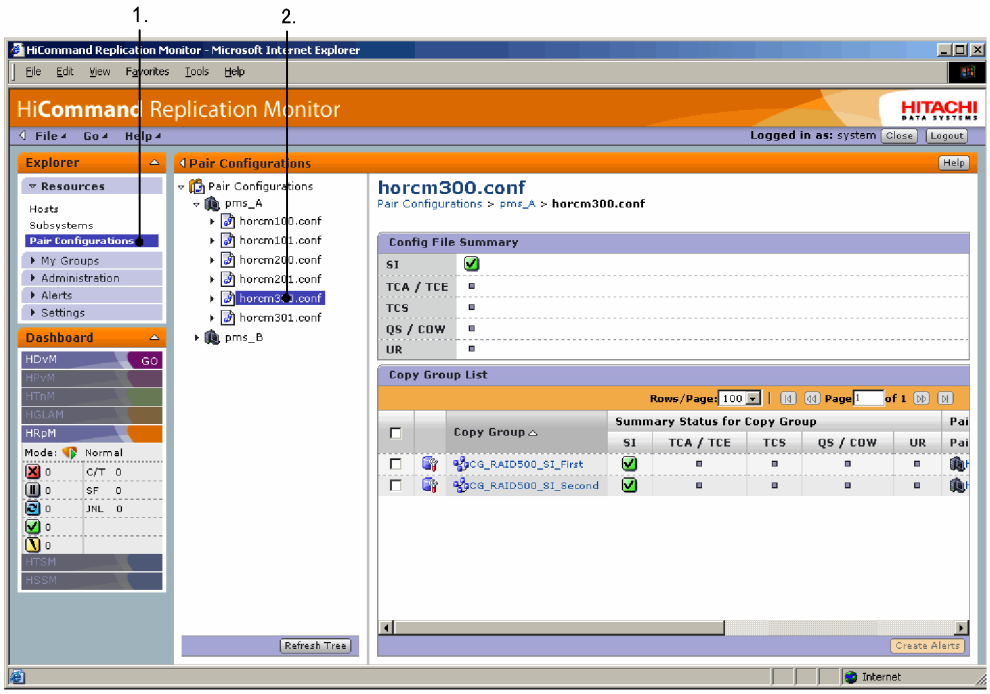


Figure 3.16 Management Target Selection (Copy Pair Status Check for a Copy Group)

2. From the list of pair management servers, select the configuration definition file or prefix that defines the copy group whose status is to be checked.

   A list of copy groups defined in the selected configuration definition file or prefix is displayed in the application area.

   Notes:

   If the target pair management server or copy group is not displayed in the Pair Configurations view for the open system, make the Device Manager agent running on the pair management server recognize the correct configuration definition file.

   If an instance number is specified in `server.agent.rm.exclusion.instance` of the `server.properties` file for the Device Manager agent, information about the configuration definition file for the specified instance number and copy pairs defined by the configuration definition file is not displayed in the Pair Configurations view.

   For details about the `server.properties` file and how to make Device Manager agents recognize configuration definition files, see the *HiCommand Device Manager Agent Installation Guide*.

3.4.4.2 How to view the copy pair status of a copy group

The following describes how to view the pair status of a copy group.

From the information displayed in the application area, you can determine the pair status of a copy group. Figure 3.17 shows the information displayed in an open system and Figure 3.18 shows the information displayed in a mainframe system.

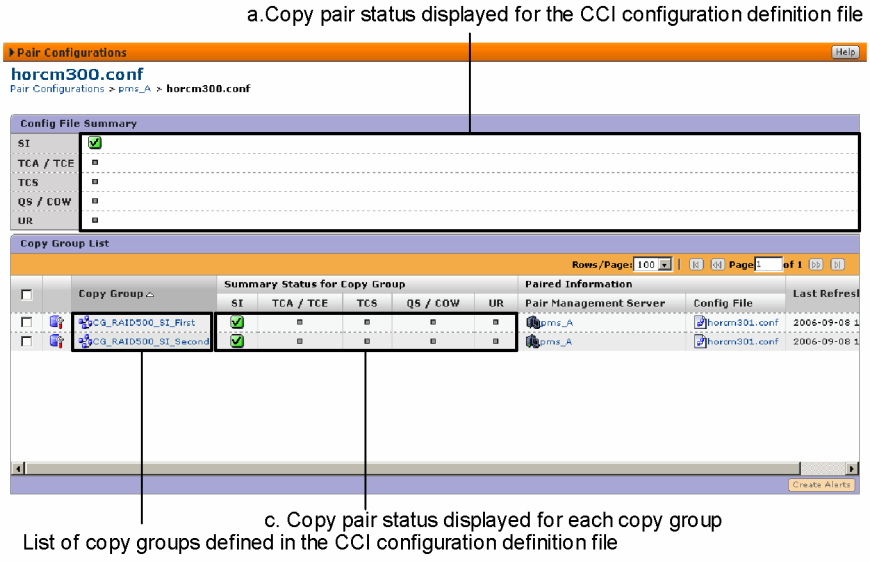


Figure 3.17 Pair Status of a Copy Group Defined in the Configuration Definition File (Open System)

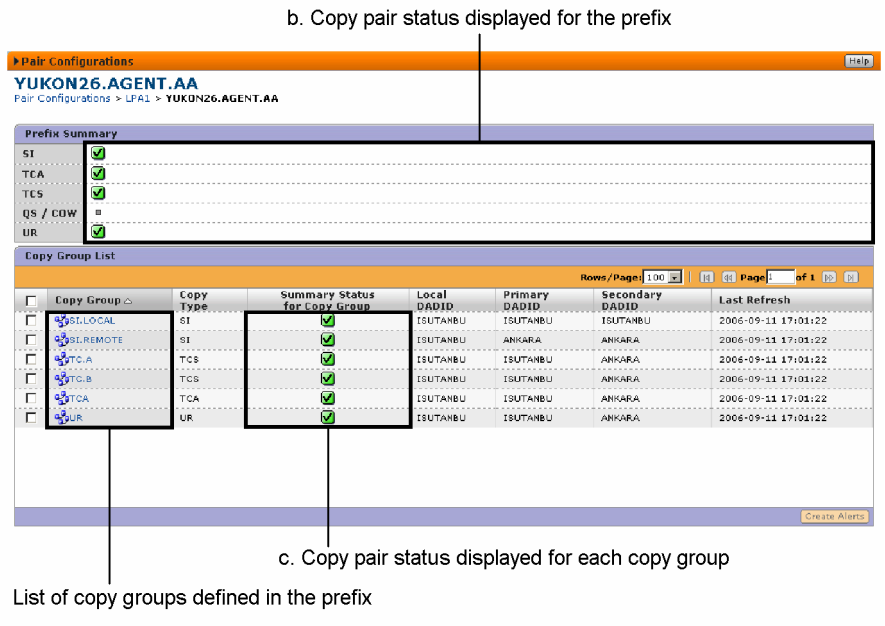


Figure 3.18 Pair Status of a Copy Group Defined in the Prefix (Mainframe System)

a. Copy pair status displayed for the configuration definition file

This information is displayed in each copy type column of **Config File Summary**. It indicates the summary pair status of the copy groups defined in the configuration definition file.

b. Copy pair status displayed for a prefix

This information is displayed in each copy type column of **Prefix Summary**. It indicates the summary pair status of the copy group definition pointed to by the prefix.

c. Copy pair status displayed for a copy group

This information is displayed in the **Summary Status for Copy Group** column in **Copy Group List**. It indicates the summary pair status for the copy pairs in each copy group.

3.4.4.3 Procedure for checking copy pair status

The following describes how to check the status of copy pairs of a copy group.

By choosing a copy group from the list of copy groups, you can check the status of copy pairs in the selected copy group.

To check the status of copy pairs in a copy group:

1. In the application area, from the list of copy groups, select a copy group whose status is to be checked.

   A list of copy pairs in the selected copy group is displayed in the application area.

2. Click the **Refresh Copy Group** button.

   A dialog box is displayed asking whether to refresh the pair status for all copy pairs in the copy group.

   Supplementary explanation:

   Refreshing of the pair status is not necessary immediately after automatic refreshing or if a similar refresh operation was executed immediately beforehand. Proceed to the explanation of Figure 3.19 or Figure 3.20 in 3.4.4.4.

3. Check the information displayed in the dialog box, select the **Yes. I have confirmed the above information and wish to refresh pair status.** check box, and then click the **Confirm** button.

   Refreshing of the copy pair status begins. When the copy pair status has been refreshed, a dialog box to that effect is displayed.

4. Click the **Close** button to close the dialog box.

   The copy pair status displayed in the application area has been updated.

3.4.4.4 How to view the copy pair status

The following describes how to view the pair status of copy pairs in a copy group.

From the information displayed in the application area, you can check the copy pair status. Figure 3.19 shows the information displayed in an open system and Figure 3.20 shows the information displayed in a mainframe system.

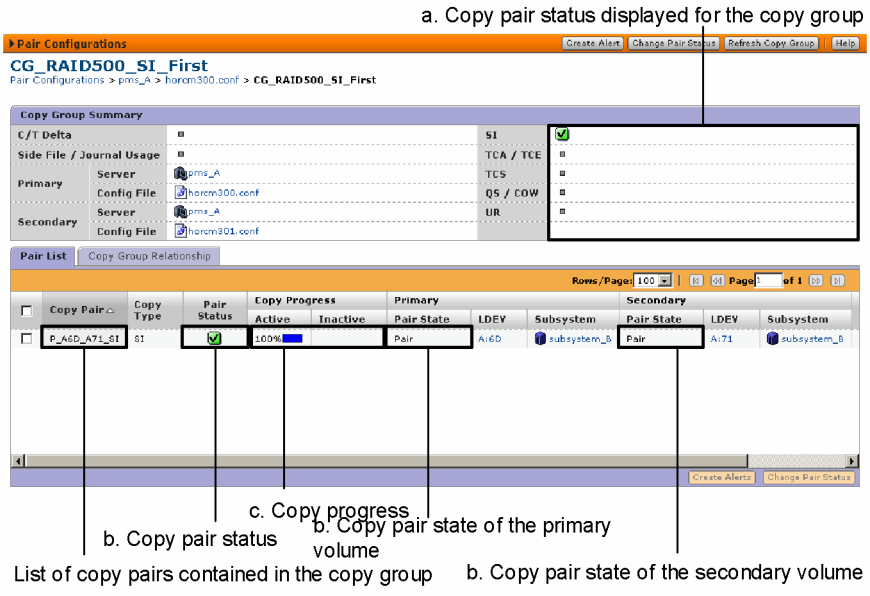


Figure 3.19 Status of Copy Pairs in a Copy Group (Open System)

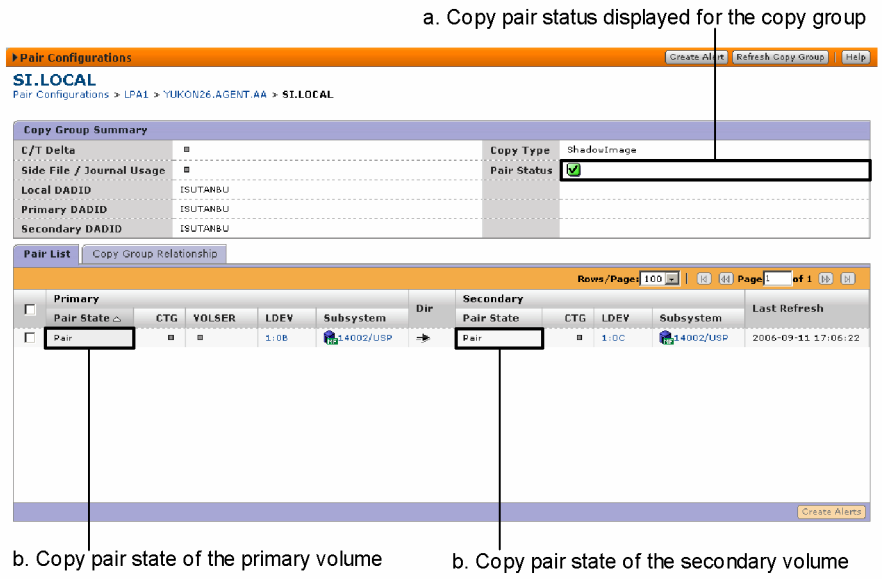


Figure 3.20 Status of Copy Pairs in a Copy Group (Mainframe System)

a. Copy pair status displayed for a copy group

In an open system, this information is displayed in each copy type column of **Copy Group Summary**. In a mainframe system, it is displayed in the **Pair Status** column of **Copy Group Summary**. It indicates the summary pair status of the copy pairs in the selected copy group. It is the same information as *c* in Figure 3.17 and Figure 3.18.

b. Copy pair status and copy pair state by copy pair

This information is displayed on the **Pair List** page. It indicates the pair status of each copy pair in the selected copy group.

c. Copy Progress

This information is displayed on the **Pair List** page. It indicates the copy progress of each copy pair in the selected copy group.

Supplementary explanation:

You can also display the copy group status only for the copy groups that are used by a selected host. To display the status of only those copy groups used by a selected host:

- For an open system

  Choose the desired host from the Hosts view to display a list of volumes (LUNs) in the application area, and then choose the **Copy Group List** tab.

- For a mainframe system

  Choose the desired host from the Hosts view to display a list of volumes (DEVNs) in the application area, and then choose the **Prefix List** tab. When a list of prefixes used by the host is displayed, select the prefix that contains the copy group whose status is to be checked.

3.5 Checking the Configuration of a Copy Pair

This section describes how to check the configuration of copy pairs that are managed by Replication Monitor.

Replication Monitor enables you to view the configuration of copy pairs defined on the pair management server in a tree format. It also enables you to check the copy pair configuration based on a specific volume and a copy group configuration based on a specific copy group.

Table 3.7 lists and describes different methods for checking the configuration of copy pairs.

Table 3.7 Different Methods for Checking the Configuration of Copy Pairs

Method for Checking the Configuration of Copy Pairs	Purpose	See
Checking the definition of copy pair configuration	Viewing the configuration of copy pairs defined on the pair management server in a tree format	See section 3.5.2
Checking a copy pair configuration based on a specific volume	Finding the target copy pair in terms of hosts and subsystems and then viewing the related copy pair configuration	See section 3.5.3
Checking a copy group configuration based on a specific copy group	Finding the target copy group in terms of hosts and copy pair configuration definition and then viewing the related copy group configuration	See section 3.5.4

3.5.1 Before Checking the Configuration of a Copy Pair

If you have created a copy pair by using Device Manager or you have changed the configuration of a copy pair, you must refresh the configuration information managed by Replication Monitor before checking the copy pair configuration. For details about how to refresh configuration information, see section 3.10

- To check the definition of a copy pair configuration, use Replication Monitor's Pair Configurations view. For details about the Pair Configurations view, see section 2.2.1.3.
- To check the configuration of a copy pair based on the volume or copy group being used by the host, use Replication Monitor's Hosts view. For details about the Hosts view, see section 2.2.1.1.
- To check the configuration of a copy pair based on the volume being used by the subsystem, use Replication Monitor's Subsystems view. For details about the Subsystems view, see section 2.2.1.2.

Notes:

If the target pair management server or copy group is not displayed in the Pair Configurations view for the open system, make the Device Manager agent running on the pair management server recognize the correct configuration definition file.

If an instance number is specified in `server.agent.rm.exclusion.instance` of the `server.properties` file for the Device Manager agent, information about the configuration definition file for the specified instance number and copy pairs defined by the configuration definition file is not displayed in the Pair Configurations view.

For details about the `server.properties` file and how to make Device Manager agents recognize configuration definition files, see the *HiCommand Device Manager Agent Installation Guide*.

3.5.2 Checking the Definition of a Copy Pair Configuration

With Replication Monitor, you can use the Pair Configurations view to check the contents of CCI's configuration definition file and Business Continuity Manager's copy group definition file, which are stored at the pair management server. The following describes how to check the definition of a copy pair configuration.

To check the definition of a copy pair configuration:

1. In the **Explorer** menu, choose **Resources**, and then **Pair Configurations**.

   A list of pair management servers is displayed in the navigation area. The numbers shown in Figure 3.21 indicate the corresponding steps.

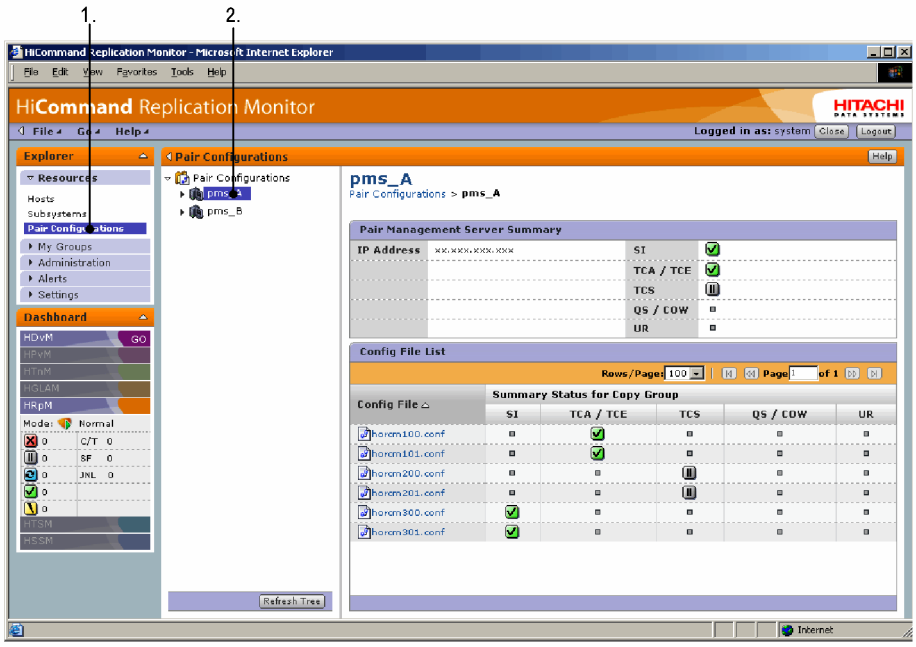


Figure 3.21 Management Target Selection (Check a Copy Pair Configuration Definition)

2. From the list of pair management servers, select a pair management server for which you want to check the definition of a copy pair configuration, and expand the tree.

   From the tree in the navigation area, you can check the definition of the copy pair configuration. Figure 3.22 shows the information displayed in an open system and Figure 3.23 shows the information displayed in a mainframe system.

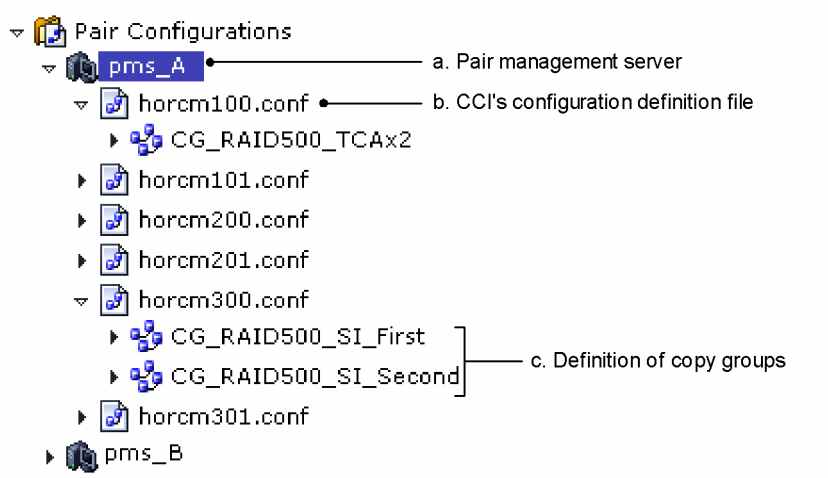


Figure 3.22 Definition of Copy Pair Configuration (Open System)

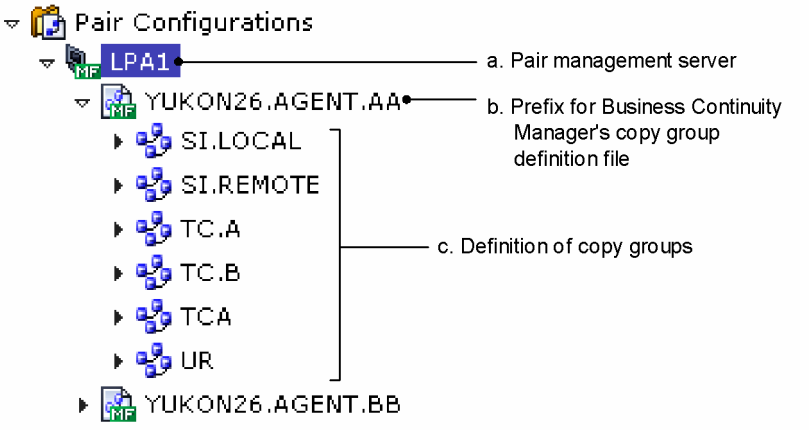


Figure 3.23 Definition of Copy Pair Configuration (Mainframe System)

a. Pair management server

Displays the pair management server.

b. File (prefix) defining the copy pair configuration

Displays the file (prefix) defining the copy pair configuration for each pair management server.

In an open system, CCI's configuration definition file is displayed.

In a mainframe system, Business Continuity Manager's copy group definition file prefix is displayed.

c. Definition of copy groups

Displays a list of defined copy groups for each file that defines the copy pair configuration.

When you choose a copy group in the navigation area, the definition of the copy pairs in the copy group is displayed in the application area. This enables you to determine the correspondence between copy group and copy pair.

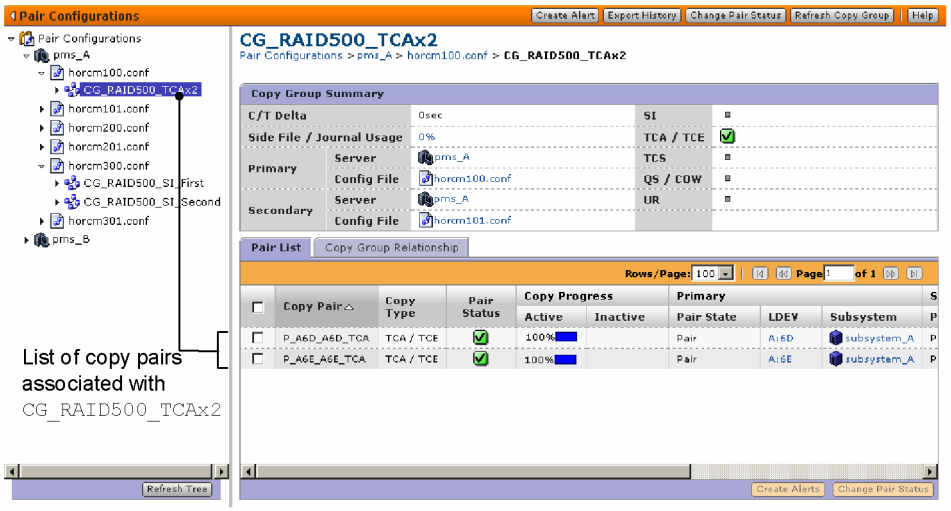


Figure 3.24 Checking a Correspondence between a Copy Group and Copy Pair (Open System)

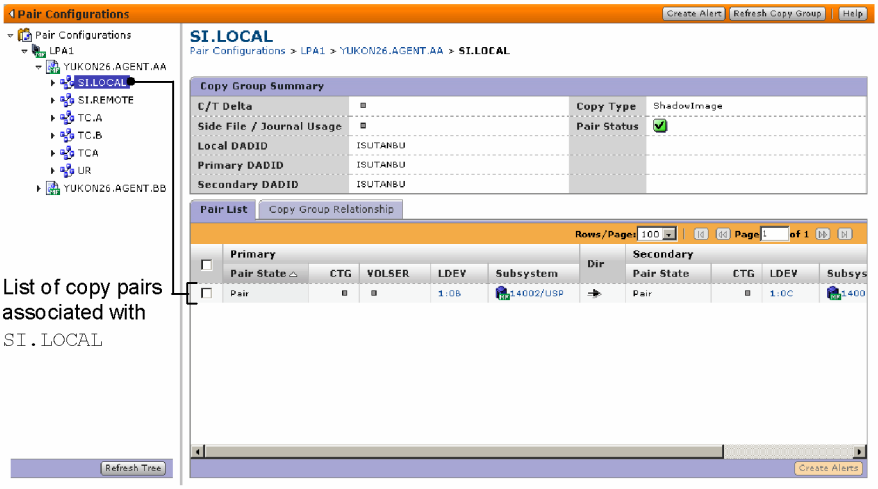


Figure 3.25 Checking a Correspondence between a Copy Group and Copy Pair (Mainframe System)

3.5.3 Checking a Copy Pair Configuration Based on a Specific Volume

Replication Monitor enables you to check the configuration of related copy pairs based on a volume being used by the host or a volume contained in the storage subsystem (LDEV). This section describes how to check the configuration of copy pairs on the basis of a volume being used by the host.

3.5.3.1 Displaying a Copy Pair Configuration

To display the configuration of copy pair on the basis of a volume being used by the host:

1. In the **Explorer** menu, choose **Resources**, and then **Hosts**.

A list of hosts is displayed in the navigation area. The numbers shown in the following figure indicate the corresponding steps.

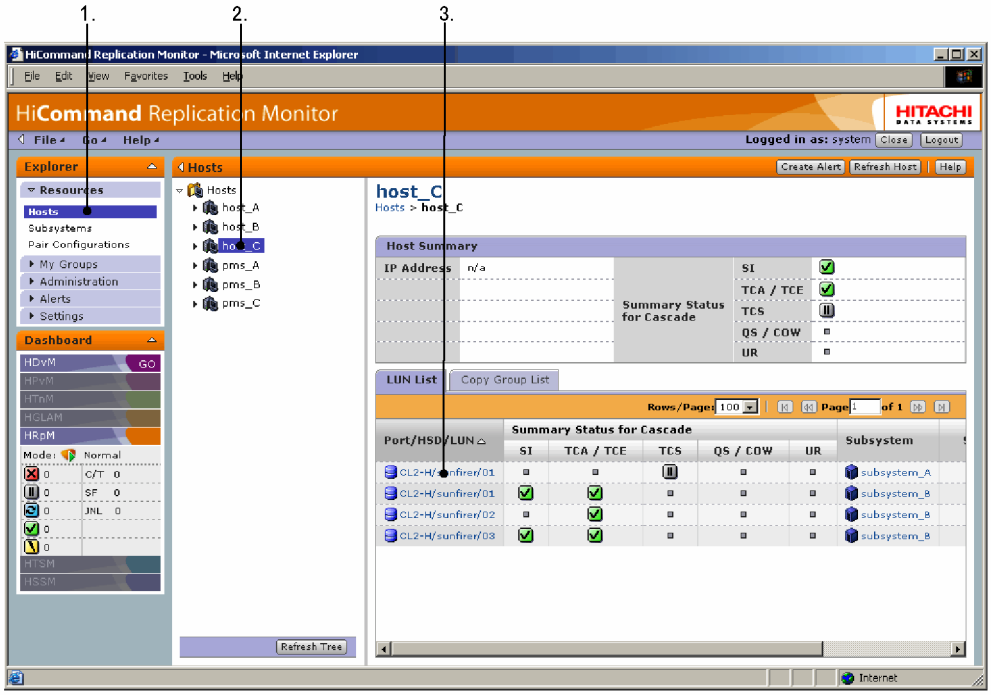


Figure 3.26 Management Target Selection (Check a Copy Pair Configuration Based on a Specific Volume)

2. From the list of hosts, select a host that is using the volume whose configuration is to be checked.

   A list of volumes being used by the host (LUNs or DEVNs) is displayed in the application area.

3. From the list of volumes being used by the host (LUNs or DEVNs), select a volume whose configuration is to be checked.

   Detailed information about the chosen volume (LUN or DEVN) is displayed in the application area.

4. Choose the **Pair Relationship** tab.

   The **Pair Relationship** page displays the copy pairs associated with the chosen volume (LUN or DEVN) and the configuration of copy pairs that are in the cascade format. Figure 3.27 shows the information displayed in an open system and Figure 3.28 shows the information displayed in a mainframe system.

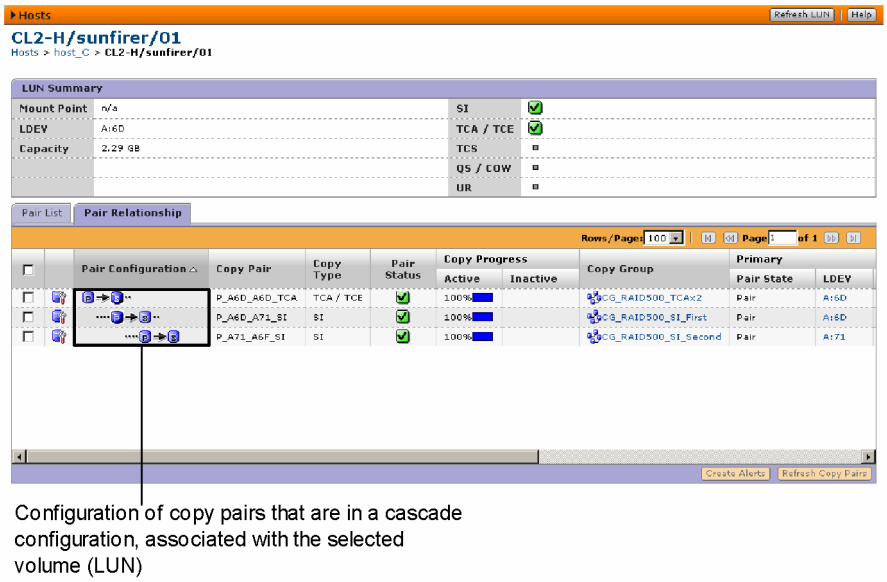


Figure 3.27 Copy Pair Configuration Based on a Specific Volume (Open System)

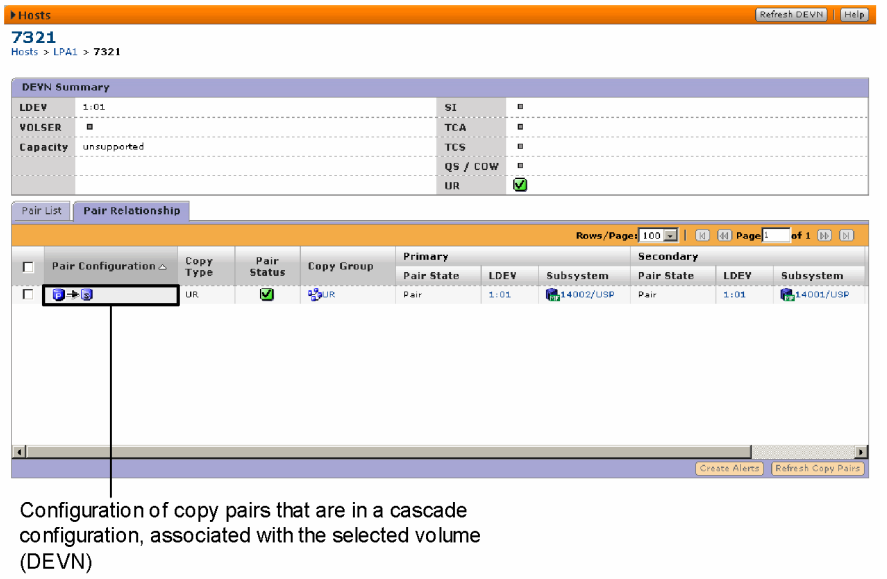


Figure 3.28 Copy Pair Configuration Based on a Specific Volume (Mainframe System)

Supplementary explanation:

For an LDEV in the subsystem, you can also check the copy pair configuration based on the LDEV. Choose a copy pair from the Subsystems view to display a list of copy pairs composed of the LDEV in the application area and then choose the **Pair Relationship** tab.

For details about how to display a list of copy pairs that are composed of an LDEV, see section 3.4.3.

3.5.3.2 Understanding Copy Pair Display Notations

Copy pair display location

The horizontal location of each copy pair is adjusted to provide a clear image of the secondary-primary volume linkage, which is located in the middle of a cascade.

Icons indicating the copy status and direction

The icons indicating the copy status and direction (right-pointing arrow, left-pointing arrow, and a line) depend on whether there is data copying between volumes and its direction, as described below:

- When the icon is a right-pointing arrow, the primary and secondary volumes are synchronized or copy processing is underway from the primary volume to the secondary volume.
- When the icon is a left-pointing arrow, copy processing is underway from the secondary volume to the primary volume.
- When the icon is a line, the copy pair is in a status other than the above.

The icon indicating the copy status and direction corresponds to the copy pair state. The following table shows the correspondence between the icon indicating the copy status and direction, and the pair status.

Table 3.8 Correspondence Between the Copy Status and Pair Status Icons

Icon Indicating Copy Status and Direction	Copy Pair State	Copy Pair Status	
		Icon	Copy Pair Status
→	Copying		copying
	Pair		sync
	Pair (Full)		
←	Copying (Reverse)		copying
—	Invalid		error
	Suspended		
	Suspended (ER)		
	Suspended (CU)		
	Suspended (HOLDER)		
	Error in LUSE		
	Split (Full)		
	Split (NODELTA)		
	Split (SW)		suspend
	Split (SP)		
	Split (SUSPOP)		
	Split (HOLD)		
	Split		
	Split (CHKJNL)		copying
	Split (HOLDTRNS)		
	Trans		
	Suspending		
	Deleting		
	Simplex		simplex
	Unknown		unknown

Notes:

If the information in the definition file does not match the actual copy pair, the right- and left-pointing arrow icons are displayed in reverse direction.

3.5.4 Checking Copy Group Configuration Based on a Specific Copy Group

Replication Monitor enables you to check the configuration of related copy groups on the basis of a copy group defined at the pair management server or a copy group associated with a volume being used by the host. This section describes how to check the configuration of a copy group defined at the pair management server.

3.5.4.1 Displaying Copy Group Configuration

To display the configuration of a copy group defined at the pair management server:

1. In the **Explorer** menu, choose **Resources**, and then **Pair Configurations**.

   A list of pair management servers is displayed in the navigation area. The numbers shown in Figure 3.29 indicate the corresponding steps.

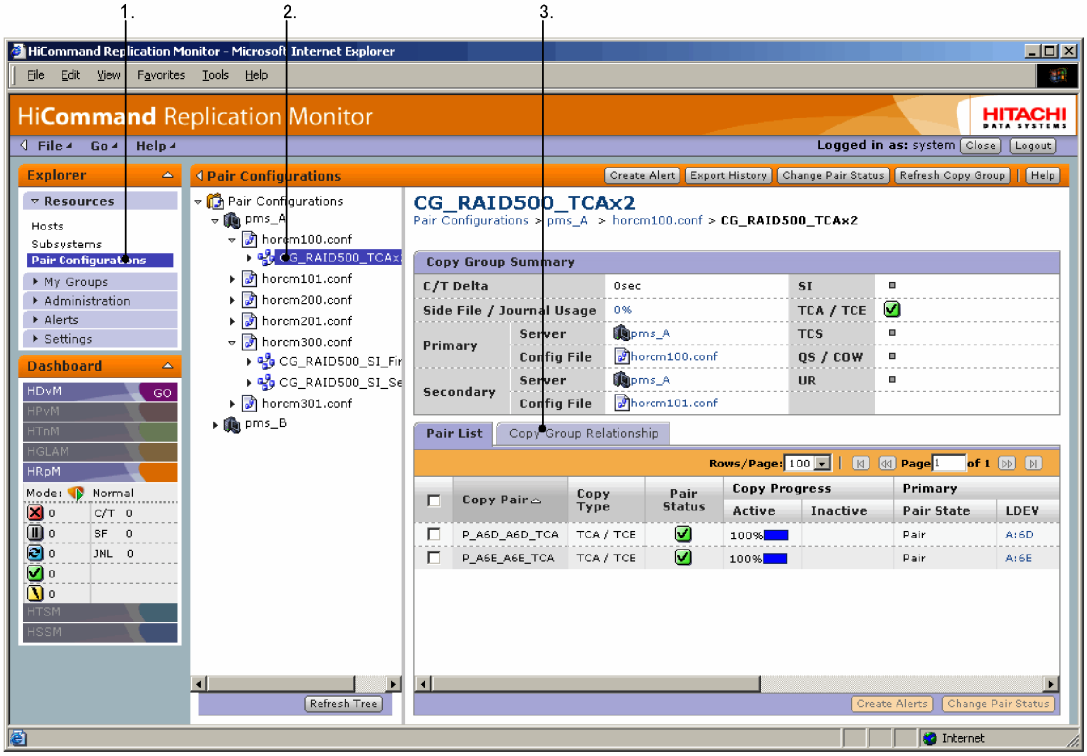


Figure 3.29 Management Target Selection (Check a Copy Group Configuration Based on a Specific Copy Group)

2. From the list of pair management servers, select a copy group whose configuration is to be checked.

   A list of copy pairs in the selected copy group is displayed in the application area.

3. Choose the **Copy Group Relationship** tab.

The **Copy Group Relationship** page displays the configuration of the chosen copy group and the copy groups that are in the cascade format. Figure 3.30 shows the information displayed in an open system and Figure 3.31 shows the information displayed in a mainframe system.

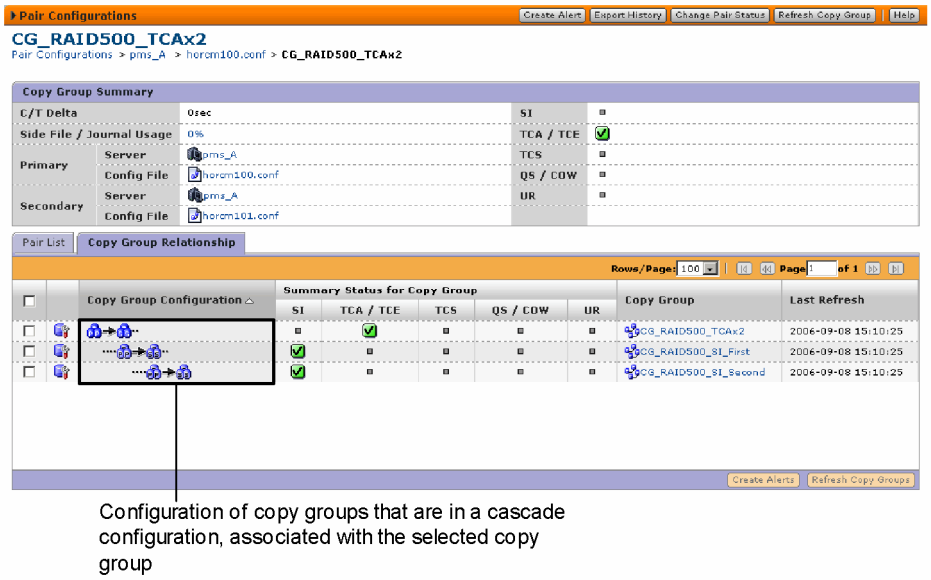


Figure 3.30 Copy Group Configuration Based on a Specific Copy Group (Open System)

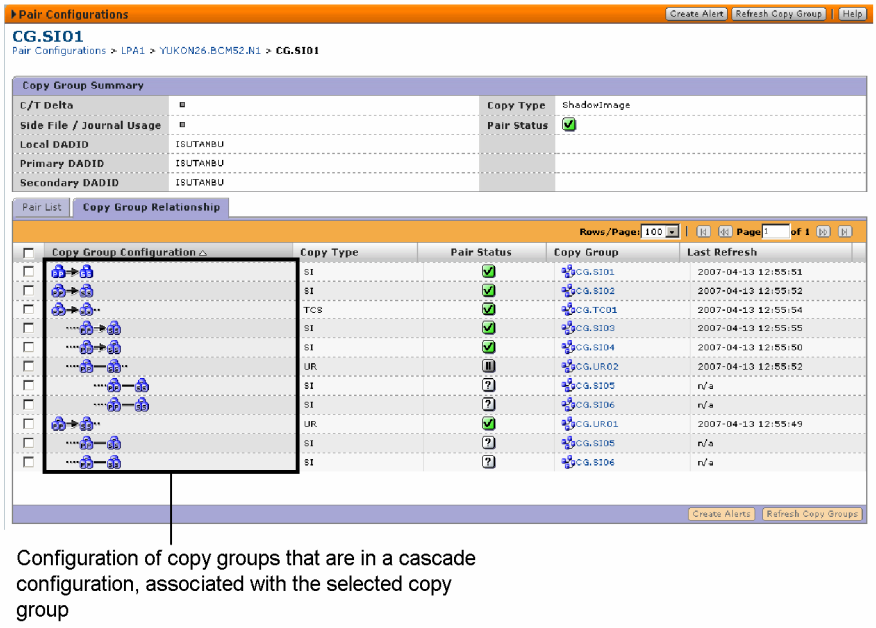


Figure 3.31 Copy Group Configuration Based on a Specific Copy Group (Mainframe System)

Supplementary explanation:

You can also display the copy group configuration from the Hosts view. To display the configuration, choose a copy group from the Hosts view to display detailed information about the copy group in the application area, and then choose the **Copy Group Relationship** tab.

3.5.4.2 Understanding Copy Group Display Notations

Copy group display location

The horizontal location of each icon indicating a copy group is adjusted to provide a clear image of relationship between copy groups.

Icons indicating the copy status and direction

The icons indicating the copy status and direction (right-pointing arrow, left-pointing arrow, and a line) summarizes whether there is data copying between volumes and its direction for each copy group, as described below.

- When the icon is a right-pointing arrow, all copy pairs in the copy group are under copy processing from the primary volume to the secondary volume.
- When the icon is a left-pointing arrow, all copy pairs in the copy group are under copy processing from the secondary volume to the primary volume.
- When the icon is a line, none of the copy pairs in the copy group is under copy processing between the primary and secondary volumes.

The shape of the icon indicating the copy status and direction correspond to the copy pair status summarized for each copy group. The following table shows the correspondence between the icon indicating the copy status and direction and the pair status.

Table 3.9 Correspondence Between the Copy Status and Pair Status Icons (for Copy Groups)

Shape of Icon indicating Copy Status and Direction	Copy Pair Status	
	Icon	Copy Pair Status
		copying
		sync
		copying
		error
		suspend
		copying
		simplex
		unknown

Notes:

If the information in the definition file does not match the actual copy pair, the right-pointing arrow icon is displayed as a left-pointing arrow.

3.5.4.3 Copy group configurations whose information cannot be displayed

Copy group information cannot be displayed for a complicated configuration (such as a copy group that contains two primary volumes). The following are specific examples of such configurations:

- Two copy group definitions are specified for the same copy group (a copy group is defined as both a primary volume and a secondary volume):
  - The figure below shows an example of defining a copy group as both a primary volume and a secondary volume.
  - In this example, in configuration definition file A, Copy Group_A is defined as a primary volume, and Copy Group_B is defined as a secondary volume. In configuration definition file B, Copy Group_B is defined as a primary volume, and Copy Group_A is defined as a secondary volume.

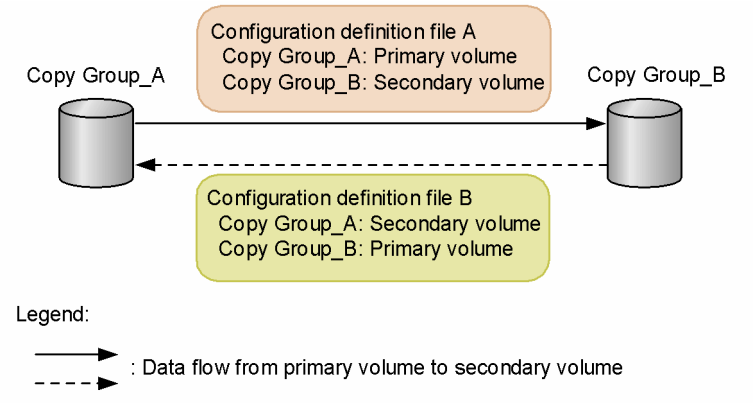


Figure 3.32 Example of Defining a Copy Group as Both a Primary Volume and a Secondary Volume

- In a cascaded configuration of a primary volume, primary-secondary volume, and secondary volume, the primary volume and secondary volume are paired in the same copy group (two pairs are defined for the same copy group).
  - The following figure shows an example of defining two pairs for the same copy group in a cascaded configuration:

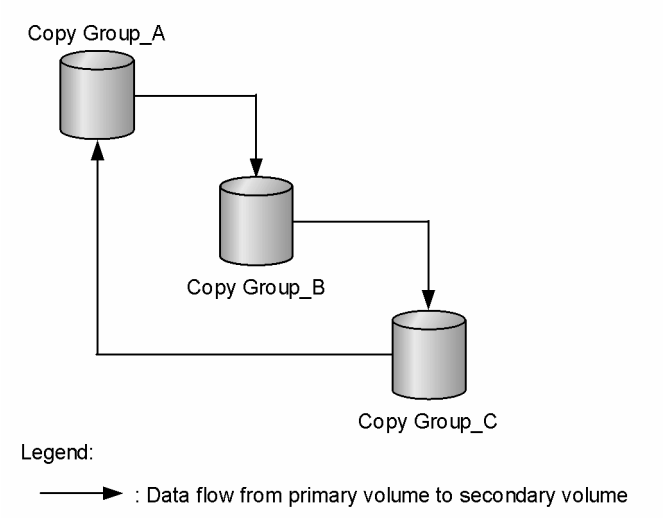


Figure 3.33 Example of Defining Two Pairs for the Same Copy Group in a Cascaded Configuration

If copy group information cannot be displayed, one of the following is displayed:

`No Object`

Displayed if the copy group defined by the configuration definition file does not exist.

`Replication Monitor cannot display the pair relationships of this copy group.`

Displayed if the configuration is too complicated to be displayed in Replication Monitor.

3.6 Using Alerts to Handle Errors

If alert settings have been created and the target that is being monitored is placed in the specified status, Replication Monitor automatically sends the copy pair status or performance information via email or SNMP trap. This section describes the procedures from creating alert settings, to handling errors after an email or a SNMP trap notification is received.

Figure 3.34 shows the flow of the procedure for handling errors by using alerts:

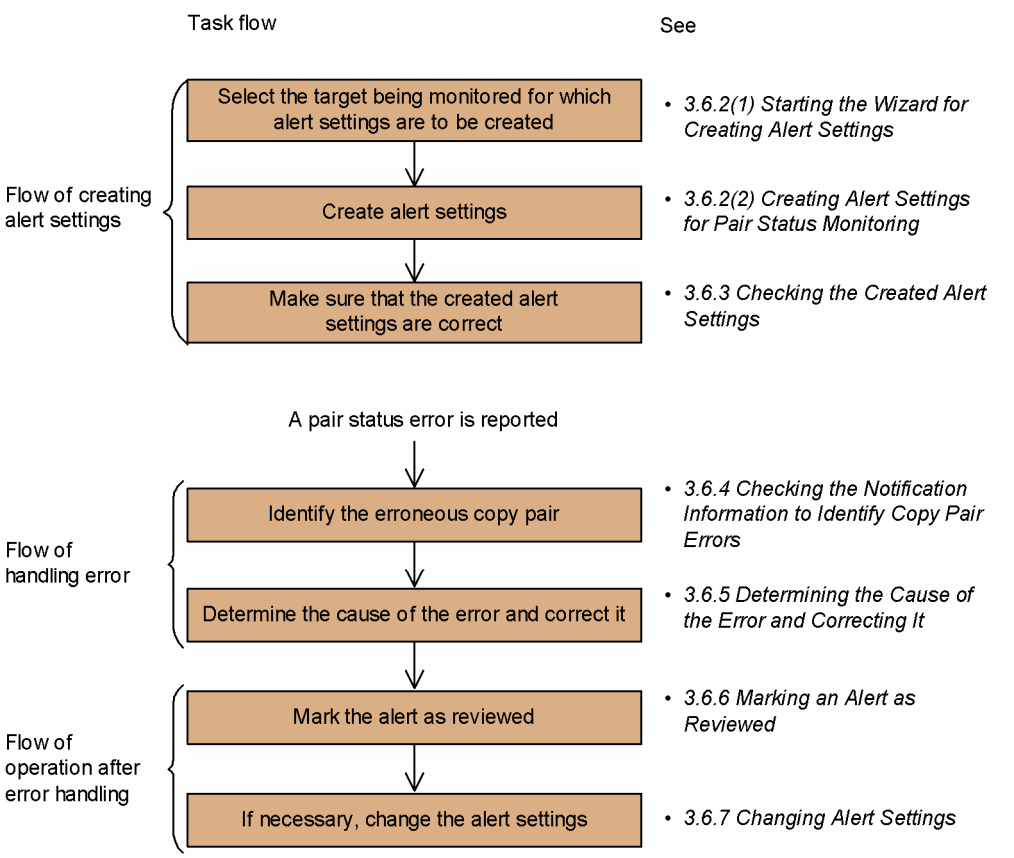


Figure 3.34 Flow of the Procedure for Handling Errors by Using Alerts

3.6.1 Before Using Alerts

When creating alert settings, you choose items, such as the target to be monitored, the pair status to be monitored, and the notification method. You can create a maximum of 1,000 alert settings. If you set multiple targets for a single alert, the total number of the targets specified in alerts must be no greater than 1,000.

Once created, alert settings can be saved as a template. You can save a maximum of 10 templates. You can use any name for the templates.

3.6.1.1 Monitored Targets

The target for which an alert has been set is called the **monitored target**. The following are the monitored targets for Replication Monitor:

- Hosts
- Subsystems
- Copy groups
- Copy pairs

When monitoring the copy pair status by using Replication Monitor, you can select the monitored target from a host, subsystem, copy group, or copy pair. When monitoring performance information, you can select a copy group as the monitored target.

3.6.1.2 Monitored Pair Status

Replication Monitor can monitor five pair statuses: `error`, `suspend`, `copying`, `sync`, and `simplex`. To use one alert setting to monitor more than one pair status, you must set multiple monitored pair statuses. For example, if only `suspend` is set as the monitored pair status, there is no alert notification if the copy pair status of a monitored target changes to `error`. This is because Replication Monitor does not treat the specified monitored pair status (`suspend`) as being satisfied. To receive an alert notification when the monitored target is placed in either `suspend` or `error` status, you must set `suspend` and `error` as the monitored pair statuses.

While the copy pair status is being monitored, if an alert is set for a host, subsystem, or copy group, and any of the copy pairs belonging to the monitored host, subsystem, or copy group satisfies the monitoring conditions, an alert is sent.

3.6.1.3 Performance Monitoring

Replication Monitor monitors performance information related to the sidefile usage rate, journal volume usage rate, and write delay time (C/T delta). The performance information for the monitored targets can be monitored based on the thresholds set by the user beforehand.

To monitor the sidefile usage rate, you can set the thresholds for the sidefile usage rate as a percentage of the primary and secondary volumes when an open system is used (When a mainframe system is used, you can set the thresholds only for the sidefile usage of the primary volume). To monitor the journal volume usage rate, you can set the thresholds for the data usage rate as a percentage of the journal volumes in the primary and secondary volumes when an open system is used (When a mainframe system is used, you can also set the thresholds for the meta data). To monitor the C/T delta, you can set the threshold for the C/T delta value in seconds. An alert occurs if the performance information exceeds the thresholds.

When monitoring the performance information, only copy groups can be specified as targets to be monitored.

3.6.1.4 Notification Methods

For the alert notification method, you can choose emails or SNMP traps. If you choose the email notification method, you can use SMTP authentication.

If you set Replication Monitor to use SMTP authentication for email notification, but the mail server you are using does not support SMTP authentication, Replication Monitor sends emails without using SMTP authentication. If you use the email notification method, check the specifications of the mail server you are using before creating the alert settings.

To use SNMP traps, load the MIB definition file into the software that will receive the traps. For details about the MIB definition file, see section 3.6.9.

3.6.1.5 Alert Management for Each User

You can choose **Alerts** from the **Explorer** menu to view alerts that are set or reported. Alert settings specified by other users, or alerts reported to other users are also displayed, because this version of Replication Monitor does not provide the functionality of managing alerts for individual users. When you change alert settings, make sure that those alerts are the ones you are managing.

3.6.2 Creating Alert Settings Required for Notification

To create alert settings, select the monitored target in the application area, and then start the wizard.

Alert settings can be set for pair status monitoring and for performance monitoring. This section describes how to set pair status monitoring for a host on an open system (host name: `host_A`), and performance monitoring for a copy group (copy group name: `copygroup_A`).

3.6.2.1 Starting the Wizard for Creating Alert Settings

There are two methods:

- Starting the wizard while information about a specific monitored target is displayed in the application area
- Starting the wizard by selecting a monitored target from the list of monitored targets displayed in the application area

Each method is explained below.

Starting the Wizard While Information About a Specific Monitored Target Is Displayed in the Application Area

To start the wizard for creating alert settings:

1. In the **Explorer** menu, choose **Resource**, and then **Hosts**.

   A list of hosts is displayed in the navigation area.

2. From the list of hosts, select the host for which you want to create alert settings (host name: `host_A`).

   Information about the selected host is displayed in the application area.

3. In the application bar area, click the **Create Alert** button.

   The wizard for creating alert settings starts.

Starting the Wizard by Selecting a Monitored Target

To start the wizard for creating alert settings:

1. In the **Explorer** menu, choose **Resource**, and then **Hosts**.

   A list of hosts is displayed in the navigation area.

2. From the list of hosts in the application area, select the check box for the host for which you want to create alert settings (host name: `host_A`), and then click the **Create Alerts** button under the list of hosts.

   The wizard for creating alert settings starts.

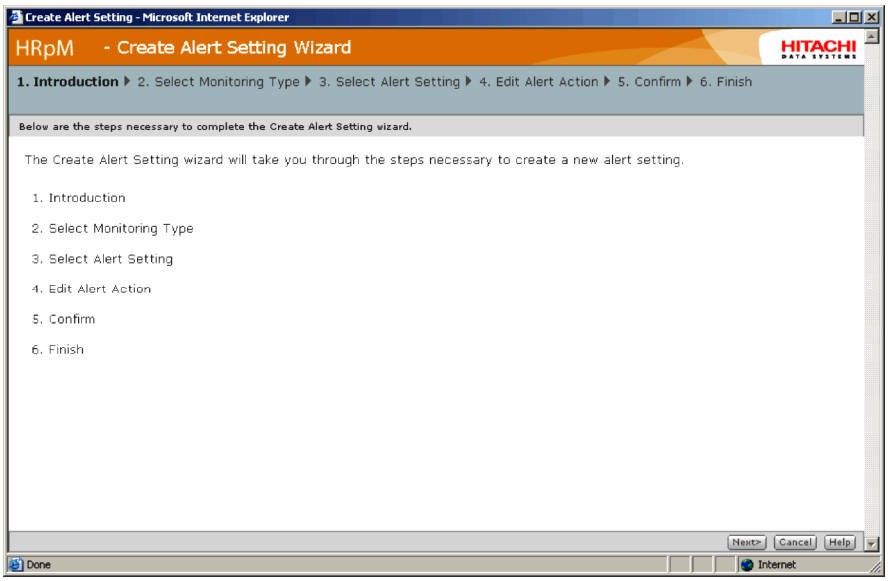


Figure 3.35 Wizard for Creating Alert Settings (Alert Settings Creation Wizard 1 – Introduction)

3.6.2.2 Creating Alert Settings for Pair Status Monitoring

This section describes how to set alerts for pair status monitoring after the wizard has been started, using a host of an open system (host name: `host_A`) as an example.

When the wizard starts, the procedure for creating alert settings is displayed. During the procedure, you can click the **Back** button to go back to the previous step, or click the **Cancel** button to terminate the wizard. Note that in the wizard for checking the settings, clicking the **Confirm** button starts processing, in which case you can no longer cancel the processing.

This example specifies the settings in such a manner that emails and SNMP traps are sent when the monitored target is placed in the `Error` or `suspend` status.

To create alert settings for pair status monitoring:

1. Check the procedure for setting alerts, and then click the **Next** button.

   The procedure advances to the step for selecting the monitoring type.

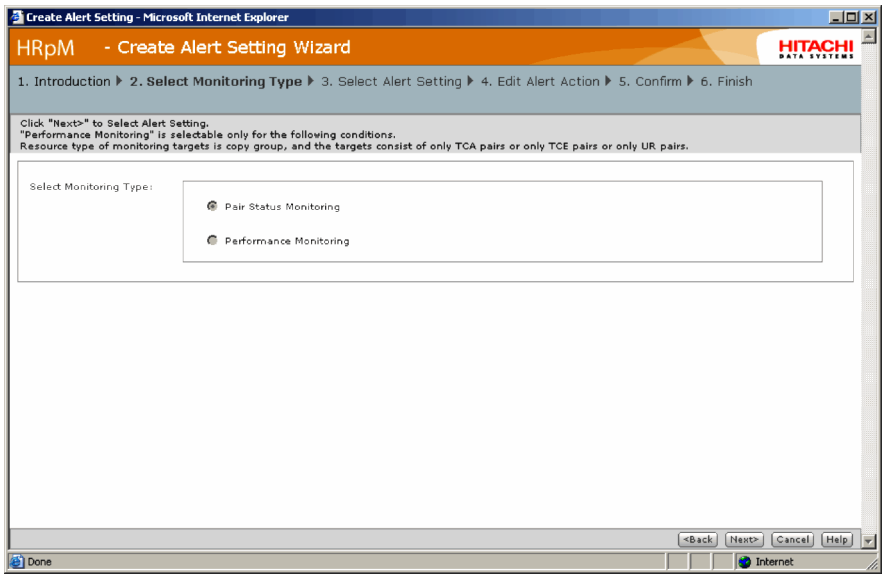


Figure 3.36 Create Alert Setting Wizard 2- Monitoring Type

2. Make sure that **Pair Status Monitoring** is selected, and then click the **Next** button.

   The procedure advances to the step for selecting the alert setting creation mode.

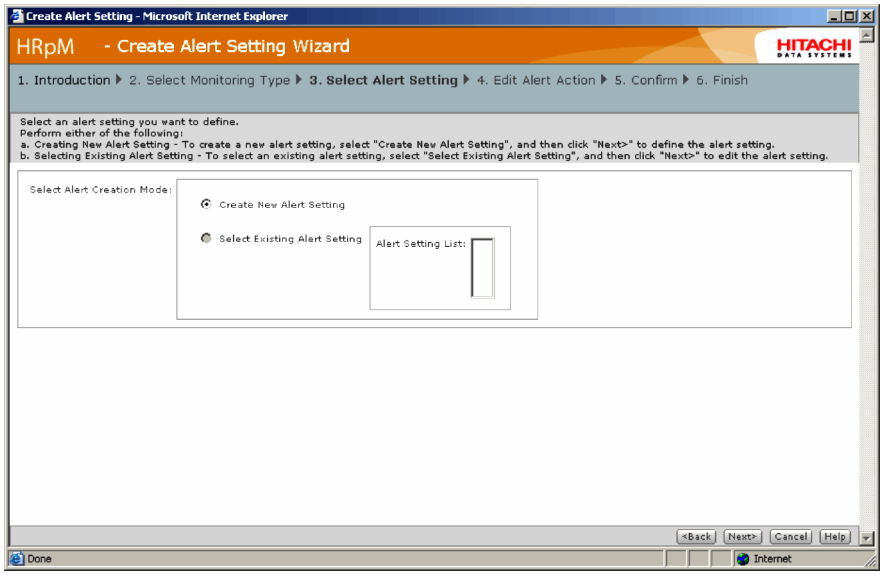


Figure 3.37 Create Alert Setting Wizard 3- Select Alert Setting

3. Select the **Create New Alert Setting** radio button, and then click the **Next** button.

   The procedure advances to the step for editing alert actions.

   To add a monitored target to an existing alert setting, select the **Select Existing Alert Setting** radio button. Next, select the alert setting to which you want to add the monitored target, and then click the **Next** button. The monitored target is added to the existing alert setting.

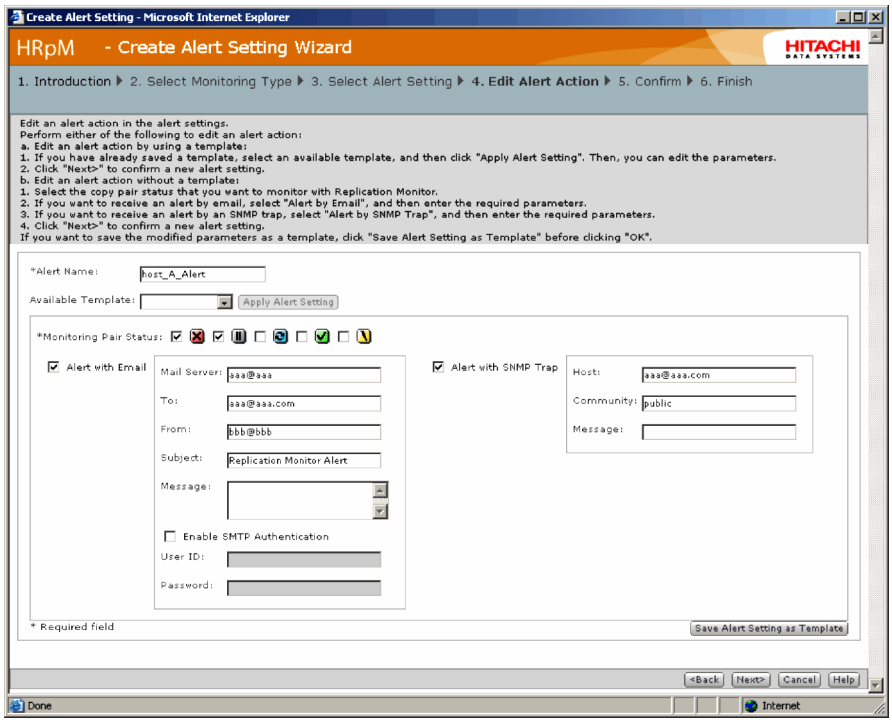


Figure 3.38 Alert Settings Creation Wizard 4 – Edit Alert Action

4. In **Alert Name**, enter `host_A_Alert`.

   Enter the name used to identify the alert. The Replication Monitor system does not allow any duplicate alert names. If the specified name matches the name of an existing alert setting, no new alert settings can be created. The rules for permitted characters are as follows:

Permitted characters#	Permitted number of characters	Entry requirement
Single-byte space, `A–Z a–z 0–9 ` ~ ! " # $ % & ' ( ) * + , – . / : ; < = > ? @ [\ ] ^ _ { | }`	1-100	Required

#

A string consisting of single-byte spaces only cannot be specified. A single-byte space leading or trailing the specified character string is not registered.

5. In **Monitoring Pair Status**, select the check boxes of icons that indicate the monitored pair statuses of error and suspend.

Select the pair status of the monitored copy pair that is to trigger notification. You can select multiple pair statuses for a single monitored target. When multiple pair statuses are selected, notification occurs when any of the selected pair statuses is satisfied. The table below lists and describes the selectable pair statuses. At least one pair status must be set.

Icon	Monitoring Pair status	Description
	error	An error has occurred.
	suspend	A split status (Split) has occurred.
	copying	Forward or backward copy processing is underway.
	sync	The status is synchronized (Pair).
	simplex	There is information that defines a copy pair, but there is no actual copy pair.

6. To send email alerts, select the **Alert with Email** check box, and then specify the email settings.

   To use SMTP authentication in email notification, select the **Enable SMTP Authentication** check box.

   Mail Server

   Specifies the host name of the mail server. The rules for permitted characters are as follows:

Permitted characters#	Permitted number of characters	Entry requirement
Single-byte space, A–Z a–z 0–9 ` ~ ! " # $ % & ' ( ) * + , – . / : ; < = > ? @ [\ ] ^ _ { | }	1-500	Required

#

A string consisting of single-byte spaces only cannot be specified. A single-byte space leading or trailing the specified character string is not registered.

To

Specifies the destination of the email notification (email address). You can specify an email address complying with RFC2821. Note that the email address supported by Replication Monitor must comply with RFC822. The rules for permitted characters are as follows:

Permitted characters#	Permitted number of characters	Entry requirement
A–Z a–z 0–9 ` ~ ! # $ % & ' * + – . / = ? @ ^ _ { | },	3-320	Required

#

A comma (,) can be used only as a delimiter for email addresses.

From

Specifies the sender of the email. The rules for permitted characters are as follows:

Permitted characters	Permitted number of characters	Entry requirement
A–Z a–z 0–9 ` ~ ! # $ % & ' * + – . / = ? @ ^ _ { | },	3-320	Required

Subject

Specifies the subject of the email. The default is `Replication Monitor Alert` and it can be changed if necessary. The actual email subject that is sent consists of the subject specified here, with the alert name attached in the following format:

email-subject (*alert-name*)

The rules for permitted characters are as follows:

Permitted characters#	Permitted number of characters	Entry requirement
Single-byte space, A–Z a–z 0–9 ` ~ ! " # $ % & ' ( ) * + , – . / : ; < = > ? @ [\ ] ^ _ { | }	0-255	Optional

#

A string consisting of single-byte spaces only cannot be specified. A single-byte space leading or trailing the specified character string is not registered.

Message

Specifies the email message. As the message we recommend that you specify clear information about the status of the monitored target. For example if the `error` status is to be set as the monitored pair status specifying not only the status of the monitored target but also some information that can identify the monitored target is helpful for identifying the location of the error. The rules for permitted characters are as follows:

Permitted characters#	Permitted number of characters	Entry requirement
Single-byte space, line-feed character, A–Z a–z 0–9 ` ~ ! " # $ % & ' ( ) * + , – . / : ; < = > ? @ [\ ] ^ _ { | }	0-255	Optional

#

A single line-feed character is counted as 2 characters.

User ID

Specifies the user ID for SMTP authentication to enable use of SMTP authentication. The rules for permitted characters are as follows:

Permitted characters	Permitted number of characters	Entry requirement
A–Z a–z 0–9 ! # $ % & ' ( ) * + , – . = @ \ ^ _ |	1-64	Required

Password

Specifies the password for SMTP authentication to enable use of SMTP authentication. The rules for permitted characters are as follows:

Permitted characters	Permitted number of characters	Entry requirement
A–Z a–z 0–9 ! # $ % & ' ( ) * + , - . = @ \ ^ _ |	0-64	Optional

7. To use SNMP traps for notification, select the **Alert with SNMP Trap** check box, and then specify SNMP trap settings.

Host

Specifies the destination of an SNMP trap notification. The rules for permitted characters are as follows:

Permitted characters#	Permitted number of characters	Entry requirement
Single-byte space, A–Z a–z 0–9 ` ~ ! " # $ % & ' ( ) * + , - . / : ; < = > ? @ [\ ] ^ _ { | }	1-500	Required

#

A string consisting of single-byte spaces only cannot be specified. A single-byte space leading or trailing the specified character string is not registered.

Community

Specifies a community. The rules for permitted characters are as follows:

Permitted characters#	Permitted number of characters	Entry requirement
Single-byte space, A–Z a–z 0–9 ` ~ ! " # $ % & ' ( ) * + , - . / : ; < = > ? @ [\ ] ^ _ { | }	1-100	Required

#

A string consisting of single-byte spaces only cannot be specified. A single-byte space leading or trailing the specified character string is not registered.

Message

Specifies a message for the SNMP trap. We recommend that you specify a detailed message, so that the message clearly shows the status of the monitored target. When you specify the error status as the pair status to be monitored, specify the information by which the monitored target can be identified, not only the information that shows the status of the monitored target. This helps you identify where the error occurred. The rules for permitted characters are as follows:

Permitted characters#	Permitted number of characters	Entry requirement
Single-byte space, A–Z a–z 0–9 ` ~ ! " # $ % & ' ( ) * + , - . / : ; < = > ? @ [\ ] ^ _ { | }	0-100	Optional

#

A string consisting of single-byte spaces only cannot be specified. A single-byte space leading or trailing the specified character string is not registered.

8. To save the entered information as a template, click the **Save Alert Setting as Template** button.

   A dialog box appears so that you can save the alert settings as a template. Specify **Template ID** and **Display Name**, and then click the **OK** button to save the alert settings as a template.

   Template ID

   Select a template ID from the drop-down list. The template ID may be from `01` to `10`. Unregistered template IDs are indicated by `(empty)` after the number.

   Display Name

   Enter a name for the selected template ID. The rules for permitted characters are as follows:

Permitted characters#	Permitted number of characters	Entry requirement
Single-byte space, `A-Z a-z 0-9 ` ~ ! " # $ % & ' ( ) * + , - . / : ; < = > ? @ [\ ] ^ _ { | }`	1-100	Required

#

A string consisting of only single-byte spaces cannot be specified. Any single-byte spaces leading or trailing the specified character string are not registered.

You can use the saved template when you edit alert actions. To set the settings stored in a template, select the template name from **Available Template,** and then click the **Apply Alert Setting** button.

The template names are displayed in **Available Template** as follows:

template-ID display-name

However, the template name is displayed as `Template_`*template-ID* if either of the following applies:

- No template has been set for the template ID.
- No change has been made to the template since it inherited the contents saved in version 5.0.

Notes:

- If the selected template already contains settings, its contents will be overwritten.
- The settings saved as a template do not contain alert names. If a template is saved with alert names set, the values become null when the template is read.

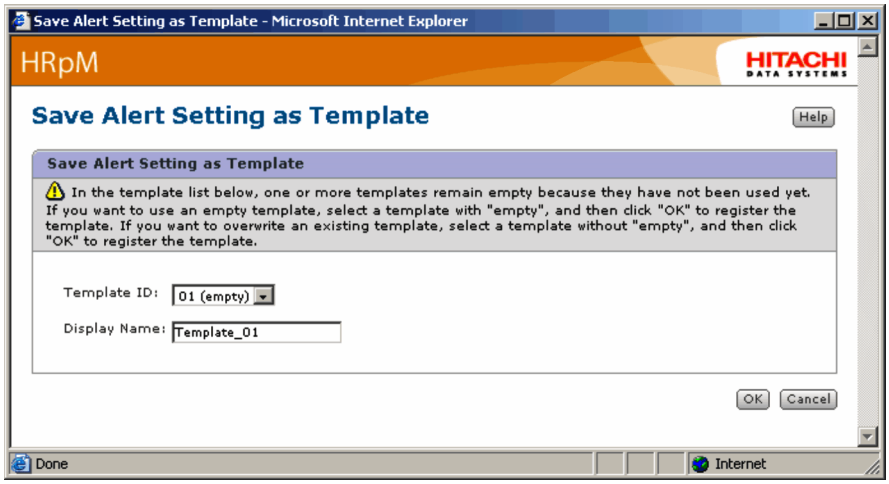


Figure 3.39 Save Alert Setting as Template Dialog Box

9. In the wizard for editing alert actions, click the **Next** button.

   The procedure advances to the step for checking the edited alert actions.

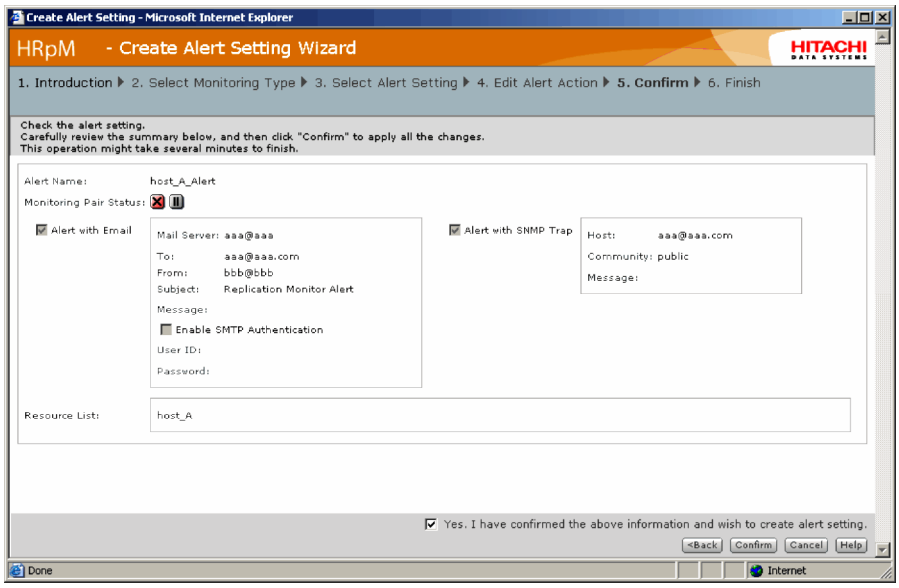


Figure 3.40 Alert Settings Creation Wizard 5 - Confirm

10. After checking the settings, select the **Yes. I have confirmed the above information and wish to create alert setting.** check box, and then click the **Confirm** button.

    The alert settings creation process begins, and a message is displayed in the wizard indicating that the alert settings are being created.

    When the creation of alert settings is completed, a message to that effect is displayed.

11. Click the **Finish** button.

    The wizard is terminated.

3.6.2.3 Creating Alert Settings for Performance Monitoring

This section describes how to set alerts for performance monitoring after the wizard has been started, using a copy group (copy group name: `copygroup_A`) as an example.

When the wizard starts, the procedure for creating alert settings is displayed. During the procedure, you can click the **Back** button to go back to the previous step, or click the **Cancel** button to terminate the wizard. Note that in the wizard for checking the settings, clicking the **Confirm** button starts processing, after which you can no longer cancel the processing.

To create alert settings for performance monitoring:

1. Check the procedure for setting alerts, and then click the **Next** button.

   The procedure advances to the step for selecting the monitoring type.

2. Select **Performance Monitoring**, and then click the **Next** button.

   The procedure advances to the step for selecting the alert setting creation mode.

3. Select the **Create New Alert Setting** radio button, and then click the **Next** button.

   The procedure advances to the step for editing alert actions.

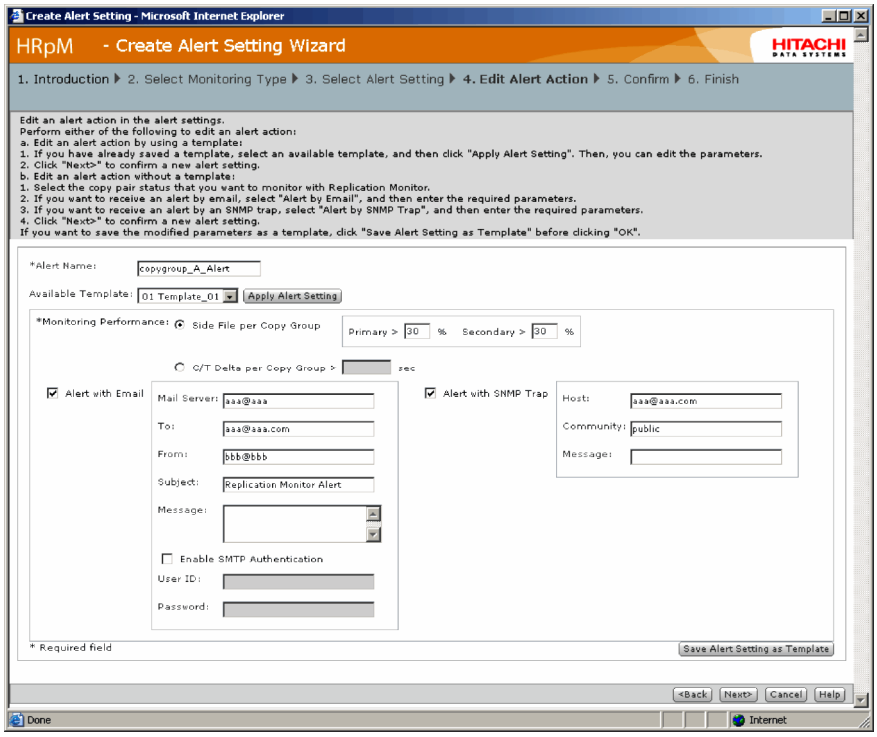


Figure 3.41 Create Alert Setting Wizard 4 - Edit Alert Action

4. In **Alert Name**, enter `copygroup_A_Alert`.

Enter the name used to identify the alert. The Replication Monitor system does not allow any duplicate alert names. If the specified name matches the name of an existing alert setting, no new alert settings can be created. The rules for permitted characters are as follows:

Permitted characters#	Permitted number of characters	Entry requirement
Single-byte space, A–Z a–z 0–9 ` ~ ! " # $ % & ' ( ) * + , – . / : ; < = > ? @ [\ ] ^ _ { | }	1-100	Required

#

A string consisting of only single-byte spaces cannot be specified. Any single-byte spaces leading or trailing the specified character string are not registered.

5. In **Performance Monitoring**, set thresholds for performance information.

   The following are the input items and the rules for the input values.

Item	Unit	Range
Sidefile usage rate and journal volume usage rate	Percent (%)	0 - 99
C/T delta	Seconds (sec)	0 - 8640000

6. To send email alerts, select the **Alert with Email** check box, and then specify the email settings.

   For details about the settings, see step 6 in 3.6.2.2.

7. To use SNMP traps for notification, select the **Alert with SNMP Trap** check box, and then specify SNMP trap settings.

   For details about the settings, see step 7 in 3.6.2.2.

8. To save the entered information as a template, click the **Save Alert Setting as Template** button.

   For details about the settings, see step 8 in 3.6.2.2.

9. In the wizard for editing alert actions, click the **Next** button.

   The procedure advances to the step for checking the edited alert actions.

10. After checking the settings, select the **Yes. I have confirmed the above information and wish to create alert settings.** check box, and then click the **Confirm** button.

    The alert settings creation begins, and a message is displayed in the wizard indicating that the alert settings are being created.

    When the alert settings have been created, a message to that effect is displayed.

11. Click the **Finish** button.

    The wizard terminates.

3.6.3 Checking the Created Alert Settings

This section checks whether or not the alert settings (alert name: `host_A_Alert`) have been created correctly. To start the checking of alert settings, choose **Alerts** in the **Explorer** menu.

If the alert settings are correct and the monitored conditions are satisfied, but there has been no alert notification, check the event log, and take appropriate action according to the displayed message. To view the event log, choose **Administration** and then **Event Logs** in the **Explorer** menu. For details about the event log, see the *HiCommand Replication Monitor Installation and Configuration Guide*.

To check the alert settings:

1. In the **Explorer** menu, choose **Alerts**.

   In the application area, log information about the alerts that have occurred is listed.

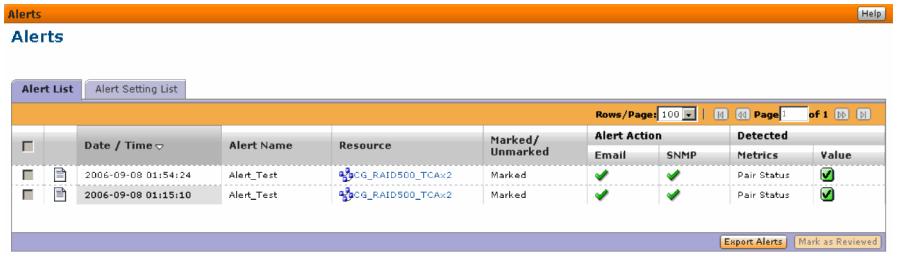


Figure 3.42 Alert Subwindow – Alert List Page

2. Choose the **Alert Setting List** tab.

   A list of alert settings is displayed in the application area.

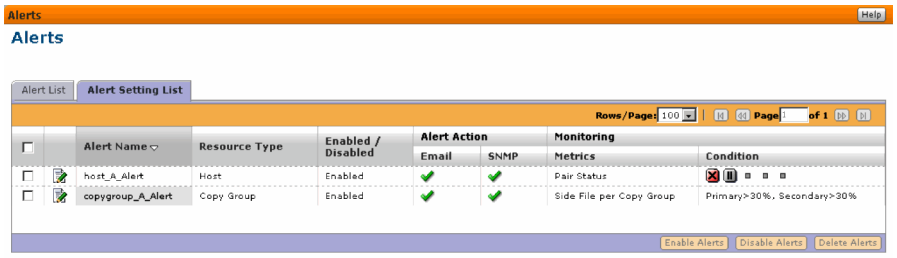


Figure 3.43 Alert Subwindow – Alert Setting List Page

3. Make sure that `host_A_Alert` is displayed.

   You can enable or disable the alert settings. From the alert name check boxes, select a desired alert name, and then click the **Enable Alerts** or **Disable Alerts** button. Clicking the **Enable Alerts** button enables the alert, and clicking the **Disable Alerts** button disables the alert.

Supplementary explanation:

You can check the performance monitoring alert settings in the same subwindow when a performance monitoring alert occurs.

4. To check the detailed information set for `host_A_Alert`, click the Edit icon.

   A dialog box for checking the detailed information is displayed.

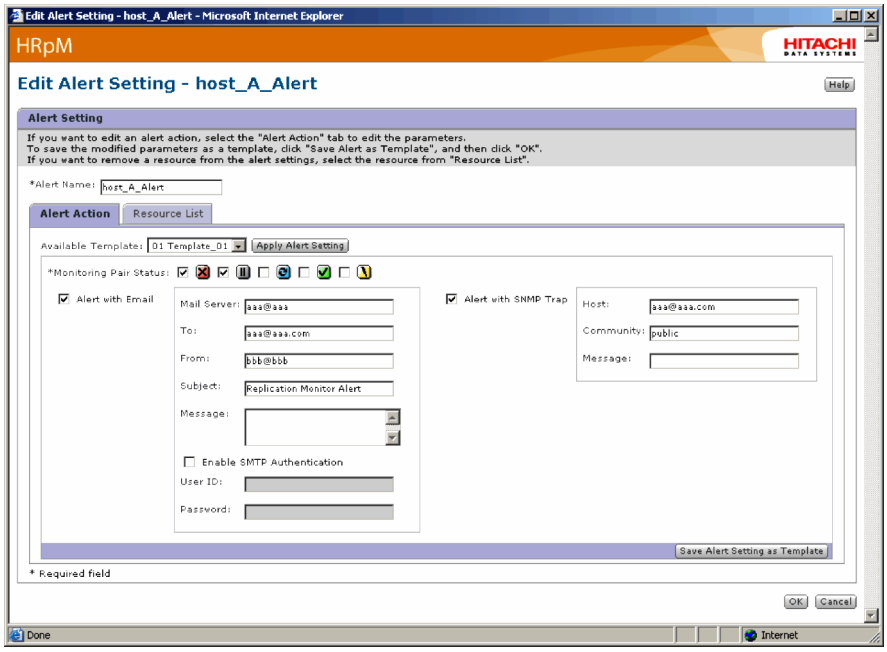


Figure 3.44 Edit Alert Settings - alert-name Dialog Box (Alert Action Page)

5. After checking the information, click the **Cancel** button.

   The dialog box closes. If the information contains an error, edit or delete the corresponding alert setting. For details about how to edit or delete alert settings, see section 3.6.7.

3.6.4 Checking the Notification Information to Identify Copy Pair Errors

This section describes how to identify copy pair errors after a notification is sent by email or an SNMP trap. You can identify errors using the same procedure whether alerts are set for pair status monitoring or for performance monitoring. This example assumes that an email notification has been sent from Replication Monitor because the pair status has changed to `suspend`.

To check the notification information for a copy pair error:

1. Make sure that, on the **Dashboard** menu, `1` is displayed in the Suspend icon.

   The **Dashboard** menu displays the number of unread alert settings that have occurred.

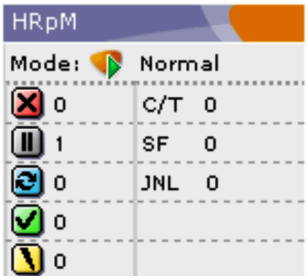


Figure 3.45 Dashboard Menu

2. In the **Explorer** menu, choose **Alerts**.

   In the application area, log information about the alerts that have occurred is listed.

3. From the **Resource** column for `host_A_Alert`, select the host name.

   The resources used to create alert settings for `host_A_Alert` are displayed.

4. Select a LUN for which the Suspend icon is displayed in **Summary Status for Cascade**.

   In the application area, a list of copy pairs related to the selected LUN is displayed.

5. Check the information about the copy pair for which the Suspend icon is displayed in **Pair Status**.

Supplementary explanation:

To use SNMP traps, load the MIB definition file into the software that will receive the traps. For details about the MIB definition file, see section 3.6.9.

3.6.5 Determining the Cause of the Error and Correcting It

Once you have identified the erroneous copy pair, next determine the cause of the error. Replication Monitor can call other HiCommand products, such as Tuning Manager and Device Manager, to determine the cause of the error and take an appropriate action.

All the products that a user is using can be called from Replication Monitor. If the products you want to call from Replication Monitor are HiCommand products, and they are installed on the server on which Replication Monitor is installed, no setting is needed to call these products. If the products you want to call from Replication Monitor do not meet the above conditions, you need to register those products beforehand. For details about how to register such products as Device Manager on another site, see the *HiCommand Replication Monitor Installation and Configuration Guide*.

To call other products, you can use either of the following two methods: clicking the **Go** link in the **Dashboard** menu, or choosing **Go** and then **Links** in the global tasks bar area. This section describes the methods for calling another product for each case shown below.

- Calling a product that has been installed on the same server as Replication Monitor
- Calling a product that has been installed on a different server

Each case is explained below.

3.6.5.1 Calling a Product That Has Been Installed on the Same Server as Replication Monitor

Product calls differ depending on whether they are used for HiCommand products or other products.

For HiCommand products

Clicking the **Go** link for products displayed on the **Dashboard** menu displays the selected product's window. You cannot use the **Go** link if the product displayed in the **Dashboard** menu has not been installed on the same server as Replication Monitor.

For products other than HiCommand products

To call products other than HiCommand products:

1. From the global tasks bar area, choose **Go**, and then **Links**.

   A list of products that can be called is displayed.

2. Select the product you want to call.

   The login window for the product you want to call is displayed. Type in required information to log in to the product.

3.6.5.2 Calling a Product That Has Been Installed on a Different Server

To call those products that have been installed on different servers, from the global tasks bar area, choose **Go**, and then **Links**.

To call a product that has been installed on a different server:

1. From the global tasks bar area, choose **Go**, and then **Links**.

   A list of products that can be called is displayed.

2. Select the product that you want to call.

   A window appears so that you can log in to the product being called. Enter the necessary information, and log in to the product.

3.6.6 Marking an Alert as Reviewed

Once you finish handling the error, you should mark the alert as having been reviewed. If the alert is left marked as unreviewed, the alert functionality for the monitored target is disabled. If the alert is marked as reviewed, the alert functionality starts monitoring again. Note that once an alert is marked as reviewed, it can no longer be reset to the unreviewed status.

This section describes how to mark the alert `host_A_Alert` as having been reviewed.

To mark the alert as having been reviewed:

1. In the **Explorer** menu, choose **Alerts**.

In the application area, log information about the alerts that have occurred is listed.

2. Select the **host_A_Alert** check box, and then click the **Mark as Reviewed** button.

   A dialog box is displayed for checking the name of the alert that is to be marked as reviewed.

3. Check the alert name, select the **Yes. I have confirmed the above information and wish to mark the alerts as reviewed.** check box, and then click the **Confirm** button.

   The dialog box closes when the process for marking an alert as reviewed is completed.

3.6.7 Changing Alert Settings

This section describes how to change alert settings as follows:

- Adding monitored targets to the existing alert settings
- Editing alert settings
- Deleting alert settings
- Enabling and disabling alert settings

3.6.7.1 Adding Monitored Targets to the Existing Alert Settings

To add monitored targets to the existing alert settings, you can use the wizard for creating alert settings.

This section describes the procedure for setting alerts, assuming that the wizard for creating alert settings has already started. For details about how to start the wizard for creating alert settings, see section 3.6.2.1.

To add monitored targets to the existing alert settings:

1. Check the procedure for setting alerts, and then click the **Next** button.

   The procedure advances to the step for selecting alert settings.

2. Select alert settings, and then click the **Next** button.

   The procedure advances to the step for selecting the alert setting creation mode.

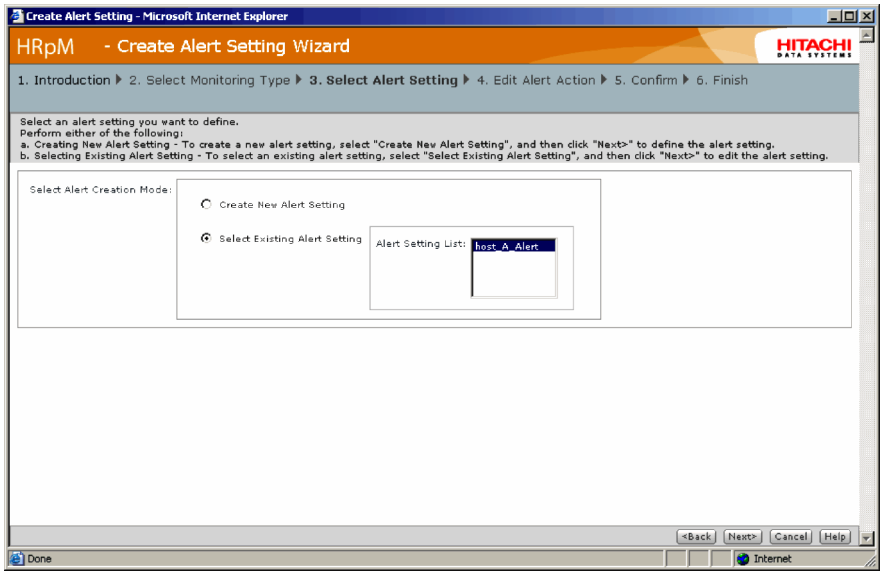


Figure 3.46 Alert Settings Creation Wizard 3- Select Alert Setting

3. After selecting the **Select Existing Alert Setting** radio button, select the alert setting to which you want to add monitored targets, and then click the **Next** button.

   The monitored target is added to the existing alert setting. The subsequent procedure is the same as for creating alert settings.

3.6.7.2 Editing Alert Settings

To edit (change) existing alert settings, use the Alert subwindow.

To edit alert settings:

1. In the **Explorer** menu, choose **Alerts**.

   In the application area, log information about the alerts that have occurred is listed.

2. Choose the **Alert Setting List** tab.

   A list of alert settings is displayed in the application area.

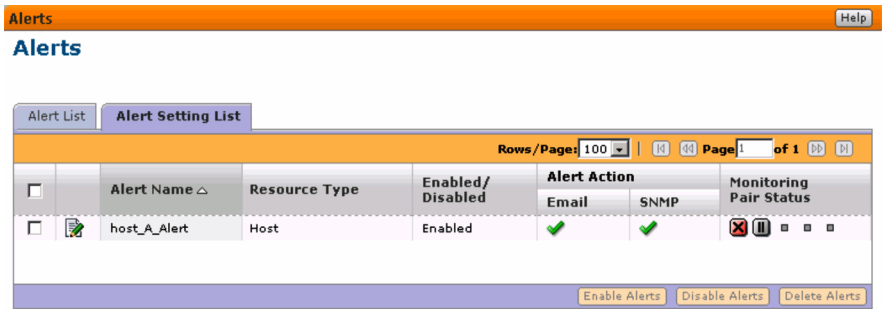


Figure 3.47 Alert Subwindow - Alert Setting List Page

3. From the list of alert settings, select the Edit icon for the alert setting that you want to edit.

A dialog box for editing the alert setting is displayed.

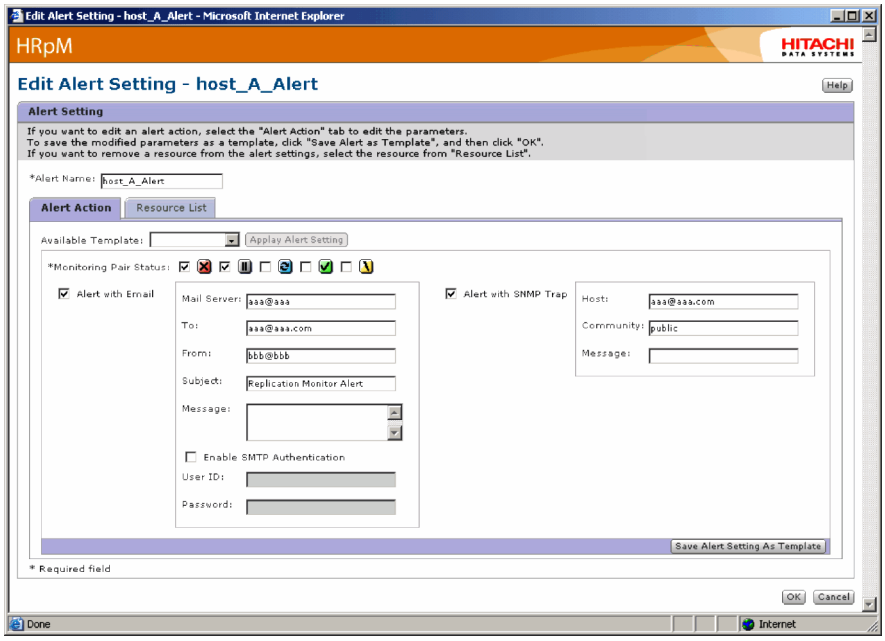


Figure 3.48 Edit Alert Settings - alert-name Dialog Box (Alert Action Page)

4. Edit desired information.

   To edit alert settings:

   Choose the **Alert Action** tab, and then edit the alert settings.

   To delete resources from the alert settings:

   Choose the **Resource List** tab. A list of resources is displayed. Select the check box for the resource to be deleted, and then click the **Remove Resources** button.

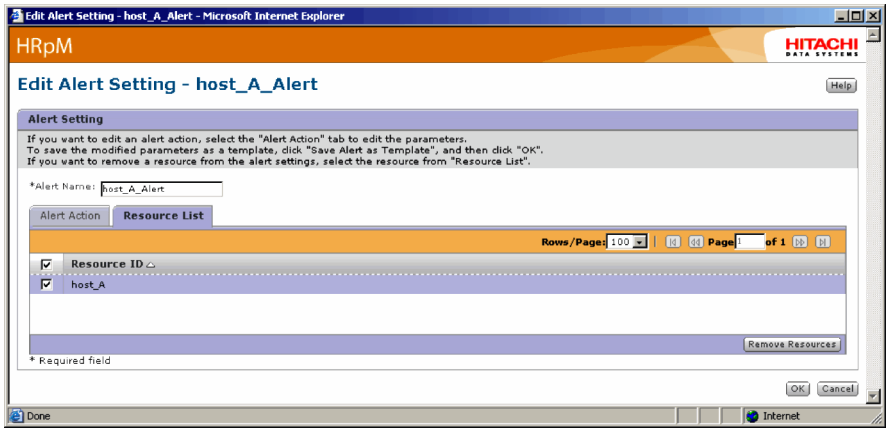


Figure 3.49 Edit Alert Settings - alert-name Dialog Box (Resource List Page)

5. Click the **OK** button.

   Editing of the alert settings is completed and the dialog box closes.

3.6.7.3 Deleting Alert Settings

To delete existing alert settings, use the Alert subwindow.

To delete alert settings:

1. In the **Explorer** menu, choose **Alerts**.

   In the application area, log information about the alerts that have occurred is listed.

2. Choose the **Alert Setting List** tab.

   A list of alert settings is displayed in the application area.

3. From the list of alert settings, select the check boxes for the alert settings that you want to delete, and then click the **Delete Alerts** button.

   A dialog box for confirming the alert settings to be deleted is displayed.

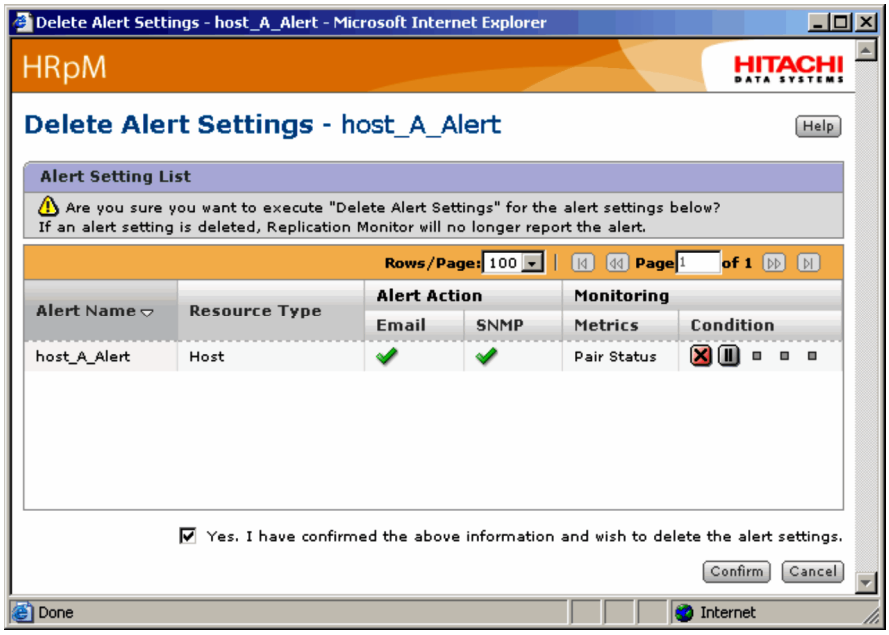


Figure 3.50 Dialog Box for Confirming the Alert Settings to Be Deleted

4. Check the alert settings, select the **Yes. I have confirmed the above information and wish to delete the alert settings.** check box, and then click the **Confirm** button.

   When the alert settings deletion process is completed, the dialog box closes.

3.6.7.4 Enabling and Disabling Alert Settings

From the Alert subwindow, you can enable or disable alert settings. To send a message when the pair status matches the monitored conditions, enable the alert settings. To not send a message even when the pair status matches the monitored conditions, disable the alert settings.

To enable or disable alert settings:

1. In the **Explorer** menu, choose **Alerts**.

   In the application area, log information about the alerts that have occurred is listed.

2. Choose the **Alert Setting List** tab.

   A list of alert settings is displayed in the application area.

3. From the list of alert settings, select an alert setting, and then enable or disable it.

   To enable alert settings:

   Select the check box for the alert setting that you want to enable, and then click the **Enable Alerts** button.

   To disable alert settings:

   Select the check box for the alert setting that you want to disable, and then click the **Disable Alerts** button.

3.6.8 Exporting Alert History

You can export alert history information. This section describes the procedure of exporting the history information of the alerts that have occurred.

To export alert history:

1. Check the Replication Monitor setup to confirm that the retention period for alert history data has been set.

   For details about the settings, see the *HiCommand Replication Monitor Installation and Configuration Guide*. If you have already checked the settings, you can skip this step.

2. When history information about the alerts that have occurred is listed in the application area, click **Export Alerts** button.

   A dialog box is displayed to export the history information about the alerts that have occurred.

3. In the dialog box, specify the time period and data format of history information to be exported.

4. Make sure that you specified correctly, and then click the **OK** button.

   The history data about the alerts that have occurred is output to a file, in accordance with the specified settings in the dialog box.

5. Make sure that the alert history is exported correctly.

3.6.9 MIB Definition Files for Viewing SNMP Traps

Use the MIB definition files provided by Replication Monitor to view the SNMP traps sent by Replication Monitor.

3.6.9.1 MIB Definition Files

The following are the MIB definition files provided by Replication Monitor:

`RPM-NOTIFICATION-MIB.txt`

The MIB for the SNMP traps that are sent when alerts occur in pair status monitoring is defined in this file.

`RPM-NOTIFICATION-MIB2.txt`

The MIB for the SNMP traps that are sent when alerts occur in performance monitoring is defined in this file.

3.6.9.2 Storage Location for MIB Definition Files

The MIB definition files are stored in the following location when the Replication Monitor server is installed:

For Windows

Replication-Monitor-installation-folder`\util\mibs`

For Solaris

`/opt/HiCommand/ReplicationMonitor/util/mibs`

3.7 Changing the Pair Status of a Copy Pair or Copy Group

Replication Monitor enables you to change the pair status and copy pace for each copy pair or copy group.

When a pair status error is reported by alert, you must determine the cause of the error and change the pair status.

3.7.1 Considerations Before Changing the Pair Status

The pair status cannot be changed in the following cases:

- The volume is managed by a mainframe system.
- The storage subsystem is Universal Storage Platform V or TagmaStore USP, and the copy type is Copy-on-Write Snapshot.
- When the version of Device Manager used is earlier than 05-10, and the copy type is TrueCopy Extended Distance.
- When the version of Device Manager used is earlier than 05-60, and the copy type is Universal Replicator.
- The copy pair state is `Simplex`, `Split (SW)`, or `Unknown`.
- There are limitations due to the system configuration.
- In TagmaStore AMS or TagmaStore WMS, when the array group to which the target LU belongs is in a spin-down state.

Some operations are not available depending on the copy pair configuration and pair status regardless of whether the target is a copy group or copy pair. After checking the items listed below, see the applicable storage subsystem manual, such as TrueCopy, ShadowImage, QuickShadow, Copy-on-Write Snapshot, or Universal Replicator and determine whether or not the attempted operation is supported.

- Current copy pair status
- Structure such as cascade
- Status of the copy pairs constituting a copy group

3.7.2 Changing the Pair Status

You can use the same method to change the pair status whether the target is a copy pair or a copy group. This section describes the procedure from starting the wizard to changing the pair status.

3.7.2.1 Starting the Wizard for Changing the Pair Status

There are three different ways to start the wizard:

- By choosing the **Change Pair Status** button in the application bar area
- By choosing the Change Pair Status icon in the application area
- By clicking the **Change Pair Status** button in the application area

Each method is described below.

Choosing the Change Pair Status Button in the Application Bar Area

To start the wizard for changing the pair status:

1. In the **Explorer** menu, choose **Resources,** and then **Hosts**.

   A list of hosts is displayed in the navigation area.

2. From the list of hosts, select the host that uses the copy pair whose status is to be changed.

   Information about the selected host is displayed in the application area.

3. Choose the **Copy Group List** tab.

   A list of copy groups managed by the selected host is displayed in the application area.

4. Select the copy group to which the copy pair whose pair status is to be changed belongs.

   A list of copy pairs that belong to the selected copy group is displayed in the application area.

5. Click the **Change Pair Status** button that is displayed in the application bar area.

   The wizard for changing the pair status starts.

Starting the Wizard from the Change Pair Status Icon in the Application Area

The Change Pair Status icon is displayed in the application area where the copy pair information is displayed.

To start the wizard for changing the pair status:

1. In the **Explorer** menu, choose **Resources,** and then **Hosts**.

   A list of hosts is displayed in the navigation area.

2. From the list of hosts, select the host that uses the copy pair whose pair status is to be changed.

   In the application area, a list of LUNs being used by the selected host is displayed.

3. From the list of LUNs, select the LUN related to the copy pair whose pair status is to be changed.

   In the application area, a list of copy pairs related to the selected LUN is displayed.

4. From the list of copy pairs, choose the Change Pair Status icon for the copy pair whose pair status is to be changed.

   The wizard for changing the pair status starts.

Starting the Wizard from the Change Pair Status Button in the Application Area

To start the wizard for changing the pair status:

1. In the **Explorer** menu, choose **Resources,** and then **Hosts**.

   A list of hosts is displayed in the navigation area.

2. From the list of hosts, select the host that manages the copy pair whose pair status is to be changed.

   In the application area, a list of LUNs in use by the selected host is displayed.

3. Choose the **Copy Group List** tab.

   A list of copy groups to which the copy pairs related to the LUN belong is displayed in the application area.

4. Select the copy group whose pair status is to be changed.

   A list of copy pairs that belong to the selected copy group is displayed in the application area.

5. Select the check box for the copy pair whose pair status is to be changed, and then click the **Change Pair Status** button in the application area.

   The wizard for changing the pair status starts.

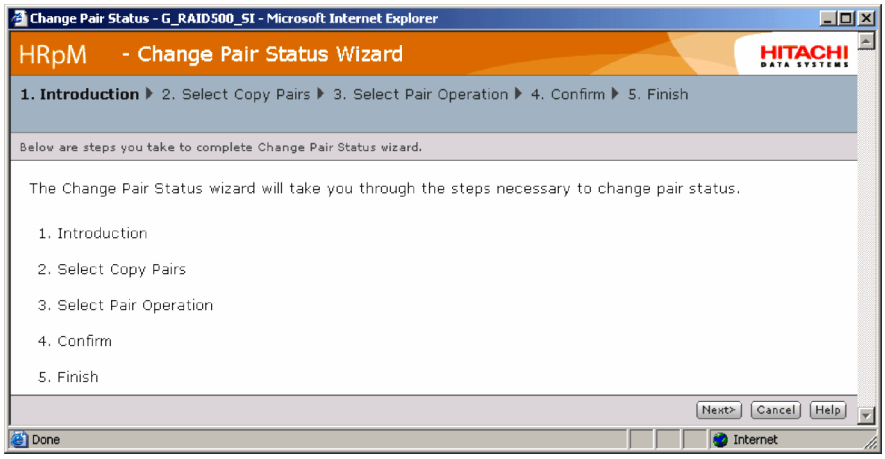


Figure 3.51 Wizard for Changing the Pair Status (Change Pair Status Wizard 1 - Introduction)

3.7.2.2 Changing the Pair Status

This section describes how to change the pair status, assuming that the wizard for changing the pair status has already started.

The wizard displays the procedure for changing the pair status. During the procedure, you can click the **Back** button to go back to the previous step or the **Cancel** button to terminate the wizard. Note that in the wizard for checking the settings, clicking the **Confirm** button starts processing, in which case you can no longer cancel the processing.

To change the pair status:

1. Check the procedure for changing the pair status, and then click the **Next** button.

The wizard proceeds to the step for selecting the pair whose status you want to change.

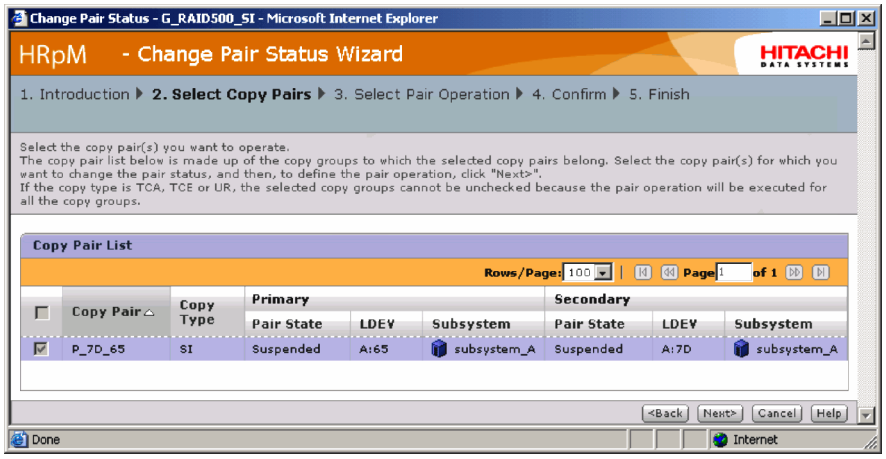


Figure 3.52 Change Pair Status Wizard 2 - Select Copy Pairs

2. From a list of copy pairs, select the check box for the copy pair whose status is to be changed, and then click the **Next** button.

   The wizard proceeds to the step for selecting a pair status and a copy pace.

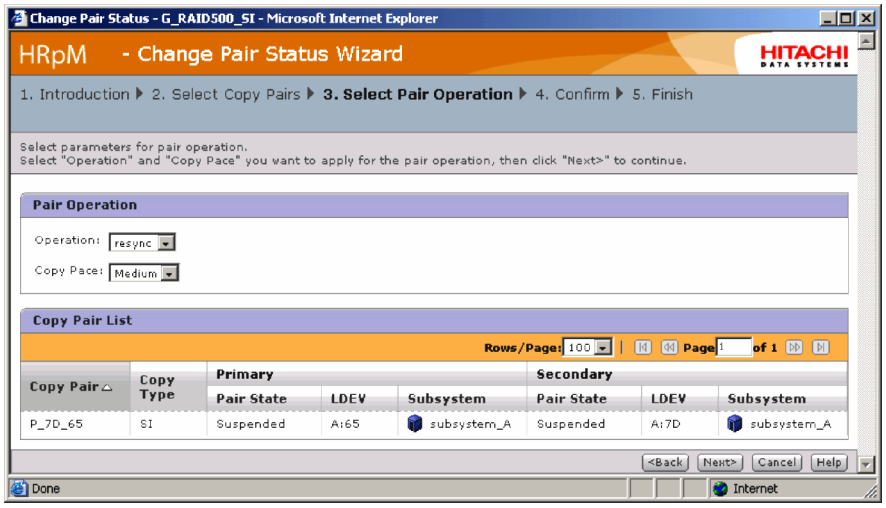


Figure 3.53 Change Pair Status Wizard 3 - Select Pair Operation

3. From the **Operation** pull-down menu, select a pair status.

   The pull-down menu displays only the pair statuses to which the current pair status can be changed.

   Operation

   The pair status to which the current pair status can be changed depends on the current pair status and the copy type. It also depends on whether the target is a copy pair or a copy group. The following table shows the pair statuses to which the pair status can be changed:

Table 3.10 Pair Statuses That Can Be Changed (When the Target Is a Single Copy Pair)

Current pair status[#1]	Copy type				
	ShadowImage	TrueCopy Sync	TrueCopy Async or TrueCopy Extended Distance[#2]	QuickShadow or Copy-on-Write Snapshot[#3]	Universal Replicator
copying (Copying)	split	split	split	split	split
copying (Copying (Reverse))	split	--	--	split	--
sync (Pair and Pair (Full))	split	split	split	split	split
suspend (Split)	resync, restore	resync	resync	resync, restore	resync
error (Suspended and Split (Full))	resync, restore	resync	resync	resync, restore	resync
error (Error in LUSE)	--	resync	resync	--	resync
copying(Deleting and Suspending)	--	--	--	--	--

Legend:

split: Indicates that the pair can be split

resync: Indicates that the pair can be re-synchronized.

restore: Indicates that the pair can be re-synchronized in reverse (from secondary to primary).

--: Indicates that the pair status cannot be changed.

#1

The parentheses enclose the copy pair state.

#2

Copy operation is executed for each consistency group.

#3

The pair status can only be changed when the storage subsystem is Thunder 9200, Thunder 9500V, TagmaStore AMS, TagmaStore WMS, Lightning 9900, or Lightning 9900V.

Table 3.11 Pair Statuses That Can Be Changed (When the Target Is Multiple Copy Pairs or a Copy Group)

Current pair status[#1]	Copy type				
	ShadowImage	TrueCopy Sync	TrueCopy Async or TrueCopy Extended Distance	QuickShadow or Copy-on-Write Snapshot[#2]	Universal Replicator
`copying (Copying)`	split	split	split	split	split
`copying (Copying (Reverse))`	split	--	--	split	--
`sync (Pair and Pair(Full))`	split	split	split	split	split
`suspend (Split)`	resync, restore	resync	resync	resync[#3], restore	resync
`error (Suspended and Split(Full))`	resync, restore	resync	resync	resync[#3], restore	resync
`error (Error in LUSE)`	--	resync	resync	--	resync
`copying (Deleting and Suspending)`	--	--	--	--	--

Legend:

split: Indicates that the pair can be split

resync: Indicates that the pair can be re-synchronized

restore: Indicates that the pair can be re-synchronized in reverse (from secondary to primary)

--: Indicates that the pair status cannot be changed.

#1

The parentheses enclose the copy pair state.

#2

The pair status can only be changed when the storage subsystem is Thunder 9200, Thunder 9500V, TagmaStore AMS, TagmaStore WMS, Lightning 9900, or Lightning 9900V.

#3

If there are multiple copy pairs that have the same primary volume in the group, only `resync` can be executed.

Notes:

– If the target copy pairs have different copy types, the pair status cannot be changed.

- If the group contains copy pairs whose copy pair states are different, all the copy pair statuses that each copy pair in the group can change to are displayed in the **Operation** pull-down menu. Note that if the group contains a copy pair whose copy pair state is `Suspended`, or `Error` in `LUSE`, the copy pair state of all copy pairs is assumed to be `Suspended`.
- If the group contains a copy pair whose pair status cannot be changed, the pair status cannot be changed for the entire group.

4. From the **Copy Pace** pull-down menu, select a desired copy pace.

   The pull-down menu displays only those copy paces that can be changed.

   Copy Pace

   A copy pace is the number of tracks that can be copied by a single operation. A fast copy pace (`Faster` or `15`) reduces the time required for copy operation, but it may have adverse affects on the storage subsystem's I/O operations.

   The copy paces that can be selected differ depending on the types of copy, operation, and storage subsystem, as shown below:

Table 3.12 Selectable Copy Paces

Copy type	Operation type	Storage subsystem	Selectable copy pace
ShadowImage	split, resync, restore	Enterprise-class storage	Select slow (`Slower`), medium (`Medium`), or fast (`Faster`). The default is medium (`Medium`).
		Midrange storage	Specify a value in the range from 1 to 15. The default value is 15.
QuickShadow or Copy-on-Write Snapshot	split, resync	--	Cannot be specified.
	restore		Specify a value in the range from 1 to 15. The default value is 15#.
Universal Replicator	split	--	Cannot be specified.
	Resync	--	Select slow (`Slower`), medium (`Medium`), or fast (`Faster`). The default is fast (`Faster`).
TrueCopy Sync, TrueCopy Async or TrueCopy Extended Distance	split	--	Cannot be specified.
	resync	TagmaStore AMS (except when the copy type is TrueCopy Extended Distance)	Select slow (`Slower`), medium (`Medium`), or fast (`Faster`). The default is fast (`Faster`).
		Anything other than the above	Specify a value in the range from 1 to 15. The default value is 15#.

Legend:

--: Any type of operation or storage subsystem

#

For midrange storage subsystems, specify a value of `15` as the copy pace.

5. Click the **Next** button.

   The wizard proceeds to the step for checking the settings.

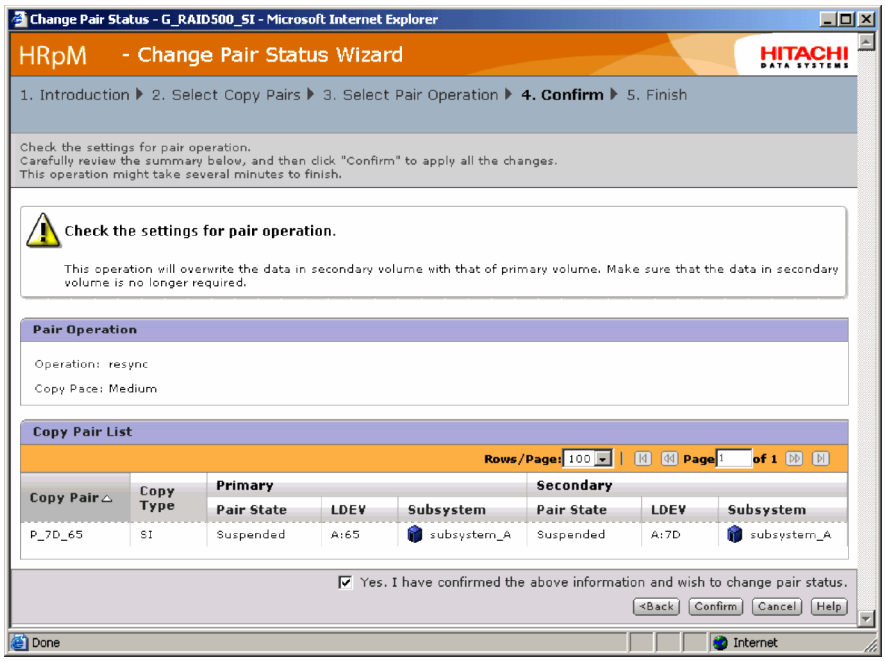


Figure 3.54 Change Pair Status Wizard 4 - Confirm

6. After checking the settings, select the **Yes. I have confirmed the above information and wish to change pair status.** check box, and then click the **Confirm** button.

   The pair status change processing begins and a message reporting that the pair status is being changed is displayed.

   When the pair status has been changed, a message indicating the completion of update operation is displayed.

7. Click the **Finish** button.

   The wizard is terminated.

8. In the application area, update the copy pair whose pair status has been changed.

   Make sure that the pair status has been updated correctly.

   In TagmaStore AMS or TagmaStore WMS, the pair status change may fail if the array group to which the target LU belongs is in a spin-down state. To change the pair status in this case, the array group to which the target LU belongs must be returned to a spin-up state. Use Storage Navigator Modular to check the state of an array group and return it to a spin-up state.

3.8 Checking the Transfer Delay State in Remote Copy Operations

In asynchronous Remote Copy operations that use TrueCopy Async, TrueCopy Extended Distance or Universal Replicator, to determine whether the intended performance has been maintained for the target copy group, use Replication Monitor to check the following transfer delay states:

- Sidefile or journal volume usage rate
  Check the usage rate of sidefiles (for TrueCopy Async) or journal volumes (for Universal Replicator) that have been placed on each of the primary and secondary volumes. If necessary, export the history of usage rate of sidefiles or journal volumes to a CSV or HTML file.
- Write delay time (C/T delta)

  Check the write delay time to determine the difference since the last time integrity was achieved between the primary and secondary volumes. If necessary, export the history of write delay time to a CSV or HTML file.

This section describes how to check the transfer delay state in Remote Copy operations.

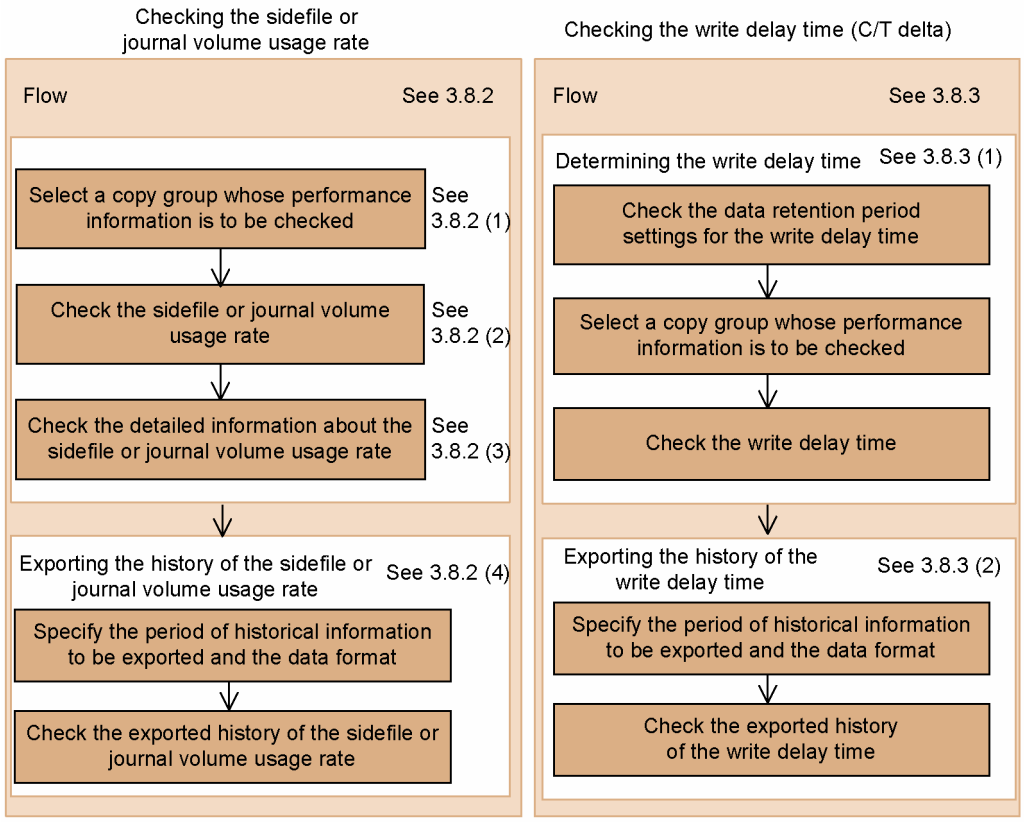


Figure 3.55 Flow of the Procedure for Checking the Transfer Delay State in Remote Copy Operations

3.8.1 Before Checking the Transfer Delay State in Remote Copy Operations

This section describes the points to be noted before you start checking the status.

3.8.1.1 Selecting a Copy Group

The target of transfer delay state checking is a copy group that has used `TCA / TCE` (TrueCopy Async, TrueCopy Extended Distance) or `UR` (Universal Replicator) as the copy type. To select the target copy group, you can use the following methods:

- Using the Hosts view, select a copy group from the list of copy groups used by the host
- Using the Pair Configurations view, select a copy group from the list of copy groups defined in the copy pair configuration definition file

Supplementary Explanation:

If you register the copy groups with statuses that are always to be monitored in My Copy Groups, you can select a desired copy group directly from the My Copy Groups Subwindow. For details about how to use My Copy Groups, see section 3.9.

3.8.1.2 Checking Data Retention

Before checking the transfer delay states, check the Replication Monitor setup to determine whether the data retention period has been set (In the **Explorer** menu, choose **Settings**, and then **Data Retention**). For details about the settings, see section the *HiCommand Replication Monitor Installation and Configuration Guide*.

3.8.2 Checking the Sidefile or Journal Volume Usage Rate

This section describes how to check the sidefile or journal volume usage rate.

3.8.2.1 Selecting a Copy Group for Performance Information Checking

This example uses the Hosts view to select a copy group from hosts in an open system.

To select a copy group whose performance information is to be checked:

1. In the **Explorer** menu, choose **Resources**, and then **Hosts**.

   A list of hosts is displayed in the navigation area.

2. From the list of hosts, select the host that is using the copy group whose status is to be checked.

   Detailed information about the selected host is displayed in the application area.

3. Choose the **Copy Group List** tab[#].

   A list of copy groups that the selected host is using is displayed.

#

For a host in a mainframe system, choose the **Prefix List** tab. From the displayed prefix list, choose the prefix defining the target copy group in order to display a list of copy groups.

4. From the displayed list of copy groups, select the target copy group.

   Information about the selected copy group is displayed in the application area.

3.8.2.2 Checking the Sidefile or Journal Volume Usage Rate

To check the sidefile or journal volume usage rate:

1. Check the value of **Side File / Journal Usage** displayed in **Copy Group Summary**.

   If necessary, click the **Refresh Copy Group** button in the application bar area to refresh the copy group information.

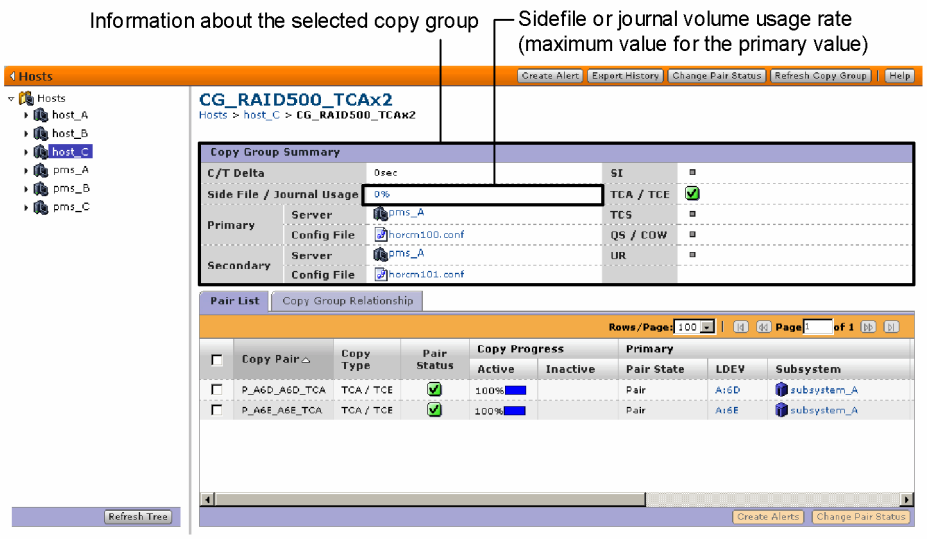


Figure 3.56 Example of Displaying Information about the Selected Copy Group

When the copy type is `TCA` (TrueCopy Async)

The maximum sidefile usage rate for the primary volume is displayed for each consistency group.

When the copy type is `UR` (Universal Replicator)

The maximum journal volume usage rate for the primary volume is displayed for each consistency group.

In a mainframe system, the target consistency group is displayed in the format `(CTG` *consistency-group-ID*`)`.

3.8.2.3 Checking Details About the Sidefile or Journal Volume Usage Rate

To check the detailed information about the sidefile or journal volume usage rate:

1. In the application area, under **Copy Group Summary**, click the value displayed in **Side File / Journal Usage.**

   Detailed information about the sidefile or journal volume usage rate is displayed in a dialog box.

When the copy type is TCA (TrueCopy Async)

- For the primary volume

  The sidefile usage rate is displayed for each consistency group.

- For the secondary volume

  The sidefile usage rate is displayed for each consistency group in an open system and for each subsystem in a mainframe system.

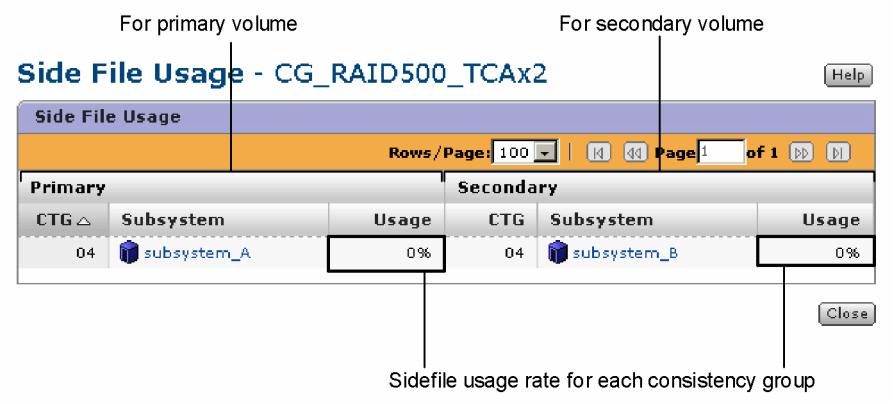


Figure 3.57 Example of Detailed Information about Sidefile Usage Rate (Open System)

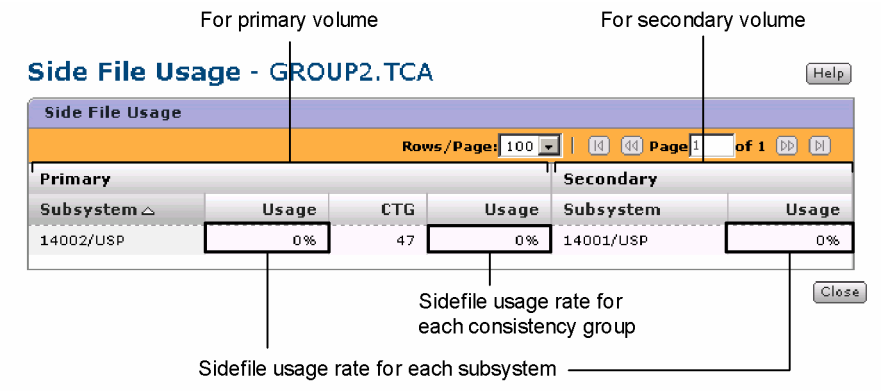


Figure 3.58 Example of Detailed Information about Sidefile Usage Rate (Mainframe System)

When the copy type is UR (Universal Replicator)

The journal volume usage rate is displayed for each consistency group in an open system and for each journal group in a mainframe system.

For a mainframe system, the usage rate is displayed for the meta data area separately from the journal data area.

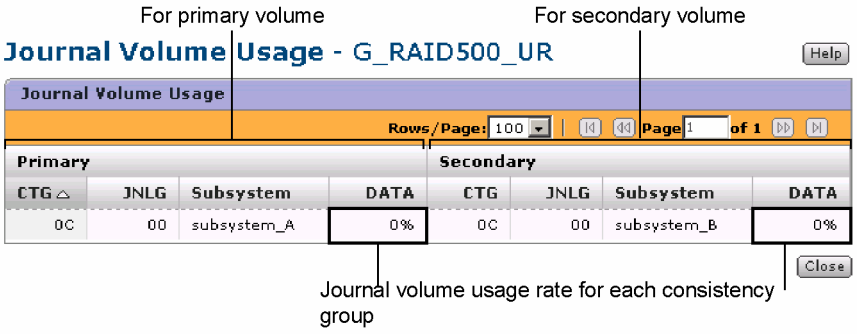


Figure 3.59 Example of Detailed Information about Journal Volume Usage Rate (Open System)

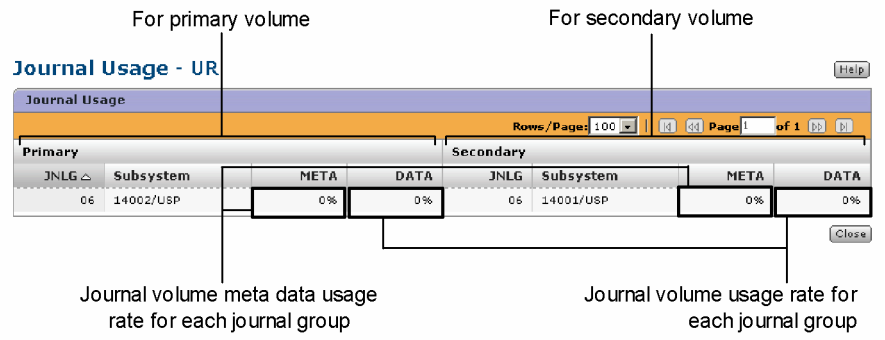


Figure 3.60 Example of Detailed Information about Journal Volume Usage Rate (Mainframe System)

3.8.2.4 Exporting the History of the Sidefile or Journal Volume Usage Rate

To export the history of the sidefile or journal volume usage rate:

1. While information about the selected copy group is displayed in the application area, click the **Export History** button in the application bar area.

   A dialog box for exporting the history is displayed.

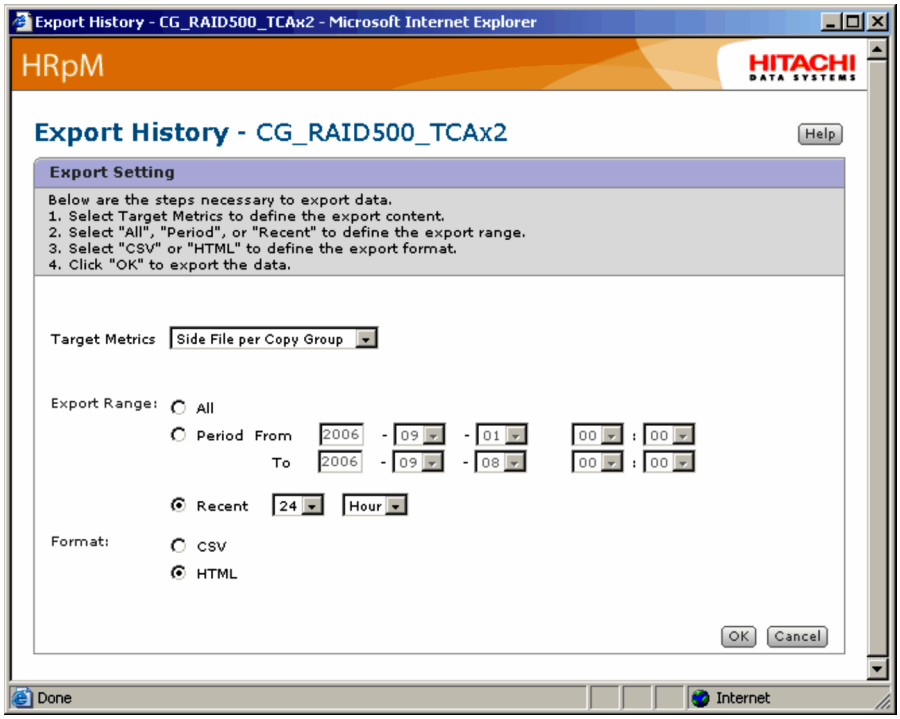


Figure 3.61 Dialog Box for Exporting the History

2. In the dialog box, specify the target to be exported, the period of historical information, and the data format.
3. Check the specified information and then click the **OK** button.

   Data for the sidefile or journal volume usage rate is output to a file according to the information specified in the dialog box.
4. Check the exported historical information about the write delay time.

For open systems

The following table lists and describes the items that are exported.

Table 3.13 Items that Are Exported as History of the Sidefile or Journal Volume Usage Rate (Open System)

Item Name	Description
`Date/Time`	The time the sidefile or journal volume usage rate was acquired.
`Pair Management Server`	The pair management server name for the primary volume.
`Configuration File`	The configuration definition file name for the primary volume.
`Copy Group`	The copy group name.
Target-to-be exported	The sidefile or journal volume usage rate for the primary volume is output in the format *Primary* `(%)`. The sidefile or journal volume usage rate for the secondary volume is output in the format *Secondary* `(%)`.

For mainframe systems

The following table lists and describes the items that are exported.

Table 3.14 Items that Are Exported as History of the Sidefile or Journal Volume Usage Rate (Mainframe System)

Item name	Description
`Date/Time`	The time the sidefile or journal volume usage rate was acquired.
`Host`	The name of the host in the mainframe system that defines the copy group.
`Prefix`	The prefix.
`Copy Group`	The copy group name#.
`CTG`	The consistency group ID.
Target-to-be exported	When the sidefile is exported: The primary sidefile usage rate is output in the format of *Primary* `(%)`. When the journal volume is exported: The meta and data usage rates of the primary and secondary journal volumes are output in the format of *P-Meta* `(%)`, *P-Data* `(%)`, *S-Meta* `(%)`, *S-Data* `(%)`.

#

If copy groups are managed as containers, there might be more than one consistency group ID.

3.8.3 Checking the Write Delay Time (C/T Delta)

This section describes how to check the write delay time and export historical information as needed.

This example uses the Hosts view to select a copy group from hosts in an open system.

To check the write delay time (C/T delta):

1. Check the Replication Monitor setup to determine whether the data retention period for the write delay time has been specified.

   For details about the settings, see the *HiCommand Replication Monitor Installation and Configuration Guide*. If you have already checked the settings, you can skip this step.

2. In the **Explorer** menu, choose **Resources**, and then **Hosts**.

   A list of hosts is displayed in the navigation area.

3. From the list of hosts, select the host that is using the copy group whose status is to be checked.

   Detailed information about the selected host is displayed in the application area.

4. Choose the **Copy Group List** tab#.

   A list of copy groups that the selected host is using is displayed.

   #

   For a host in a mainframe system, choose the **Prefix List** tab. From the displayed prefix list, choose the prefix defining the target copy group in order to display a list of copy groups.

5. From the displayed list of copy groups, select the target copy group.

   Information about the selected copy group is displayed in the application area.

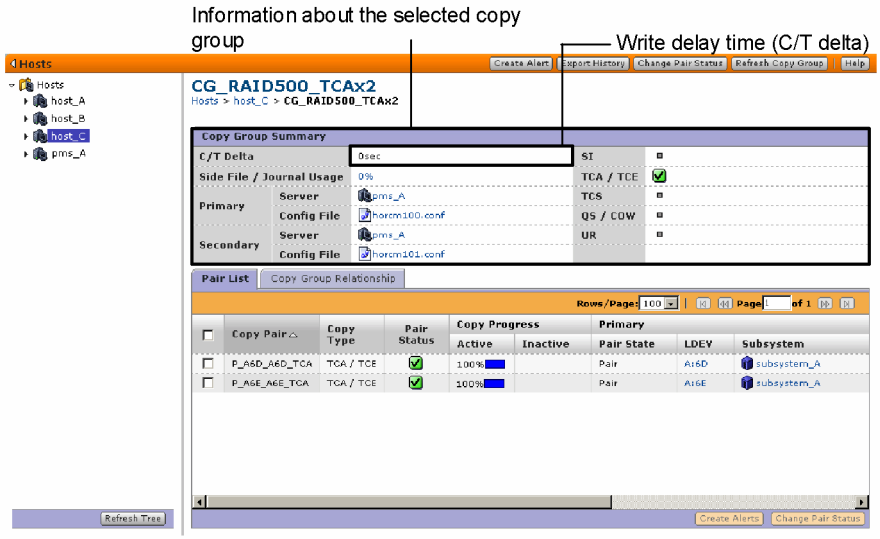


Figure 3.62 Example of Displaying Information about the Selected Copy Group

6. Check the value of **C/T Delta** displayed in **Copy Group Summary**.

   The write delay time is displayed in seconds.
   If necessary, click the **Refresh Copy Group** button in the application bar area to refresh the copy group information.

For an open system

The difference between the time the data was written on the primary volume and the time the data was written on the secondary volume is displayed.

For a mainframe system

The target consistency group is displayed in the format `(CTG` *primary-volume's-consistency-group-ID–secondary-volume's-consistency-group-ID*`)`. The difference between the secondary volume's group consistency time and the current time is displayed for each consistency group.

3.8.3.1 Exporting the History of Write Delay Time (C/T delta)

To export the history of the write delay time (C/T delta):

1. While information about the selected copy group is displayed in the application area, click the **Export History** button in the application bar area.

   A dialog box for exporting the history is displayed.

2. In the dialog box, specify the target to be exported, the period of historical information, and the data format.

3. Check the specified information and then click the **OK** button.

Data for the write delay time is output to the file according to the information specified in the dialog box.

4. Check the exported historical information about the write delay time.

For open systems

The table below lists and describes the items that are exported. The figures below show output examples in the CSV and HTML formats.

Table 3.15 Items Exported as History of the Write Delay Time (Open System)

Item Name	Description
Date / Time	The time the write delay time was acquired
Pair Management Server	The pair management server name for the primary volume
Configuration File	The configuration definition file name for the primary volume
Copy Group	The copy group name
C/T Delta (sec)	The write delay time (difference between the time the data was written on the primary volume and the time the data was written on the secondary volume)

```
Date / Time,        Pair Management Server,  Configuration File,  Copy Group,      C/T Delta (sec)
2006/3/29 12:12,    pms_A,                   horcm100.conf,       G_RAID500_TCA,  7
2006/3/29 12:15,    pms_A,                   horcm100.conf,       G_RAID500_TCA,  7
2006/3/29 12:18,    pms_A,                   horcm100.conf,       G_RAID500_TCA,  7
2006/3/29 12:21,    pms_A,                   horcm100.conf,       G_RAID500_TCA,  7
2006/3/29 12:24,    pms_A,                   horcm100.conf,       G_RAID500_TCA,  7
2006/3/29 12:27,    pms_A,                   horcm100.conf,       G_RAID500_TCA,  7
```

Figure 3.63 Output Example of the History of the Write Delay Time in CSV Format (Open System)

Export C/T Delta - G_RAID500_TCA

Date / Time	Pair Management Server	Configuration File	Copy Group	C/T Delta (sec)
2006-03-29 12:12:41	pms_A	horcm100.conf	G_RAID500_TCA	7
2006-03-29 12:15:41	pms_A	horcm100.conf	G_RAID500_TCA	7
2006-03-29 12:18:40	pms_A	horcm100.conf	G_RAID500_TCA	7
2006-03-29 12:21:41	pms_A	horcm100.conf	G_RAID500_TCA	7
2006-03-29 12:24:41	pms_A	horcm100.conf	G_RAID500_TCA	7
2006-03-29 12:27:41	pms_A	horcm100.conf	G_RAID500_TCA	7

Figure 3.64 Output Example of the History of the Write Delay Time in HTML Format (Open System)

For mainframe systems

The table below lists and describes the items that are exported. The figures below show output examples in the CSV and HTML formats.

Table 3.16 Items Exported as History of the Write Delay Time (Mainframe System)

Item Name	Description
Date/Time	The time the C/T delta value was acquired
Host	The name of the host in the mainframe system that defines the copy group
Prefix	The prefix
Copy Group	The copy group name#
CTG	The consistency group ID
C/T Delta (sec)	The C/T delta value (the value in the format *ddd hh*:*mm*:*ss* acquired from Business Continuity Manager is converted to seconds)

#

If copy groups are managed as containers, there might be more than one consistency group ID.

```
Date / Time,      Host,   Prefix,           Copy Group,    CTG,    C/T Delta (sec)
2006/3/29 13:51,  LPA1,   YUKON12.AGENT.A,  GROUP2.TCA,    47-47,  7
2006/3/29 13:56,  LPA1,   YUKON12.AGENT.A,  GROUP2.TCA,    47-47,  7
2006/3/29 14:01,  LPA1,   YUKON12.AGENT.A,  GROUP2.TCA,    47-47,  7
2006/3/29 14:01,  LPA1,   YUKON12.AGENT.A,  GROUP2.TCA,    46-46,  7
2006/3/29 14:06,  LPA1,   YUKON12.AGENT.A,  GROUP2.TCA,    47-47,  7
2006/3/29 14:06,  LPA1,   YUKON12.AGENT.A,  GROUP2.TCA,    46-46,  7
```

Figure 3.65 Output Example of the History of the Write Delay Time in CSV Format (Mainframe System)

Export C/T Delta - GROUP2.TCA					
Date / Time	Host	Prefix	Copy Group	CTG	C/T Delta (sec)
2006-03-29 13:51:24	LPA1	YUKON12.AGENT.A	GROUP2.TCA	47-47	7
2006-03-29 13:56:24	LPA1	YUKON12.AGENT.A	GROUP2.TCA	47-47	7
2006-03-29 14:01:23	LPA1	YUKON12.AGENT.A	GROUP2.TCA	47-47	7
2006-03-29 14:01:24	LPA1	YUKON12.AGENT.A	GROUP2.TCA	46-46	7
2006-03-29 14:06:24	LPA1	YUKON12.AGENT.A	GROUP2.TCA	47-47	7
2006-03-29 14:06:24	LPA1	YUKON12.AGENT.A	GROUP2.TCA	46-46	7

Figure 3.66 Output Example of the History of the Write Delay Time in HTML Format (Mainframe System)

3.9 Using My Copy Groups to Check Copy Groups

My Copy Groups enables you to view the relationship between volumes, the cascade structure, and the copy pair status for a specific copy group in a single window.

This section describes how to use My Copy Groups to check the configuration and status of copy groups. The following figure shows the flow of the procedure:

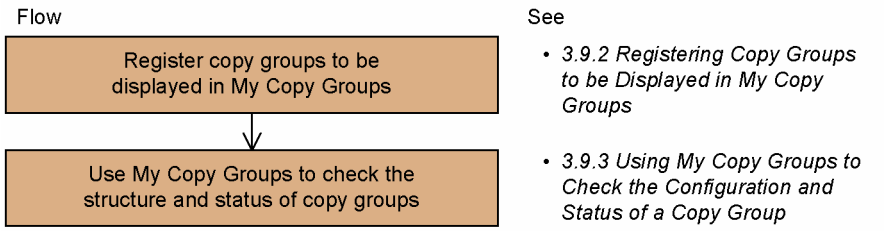


Figure 3.67 Flow of the Procedure for Using My Copy Groups to Check Copy Groups

3.9.1 Before Using My Copy Groups

This section describes the points to be noted before you start using **My Copy Groups**.

To use My Copy Groups, you must register the copy groups to be displayed as My Copy Groups in Replication Monitor. You can register a maximum of 100 copy groups.

3.9.1.1 Which Copy Groups to Register in My Copy Groups

We recommend that you register in My Copy Groups those copy groups whose status must be monitored constantly during operation and those that require special attention. My Copy Groups enables you to not only quickly check the configuration and status of the registered copy group, but also to refresh information about the pair status in batch mode.

3.9.1.2 Refreshing the My Copy Groups Display

The information displayed in My Copy Groups is refreshed at five-minute intervals, so users do not have to refresh the information.

Note that the copy pair status displayed in the subwindow is the one stored in the Replication Monitor server database. Therefore, the copy pair status displayed in the My Copy Groups subwindow may be different from the actual copy pair status, depending on the refreshment interval of the Replication Monitor server database.

To display the latest copy pair status, use the **Refresh My Copy Groups** button to update the Replication Monitor server database manually.

3.9.2 Registering Copy Groups to be Displayed in My Copy Groups

This section describes how to select the copy groups to be displayed in My Copy Groups, and how to register them in Replication Monitor.

To register the copy groups to be displayed in My Copy Groups:

1. In the **Explorer** menu, choose **My Groups**.

   My Copy Groups is displayed in the application area.

2. In the application bar area, click the **Edit My Copy Groups** button.

   A dialog box for editing My Copy Groups is displayed.

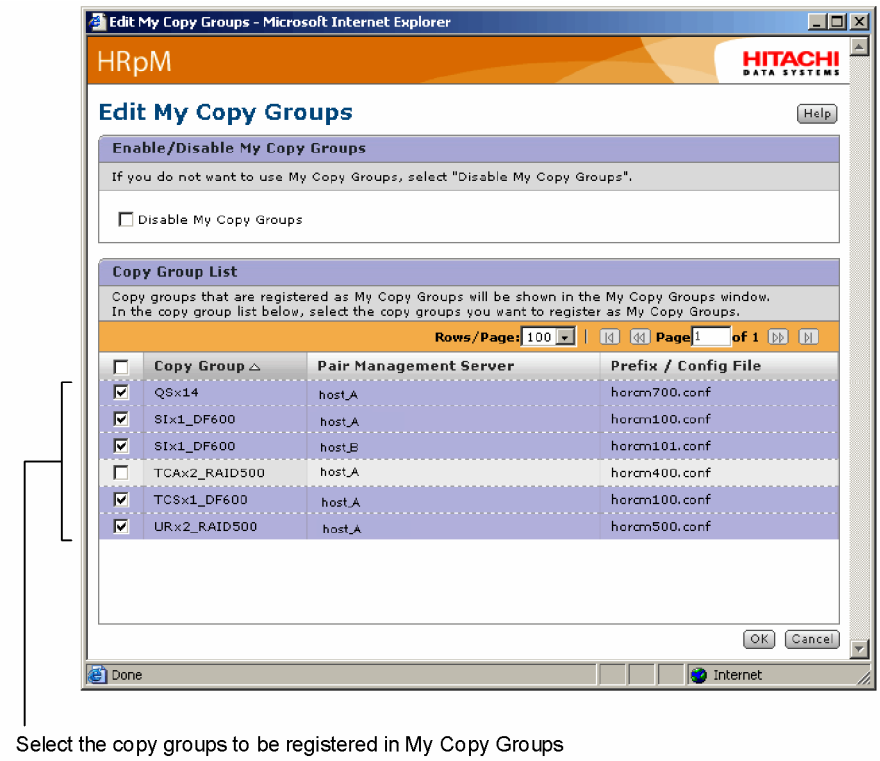


Figure 3.68 Dialog Box for Editing My Copy Groups

3. In **Enable/Disable My Copy Groups**, make sure that the **Disable My Copy Groups** check box is cleared.

   If you are not using My Copy Groups, select the **Disable My Copy Groups** check box and then proceed to step 5.

4. From the list of copy groups, select the check boxes for the copy groups that you want to display in My Copy Groups.

5. Click the **OK** button.

   Editing of the My Copy Groups is finished and the dialog box closes.

3.9.3 Using My Copy Groups to Check Configuration and Status of a Copy Group

This section describes how to use My Copy Groups to check the configuration and status of a copy group and how to view the information.

3.9.3.1 Displaying My Copy Groups

To use My Copy Groups to check the configuration and status of a copy group:

1. In the **Explorer** menu, choose **My Groups**.

   My Copy Groups is displayed in the application area.

Figure 3.69 Display Example of My Copy Groups

To refresh the displayed My Copy Groups information:

1. To refresh the displayed information, click the **Refresh My Copy Groups** button in the application bar area.

   A dialog box asking you whether you want to refresh the copy pair status is displayed.

2. Check the information displayed in the dialog box, select the **Yes. I have confirmed the above information and wish to refresh pair status.** check box, and then click the **Confirm** button.

   Refreshing of the copy pair status begins. When the copy pair status has been refreshed, a dialog box reporting the completion of the process is displayed.

3. Click the **Close** button to close the dialog box.

3.9.3.2 Identifying the Information in My Copy Groups

This section describes each element that is displayed in My Copy Groups.

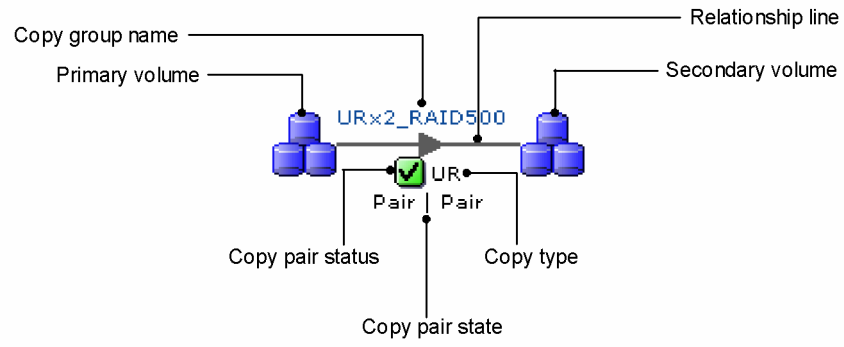


Figure 3.70 Display Example of the Copy Group Status and Configuration

Copy group name

Displays the name of a copy group registered in My Copy Groups.

In an open system, the copy group name is displayed above the relationship line. In a mainframe system, the copy group name is displayed above the primary volume and secondary volume respectively.

Clicking the copy group name displays detailed information about the copy group.

In an open system, clicking the copy group name displays detailed information about the copy group of the primary volume.

Primary and secondary volumes

Displays an icon for the primary volume on the left and an icon for the secondary volume on the right.

Copy pair status

Displays an icon for the summary copy pair status in the copy group for each copy type. For details about the correspondence between the icon and copy pair status, see section 2.3.1.

If the registered copy group does not exist in the configuration information managed by Replication Monitor, `n/a` is displayed for the copy pair status.

Copy type

Displays the copy type of the copy pairs in the copy group. If there is more than one copy type in the copy group, multiple copy types are displayed.

If the registered copy group does not exist in the configuration information managed by Replication Monitor, `n/a` is displayed for the copy type.

Copy pair state

Displays the copy pair state of the copy pairs in the copy group. Copy pair states for the primary and secondary volumes are linked with a vertical bar (`|`). If there is more than one copy pair state in the copy group, then multiple copy pair states are displayed. For details about the copy pair states, see section 2.3.2.

Relationship line

Displays a summary of the status and copy direction of copy pairs in the copy group for each copy group.

 : When the relationship line points to the rightAll copy pairs in the copy group are being copied from the primary volume to the secondary volume, or they are in the synchronized status.

 : When the relationship line points to the leftAll copy pairs in the copy group are being copied from the secondary volume to the primary volume, or they are in the synchronized status.

 : When the relationship line points to both directionsA single copy group contains those copy pairs that are being copied from the primary volume to the secondary volume, or which are in the synchronized status, as well as those copy pairs that are being copied from the secondary volume to the primary volume, or which are in the synchronized status.

: When the relationship line is only a lineThe copy group contains copy pairs that are neither being copied nor are in the synchronized status.

The shape of the relationship line (arrow pointing to the right, to the left, or in both directions, or a line with no arrow) corresponds to the copy pair state of the copy pairs in the copy group. Table 3.17 describes the shapes of the relationship lines and their correspondence to the copy pair state when all copy pairs in the copy group have the same copy pair state:

Table 3.17 Shapes of the Relationship Lines and Their Correspondence to Copy Pair State

Shape of Relationship Line	Copy State of the Copy Pair
	▪ Copying ▪ Pair ▪ Pair (Full)
	Copying (Reverse)
	▪ Invalid ▪ Suspended ▪ Suspended (ER) ▪ Suspended (CU) ▪ Suspended (HOLDER) ▪ Error in LUSE ▪ Split (Full) ▪ Split (SW) ▪ Split (SP) ▪ Split (CHKJNL) ▪ Split (HOLDTRNS) ▪ Split (NODELTA) ▪ Split (SUSPOP) ▪ Split (HOLD) ▪ Split ▪ Trans ▪ Suspending

	▪ Deleting ▪ Simplex ▪ Unknown

#1

If the information in the definition file does not match the actual copy pair, the right- and left-pointing arrow icons are displayed in reverse direction.

#2

If the copy group contains even one copy pair that is not being copied, or it is not in the synchronized status, the relationship line is displayed as a line with no arrow.

If the copy groups registered in My Copy Groups have a cascade structure, the relationship between the copy groups is displayed as follows:

When copy groups are arranged in a row

The secondary volume of a copy group displayed on the left is the primary volume of the copy group displayed on the right.

In the following example, the secondary volume of `Copy Group_A` is the primary volume of `Copy Group_B`, and the secondary volume of `Copy Group_B` is the primary volume of `Copy Group_C`:

Figure 3.71 Example of Display When Copy Groups Are Arranged in a Row

When a single copy group branches out to multiple copy groups

When a single copy group branches out to multiple copy groups to the right, the secondary volume of the copy group on the left is the primary volume of the multiple copy groups on the right.

In the following example, the secondary volume of `Copy Group_A` is the primary volume of `Copy Group_B` and `Copy Group_C`:

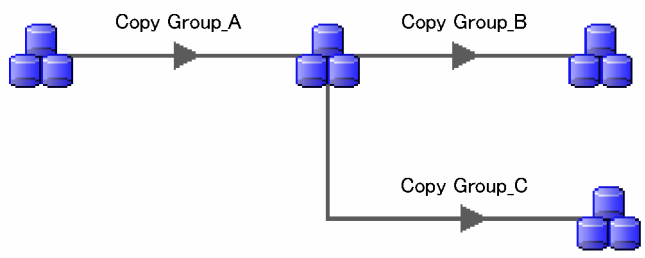


Figure 3.72 Example of Display When a Single Copy Group Branches out to Multiple Copy Groups

When a single copy group is connected to multiple copy groups

The secondary volume of multiple copy groups on the left is the primary volume of a single copy group on the right.

In the following example, the secondary volume of `Copy Group_A` and `Copy Group_B` is the primary volume of `Copy Group_C`:

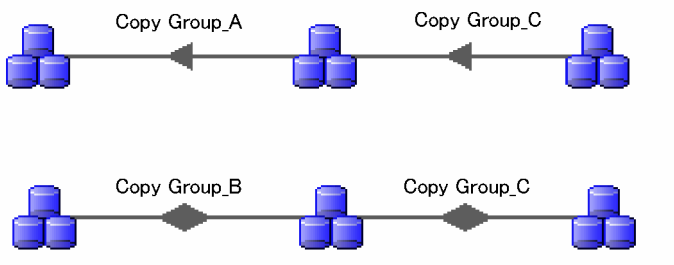


Figure 3.73 When a Single Copy Group Is Connected to Multiple Copy Groups

When the delta resync function is used for a 3DC Multi-Target configuration

In a 3DC Multi-Target configuration using the delta resync function, the copy group on ight, with a copy group at the the secondary volumes (the copy ary volume (the copy group on the

Group_C share the primary Group_A is the primary volume of Group_C is the secondary volume

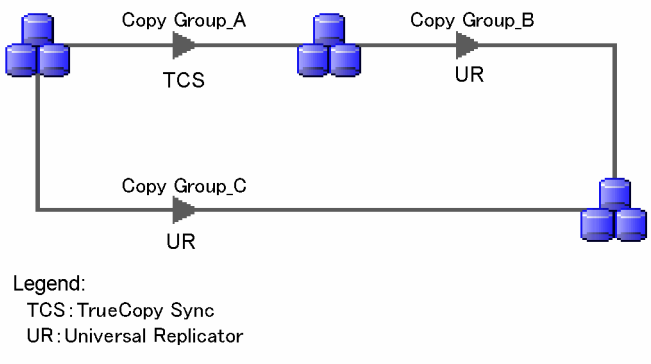


Figure 3.74 Example of Display When the Delta Resync Function Is Used for a 3DC Multi-Target Configuration

When a 3DC Multi-Target configuration using the delta resync function branches out to multiple copy groups

The following example shows the relationship among copy groups when a 3DC Multi-Target configuration using the delta resync function branches out to a ShadowImage (or QuickShadow) copy group.

In the following example, the secondary volume of `Copy Group_C` is the primary volume of `Copy Group_D`. In this case, the copy type of `Copy Group_D` is ShadowImage.

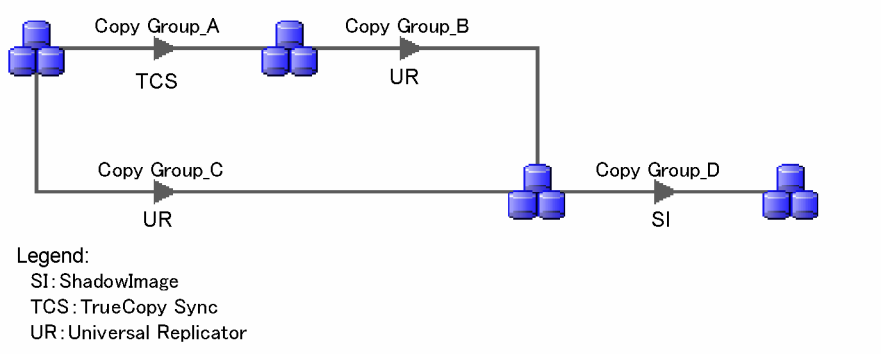


Figure 3.75 Example of Display When the Delta Resync Function Is Used for a 3DC Multi-Target Configuration (ShadowImage Copy Groups Are Used as the Secondary Volume of Copy Group_C)

In the following example, the secondary volume of `Copy Group_A` is the primary volume of `Copy Group_D` and `Copy Group_E`. In this case, the copy type of `Copy Group_D` and `Copy Group_E` is ShadowImage.

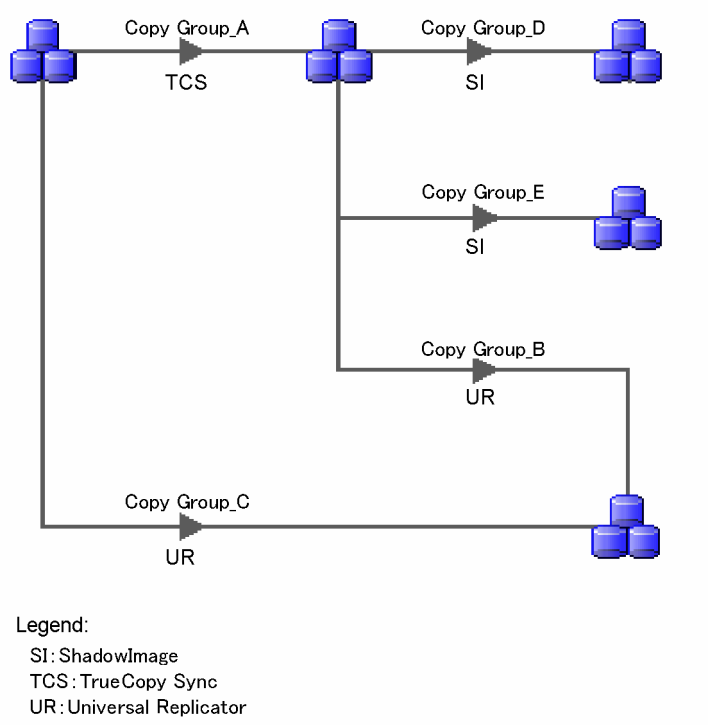
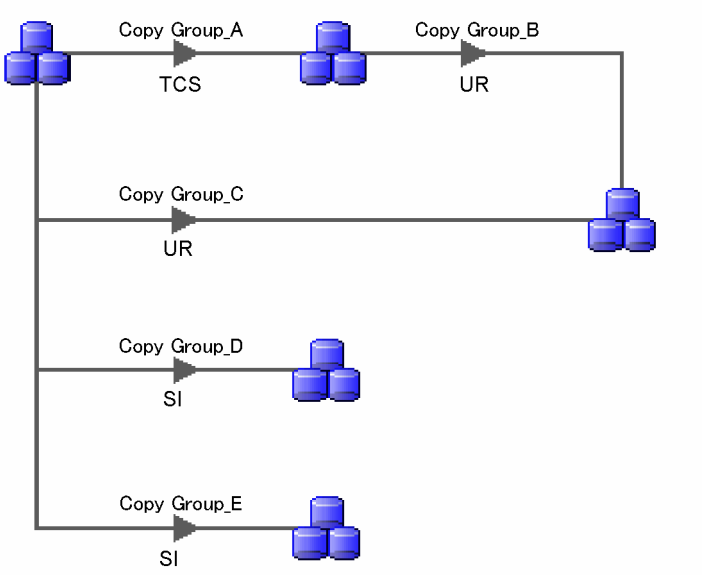


Figure 3.76 Example of Display When the Delta Resync Function Is Used for a 3DC Multi-Target Configuration (ShadowImage Copy Groups Are Used as the Secondary Volume of Copy Group_A)

In the following example, the primary volume of `Copy Group_A` is the primary volume of `Copy Group_D` and `Copy Group_E`. In this case, the copy type of `Copy Group_D` and `Copy Group_E` is ShadowImage.



Legend:
SI: ShadowImage
TCS: TrueCopy Sync
UR: Universal Replicator

Figure 3.77 Example of Display When the Delta Resync Function Is Used for a 3DC Multi-Target Configuration (ShadowImage Copy Groups Are Used as the primary Volume of Copy Group_A)

3.10 Refreshing the Copy Pair Configuration Information

If you have created new copy pairs, or you have changed the copy pair configuration after starting the Replication Monitor operation, make sure that you refresh the configuration information managed by Replication Monitor. This section describes how to refresh the configuration information.

The figure below shows the flow of updating the configuration information. This procedure acquires copy pair configuration information from the Device Manager server or Business Continuity Manager that has been registered as the information source, and then applies the configuration information to the database maintained by Replication Monitor.

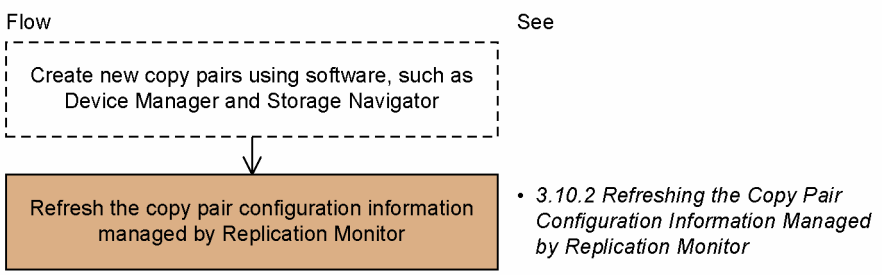


Figure 3.78 Flow of Updating the Copy Pair Configuration information

3.10.1 Before Refreshing the Copy Pair Configuration Information

This section describes the points to be noted before you start refreshing the copy pair configuration information.

To check the most recent pair status in the refreshed copy pair configuration, you must refresh the copy pair status separately. For details, see section 3.4

3.10.1.1 Applying the Most Recent Storage Subsystem Information (Open System)

In an open system, copy pair configuration information is acquired from Device Manager server database. When Replication Monitor's configuration information is refreshed, this information is not acquired from the storage subsystem connected to Device Manager.

Therefore, to apply the most recent information in the storage subsystem, you must use Device Manager beforehand to refresh the hosts and subsystems, and to refresh the information in Device Manager. For details, see the *HiCommand Device Manager Web Client User's Guide*.

Supplementary explanation:

Replication Monitor can be set to automatically synchronize with the Device Manager server database when the Device Manager server database is changed. For details about settings, see the properties file explanation in the *HiCommand Replication Monitor Installation and Configuration Guide*.

3.10.1.2 Checking the Refreshed Configuration Information

After you have refreshed configuration information, we recommend that you use Replication Monitor's copy pair configuration definition view to make sure that the new or changed copy pairs are displayed. For details about the checking procedure, see section 3.5.

3.10.2 Refreshing the Copy Pair Configuration Information Managed by Replication Monitor

This section describes how to refresh the configuration information managed by Replication Monitor.

To refresh the copy pair configuration information:

1. In the **Explorer** menu, choose **Settings**, and then **Refresh Setting**.
2. In the object tree or subwindow, choose **Configuration Setting**.

   In the application area, the Device Manager servers and Business Continuity Managers are listed as the sources of configuration information.

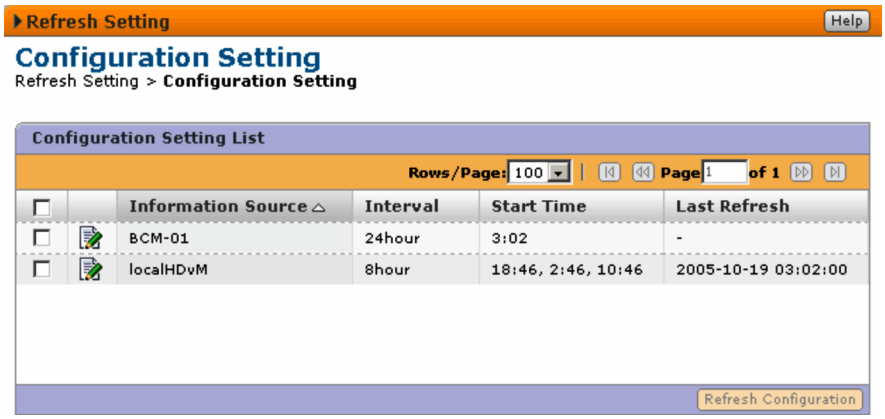


Figure 3.79 List of Device Manager Servers and Business Continuity Managers as Sources of Configuration Information

3. In the application area, select the check box for the information source that manages the newly created or modified copy pair.
4. Click the **Refresh Configuration** button.

   A dialog box asking whether the configuration information is to be acquired from the selected information source is displayed.
5. Check the message in the dialog box. To acquire the configuration information, select the **Yes. I have confirmed the above information and wish to refresh configuration.** check box, and then click the **Confirm** button.

Acquisition of configuration information begins. When the processing is completed, a dialog box to that effect is displayed.

6. Click the **Close** button to close the dialog box.

   In the application area, the list of information sources is refreshed, and the most recent refresh date and time for the configuration information are displayed in the **Last Refresh** column.

3.11 Understanding the Web Client Interface

This section provides supplemental information about the display format and messages of Web Client.

If you have changed the copy pair status from `simplex` to another status, or vice versa, refresh the configuration information to display the new information. In this case, the workload of the host is greater when the management target to be refreshed is a mainframe system than when it is an open system.

In a mainframe system, the copy pair configuration definition view enables you to continue monitoring the copy pair status without having to refresh the configuration information. To reduce the workload of the host, you can keep the configuration information unrefreshed.

3.11.1 Display Format When Copy Pair Definition Does Not Match Actual Configuration

In general, when CCI or Business Continuity Manager is used, copy pairs are configured based on the definition information for the copy pair. In this case, the definition information for the copy pair matches the actual copy pair configuration.

However, if a program such as Storage Navigator is used to configure a copy pair while no definition information is available, the definition information for the copy pair does not match the actual copy pair configuration. As a result, the display format obtained is different, and multiple information items might be displayed for a single item, or no information might be displayed for the corresponding item.

How the definition information for a copy pair, and the actual copy pair configuration, are displayed depends on the selected view and copy pair. To check the definition information for a copy pair, we recommend that you use the Pair Configurations view. To check the actual copy pair configuration, we recommend that you use the Hosts view and Subsystems view.

3.11.1.1 Understanding Display Behavior

In the Hosts view and Subsystems view

- If the copy pair definition information does not match the actual copy pair configuration, the definition information is not displayed.
- If the actual copy pair configuration exists, the actual copy pair information is displayed regardless of whether it matches the definition information for the copy pair.

In the Pair Configurations view

- In an open system, if the copy pair status is not `simplex`, the definition information for the copy pair is displayed regardless of whether it matches the actual copy pair configuration. If the copy pair status is `simplex`, the configuration information is not displayed even if the actual copy pair configuration exists. To display the information for the actual copy pair configuration, change the copy pair from `simplex` to a different status, and then refresh the configuration information.
- In a mainframe system, the definition information for the copy pair is displayed regardless of whether it matches the actual copy pair configuration.

3.11.1.2 Display Example (Hosts view and Subsystems view)

This section presents an example using the Hosts view and the Subsystems view, among the preceding display formats.

With a mainframe system, separate definition files are provided for the same copy group for different purposes, such as application and backup, and the definition files are swapped by time frame. In this case, multiple items of information are displayed for a single item, because two definition files are used.

The following shows the relationship between copy group and definition files:

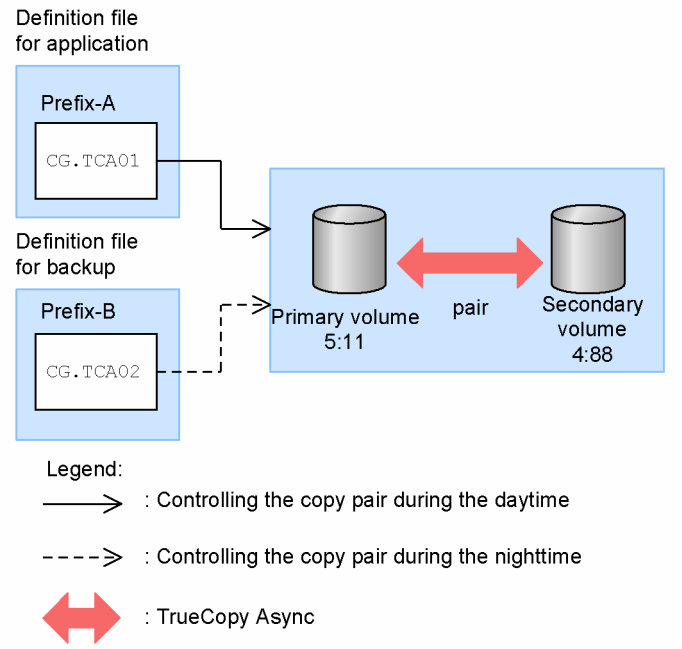


Figure 3.80 When Copy Pair Definition Information Does Not Match Actual Configuration

The following shows the information that is displayed during the daytime:

Table 3.18 Example of Information Displayed on Web Client During the Daytime (in Hosts View or Subsystems View)

Item Name		Value
Copy Type		TCA / TCE
Pair Status		
Copy Group		CG.TCA01 CG.TCA02
Primary	Pair State	Pair
	LDEV	5:11
	Subsystem	USP/14001
Secondary	Pair State	Pair
	LDEV	4:88
	Subsystem	USP/14002
Last Refresh		2006-01-19 13:17:30

Two copy group names are displayed for the Copy Group item, because two definition files are available for the same copy group.

3.11.1.3 Display Example (Pair Configurations View)

This section presents an example using the Pair Configurations view, among the display formats described in section 4.1. In an open system, if the copy pair status is `simplex`, the information is not displayed in the Pair Configurations view.

The following shows the relationship between copy group and definition files:

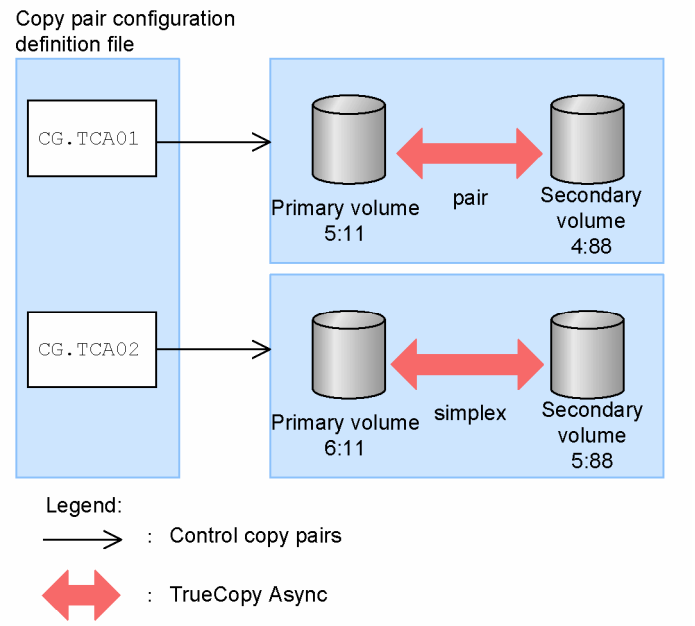


Figure 3.81 Copy Group and Definition File That Include a Copy Pair in Simplex Status

In this case, the actual copy pair configuration and the configuration information for the copy pair are not displayed for copy group `CG.TCA02`, because its copy pair status is `simplex`. To display the configuration information, change the copy pair from `simplex` to a different status.

3.11.2 Error and Warning Messages

In the event of an error, an error message or a warning message is displayed. A window containing an error message displays the icon for an error. A window containing a warning message displays the icon for a warning.

For details about the displayed messages, see the *HiCommand Replication Monitor Messages*.

3.11.2.1 Error Messages Displayed in the application area

When an error message is displayed in the application area, neither the **OK** nor the **Close** button is displayed. To change the display in the subwindow, choose a node in the **Explorer** menu or navigation area.

3.11.2.2 Error Messages in Dialog Boxes

When an error message is displayed in a dialog box, take one of the following actions:

When the **OK** button is displayed

After checking the displayed error message, click the **OK** button.

When the **OK** button is not displayed

If an error message is displayed in the dialog box used to start a wizard, no **OK** button is displayed. In this case, check the displayed error message, and then click the **Back** button. The previous step is displayed, enabling you to specify the settings again.

3.11.2.3 Warning Messages

A warning message is displayed immediately before or after an operation, such as when you refresh information or change a pair status. Check the displayed warning message, and then continue the operation.

3.11.3 Displaying Multiple Information Items for a Specific Management Target

For a specific management target, multiple information items might be displayed for a single item. In this case, each information item is separated by a comma (,) or a linefeed.

For example, when you have created several mount points by using Volume Manager, or when you are sharing a single LU among multiple hosts, multiple information items are displayed for the mount point item or the host item in the dialog box that displays detailed information. In this case, a separate line of information is displayed for each host (the mount points for each host are displayed as a concatenated string that contains delimiter commas (,) and is not broken by line feeds).

The following shows an example of the display:

Table 3.19 Correspondence Between LUN, Mount Point, and Host

LUN	Copy Type	Mount Point	Host
LUN1	TCS	/mnt,/mnt2 /mnt,/mnt2	Host_A Host_B
LUN2	TCS	/mnt,/mnt2 /mnt,/mnt2	Host_A Host_B

3.11.4 Languages Displayed While Web Client Is Operating

Replication Monitor supports English **en** and Japanese **ja** as display languages. The language used by Replication Monitor is determined by the language setting of the Web browser being used. The following table shows the relationship between the language setting of the Web browser and the language displayed in the Replication Monitor window. Replication Monitor can only display languages that have characters in UTF-8 encoding.

Table 3.20 Web Browser Language Setting and Displayed Language

Language Setting in the Web Browser		Language Displayed in the Window
Both **en** and **ja** have been set	**en** has priority over **ja**	**en**
	ja has priority over **en**	**ja**
en can be set, but **ja** cannot be set		**en**
ja can be set, but **en** cannot be set		**ja**
Neither **en** nor **ja** can be set		**en**

In the following cases, the display language is determined by the language version of the OS and Web browser, and by OS locale information.

- Buttons and dialog boxes directly displayed by the OS are displayed in the language corresponding to the language version of the OS and Web browser, regardless of locale information.
- The character encoding defined in OS locale information is used when messages output by Replication Monitor are output to log files or other resources that users can identify.
- The language corresponding to the language setting of the OS is used in the Windows event log and Solaris syslog file.

Note:

When the management client OS is Solaris, if the language setting of the Web browser differs from that of X-terminal, a character string in the title bar might not be displayed correctly. In this case, match the language setting of the Web browser to that of X-terminal.

3.11.5 If a Mozilla Window Displays Incorrectly

When using Mozilla 1.4 as a Web browser, sometimes you might not be able to display a window correctly. In this case, from the navigation area, click the **Refresh Tree** button or use the scroll bar so that the window is displayed correctly.

The following are examples of incorrectly displayed Mozilla windows:

- A dialog box is displayed as blank.

  This problem might occur if you attempt to close the dialog box by using the application area instead of the dialog box.

- Part of the object tree is no longer displayed.

  This problem might occur if you perform an operation that refreshes the object tree from the application area or dialog box, and then use the object tree from the navigation area.

Note:

When the GUI help is called from the Mozilla Web browser, italic and bold styles might not be displayed correctly. This problem cannot be solved by clicking the **Refresh Tree** button or using the scroll bar from the navigation area.

Chapter 4 Troubleshooting Replication Monitor

This chapter describes countermeasures for errors that might occur during operation of Replication Monitor.

- Resolving Errors (see section 4.1)
- Log File Output from Replication Monitor (see section 4.2)
- Maintenance Information Batch Collection Command (see section 4.3)
- Collecting Maintenance Information for a Replication Monitor Agent (see section 4.4)

4.1 Resolving Errors

This section explains the sequence of actions that a user needs to take when a problem occurs.

1. Check any messages and problem details.

   For countermeasures for each message, see the *HiCommand Replication Monitor Messages*.

2. Check the messages output to the Replication Monitor event log.

   To view the event log, choose **Administration** and then **Event Logs** in the **Explorer** menu. For details about the event log, see the *HiCommand Replication Monitor Installation and Configuration Guide*.

3. When you cannot resolve the error by checking the messages, execute the maintenance information batch collection command to obtain the integrated trace log file and trace log file.

   For details on how to execute this command, see section 4.3

4. Check the problem details by examining the integrated trace log file.

5. Track the operations executed by Replication Monitor by examining the trace log file to analyze the cause.

6. If the cause of the error cannot be established by analyzing the trace log file, send all information collected by the maintenance information batch collection command and maintenance information of the Replication Monitor agent to customer support, and then request for analysis of the information.

   For details about the maintenance information batch collection command, see section 4.3. For details about the maintenance information of the Replication Monitor agent, see section 4.4.

For details about problems that might occur during installation or uninstallation, see the discussion of troubleshooting in the *HiCommand Replication Monitor Installation and Configuration Guide*.

4.2 Log File Output from Replication Monitor

This section describes the log file output from Replication Monitor.

An output level, which corresponds to the importance of a message, is specified for messages output to log files. Replication Monitor outputs (to the log file) only those messages that have an output level equal to, or more important than, the specified log output level and its output threshold. For details about the output levels of log files, see the explanation of the log output settings in the discussion of property files in the *HiCommand Replication Monitor Installation and Configuration Guide*.

The following table describes the types of output log files.

Table 4.1 Types of Log Files Output from Replication Monitor

Type of log file	Log file name	Description	Output directory (Windows)	Output directory (Solaris)
Integrated trace log files	`hntr2`*n*`.log`	Detailed information related to server startup is output to these files. Use this log to check error details when an error occurs during Replication Monitor operation.	*system-drive*`\Program Files\Hitachi\HNTRLib2\spool`[#1]	`/var/opt/hitachi/HNTRLib2/spool`
Event log file	`Eventlog`	The Windows event log	Event Viewer	N/A
syslog file	`syslog`	The Solaris system log	N/A	Defined by `/etc/syslog.conf`
Trace log files	`HRpMTrace`*n*`.log`	Detailed information indicating the program processing status is output to these files. Use this log to track the flow of the program processing when a problem occurs during a Replication Monitor operation.	*Replication-Monitor-installation-folder*`\logs`	`/var/opt/HiCommand/ReplicationMonitor/logs`

Type of log file	Log file name	Description	Output directory (Windows)	Output directory (Solaris)
Installation related trace log files	▪ During installation: `HRpM_InstallLog.log` ▪ During uninstallation: `HRpM_UninstallLog.log`	Results of each processing performed by the installer and uninstaller (various checks, file copies, command executions) are recorded in this file. Use this log to analyze the cause of an error that occurred during installation or uninstallation. For details about the processing performed by the installer and uninstaller, see the explanation of the installation procedure in the *HiCommand Replication Monitor Installation and Configuration Guide*. For details about the trace log output format, see the explanation of troubleshooting during installation and uninstallation in the *HiCommand Replication Monitor Installation and Configuration Guide*.	*Replication-Monitor-installation-folder*`\logs`[#2]	`/var/opt/HiCommand/ReplicationMonitor/logs`
Version information log files	`HRpMVersion`	Version information for Replication Monitor	*Replication-Monitor-installation-folder*`\logs`	`/var/opt/HiCommand/ReplicationMonitor/logs`

#1

For management servers running on a Windows Server 2003 x64 Edition or Windows Server 2003 R2 x64 Edition, the output directory is as follows:

```
system-drive\Program Files(x86)\Hitachi\HNTRLib2\spool
```

#2

If an error occurs during installation and the installation folder fails to be created, the log is output to the following location:

```
system-drive\
```

4.3 Maintenance Information Batch Collection Command

The maintenance information batch collection command enables the user to collect all the information used for troubleshooting. This section describes the usage of this command.

4.3.1.1 Format

In Windows:

```
hcmdsgetlogs /dir directory-name
              [ /type HiCommand-product-name ]
              [ /arc archive-file-name ]
```

In Solaris:

```
hcmdsgetlogs -dir directory-name
             [ -type HiCommand-product-name ]
             [ -arc archive-file-name ]
```

4.3.1.2 Description

The command collects all Replication Monitor maintenance information at one time. The maintenance information is output together into an archive file. The command also collects all maintenance information of every HiCommand product installed on the same host.

The following files are collected by the maintenance information batch collection command:

- Integrated trace log file
- Trace log file
- Installation-related trace log file
- Uninstallation-related trace log file
- Version information log file
- Property file#
- Log information from execution of the HiCommand Suite Common Component commands
- License information file

#

The following property files are collected by the maintenance information batch collection command. For details about property files, see the explanation of the property file settings in the *HiCommand Replication Monitor Installation and Configuration Guide*.

- `installation.properties`
- `client.properties`
- `database.properties`
- `logger.properties`

- monitor.properties
- agentif.properties
- serverstorageif.properties
- bcmif.properties
- base.properties

4.3.1.3 Arguments

`dir` *directory-name*

Specify the directory name where the collected maintenance information is to be stored. In Solaris, you cannot specify a directory name containing a space character. There is no need to create the specified directory. The specified directory is created automatically. If the specified directory already exists, make sure that there are no subdirectories or files in the directory. If there are any subdirectories or files in the specified directory, an error message will be produced and the maintenance information collection processing will be cancelled.

The maximum length allowed for a directory name is as follows:

- When the `type` option is not specified: 71 bytes
- When `ReplicationMonitor` is specified in the `type` option: 35 bytes

For details about the maximum allowable length when an application name other than `ReplicationMonitor` is specified in the `type` option, see the manual for each product.

`type` *HiCommand-product-name*

Specify the name of the target product from which the maintenance information is to be collected, from among the HiCommand products. If this option is omitted, all HiCommand products installed on the management server are deemed to be the target.

When specifying Replication Monitor, specify `ReplicationMonitor`.

To examine the cause of the problem, you need the maintenance information in Replication Monitor and Device Manager. Use the maintenance information batch collection command twice to collect the maintenance information from Replication Monitor and Device Manager, or omit the `type` option to collect the maintenance information from every HiCommand product. Note, however, that collecting the maintenance information from all the HiCommand products might require a large capacity for the files.

`arc` *archive-file-name*

Specify the name of the archive file to be created. Do not specify a path for the archive file name. If you do so, the command might terminate abnormally.

The name of the archive file is generated with the specified name and an extension of `.jar`.

If this option is omitted, the archive file name will be `HiCommand_log.jar`.

4.3.1.4 Return Values

0: Normal termination

1: Invalid argument

2: Termination with an error

4.3.1.5 Notes

To execute this command, the following user must be logged in to the system:

- In Windows:

  An Administrators group user

- In Solaris:

  A root user

Do not concurrently execute more than one maintenance information batch collection command.

The following lists notes on arguments:

- The following characters cannot be used for specifying arguments:
  - In Windows:

    \ / : , * ? " < > | $ % ' `

    However, a backslash (\), forward slash (/), and colon (:) can be used as a delimiter. Note that a delimiter cannot be specified at the end of a directory name.
  - In Solaris:

    \ / : , * ? " $ % `

    However, a forward slash (/) can be used as a delimiter. Note that a delimiter cannot be specified at the end of a directory name.
- The following characters can be used when the entire argument is enclosed in quotation marks. Note that you cannot enclose only part of an argument in quotation marks.
  - In Windows (double quotation marks (") can be used):

    ; = , & and the space character
  - In Solaris (both single (') and double (") quotation marks can be used):

    ; & ( ) | < > ' and the space character

    The escape character (\) can be used immediately before each character instead of enclosing the entire argument in quotation marks.

4.3.1.6 Execution Examples

In the following example, the command collects the maintenance information of Replication Monitor:

In Windows:

```
> hcmdsgetlogs /dir C:\logfile /type ReplicationMonitor
```

In Solaris:

```
# hcmdsgetlogs -dir /logfile -type ReplicationMonitor
```

In the following example, the command collects all maintenance information of HiCommand products (the output archive file name is `Hitachi_log`):

In Windows:

```
> hcmdsgetlogs /dir "C:\Program Files\HiCommand\log" /arc Hitachi_log
```

In Solaris:

```
# hcmdsgetlogs -dir "(user1)/HiCommand/log" -arc Hitachi_log
```

or

```
# hcmdsgetlogs -dir \(user1\)/HiCommand/log -arc Hitachi_log
```

4.4 Collecting Maintenance Information for a Replication Monitor Agent

When a failure occurs in a Replication Monitor agent, collect maintenance information for the Replication Monitor agent to determine the cause of the failure.

In most cases, to determine the cause of a failure, you need maintenance information for both the Replication Monitor agent and the Device Manager agent. In Device Manager agent 05-60 or later, you can use the maintenance information batch collection tool (TIC: Trouble Information Collector) supported by the Device Manager agent to batch collect maintenance information for the Replication Monitor agent.

Depending on the Device Manager version you are using, use either of the following ways to collect maintenance information:

- When using a Device Manager agent version 05-60 or later:

  Use the `TIC` command provided by the Device Manager agent to batch collect maintenance information for the Replication Monitor agent and Device Manager agent.

- When using a Device Manager agent version earlier than 05-60:

  You cannot collect maintenance information for the Replication Monitor agent by using the `TIC` command supported by a Device Manager version earlier than 05-60. Use the `hrpm_getras` command to collect maintenance information for the Replication Monitor agent.

  To collect maintenance information for the Device Manager agent, use the TIC command.

4.4.1 Using the TIC Command to Collect Maintenance Information for the Replication Monitor Agent

When a Device Manager agent whose version is 05-60 or later is installed on a pair management server, you can use the `TIC` command supported by the Device Manager agent to batch collect maintenance information for both the Device Manager agent and Replication Monitor agent.

For details about the `TIC` command, see the *HiCommand Device Manager Agent Installation Guide*.

4.4.2 Using the hrpm_getras Command to Collect Maintenance Information for the Replication Monitor Agent

When a Device Manager agent whose version is earlier than 05-60 is installed on a pair management server, use the `hrpm_getras` command to collect maintenance information for the Replication Monitor agent. Note that, to determine the cause of a failure, you also need to use the `hcmdgetlogs` command to collect maintenance information for the management server, in addition to maintenance information for the pair management server. The following explains how to use the `hrpm_getras` command:

4.4.2.1 Format

```
hrpm_getras directory-name
```

4.4.2.2 Description

Collects maintenance information for a Replication Monitor agent.

4.4.2.3 Arguments

directory-name

Specifies the name of the directory in which collected maintenance information is stored. An absolute path or relative path can be specified. Enclose in double quotation marks (") directory names containing space characters.

If you specify an existing directory, all the files and subdirectories in that directory are deleted, and then maintenance information is collected and stored.

In Windows:

- The following characters cannot be specified in a directory name:

  / , * ? " < > | $ % & ' ` ; [ ] { }

- The colon (:) indicates a drive, and the backslash (\) separates directory levels.

In Solaris:

- The following characters cannot be specified in a directory name:

  , * ? " < > | $ % & ' ` \ : ; [ ] { }

- The forward slash (/) indicates a drive and separates directory levels.

4.4.2.4 Execution Examples

In the following example, the hrpm_getras command collects the Replication Monitor maintenance information :

In Windows:

```
> hrpm_getras C:\logfile
```

In Solaris:

```
# hrpm_getras /logfile
```

4.5 Contacting the Hitachi Data Systems Technical Support Center

If you need to call the Hitachi Data Systems Support Center, make sure to provide as much information about the problem as possible, including the circumstances surrounding the error or failure, and the exact content of any error messages.

The Hitachi Data Systems customer support staff is available 24 hours a day, seven days a week. If you need technical support, please call:

- United States: (800) 446-0744
- Outside the United States: (858) 547-4526

Appendix A Conditions for Determining Copy Pair Status (Combination of Primary and Secondary Volume Copy Pair States)

The copy pair status displayed in Replication Monitor is determined by the combination of primary and secondary volume copy pair states. The copy pair status, determined by the combination of primary and secondary volume copy pair states, varies according to the copy types.

The following table shows the conditions for determining copy pair status when the copy type is TrueCopy Async, TrueCopy Sync, TrueCopy Extended Distance, or Universal Replicator (the table has been split into three parts).

Table A.1 Conditions for determining copy pair status 1/3 (for TrueCopy Async, TrueCopy Sync, TrueCopy Extended Distance, and Universal Replicator)

Copy pair state of the secondary volume	Copy pair state of the primary volume						
	Invalid	Suspended	Suspended (ER)	Suspended (CU)	Suspended (HOLDER)	Error in LUSE	Split (Full)
Invalid	error	error	error	error	error	error	error
Suspended	error	error	error	--	--	error	error
Suspended (ER)	error	error	error	error	error	error	error
Suspended (CU)	error	--	error	error	error	--	--
Error in LUSE	error	error	error	--	--	error	error
Split (Full)	error	error	error	--	--	error	error
Split (SW)	suspend	error	suspend/error[#]	suspend	error	error	error
Split (SUSPOP)	suspend	--	error	error	error	--	--
Split (HOLD)	suspend	--	error	error	error	--	--
Split	suspend	error	error	--	--	error	error
Trans	copying	error	error	error	error	error	error
Deleting	copying	error	error	--	--	error	error
Suspending	copying	error	error	--	--	error	error
Copying	copying	error	error	error	error	error	error
Pair (Full)	sync	error	error	--	--	error	error
Pair	sync	error	error	error	error	error	error
Simplex	simplex	error	error	error	error	error	error
Unknown	error	error	error	error	error	error	error

Legend:

--: The indicated combination does not exist.

#

`suspend` is displayed for a mainframe system, and `error` for an open system.

Table A.2 Conditions for determining copy pair status 2/3 (for TrueCopy Async, TrueCopy Sync, TrueCopy Extended Distance, and Universal Replicator)

Copy pair state of the secondary volume	Copy pair state of the primary volume						
	Split (NODELTA)	Split (SUSPOP)	Split (HOLD)	Split	Split (CHKJNL)	Split (HOLDTRNS)	Trans
Invalid	error	suspend	suspend	suspend	copying	copying	copying
Suspended	--	--	--	error	--	--	error
Suspended (ER)	error	error	error	error	error	error	error
Suspended (CU)	error	error	error	--	error	error	error
Error in LUSE	--	--	--	error	--	--	error
Split (Full)	--	--	--	error	--	--	error
Split (SW)	copying	suspend	copying	suspend	copying	copying	copying
Split (SUSPOP)	copying	suspend	copying	--	copying	copying	copying
Split (HOLD)	error	copying	suspend	--	copying	copying	copying
Split	--	--	--	suspend	--	--	copying
Trans	copying	copying	copying	copying	copying	copying	copying
Deleting	--	--	--	copying	--	--	copying
Suspending	--	--	--	copying	--	--	copying
Copying	copying	copying	copying	copying	copying	copying	copying
Pair (Full)	--	--	--	copying	--	--	copying
Pair	copying	copying	copying	copying	copying	copying	copying
Simplex	error	suspend	error	suspend	error	error	copying
Unknown	error	suspend	suspend	suspend	copying	copying	copying

Legend:

--: The indicated combination does not exist.

Table A.3 Conditions for determining copy pair status 3/3 (for TrueCopy Async, TrueCopy Sync, TrueCopy Extended Distance, and Universal Replicator)

Copy pair state of the secondary volume	Copy pair state of the primary volume						
	Deleting	Suspending	Copying	Pair (Full)	Pair	Simplex	Unknown
Invalid	copying	copying	copying	sync	sync	simplex	error

Suspended	error	error	error	error	error	simplex	error
Suspended (ER)	error	error	error	error	error	simplex	error
Suspended (CU)	--	--	error	--	error	simplex	error
Error in LUSE	error	error	error	error	error	simplex	error
Split (Full)	error	error	error	error	error	simplex	error
Split (SW)	copying	copying	copying	copying	suspend/copying#	simplex	suspend
Split (SUSPOP)	--	--	copying	--	copying	simplex	suspend
Split (HOLD)	--	--	copying	--	copying	copying	suspend
Split	copying	copying	copying	copying	copying	simplex	suspend
Trans	copying	copying	copying	copying	copying	simplex	copying
Deleting	copying	copying	copying	copying	copying	copying	copying
Suspending	copying	copying	copying	copying	copying	simplex	copying
Copying	copying	copying	copying	copying	copying	simplex	copying
Pair (Full)	copying	copying	copying	sync	sync	simplex	sync
Pair	copying	copying	copying	sync	sync	simplex	sync
Simplex	copying	copying	copying	copying	copying	simplex	simplex
Unknown	copying	copying	copying	sync	sync	simplex	unknown

Legend:

--: The indicated combination does not exist.

#

`suspend` is displayed for a mainframe system when the copy type is TrueCopy Sync. `copying` is displayed for an open system or for a mainframe system when the copy type is TrueCopy Async or Universal Replicator.

The following table shows the conditions for determining copy pair status when the copy type is ShadowImage or QuickShadow/Copy-on-Write Snapshot (the table has been split into two parts).

Table A.4 Conditions for determining copy pair status 1/2 (for ShadowImage and QuickShadow/Copy-on-Write Snapshot)

Copy pair state of the secondary volume	Copy pair state of the primary volume						
	Invalid	Suspended	Suspended (ER)	Split (SP)	Split (SUSPOP)	Split	Trans
Invalid	error	error	error	suspend	suspend	suspend	copying
Suspended	error	error	error	suspend	--	suspend	copying
Suspended (ER)	error	error	error	suspend	suspend	suspend	copying

Split (SP)	suspend	error	error	suspend	suspend	suspend	copying
Split (SUSPOP)	suspend	--	error	suspend	suspend	--	copying
Split	suspend	error	error	suspend	--	suspend	copying
Trans	copying	error	error	suspend	suspend	suspend	copying
Deleting	copying	error	error	suspend	--	suspend	copying
Copying	copying	error	error	suspend	suspend	suspend	copying
Copying (Reverse)	copying	error	error	suspend	suspend	suspend	copying
Pair	sync	error	error	suspend	suspend	suspend	copying
Simplex	simplex	error	error	suspend	suspend	suspend	copying
Unknown	error	error	error	suspend	suspend	suspend	copying

Legend:

--: The indicated combination does not exist.

Table A.5 Conditions for determining copy pair status 2/2 (for ShadowImage and QuickShadow/Copy-on-Write Snapshot)

Copy pair state of the secondary volume	Copy pair state of the primary volume					
	Deleting	Copying	Copying (Reverse)	Pair	Simplex	Unknown
Invalid	copying	copying	copying	sync	simplex	error
Suspended	copying	copying	copying	sync	error	error
Suspended (ER)	copying	copying	copying	sync	error	error
Split (SP)	copying	copying	copying	sync	error	suspend
Split (SUSPOP)	--	copying	copying	sync	error	suspend
Split	copying	copying	copying	sync	error	suspend
Trans	copying	copying	copying	sync	error	copying
Deleting	copying	copying	copying	sync	error	copying
Copying	copying	copying	copying	sync	error	copying
Copying (Reverse)	copying	copying	copying	sync	error	copying
Pair	copying	copying	copying	sync	error	sync
Simplex	copying	copying	copying	sync	simplex	simplex
Unknown	copying	copying	copying	sync	simplex	unknown

Legend:

--: The indicated combination does not exist.

Acronyms and Abbreviations

AMS	Adaptable Modular Storage
CCI	Command Control Interface
CSV	comma separated value
CU	Control Unit
DAMP	Disk Array Management Program
DEVN	DEVice Number
GUI	Graphical User Interface
HP SIM	HP Systems Insight Manager
HTTP	HyperText Transfer Protocol
HTTPS	HyperText Transfer Protocol Security
IP	Internet Protocol
LAN	Local Area Network
LDEV	Logical DEVice
LU	Logical Unit
LUN	Logical Unit Number
OS	Operating System
P-VOL	Primary volume
RAID	Redundant Array of Independent Disks
SAN	Storage Area Network
SMTP	Simple Mail Transfer Protocol
SNMP	Simple Network Management Protocol
SP-VOL	Secondary-primary volume
SSL	Secure Sockets Layer
S-VOL	Secondary volume
TCA	TrueCopy Async
TIC	Trouble Information Collector
URL	Uniform Resource Locator
USP	Universal Storage Platform
USP V	Universal Storage Platform V
WMS	Workgroup Modular Storage

Glossary

Abbreviation	Full name or meaning
3DC Multi-Target configuration	A configuration where a short-distance local site and long-distance remote site are established, and TrueCopy and Universal Replicator are used for copying from the primary site to the local site, and from the primary site to the remote site.
application server	The machine on which application programs are installed. Also called the **host.** The host uses the storage subsystem as an external storage device. In an open system, information about the host can be acquired if a Device Manager agent is installed on the host. In a mainframe system, the host on which Business Continuity Manager is installed is also called the **pair management server**. The pair management server can acquire copy pair configuration and status information about the copy pairs it manages.
batch collection command for maintenance information	Software that collects necessary information such as log files and property files, related to a problem that cannot be resolved at the user level, for forwarding on to customer support.
Business Continuity Manager	Software used to control the storage subsystem from the host in a mainframe system. By using Business Continuity Manager to issue commands from the host to the storage subsystem, you can acquire copy pair configuration and status information. A Replication Monitor server acquires information about copy pair configuration and status in conjunction with Business Continuity Manager.
cascade structure	A structure of consecutive copy pairs. In a cascade structure, the secondary volume of a given copy pair coincides with the primary volume of another copy pair. This volume is called the **secondary/primary volume (SP-VOL)**.
CCI	Software used to control the storage subsystem from the host in an open system, which is used to control storage subsystem volume duplication features (such as TrueCopy and ShadowImage) by issuing commands from the host to the storage subsystem, and also is used for gathering information about pair configuration in the storage subsystem. Replication Monitor acquires information about copy pair configuration and status in conjunction with a Device Manager server, a Device Manager agent, and CCI.
cluster configuration	In the Replication Monitor operating environment, the term **cluster configuration** refers to the configuration of duplicated management servers consisting of an executing node and a standby node.

cluster software	Software required to be installed on management server nodes to boost overall availability by duplicating management servers as a cluster system. Available software depends on the OS that runs on the management server.
Copy-on-Write Snapshot	Software provided by the storage subsystem, used to duplicate volumes within a storage subsystem. For more information, see the Copy-on-Write Snapshot manual.
copy group	A group of multiple copy pairs. Operations such as pair status modification apply to all copy pairs in the group.
copy pair	Denotes a primary and secondary volume pair linked by the volume replication function of the storage subsystem. Also called a **pair volume**. In this manual, **copy pair** is sometimes written simply as *pair*.
copy pair state	Indicates in detail the current state of a copy pair status. Each copy pair **state** value is categorized into one of the six copy pair **status** values used in Replication Monitor (`error`, `suspend`, `copying`, `sync`, `simplex`, and `unknown`).
copy pair status	Indicates the current status of the copy pair. Replication Monitor uses six status values: `error`, `suspend`, `copying`, `sync`, `simplex`, and `unknown`. Also called **pair status**.
copy progress	Progress status of the volume replication function performed by the storage subsystem. Replication Monitor displays the copy progress, according to the copy pair status, for items that are **Active** or **Inactive**. For **Active** items, the copy progress is displayed when the copy pair status is `copying` or `sync`. For **Inactive** items, the copy progress is displayed when the copy pair status is `error` or `suspend`.
CU (Control Unit)	A virtual control unit created in an enterprise-class storage subsystem. Also called a CU image. The LDEVs created in a storage subsystem are connected to a single CU, and a number is assigned to each CU for identifying the LDEVs. Therefore, volumes (LDEVs) in a storage subsystem are specified by the CU number (CU#) and LDEV number.
delta resync	A status in which synchronization processing is performed by copying differential data to a Universal Replicator copy pair that exists between a local site and a remote site in a 3DC Multi-Target configuration.
Device Manager	Software used for the operation and/or management of a system that uses multiple or different types of storage subsystems. Device Manager consists of a Device Manager server and a Device Manager agent.

DEVN (Device Number)	A device number that is assigned to identify an LDEV when it is being used by a mainframe system. A DEVN is expressed as a 4-digit hexadecimal number.
HiCommand Suite Common Component	A component that provides functionality common to all HiCommand products, including login, output log, and Web services. Installed as part of a Replication Monitor server.
HiCommand Suite common log file	A log file for detailed information on events such as server startup. Used to check errors that occur during Replication Monitor operation.
host	The machine on which application programs are installed. Also called the **application server**.
host storage domain	A group of volumes (LUs) in a storage subsystem and the hosts that can access those LUs. A host storage domain is defined to improve LU security. Device Manager can be used to define a host storage domain using the host group set by the LUN security function of a storage subsystem, such as Universal Storage Platform V, TagmaStore USP, Lightning 9900V, or Thunder 9500V.
installation related trace log file	A log file of detailed processing information generated during installation and uninstallation of Replication Monitor. Used to trace the source of errors that occur during installation and uninstallation.
journal group	A group used in Universal Replicator as a unit to keep the integrity of the update order for a volume.
LDEV (Logical Device)	A volume created in an enterprise-class storage subsystem. Also called a **logical device**.
LU (Logical Unit)	A volume created in a midrange storage subsystem. Also called a **logical unit**. When an LDEV volume created in an enterprise-class storage subsystem is used from an open system host, it is treated as an LU.
LUN (Logical Unit Number)	A management number assigned to LUs in a storage subsystem. A LUN is a number assigned to identify LUs for the port in the storage system to which the LU is connected, either by port or by host group assigned to the port. An open system host uses a LUN to access a particular LU.

management client	The machine on which the Replication Monitor Web Client is executed. Issues instructions to the Replication Monitor server on the management server for basic Replication Monitor operations, such as pair configuration browsing, pair status monitoring and pair status modification.
management server	The machine on which a Replication Monitor server and its prerequisite program, a Device Manager server, are installed. The management server requests information such as copy pair configuration and status information and host information from all pair management servers and hosts, and provides this information to management clients.
MIB (Management Information Base)	The structure of information used by the SNMP protocol is defined. The MIB used for Replication Monitor defines the information set for alerts, such as monitored targets, conditions, and messages.
Pair	In this manual, **pair** means **copy pair**.
pair management server	A server for managing copy pairs and for collecting information about copy pair configuration and status. In an open system, a Device Manager agent, CCI, and a Replication Monitor agent are installed on the pair management server. Once a pair management server, which is independent of the host, is installed, the load on the host is reduced. In a mainframe system, a host on which Business Continuity Manager is installed is a pair management server.
pair status	Indicates the current status of the copy pair. Replication Monitor uses six status values: error, suspend, copying, sync, simplex, and unknown. Pair status is also called **copy pair status**.
paired volume	Denotes a primary and secondary volume pair linked by the volume replication function of the storage subsystem. Also called a **copy pair**. In this manual, **copy pair** is sometimes written simply as **pair**.
prefix	The name of the prefix portion of the copy group definition file (*prefix*.GRP.*copy-group-id*) created by Business Continuity Manager. Replication Monitor uses the prefix as a unique name to identify copy group definition files created by Business Continuity Manager.
primary volume (P-VOL)	The source volume that is copied to another volume using the volume replication function of the storage subsystem.

property files	Generic term for the files that define the Replication Monitor operating environment. The Replication Monitor operating environment can be modified by changing the appropriate property files.
QuickShadow	Software provided by the storage subsystem, used to duplicate volumes within a storage subsystem. For more information, see the QuickShadow manual.
refresh	The term **refresh** refers to updating the database that is maintained by the Replication Monitor server, by using the most recent information. This database stores copy pair configuration information and copy pair status information obtained from the Device Manager server, the Replication Monitor agent, and Business Continuity Manager.
secondary-primary volume (SP-VOL)	The volume located in the middle of the cascade structure, when a cascade structure is used by the volume replication function of the storage subsystem. Indicates the secondary volume in an upper level copy pair and the primary volume in a lower level copy pair.
secondary volume (S-VOL)	The destination volume to which the primary volume is copied using the volume replication function of the storage subsystem.
ShadowImage	Software provided by the storage subsystem, used to duplicate volumes within a storage subsystem. For more information, see the ShadowImage manual.
subsystem	An external storage device (storage subsystem) connected to the host. In this manual, **subsystem** means **storage subsystem**.
summary pair status, displaying	By displaying only the summary copy pair status in the upper levels that contain the copy pairs (such as at the host level from the host perspective, or at the storage subsystem level from the subsystem perspective), Replication Monitor enables viewers to quickly check copy pair status. Replication Monitor determines the summary copy pair status for each copy function (such as ShadowImage and TrueCopy) in turn.
TIC (Trouble Information Collector)	A Trouble Information Collector, used to collect information for a Device Manager agent and various agents installed on the same pair management server. The TIC included with version 05-60 or later of Device Manager agent can also collect log files and system information needed to perform a failure analysis of a Replication Monitor agent.
trace log file	A log file containing detailed program processing information, used to analyze program processing in the event of an error during Replication Monitor operation.

TrueCopy	Software provided by the storage subsystem, used to duplicate volumes between storage subsystems. For more information, see the TrueCopy manual.
Universal Replicator	Software provided by the storage subsystem and used to asynchronously duplicate volumes between storage subsystems. For more information, see the Universal Replicator manual.
volume	A collective name for the logical devices (LDEVs) and logical units (LUs) that are created in the storage subsystem.
volume replication functions	Generic term used in this manual to refer to high-speed volume replication functions in the storage subsystem (such as ShadowImage and TrueCopy). The mirror control function provided by the storage subsystem can be used to quickly create a replica of the volume without passing through the LAN.

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