



Hitachi Universal Storage Platform V Hitachi Universal Storage Platform VM Hitachi Compatible Replication for IBM® XRC User's Guide

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Preface

This document describes and provides instructions for using the Hitachi Compatible Replication for IBM® XRC feature of the Hitachi Universal Storage Platform V (USP V) and Hitachi Universal Storage Platform VM (USP VM) storage systems.

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

This preface includes the following information:

- [Intended Audience](#)
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Notice: The use of Hitachi Compatible Replication for IBM® XRC and all other Hitachi Data Systems products is governed by the terms of your agreement(s) with Hitachi Data Systems.

Intended Audience

This document is intended for system administrators, Hitachi Data Systems representatives, and Authorized Service Providers who are involved in installing, configuring, and operating the Hitachi Universal Storage Platform V and VM storage systems.

This document assumes the following:

- The user has a background in data processing and understands RAID storage systems and their basic functions.
- The user is familiar with the Hitachi Universal Storage Platform V and/or VM storage system and has read the *Universal Storage Platform V/VM User and Reference Guide*.
- The user is familiar with the Storage Navigator software for the Universal Storage Platform V/VM and has read the *Storage Navigator User's Guide*.
- The user is familiar with the IBM Extended Remote Copy (XRC) host software.

Product Version

This document revision applies to USP V/VM microcode 60-02-2x and higher.

Document Revision Level

Revision	Date	Description
MK-96RD610-00	January 2008	Initial Release
MK-96RD610-01a	Sept 2008	Revision 1, supersedes and replaces MK-96RD610-00
MK-96RD610-01b	Feb 2009	Incorporated "RSD_Comment_MK-96RD610-01a-HDS".
MK-96RD610-01c	Sept 2010	Incorporated "Updates_to_XRC_manual_RSDcmt.doc".

Source Documents for this Revision

- MK-96RD610-01a-HDS.doc.

Changes in this Revision

- Added the recommendation to assign open-systems volumes and mainframe volumes to separate CLPRs ([Performance Considerations](#)).
- Updated the presentation of the information for the Compatible XRC GUI on Storage Navigator ([Using the Compatible XRC GUI](#)).
- Added important information about XRC session suspension considerations (new section [XRC Session Suspension Considerations](#)).

Document Organization

The following table provides an overview of the contents and organization of this document. Click the [chapter title](#) in the left column to go to that chapter. The first page of each chapter provides links to the sections in that chapter.

Chapter	Description
1. Overview of Hitachi Compatible Replication for IBM XRC	Provides an overview of the Hitachi Compatible XRC software and describes its features and benefits.
2. Compatible XRC Operations	Provides an overview of Compatible XRC operations.
3. Preparing for Compatible XRC Operations	Outlines the components that are required for Compatible XRC operations.
4. Performing Compatible XRC Operations	Describes the Compatible XRC GUI and explains how to prepare your system and perform XRC operations.
5. Troubleshooting	Provides troubleshooting information for Compatible XRC and instructions for calling technical support.

Referenced Documents

Hitachi Universal Storage Platform V/VM:

- *User and Reference Guide*, MK-96RD635
- *Storage Navigator User's Guide*, MK-96RD621
- *TrueCopy for IBM z/OS User's Guide*, MK-94RD623
- *Storage Navigator Messages*, MK-96RD613
- *ShadowImage for IBM z/OS User's Guide*, MK-96RD618
- *Compatible Mirroring for IBM® FlashCopy® User's Guide*, MK-96RD614

IBM documents:

- *DFSMS Advanced Copy Services (SC35-0428-02)*
- *Implementing ESS Copy Services on S/390 (SG24-5680)*

Document Conventions

The terms “Universal Storage Platform V” and “Universal Storage Platform VM” refer to all models of the Hitachi Universal Storage Platform V and VM storage systems, unless otherwise noted.

This document uses the following typographic conventions:

Convention	Description
Bold	Indicates text on a window, other than the window title, including menus, menu options, buttons, fields, and labels. Example: Click OK .
<i>Italic</i>	Indicates a variable, which is a placeholder for actual text provided by the user or system. Example: copy <i>source-file target-file</i> Note: Angled brackets (< >) are also used to indicate variables.
screen/code	Indicates text that is displayed on screen or entered by the user. Example: # pairdisplay -g ora db
< > angled brackets	Indicates a variable, which is a placeholder for actual text provided by the user or system. Example: # pairdisplay -g <group> Note: Italic font is also used to indicate variables.
[] square brackets	Indicates optional values. Example: [a b] indicates that you can choose a, b, or nothing.
{ } braces	Indicates required or expected values. Example: { a b } indicates that you must choose either a or b.
vertical bar	Indicates that you have a choice between two or more options or arguments. Examples: [a b] indicates that you can choose a, b, or nothing. { a b } indicates that you must choose either a or b.
underline	Indicates the default value. Example: [<u>a</u> b]

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

Icon	Meaning	Description
	Note	Calls attention to important and/or additional information.
	Tip	Provides helpful information, guidelines, or suggestions for performing tasks more effectively.
	Caution	Warns the user of adverse conditions and/or consequences (e.g., disruptive operations).
	WARNING	Warns the user of severe conditions and/or consequences (e.g., destructive operations).

Convention for Storage Capacity Values

Physical storage capacity values (e.g., disk drive capacity) are calculated based on the following values:

- 1 KB = 1,000 bytes
- 1 MB = 1,000² bytes
- 1 GB = 1,000³ bytes
- 1 TB = 1,000⁴ bytes
- 1 PB = 1,000⁵ bytes

Logical storage capacity values (e.g., logical device capacity) are calculated based on the following values:

- 1 KB = 1,024 (2¹⁰) bytes
- 1 MB = 1,024 KB or 1,024² bytes
- 1 GB = 1,024 MB or 1,024³ bytes
- 1 TB = 1,024 GB or 1,024⁴ bytes
- 1 PB = 1,024 TB or 1,024⁵ bytes
- 1 block = 512 bytes

Accessing Product Documentation

The user documentation for the Hitachi RAID storage systems is available on the Hitachi Data Systems Portal: <https://hdssupport.hds.com>. Check this site for the most current documentation, including important updates that may have been made after the release of the product.

Getting Help

The Hitachi Data Systems customer support staff is available 24 hours a day, seven days a week. If you need technical support, log on to the Hitachi Data Systems Portal for contact information: <https://hdssupport.hds.com>

Comments

Please send us your comments on this document: doc.comments@hds.com. Include the document title, number, and revision, and refer to specific section(s) and paragraph(s) whenever possible.

Thank you! (All comments become the property of Hitachi Data Systems.)

Overview of Hitachi Compatible Replication for IBM XRC

This chapter summarizes the Hitachi Compatible Replication for IBM XRC feature (Compatible XRC) and reviews the copy features that can be used in combination with XRC on the Hitachi Universal Storage Platform V and VM storage systems.

- [Hitachi Compatible Replication for IBM® XRC](#)
- [Other Supported Copy Features](#)

Hitachi Compatible Replication for IBM® XRC

The Hitachi Compatible Replication for IBM XRC feature (Compatible XRC) for the Hitachi Universal Storage Platform V/VM storage systems provides compatibility with IBM Extended Remote Copy (XRC) asynchronous remote copy operations for data backup and recovery in the event of a disaster.

Hitachi Compatible XRC is compatible with System Data Mover (SDM) in Data Facility Storage Management Subsystem (DFSMS), which is common to the XRC environment. XRC operations are performed by issuing TSO commands from the host system to the logical devices on the USP V/VM storage system. The data written by the host at the primary site is temporarily stored as a sidefile in cache. Upon request of the host at the secondary site, the sidefile is asynchronously transferred to the secondary site for data backup.

Since XRC is an asynchronous remote copy feature, host I/O response time at the primary site does not depend on the distance between the primary and secondary sites. Therefore, a long distance connection can be used between these sites. By using a common time stamp provided by the Sysplex timer, XRC guarantees that data written at the secondary site is written in the same order as at the primary site.

In XRC operations, a group of volumes is processed as one session. The order of writes at the secondary site is guaranteed for each session. You can register 4,096 sessions in one storage system, and XRC enables you to have a large-scale remote copy system involving multiple hosts.

The Compatible XRC program product must be installed in the Universal Storage Platform V/VM storage system at the primary site. Compatible XRC allows you to configure the settings and options for and monitor XRC operations on the Universal Storage Platform V/VM.

Other Supported Copy Features

The Hitachi Universal Storage Platform V/VM storage system supports the following copy features that can be used in combination with XRC in mainframe systems:

- Hitachi TrueCopy for IBM z/OS®
- Hitachi ShadowImage for IBM z/OS®
- Hitachi Compatible Mirroring for IBM® FlashCopy®

Hitachi TrueCopy for IBM z/OS

Hitachi TrueCopy for IBM z/OS (TCz) enables you to create copies of volumes in two different storage systems at remote locations. You can manage the data in mainframe systems by using the TrueCopy for z/OS software on Storage Navigator or by using TSO and/or ICKDSF commands.

Hitachi TrueCopy for IBM z/OS has synchronous (TCz Sync) and asynchronous (TCz Async) copy modes:

- TCz synchronous can be used for volume-based real-time data backup. TCz Synchronous can be used in conjunction with XRC to support disaster recovery systems in three data center (3DC) configuration. See [Using XRC in Conjunction with TrueCopy for z/OS](#) for further information on combining XRC and TCz Sync operations.
- TCz asynchronous enables you to back up data asynchronously using the host write operation, so that the response time to the host is not affected.

For information and instructions on using Hitachi TrueCopy for IBM z/OS, see the *Hitachi TrueCopy for IBM z/OS User's Guide* (MK-96RD623), or contact your Hitachi account team.

Hitachi ShadowImage for IBM z/OS

Hitachi ShadowImage for IBM z/OS (SIz) enables you to set up and maintain multiple copies of volumes within the same USP V/VM storage system. You can manage data in mainframe systems by using the ShadowImage for z/OS software on Storage Navigator or by using TSO and/or ICKDSF commands.

The RAID-protected ShadowImage duplicate volumes are created within the same USP V/VM storage system at hardware speeds. SIz can be used in conjunction with XRC operations to maintain multiple copies of critical data at your primary and/or secondary sites. See [Using XRC in Conjunction with ShadowImage for z/OS](#) for further information on combining XRC and ShadowImage for z/OS operations.

For information and instructions on using Hitachi ShadowImage for IBM z/OS, see the *Hitachi ShadowImage for IBM z/OS User's Guide* (MK-96RD619), or contact your Hitachi account team.

Hitachi Compatible Mirroring for IBM FlashCopy

The Hitachi Compatible Mirroring for IBM[®] FlashCopy (FlashCopy Mirroring) program product enables you to set up and maintain multiple copies of volumes on the Universal Storage Platform V/VM storage systems. FlashCopy Mirroring operations are performed by issuing TSO and/or DFSMSdss commands from the host to the USP V/VM storage system.

If you use FlashCopy in conjunction with XRC, you are able to maintain multiple copies of critical data at your primary and/or secondary sites. See [Using XRC in Conjunction with FlashCopy Mirroring](#) for further information on combining XRC and FlashCopy Mirroring operations.

For further information on FlashCopy Mirroring, see the *Hitachi Compatible Mirroring for IBM FlashCopy User's Guide* (MK-96RD614), or contact your Hitachi account team.

Compatible XRC Operations

This chapter contains details and examples of the data replication process.

- [Function Overview](#)
- [Configuration](#)
- [XRC Options on the Universal Storage Platform V/VM](#)
- [Do Not Block Parameter of the SDM XADPAIR Command](#)
- [Interoperability with Other Products and Functions](#)

Function Overview

In IBM XRC operations, the data written from the primary host at the primary site is written to the primary volume by means of the cache memory at the primary USP V/VM storage system. At the same time, the data is temporarily stored in cache memory as a sidefile. At the secondary site, the System Data Mover (SDM) software asynchronously reads the sidefile data over communication lines from the primary storage system at the primary site. SDM then writes the data to the secondary volume in the secondary storage system in the same order as it was written at the primary site.

SDM manages pair definitions of the primary and secondary storage systems or pair definitions of the primary and secondary volumes. An overview of XRC operations is shown next in Figure 2-1.

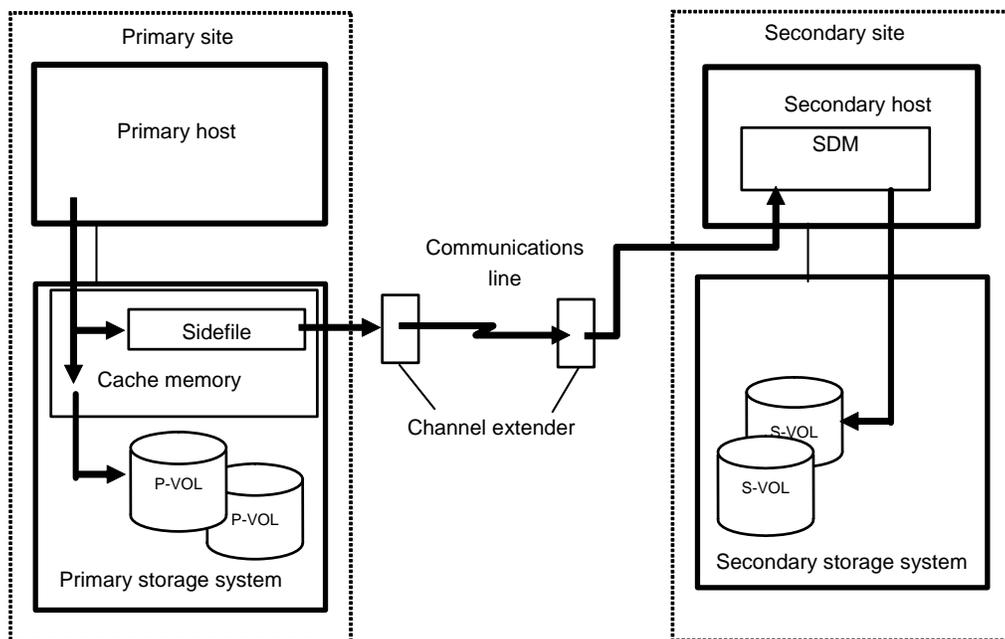


Figure 2-1 Overview of IBM XRC Operations

Sessions

In XRC operations, a group of primary volumes is processed as one session. Data is written to the secondary volumes in each session in the same order as it was written at the primary site. In the event of a failure, all volume pairs in the same session are suspended. The write operation is not performed due to the failure. However, the write order (sequence) is maintained so that the write process can be reinitiated after recovery.

A session is further divided into internal sessions called storage control (SC) sessions per each volume. SDM reads the data written to the USP V/VM storage system at the primary site in order of time stamp in each SC session. SDM checks the time stamp of each SC session, and determines in what order the data is written to the secondary volumes. Data is written to the secondary volumes in units of session in the same order as it was written at the primary site, not in units of SC session.

SDM manages definitions of sessions and SC sessions. They are defined for session IDs and volumes by TSO command in the storage system.

TSO Commands

The following settings concerning XRC operations are defined by the TSO commands issued to the storage system from the host system.

- Creation and deletion of pair volumes
- Creation of utility volumes
- Display of pair status
- Display of session status
- Display of utility volume status
- Integration and withdrawal from the session
- Recovery at the secondary site
- Resuming suspended pairs
- Start and end of the session
- Suspending of pairs

For details on the TSO commands for XRC operations, see the IBM document *DFSMS Advanced Copy Services (SC35-0428-02)*.

Configuration

XRC operations require hosts and storage systems at the primary and secondary sites. If operation at the secondary site is required, the secondary storage system (or systems) must have the capability of supporting the XRC workload. If the system at the primary site consists of several hosts, a SYSPLEX timer is required in the primary host to provide a common time reference for the I/O time-stamping function. The secondary host requires the SDM host software for remote copy operations. The Compatible XRC program product needs to be installed in the primary storage system, and Storage Navigator is required at the primary site for setting XRC options.

Figure 2-2 shows the connection configuration of channel extenders for XRC operations. Notice that LCP/RCP configurations can be either ESCON® or FICON® connections.

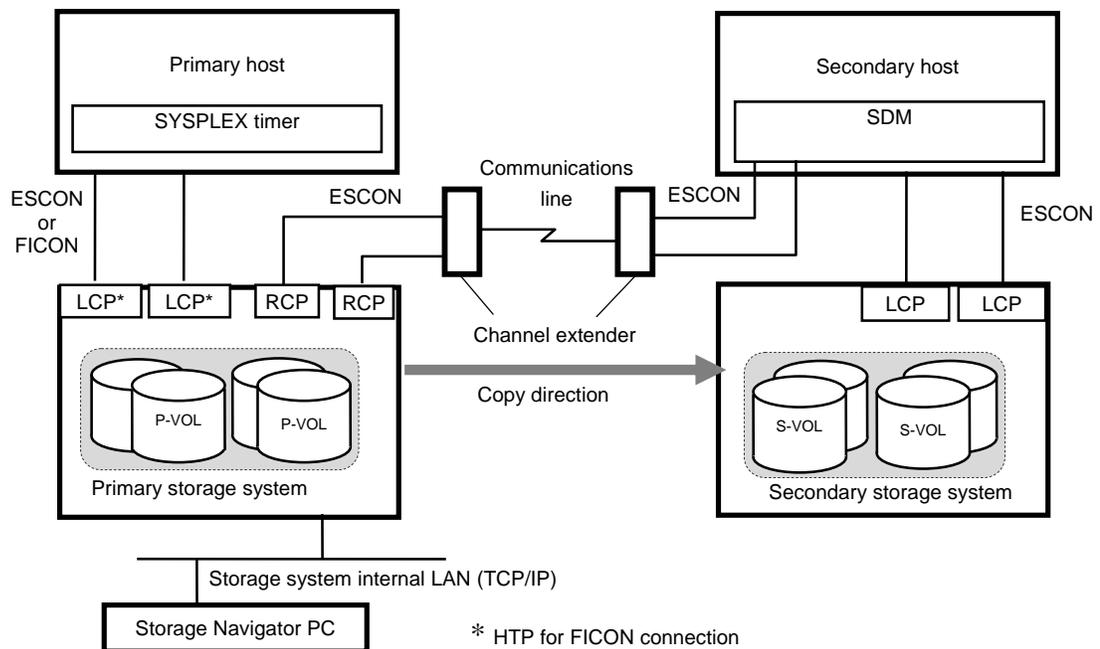


Figure 2-2 Channel Extender Connection Configuration for XRC

XRC Options on the Universal Storage Platform V/VM

The Compatible XRC software on Storage Navigator allows you to set the XRC options for the Universal Storage Platform V/VM storage system. The XRC options control the behavior of the Universal Storage Platform V/VM storage system during XRC operations. The XRC options are:

- [Level 2 Threshold Option](#)
- [Block Option](#)
- [Do not Block \(Volume Level\) Option](#)
- [Level 1 Sleep Option](#)
- [Sleep Time Option](#)
- [Level 1 SIM Option](#)
- [Level 2 Suspend Option](#)

Level 2 Threshold Option

The **Level 2 Threshold** option sets the threshold for the sidefile for reporting SCP-SCI. The level-2 threshold can be set from 30 to 70 percent in 10-percent increments: 30, 40, 50, 60, or 70 percent. The default level-2 threshold setting is 50 percent.

- To calculate the level-1 threshold, subtract 10 percent from the level-2 threshold.
- To calculate the level-3 threshold, add 10 percent to the level-2 threshold.



Caution: The level-2 threshold setting for SCP-SCI reporting applies to TrueCopy Asynchronous, TrueCopy Asynchronous for z/OS, and Concurrent Copy as well as Compatible XRC. When the level-2 threshold setting is changed, all of these functions are affected.

Block Option

The **Block** option sets the IBM-compatibility mode for device blocking, which controls the amount of write data according to sidefile capacity: volume level, or cache level.

- **Volume Level:** When the **Volume Level** block option is selected, write I/Os to volumes are put in a sleep-wait status by executing the command. If you reissue the command, the write I/Os restart. The amount of write data may exceed the threshold for the number of record sets per volume. The threshold is specified by SDM; the default threshold is 0x500.

When the **Volume Level** block option is selected, the following additional settings are made:

- **Do not Block (Volume Level)** is set to **Enable**.
 - **Level 1 Sleep** is set to **Disable**.
 - **Level 2 Suspend** is set to **Disable**.
- **Cache Level:** When the **Cache Level** block option is selected, depending on the sidefile capacity, the storage system performs one of the following three levels for controlling the amount of write data (see Figure 2-3):



Note: The IBM system data mover (SDM) function does not work when the **Cache Level** block option is selected.

- **Level 1:** This level of control is performed when the sidefile capacity is equal to or larger than the level-1 threshold, and is smaller than the level-2 threshold.

When **Level 1 Sleep** is set to **Enable**, write I/Os to volumes are put in a wait status by command retry when the sleep wait threshold (i.e., level-1 threshold) is exceeded.

When **Level 1 Sleep** is set to **Disable**, write I/Os to volumes are not put in a wait status.

- **Level 2:** This level of control is performed when the sidefile capacity is equal to or larger than the level-2 threshold, and is smaller than the level-3 threshold.

When **Level 2 Suspend** is set to **Disable**, write I/Os to volumes are put in a wait status by SCP-SCI reporting when the SCP-SCI reporting threshold (i.e., level-2 threshold) is exceeded.

When **Level 2 Suspend** is set to **Enable**, the storage system does not report SCP-SCI to hosts. Sidefile puncture occurs, and the target session is suspended. Sidefile puncture is the sidefile threshold plus 10%.

- **Level 3:** This level of control is performed when the sidefile capacity is equal to or larger than the level-3 threshold.

Sidefile puncture can occur. The session for the sidefile, containing the maximum capacity in the cache in the CLPR, is suspended.

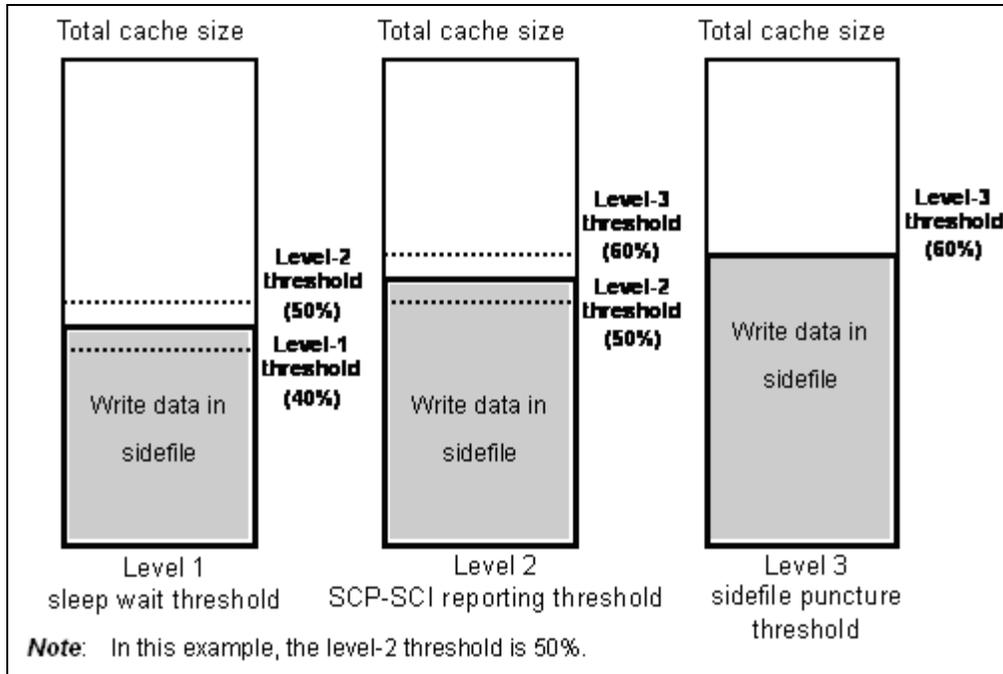


Figure 2-3 Controlling the Amount of Write Data (1)

Do not Block (Volume Level) Option

The **Do not Block (Volume Level)** option specifies whether the storage system should control the amount of data to be written to the specified volume:

- **Enable:** When the **Do not Block** option is enabled, the storage system does not control the amount of data to be written to the specified volume. Therefore, write I/Os from hosts are not put in a wait status.



Note: The **Do not Block** option is always set to **Enable** when the **Block** option is set to **Volume Level**.

- **Disable:** When the **Do not Block** option is disabled, depending on the sidefile capacity, the storage system performs one of the following four levels of control of the amount of write data (see Figure 2-4):
 - **Level 0:** This level of control is performed when the sidefile capacity is smaller than the level-1 threshold.

When **Level 1 Sleep** is set to **Enable**, write I/Os to volumes are put in a wait status according to the threshold for the number of record sets per volume. The threshold is specified by SDM; the default threshold is 0x500.

When **Level 1 Sleep** is set to **Disable**, write I/Os to volumes are not put in a wait status.
 - **Level 1:** This level of control is performed when the sidefile capacity is equal to or larger than the level-1 threshold, and is smaller than the level-2 threshold.

Write I/Os to volumes are put in a wait status by command retry when the sleep wait threshold (i.e., level-1 threshold) is exceeded.
 - **Level 2:** This level of control is performed when the sidefile capacity is equal to or larger than the level-2 threshold, and is smaller than the level-3 threshold.

Write I/Os to volumes are put in a wait status by SCP-SCI reporting when the SCP-SCI reporting threshold (i.e., level-2 threshold) is exceeded.
 - **Level 3:** This level of control is performed when the sidefile capacity is equal to or larger than the level-3 threshold.



Note: Sidefile puncture will occur. The puncture threshold is the sidefile threshold plus 10%.

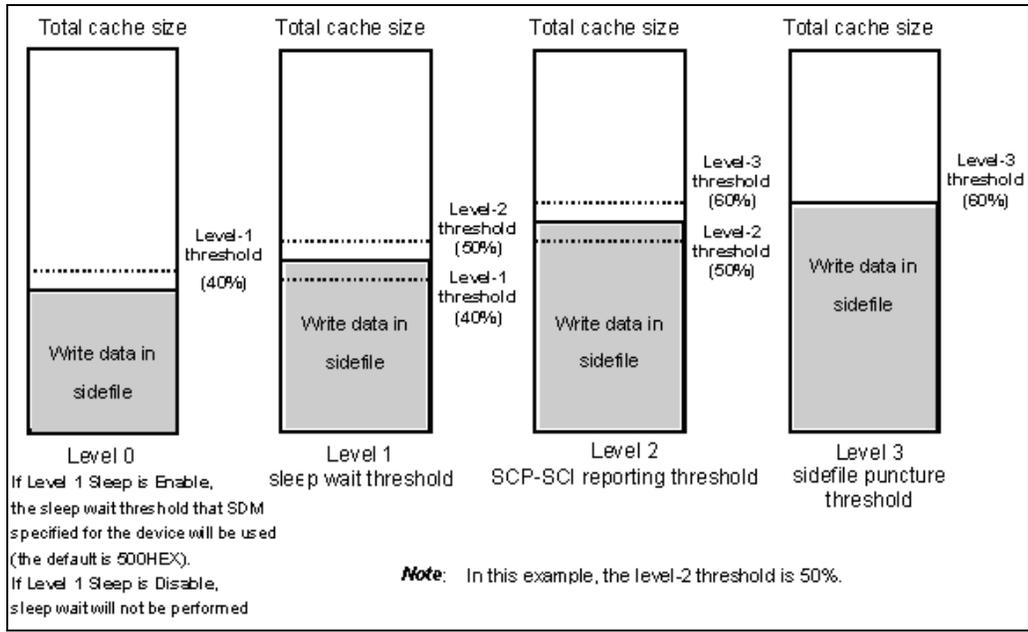


Figure 2-4 Controlling the Amount of Write Data (2)

Level 1 Sleep Option

The **Level 1 Sleep** option specifies whether the storage system should perform “Sleep” – “Wait” command retry when the sidefile threshold exceeds the sleep wait threshold (i.e., the level-1 threshold).

- **Enable:** When the **Level 1 Sleep** option is enabled, the storage system performs a “Sleep” - “Wait” command retry.
- **Disable:** When the **Level 1 Sleep** option is disabled, the storage system does not perform the “Sleep” - “Wait” command retry.



Note: The **Level 1 Sleep** option is always set to **Disable** when the **Block** option is set to **Volume Level**.

Sleep Time Option

The **Sleep Time** option specifies the sleep wait time for “Sleep” – “Wait” command retry.

- **10ms:** The storage system waits 10 milliseconds.
- **100ms:** The storage system waits 100 milliseconds.

Level 1 SIM Option

The **Level 1 SIM** option specifies whether the storage system should report a service information message (SIM) to the host when the sidefile threshold exceeds the sleep wait threshold (i.e., the level-1 threshold).

- **Enable:** When the **Level 1 SIM** option is enabled, a SIM indicating that the sidefile exceeds the sleep wait threshold is reported to the host.
- **Disable:** When the **Level 1 SIM** option is disabled, a SIM is not reported to the host, even when the sidefile exceeds the sleep wait threshold.

Level 2 Suspend Option

The **Level 2 Suspend** option specifies whether the storage system should report SCP-SCI to the host when the sidefile threshold exceeds the SCP-SCI reporting threshold (i.e., the level-2 threshold).

- **Enable:** When the **Level 2 Suspend** option is enabled, the storage system does not report SCP-SCI to the host. Sidefile puncture occurs, and the target session is suspended.
- **Disable:** When the **Level 2 Suspend** option is disabled, the storage system reports SCP-SCI to the host. After the host receives SCP from the storage system, the host is unable to issue write I/Os until the host receives SCI.



Note: The **Level 2 Suspend** option is always set to **Disable** when the **Block** option is set to **Volume Level**.

Do Not Block Parameter of the SDM XADDPAIR Command

In addition to the XRC options, the behavior of the Universal Storage Platform V/VM storage system is affected by the **Do not Block** parameter of the **XADDPAIR** command of SDM:

- Table 2-1 describes the behavior of the storage system when the **Do not Block** parameter of the **XADDPAIR** command is set to **Volume Level**.
- Table 2-2 describes the behavior of the storage system when the **Do not Block** parameter of the **XADDPAIR** command is set to **Cache Level**.

Note: Level 1 Sleep is performed on a volume in which a threshold specified by SDM is enabled (**Block** option). Level 1 Sleep is not performed on a volume for which **Do not Block (Volume Level)** is specified.

Table 2-1 Behavior of Storage System - Block Option is "Volume Level"

Compatible XRC Options		Behavior of the USP V/VM Storage System	
Option	Setting	"Do not Block" is Specified by SDM	"Do not Block" is Not Specified by SDM ("Block" is Specified)
Do not Block (Volume Level)	Enable	The storage system does not control the amount of data to be written to the specified volume.	According to the amount of used sidefile capacity, the storage system performs "Sleep" - "Wait" command retry when the threshold specified by SDM is exceeded.
	Disable*	—	—
Level 1 Sleep	Enable*	—	—
	Disable	The storage system does not perform "Sleep" - "Wait" command retry.	According to the amount of used sidefile capacity, the storage system performs "Sleep" - "Wait" command retry when the threshold specified by SDM is exceeded.
Level 1 SIM	Enable	The storage system does not report an SIM to the host when the usage of sidefile exceeds the sleep wait threshold.	The storage system reports an SIM to the host when the usage of sidefile exceeds the sleep wait threshold.
	Disable	The storage system does not report an SIM to the host when the usage of sidefile exceeds the sleep wait threshold.	The storage system does not report an SIM to the host when the usage of sidefile exceeds the sleep wait threshold.
Level 2 Suspend	Enable*	—	—
	Disable	Even when the amount of used sidefile capacity exceeds the level-2 threshold, level-2 suspension does not occur and the storage system does not report SCP-SCI to the host.	Even when the amount of used sidefile capacity exceeds the level-2 threshold, level-2 suspension does not occur and the storage system does not report SCP-SCI to the host.

* You cannot use this setting when the block option of XRC is set to **Volume Level**.

Table 2-2 Behavior of Storage System - Block Option is “Cache Level”

Compatible XRC Options		Behavior of the USP V/VM Storage System	
Option	Setting	Do not Block is Specified by SDM	Do not Block is Not Specified by SDM (Block is Specified)
Do not Block (Volume Level)	Enable	The storage system does not control the amount of data to be written to the specified volume.	The storage system controls the amount of data to be written. To control the amount, the storage system uses the threshold specified by the Level 2 Threshold drop-down list.
	Disable	The storage system controls the amount of data to be written. To control the amount, the storage system uses the threshold specified by the Level 2 Threshold drop-down list.	The storage system controls the amount of data to be written. To control the amount, the storage system uses the threshold specified by the Level 2 Threshold drop-down list.
Level 1 Sleep	Enable	If Do not Block (Volume Level) is enabled, the storage system does not perform “Sleep” – “Wait” command retry. If Do not Block (Volume Level) is disabled, the storage system performs “Sleep” – “Wait” command retry.	The storage system performs “Sleep” - “Wait” command retry.
	Disable	The storage system does not perform “Sleep” - “Wait” command retry.	The storage system does not perform “Sleep” - “Wait” command retry.
Level 1 SIM	Enable	If Do not Block (Volume Level) is enabled, the storage system does not report an SIM to the host when the amount of used sidefile capacity exceeds the “Sleep” - “Wait” threshold. If Do not Block (Volume Level) is disabled but Level 1 Sleep is enabled, the storage system report san SIM that indicates the amount of used sidefile capacity exceeds the “Sleep” - “Wait” threshold to the host. If Do not Block (Volume Level) is disabled and Level 1 Sleep is disabled, the storage system does not report an SIM to the host when the amount of used sidefile capacity exceeds the “Sleep” - “Wait” threshold.	If Level 1 Sleep is enabled, the storage system reports an SIM to the host when the amount of used sidefile capacity exceeds the “Sleep” - “Wait” threshold. If Level 1 Sleep is disabled, the storage system does not report an SIM to the host when the amount of used sidefile capacity exceeds the “Sleep” - “Wait” threshold.
	Disable	The storage system does not report an SIM to the host when the amount of used sidefile capacity exceeds the sleep wait threshold.	The storage system does not report an SIM to the host when the amount of used sidefile capacity exceeds the sleep wait threshold.
Level 2 Suspend	Enable	If Do not Block (Volume Level) is enabled, level-2 suspension does not occur when the amount of used sidefile capacity exceeds the level-2 threshold. Also, the storage system does not report SCP-SCI to the host. If Do not Block (Volume Level) is disabled, level-2 suspension occurs when the amount of used sidefile capacity exceeds the level-2 threshold.	Level-2 suspension occurs when the amount of used sidefile capacity exceeds the level-2 threshold.

Compatible XRC Options		Behavior of the USP V/VM Storage System	
	Disable	<p>If Do not Block (Volume Level) is enabled, level-2 suspension does not occur when the amount of used sidefile capacity exceeds the level-2 threshold. Also, the storage system does not report SCP-SCI to the host.</p> <p>If Do not Block (Volume Level) is disabled, level-2 suspension does not occur when the amount of used sidefile capacity exceeds the level-2 threshold. The storage system reports SCP-SCI to the host.</p>	<p>When the amount of used sidefile capacity exceeds the level-2 threshold, level-2 suspension does not occur. The storage system reports SCP-SCI to the host.</p>

Interoperability with Other Products and Functions

The Hitachi Universal Storage Platform V/VM supports concurrent operations of XRC with other copy functions. Table 2-3 indicates whether XRC volumes can be shared with other copy functions.

Table 2-3 Volume Sharing between XRC and Other Copy Functions

	XRC P-VOL	XRC S-VOL	TCz M-VOL	TCz R-VOL	Siz S-VOL	Siz T-VOL	FlashCopy Mirroring S-VOL	FlashCopy Mirroring T-VOL
XRC P-VOL	—	Yes (<i>Note 1</i>)	Yes (<i>Note 2</i>)	No	Yes (<i>Note 3</i>)	No	Yes	No
XRC S-VOL	Yes (<i>Note 1</i>)	—	Yes	No	Yes	No	Yes	No

Note 1: An S-VOL of XRC cannot be used as an XRC P-VOL within the same XRC session, but it can be used as an XRC P-VOL in another XRC session.

Note 2: An XRC S-VOL cannot be used as a TCz Async M-VOL at the same time.

Note 3: When the XRC P-VOL and the Siz S-VOL are the same volume, you cannot use the Reverse Copy or Quick Restore commands of Siz.

Using Two XRC Pairs in Conjunction

By using two XRC pairs in conjunction, you can maintain three copies of data at multiple secondary sites for disaster recovery purposes. Figure 2-5 shows the configuration in which two XRC operations are performed: data is copied from the primary site to the first secondary site using XRC, and then the same data is copied from the first secondary site to the second secondary site using XRC.

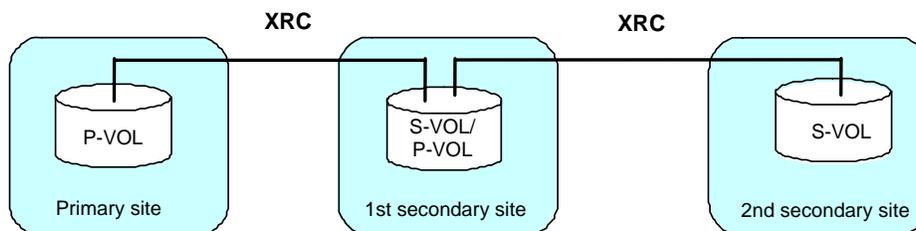


Figure 2-5 Double XRC Pairs

Using XRC in Conjunction with TrueCopy for z/OS

The Universal Storage Platform V/VM supports the use of XRC in conjunction with Hitachi TrueCopy for IBM z/OS (TCz) to maintain three copies of critical data at your primary and/or secondary sites for disaster recovery purposes.

- Volume is functioning as XRC P-VOL and TCz M-VOL.

Figure 2-6 shows the configuration in which a volume is functioning as both an XRC P-VOL and a TCz M-VOL. In this configuration, data is copied from the primary site to the first secondary site using TCz, and it is copied from the primary site to the second secondary site using XRC.

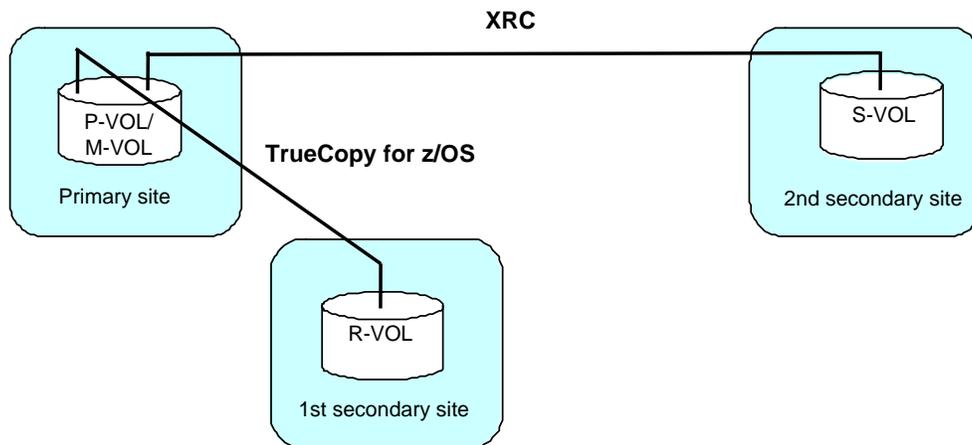


Figure 2-6 Volume Functioning as XRC P-VOL and TCz M-VOL

- Volume is functioning as XRC S-VOL and TCz M-VOL.

Figure 2-7 shows the configuration in which a volume is functioning as both an XRC S-VOL and a TCz M-VOL. In this configuration, data is copied from the primary site to the first secondary site using XRC, and it is copied from the first secondary site to the second secondary site using TCz.

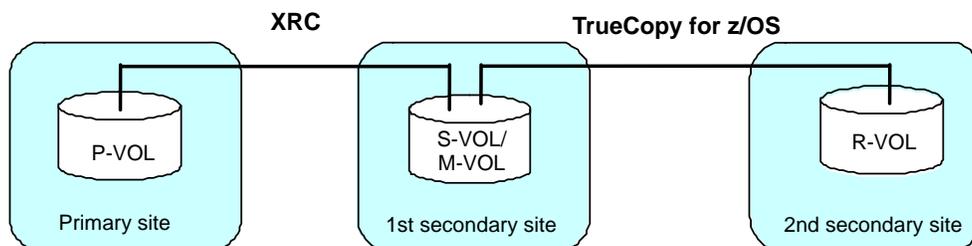


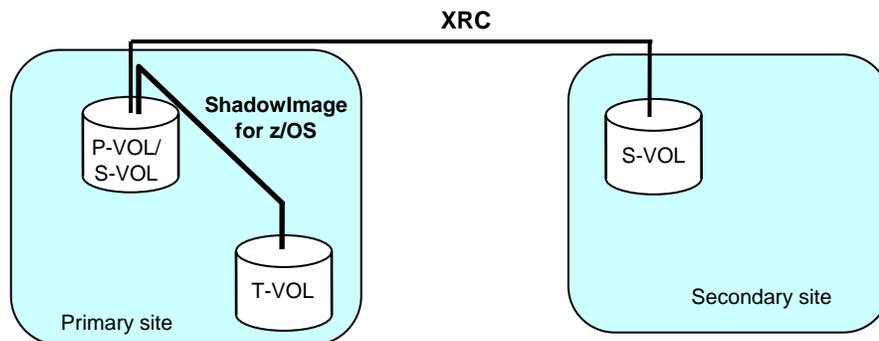
Figure 2-7 Volume Functioning as XRC S-VOL and TCz M-VOL

Using XRC in Conjunction with ShadowImage for z/OS

The USP V/VM supports the use of XRC in conjunction with ShadowImage for IBM z/OS (SIz) to maintain data in the secondary site and the primary site for disaster recovery and data migration purposes.

- Volume is functioning as XRC P-VOL and SIz S-VOL.

Figure 2-8 shows the configuration in which a volume is functioning as both an XRC P-VOL and an SIz S-VOL. In this configuration, data is copied within the primary site using SIz, and it is copied from the primary site to the secondary site using XRC.

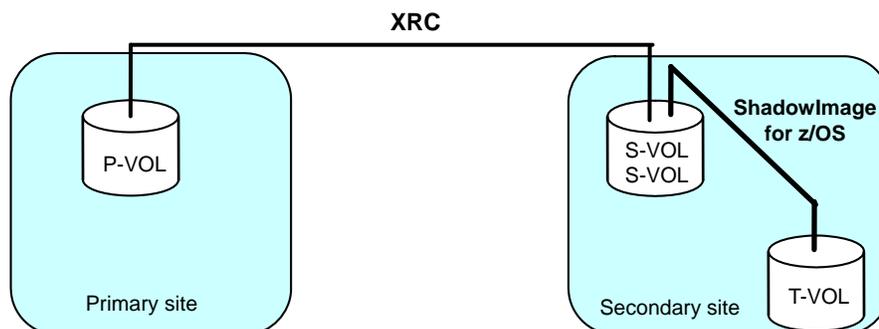


Note: "S-VOL" is source volume for SIz, and secondary volume for XRC.

Figure 2-8 Volume Functioning as XRC P-VOL and SIz S-VOL

- Volume is functioning as XRC S-VOL and SIz S-VOL.

Figure 2-9 shows the configuration in which a volume is functioning as both an XRC S-VOL (secondary volume) and an SIz S-VOL (source volume). In this configuration, data is copied from the primary site to the secondary site using XRC, and then it is copied within the secondary site using SIz.

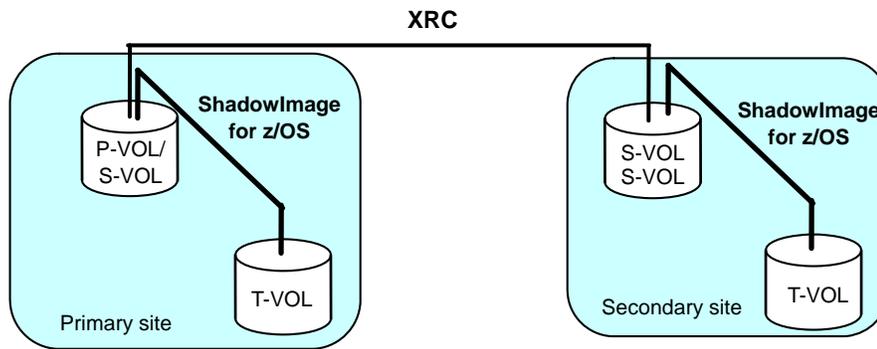


Note: "S-VOL" is secondary volume for XRC, and source volume for SIz.

Figure 2-9 Volume Functioning as XRC S-VOL and SIz S-VOL

- Volume is functioning as XRC P-VOL and Siz S-VOL, and another volume is functioning as XRC S-VOL and Siz S-VOL.

Figure 2-10 shows the configuration in which one volume is functioning as both an XRC P-VOL and an Siz S-VOL (source volume) and another volume is functioning as both an XRC S-VOL (secondary volume) and an Siz S-VOL (source volume). In this configuration, data is copied within the primary site using Siz, and it is copied from the primary site to the secondary site using XRC. Afterward, it is copied within the secondary site using Siz.



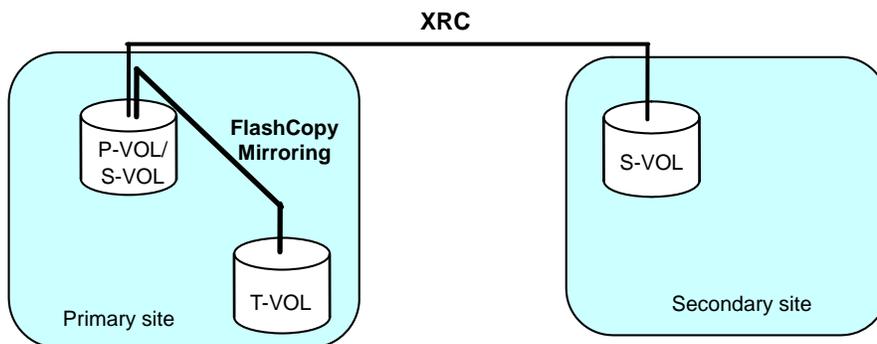
Note: "S-VOL" is source volume for Siz, and secondary volume for XRC.

Figure 2-10 Volume as XRC P-VOL and Siz S-VOL, Another Volume as XRC S-VOL and Siz S-VOL

Using XRC in Conjunction with FlashCopy Mirroring

The USP V/VM supports the use of XRC in conjunction with Hitachi Compatible Mirroring for IBM FlashCopy® (FlashCopy Mirroring) to maintain data in the secondary and primary site for disaster recovery and data migration purposes.

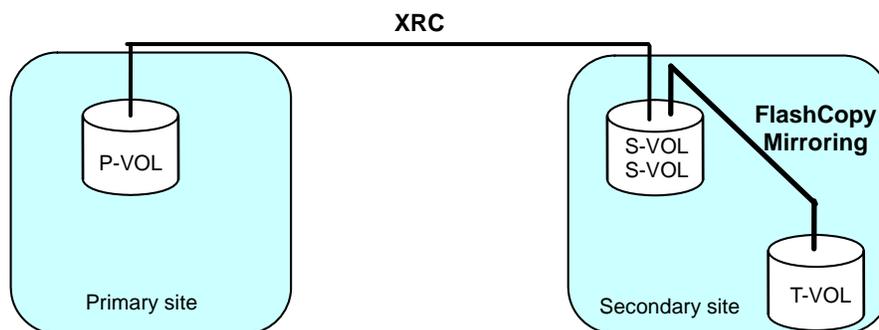
- Volume is functioning as XRC P-VOL and FlashCopy Mirroring S-VOL. Figure 2-11 shows the configuration in which a volume is functioning as both an XRC P-VOL and a FlashCopy Mirroring S-VOL. In this configuration, data is copied within the primary site using FlashCopy Mirroring, and it is copied from the primary site to the secondary site using XRC.



Note: "S-VOL" is source volume for FlashCopy, and secondary volume for XRC.

Figure 2-11 Volume Functioning as XRC P-VOL and FlashCopy Mirroring S-VOL

- Volume is functioning as XRC S-VOL and FlashCopy Mirroring S-VOL. Figure 2-12 shows the configuration in which a volume is functioning as both an XRC S-VOL (secondary volume) and a FlashCopy Mirroring S-VOL (source volume). In this configuration, data is copied from the primary site to the secondary site using XRC, and it is copied within the secondary site using FlashCopy Mirroring.

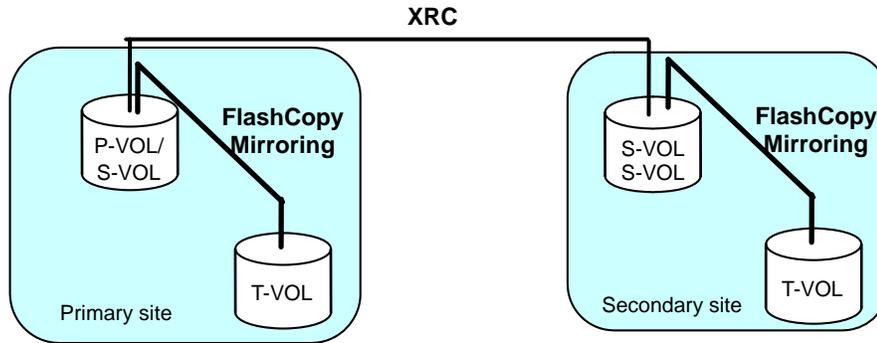


Note: "S-VOL" is secondary volume for XRC, and is source volume for FlashCopy.

Figure 2-12 Volume Functioning as XRC S-VOL and FlashCopy Mirroring S-VOL

- Volume is functioning as XRC P-VOL and FlashCopy Mirroring S-VOL, and another volume is functioning as XRC S-VOL and FlashCopy Mirroring S-VOL.

Figure 2-13 shows the configuration in which one volume is functioning as both an XRC P-VOL and a FlashCopy Mirroring S-VOL, and another volume is functioning as both an XRC S-VOL and a FlashCopy Mirroring S-VOL. In this configuration, data is copied within the primary site using FlashCopy Mirroring, and then it is copied within the secondary site using FlashCopy Mirroring.



Note: "S-VOL" is source volume for FlashCopy, and secondary volume for XRC.

Figure 2-13 One Volume Functioning as P-VOL and S-VOL, and Another Volume Functioning as S-VOL and S-VOL

Preparing for Compatible XRC Operations

This chapter outlines all the components that are required for XRC operations.

- [System Requirements](#)
- [Requirements and Restrictions for Compatible XRC](#)
- [Performance Considerations](#)
- [Operational Considerations](#)

System Requirements

Hitachi Compatible XRC operations at the primary site require hosts and USP V/VM storage systems. Operations at the secondary site require a secondary storage system (or systems) that must have the capability of supporting the XRC workload. Additionally, a Storage Navigator PC and the Compatible XRC program product are required.

The Compatible XRC system requirements are:

- **Primary host**

If the system in the primary site consists of several hosts, a SYSPLEX timer is required in the primary host to provide a common time reference for the I/O time-stamping function.

- **Secondary host**

The secondary host requires the System Data Mover (SDM) host software for remote copy operations.

- **Primary Universal Storage Platform V/VM storage system**

The Hitachi Compatible XRC program product must be installed in the primary Universal Storage Platform V/VM storage system.



Note: When the controller emulation type is 3990-6 or 3990-6E, you are able to use XRC even if the program product is not installed. In such a case, however, XRC supports only the XRC2 feature. (For details, see [Supported Functions](#).) When the controller emulation type is 2105 or 2107, the XRC program product must be installed.

- **Secondary Universal Storage Platform V/VM storage system**

The Universal Storage Platform V/VM storage system is required. The installation of the Hitachi Compatible XRC program product is not required for the secondary storage system.

- **Communication path connection**

- If ESCON is used for connection, the maximum distance between the primary storage system and the secondary host is 3 km.
- If a director (e.g., Ultraset) is used for connection, the maximum distance between the primary subsystem and secondary host is 20 km.
- If a director and repeater are used for connection, the maximum distance between the primary subsystem and secondary host is 40 km.
- If a channel extender is used for connection, no restriction is applied to the distance between the primary storage system and secondary host.
- The following channel extender is supported.
 - CNT Ultraset Storage Director (ATM, IP connections). Line type: ATM lines (Up to 135 Mbps), IP lines (500 Mbps).

- **Storage Navigator**

You must have Storage Navigator at the primary site. For instructions on installing and using Storage Navigator, see the *Storage Navigator User's Guide* (MK-96RD621).

Administrator or Compatible XRC write access to Storage Navigator is required to perform Compatible XRC operations. Users without Administrator or Compatible XRC write access can only view Compatible XRC information.

- **Hitachi Compatible Replication for IBM XRC**

You must install the Hitachi Compatible XRC program product on the Hitachi Universal Storage Platform V/VM storage system at the primary site by entering the Compatible XRC license key code on Storage Navigator.

For instructions on installing Hitachi Compatible XRC, see the *Storage Navigator User's Guide* (MK-96RD621).

Requirements and Restrictions for Compatible XRC

3390-M Devices

If you want to use a 3390-M device as an XRC P-VOL or S-VOL, you must patch the System Data Mover (SDM) software at the secondary site with the following PTF (program temporary fix):

[PTF] UA18053: SUPPORT XRC VOLUME SIZE UP TO 65520 CYL

The 3390-M devices cannot be used as P-VOLs or S-VOLs in XRC operations if this PTF has not been patched to the SDM.

Supported XRC Functions in XRC2 and XRC3

Table 3-1 indicates the supported XRC features in IBM XRC functions (XRC2 and XRC3).



Note: When the controller emulation type is 3990-6 or 3990-6E, only XRC2 is supported (XRC3 is not supported). When the controller emulation type is 2105 or 2107, both XRC2 and XRC3 are supported.

Table 3-1 Features Supported by Compatible XRC

Feature	Description	XRC2	XRC3
DEV blocking	Sidefile threshold tuning feature for each volume.	Supported	Supported
Unplanned outage	Differential copy feature for unplanned outage achieved by the differential bit management in the storage system.	Not supported	Supported
CNT MULTI path	Alternate path retry feature for CNT USD ^{*1} connections.	Not supported	Supported
Fix utility	Fix or Float of Utility DEV setting feature.	Not supported	Supported ^{*2}
Suspend on Long Busy	Suspend setting feature which does not report SCP from SDM.	Not supported	Supported ^{*3}
Write Pacing	Function to set arbitrary Sleep Time from SDM when the amount of write data is controlled.	Not supported	Supported ^{*4}

*1 CNT extender (Ultranet Storage Director).

*2 Only Fix of Utility DEV is supported (Float is not supported).

*3 Operates when Level 2 Suspend is set to Disabled in the option of Compatible XRC. Level 2 Suspend operation is processed preferentially, when Level 2 Suspend is set to Enable.

*4 Operates when Block Option is set to Volume Level in the option of Compatible XRC. Write Pacing does not operate when Block Option is set to Cache Level.

Number of Sessions for Compatible XRC and CC

Table 3-2 shows the number of sessions in Compatible XRC.

The number of Concurrent Copy (CC) and XRC sessions per volume depends on the combination of CC and XRC (XRC2 and XRC3). Table 3-3 shows the number of sessions per volume.

Table 3-2 Number of Hitachi Compatible XRC Sessions

Unit	Number of Sessions
Per storage system	Number of CUs × 64
Per CU	64
Per volume	1

Table 3-3 Number of Sessions per Volume

Session Type	Device Emulation Type (3390-1, 3390-2, 3390-3, 3390-3R, 3390-9, 3390-L, 3390-M)	
	Number of CC Sessions	Number of Hitachi Compatible XRC Sessions
CC only	16	—
CC and XRC2	15	1
CC and XRC3	15	1

Performance Considerations

Note the following important performance considerations for Hitachi Compatible XRC operations:

- **Paths per session.** Hitachi Data Systems recommends that you have one ESCON path for each SC session.
- **Block size.** Take the block sizes into consideration when configuring the SC sessions: do not issue too many write I/Os with large blocks to one SC session.
- **SDM tuning.** The performance of XRC is affected by the performance of SDM. You must tune the SDM to achieve the desired performance. For information on SDM tuning, see the IBM document *Implementing ESS Copy Services on S/390*.
- **Available cache.** Both Compatible XRC and TCz Async operations utilize cache to store the sidefile queue of asynchronous record sets. If you are maintaining XRC pairs and TCz Async pairs, consider the asynchronous remote copy workloads, and then make sure that your USP V/VM storage systems have adequate cache installed and available.
- **Using CLPRs in multiplatform configurations.** In multiplatform configurations, it is recommended that open-system volumes and mainframe volumes be assigned to separate cache logical partitions (CLPRs). This isolates open-systems cache usage from mainframe cache usage to prevent any negative impact from concurrent I/O activity.
- **FICON and ESCON host interface paths.** If XRC is used with FICON host interface, you must be careful about the path combination with serial channel (ESCON). Since FICON provides faster transfer speed than ESCON, you need to consider the difference in performance between FICON and ESCON paths. If FICON is used for the connection between the primary host and the primary storage system, using ESCON for connecting the primary storage system and the secondary host is not recommended (see Table 3-4). In this case, use FICON instead.

Table 3-4 Combinations of ESCON and FICON Paths

Paths between Primary Host and Primary Storage System	Paths between Primary Storage System and Secondary Host	Support
ESCON	ESCON	Supported
ESCON	FICON	
FICON	ESCON	Not recommended
FICON	FICON	Supported

Operational Considerations

Note the following important operational considerations for Hitachi Compatible XRC operations:

- **Multiple CLPR use.** If you want to use Compatible XRC and more than one cache logical partition (CLPR), it is recommended that you use SC sessions in the same CLPR. XRC options can be set to each CLPR. If an SC session extends over more than one CLPR, the storage system operates depending on the XRC option setting for each CLPR. For example, if more than one session exists in one CLPR and the amount of used sidefile capacity in the CLPR reaches *level-2* (if the **Level 2 Suspend** option of XRC is enabled) or *level-3*, the session that occupies the largest capacity in the sidefile in the cache is suspended.
- **Offline micro program replacement.** The storage control (SC) session of the storage system is terminated automatically when offline micro program replacement, which requires PS OFF and PS ON (or volatile PS ON after the battery has discharged), is performed while XRC is operating. The session of the SDM side of the secondary site is suspended by the termination and the RESUME operation may fail. To avoid these issues:
 - Before performing an offline micro program replacement, delete all XRC pairs by XDELPAIR command before PS OFF, and then create all pairs again by XADDPAIR command after PS ON.
 - When performing volatile PS ON, delete all XRC pairs by XDELPAIR command immediately after PS ON, and then create all pairs again by XADDPAIR command.

XRC Session Suspension Considerations

- **XRC Session Suspension when level 2 cache sidefile threshold exceeded.** The USP V/VM informs the SDM of session suspension when “Level 2 Suspend” is “Enabled” and the session sidefile cache threshold is exceeded. SDM issues the following message:

```
ANTX5119E XRC SESSION(sessname) ENCOUNTERED AN ERROR PROCESSING  
STORAGE CONTROL scnum SESSION sessnum, RC=0647 REAS=0002 SRVC=xxxx
```

where:

sessname = name of the session

scnum = storage control device number

sessnum = storage control session number

The meaning of RC=0647 and REAS=0002 are as follows:

RC=0647: The primary storage control session has been suspended. All volumes associated with the storage control session are suspended.

REAS=0002: The storage control session timer expired.

- **Resuming or Deleting pairs after session suspension.** Special considerations apply when attempting to RESUME or DELETE volume pairs. Do not execute RESUME or DELETE operations during the following conditions:

- When pairs are suspended by the XSUSPEND TSO command
- When pairs are suspended by other XRC session suspension failures

Before attempting to RESUME or DELETE volume pair operations, verify the state of the session sidefile on the USP V/VM. When the USP V/VM is still in the process of deleting sidefile cache entries and RESUME or DELETE operations are initiated, device timeouts may be reported by SDM or MVS IOS with one of the following messages:

```
MIH detected error on SDM Utility devices.  
IOS071I Missing channel or device end
```

SDM detected timeout.

```
ANTX5124W I/O REQUEST FOR DEVICE device_number STORAGE CONTROL  
ssid SESSION session_number HAS TIMED OUT, FUNC= function_code  
ANTX5150E XRC SESSION(session_id) HAS STALLED, REASON=reason
```

To ensure that the RESUME or DELETE volume pair operations do not encounter any of the timeout conditions described above, use the following commands to determine the XRC session sidefile status in the USP V/VM. When the sidefile status indicates zero, it is safe to proceed.

To determine the XRC session number, use the SDM LISTSESS command in the following format. Note that *xxxx* is a device number of a volume that is part of the XRC session.

```
F ANTAS000,LISTSESS xxxx
```

The output of this command is message ANTX8913I with the following format:

```
ANTX8913I xxxx - Xsnn
```

xxxx is the same device number as used in the LISTSESS command.

Xsnn has the following meaning:

X indicates an XRC session

s is "A" for an active session

"S" for a suspended session

"Q" for a quiesced session

nn is the storage control session identifier: 01 to FF

Using the 'nn' value obtained from the LISTSESS command, the SDM SCDATA command can be issued to obtain further XRC session status:

```
F ANTAS000,SCDATA xxxx nn
```

The output of the SCDATA command provides the following:

```
ANTX8936I xxxx - SESSION=XAnn RESIDUAL=0000 NEXT DEV=B500  
MAXSIZE=E000
```

```
SFILESZ=00000000 SFILE60=0116FAC0 TIME=2010.180
```

```
ANTX8936I (CONT) hh:mm:ss.yyyyyy TIMEOUT=00.05.00
```

When the SFILESZ=00000000, it is safe to proceed with RESUME or DELETE volume pair operations.

- **Manual XRC Session Termination.** There may be situations after timeout errors when volume pair information as managed by the SDM may not match the status of the USP V/VM. For example, when XDELPAIR is executed by SDM, but the XRC session may remain on the USP V/VM. In this case it may be necessary to determine if the XRC sessions still exist on the USP V/VM by using the SDM LISTSESS command. Use the SDM TERMSESS to terminate these 'orphaned' XRC sessions.

- **Additional SDM Message considerations**

ANTA5107E

This message may be issued with RC=0608 if an XADDPAIR command is issued after a session has been terminated with the SDM TERMSESS command. If this occurs, reissue the XADDPAIR command again.

ANTA5107E

This message may be issued with RC=4130 when the USP V/VM control unit emulation is set to 3990-6 or 3990-6E: the WRITE PACING function is not supported if it is specified on an XADDPAIR command. In this case the SDM pair status is deleted but the session may remain on the USP V/VM. Use the LISTSESS and TERMSESS commands to terminate any remaining sessions.

Performing Compatible XRC Operations

This chapter describes the Compatible XRC window and provides instructions for performing Compatible XRC operations.

- [Using the Compatible XRC GUI](#)
- [Setting the XRC Options](#)

Using the Compatible XRC GUI

This section describes the Compatible XRC graphical user interface (GUI) on Storage Navigator:

- Compatible XRC window
- Change Option dialog box

This section describes only the Compatible XRC window and associated dialog boxes. For general information on Storage Navigator features, see the *Storage Navigator User's Guide*.

Compatible XRC Window

The **Compatible XRC** window (see Figure 4-1) displays the Compatible XRC information for the connected USP V/VM storage system and provides access to all Compatible XRC operations.

To open the Compatible XRC window:

1. Enter the URL of the primary USP V/VM service processor (SVP) into the web browser to access the primary SVP.
2. From the **Storage Device List** window, select the USP V/VM storage system on which you want to perform Compatible XRC operations.
3. Enter your user ID and password, and then select **OK** to log in to Storage Navigator.

If you logged in to Storage Navigator as a storage administrator, you can perform Compatible XRC operations for all volumes. If you logged in as a storage partition administrator, you can only perform Compatible XRC operations for the volumes in the CLPR that you administer.

4. The Storage Navigator main window opens in **View** mode. If you want to perform Compatible XRC operations, change to **Modify** mode. For instructions, see the *Storage Navigator User's Guide*.
5. On the Storage Navigator menu bar click **Go**, select **Mainframe Connection**, and then select the **XRC** tab.

When you are finished performing Compatible XRC operations, you can perform other operations on the connected USP V/VM storage system, or you can exit Storage Navigator by clicking **Close** (.

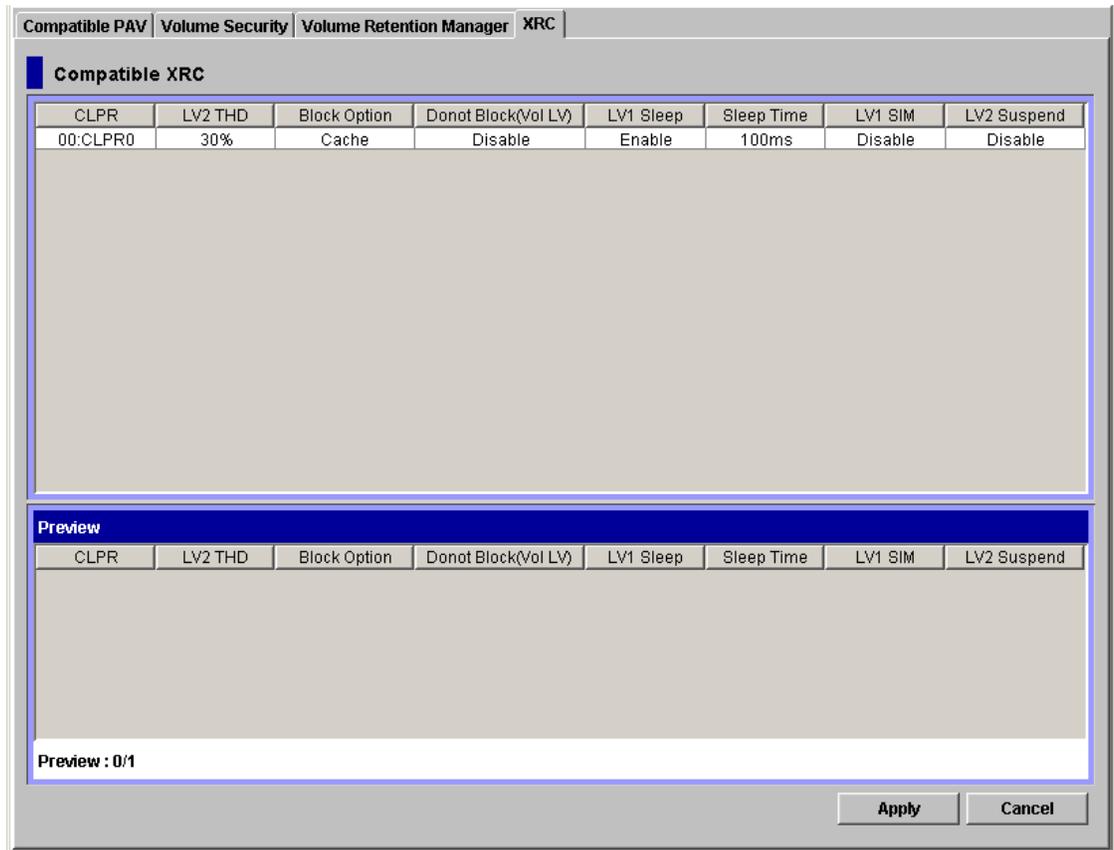


Figure 4-1 Compatible XRC Window

Item	Description
XRC options table	Displays the settings for XRC operations on the connected storage system. For details on the settings, see XRC Options Table . If you are logged in to Storage Navigator as a storage administrator, all CLPRs are shown (one row for each CLPR). If you are logged in as a storage partition administrator, only the CLPR that you administer is shown.
Preview list	Displays the requested changes to the XRC settings on the connected storage system. For details, see Preview List .
Apply	Applies the requested XRC setting changes to the storage system.
Cancel	Discards the requested XRC setting changes without applying them to the storage system.

XRC Options Table

The XRC options table (see Figure 4-2) displays the XRC option settings for the connected Universal Storage Platform V/VM storage system. If you have requested changes to the XRC options, the requested changes are shown in blue, bold, italic text.

CLPR	LV2 THD	Block Option	Donot Block(Vol LV)	LV1 Sleep	Sleep Time	LV1 SIM	LV2 Suspend
00:CLPR0	30%	Cache	Disable	Enable	100ms	Disable	Disable

Figure 4-2 XRC Options Table

Item	Description
CLPR	CLPR number. If you are logged in to Storage Navigator as a storage administrator, all CLPRs are shown (one row for each CLPR). If you are logged in as a storage partition administrator, only the CLPR that you administer is shown.
LV2 THD	Level 2 threshold setting for XRC operations in the specified CLPR.
Block Option	Block option setting for XRC operations in the specified CLPR.
Do not Block (Vol LV)	Do not block (volume level) setting for XRC operations in the specified CLPR.
LV1 Sleep	Level 1 sleep setting for XRC operations in the specified CLPR.
Sleep Time	Sleep time setting for XRC operations in the specified CLPR.
LV1 SIM	Level 1 SIM setting for XRC operations in the specified CLPR.
LV2 Suspend	Level 2 suspend setting for XRC operations in the specified CLPR.

Preview List

The **Preview** list (see Figure 4-3) displays the requested changes to the XRC option settings on the connected USP V/VM storage system. The requested changes shown in the **Preview** list are applied to the storage system when you click **Apply** on the **Compatible XRC** window.

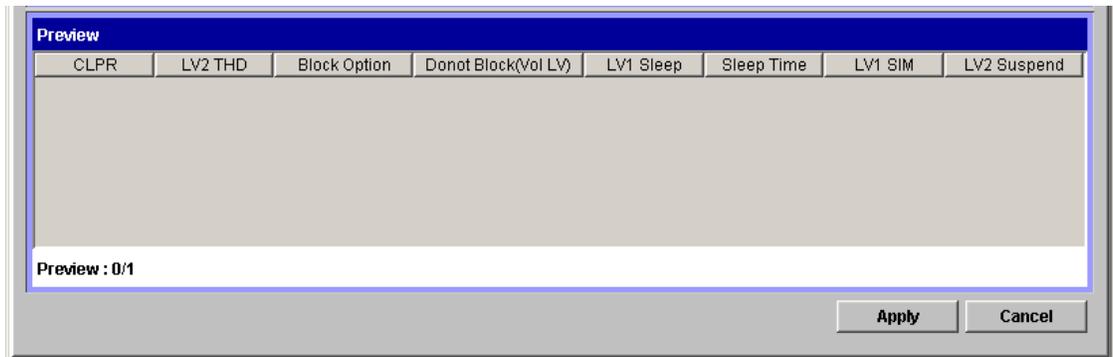


Figure 4-3 Preview List

Item	Description
Preview list	Displays the requested changes to the XRC settings on the connected storage system. For details, see Change Option Dialog .
Preview:	Displays the number of CLPRs for which changes are requested and the total number of CLPRs in the connected storage system. For example, 1/2 indicates that changes are requested for 1 of the 2 CLPRs in the storage system.

Change Option Dialog Box

The Change Option dialog box (see Figure 4-4) allows you to change the XRC option settings on the connected USP V/VM storage system. To open the Change Option dialog box, select and right-click the desired CLPR in the XRC option list, and then select **Change Option** from the pop-up menu.

For detailed information on the XRC options, see [XRC Options on the Universal Storage Platform V/V](#).

Figure 4-4 Change Option Dialog Box

Item	Description
CLPR	Select the desired CLPR. The CLPRs are listed by LDKC number and CLPR number (e.g., 00:CLPR00 is CLPR 00 in LDKC 00). If you are logged in to Storage Navigator as a storage administrator, all CLPRs are listed. If you are logged in to Storage Navigator as a storage partition administrator, only the CLPR that you administer is listed.
The same setting is applied.	Check this box to apply the settings to all CLPRs. Clear this box to apply the settings only to the selected CLPR.
Level 2 Threshold	Select the desired Level 2 Threshold (SCP-SCI reporting threshold). You can choose from the following values: 30%, 40%, 50%, 60%, 70%.
Block Option	Select the desired Block option : Volume Level or Cache Level . Note: If you select Volume Level , the Do not Block (Volume Level) is set to Enable , and the Level 1 Sleep and Level 2 Suspend options are set to Disable .

Item	Description
Do not Block (Volume Level)	Select the desired Do not Block (Volume Level) option: Enable or Disable . Note: When the Block Option is set to Volume Level , this option is set to Enable and cannot be changed.
Level 1 Sleep	Select the desired Level 1 Sleep option: Enable or Disable . Note: When the Block Option is set to Volume Level , this option is set to Disable and cannot be changed.
Sleep Time	Select the desired Sleep Time : 10ms or 100ms .
Level 1 SIM	Select the desired Level 1 SIM option: Enable or Disable .
Level 2 Suspend	Select the desired Level 2 Suspend option: Enable or Disable . Note: When the Block Option is set to Volume Level , this option is set to Disable and cannot be changed.
OK	Saves the requested XRC option changes, and closes the Change Option dialog box. The requested XRC option changes are displayed in the Preview list and in blue, bold and italics in the XRC options table.
Cancel	Closes the Change Option dialog box without saving your changes.
Default	Sets the XRC options to their default values.

Setting the XRC Options

To set the XRC options using Hitachi Compatible XRC:

1. In the XRC options table, select and right-click the CLPR(s) for which you want to make option settings.
2. On the pop-up menu, select **Change Option** to open the **Change Option** dialog box.
3. In the **Change Option** dialog box, set the desired XRC options.
If you want to set the XRC options to their default values, click **Default**.
For details on the default values, see [Change Option Dialog Box](#).
4. If you want to apply the same XRC options to all CLPRs, select **The same setting is applied** check box, and click **OK** on the confirmation message (see Figure 4-5).

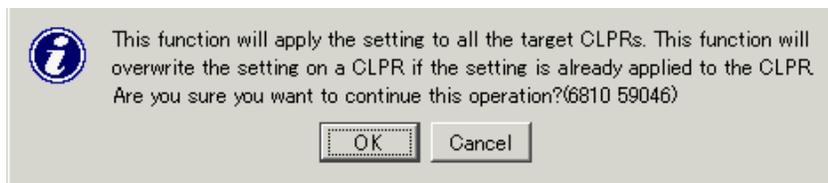


Figure 4-5 Confirming to Apply the Same Settings to All CLPRs

5. When you have finished changing XRC options, click **OK** to save your changes and close the **Change Option** dialog box.
6. Review your requested changes on the Compatible XRC window. The requested XRC option settings are displayed in the **Preview** list, and the requested changes are displayed in blue, bold, italics in the XRC option list.
If you want to modify your requested changes, select and right-click the CLPR in the **Preview** list, select **Modify** in the pop-up menu to open the Change Option dialog box, make the desired changes, and click **OK** to save your changes and return to the Compatible XRC window.
If you want to delete your requested changes, select and right-click the CLPR in the **Preview** list, select **Delete** in the pop-up menu, and click **OK** on the confirmation (see Figure 4-6). The CLPR is deleted from the **Preview** list, and the options in the XRC options list are reset to their previous values.



Figure 4-6 Confirming to Delete Changes from the Preview List

7. When you are ready to apply your requested changes to the storage system, select **Apply**.

Depending on your settings, a confirmation dialog box may appear and inform you that one or more pairs may be suspended (see Figure 4-7). To continue the operation, select **OK**.

If you select **Cancel**, you are returned to the Compatible XRC window so that you can modify or delete your requested changes.

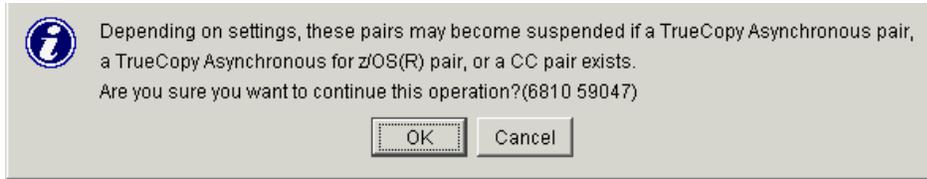


Figure 4-7 Confirming to Continue When Pairs May Be Suspended

8. If you chose to continue the operation, a confirmation dialog box appears (see Figure 4-8). To apply the settings to the storage system, click **OK**. If you select **Cancel**, you are returned to the Compatible XRC window so that you can modify or delete your requested changes.

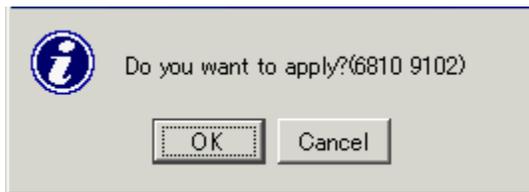


Figure 4-8 Confirming to Apply Changes to the Storage System

9. If you applied the settings to the storage system, a dialog box appears and informs you that the operation is finished (see Figure 4-9). Click **OK**.
The settings are reflected in the XRC option list in the **Compatible XRC** window.



Figure 4-9 Dialog Box Indicates that the Operation is Finished

Troubleshooting

This chapter provides troubleshooting information for Hitachi Compatible Replication for IBM® XRC and instructions for calling technical support.

- [Troubleshooting](#)
- [Calling the Hitachi Data Systems Support Center](#)

Troubleshooting

Table 5-1 provides general troubleshooting information for Compatible XRC operations on the USP V/VM storage system. For troubleshooting information on IBM XRC operations, please refer to the IBM XRC user documentation:

- *DFSMS Advanced Copy Services (SC35-0428-02)*
- *Implementing ESS Copy Services on S/390 (SG24-5680)*

If you need to call technical support, please follow the instructions in the next section ([Calling the Hitachi Data Systems Support Center](#)).

Table 5-1 General Troubleshooting for Compatible XRC

Problem	Description
There is a problem with Storage Navigator.	Make sure that the problem is not being caused by the PC or LAN hardware or software. Try restarting the PC and reconnecting to the USP V/VM storage system. Exiting the Storage Navigator software does not affect XRC operations already in progress. For further information on errors pertaining to Storage Navigator, see the <i>Storage Navigator User's Guide</i> .
Storage Navigator is displaying an error message.	Resolve the specified error condition, and then try the operation again. For information on error messages displayed by Storage Navigator, see the <i>Storage Navigator Error Codes</i> .
XRC operations do not function properly.	Make sure that all requirements and restrictions for XRC and Compatible XRC are met. Check all input values and parameters to make sure that you entered the correct information on the host console. Make sure that the main and remote storage systems are powered on and fully operational (NVS, cache, DFW). Refer to the <i>USP V/VM User and Reference Guide</i> for operational and troubleshooting information for the USP V/VM.
One or more XRC pairs are suspended.	Hardware failures that affect the cache storage or shared memory of the USP V/VM storage system may cause XRC pairs to be suspended. Check the SIMs (displayed by Storage Navigator and logged at the host). For further information on SIMs, call the Hitachi Data Systems Support Center.
The ANTX5123W console message is displayed during the RESUME operation for XRC pairs.	If the ANTX5123W console message is displayed during the RESUME operation for XRC pairs, the operation might be unsuccessful. In this case, you must perform the XDELPAIR operation to delete the pairs, and then perform the XADDPAIR operation to create the pairs again.
The ANTA5107E (RC=9014, REAS=604 or REAS=608) console message is displayed during the XADDPAIR operation.	If the ANTA5107E (RC=9014, REAS=604 or REAS=608) console message is displayed during the XADDPAIR operation, the Compatible XRC program product may not be installed on the USP V/VM storage system. If the Compatible XRC program product is not installed, install it. See the <i>Storage Navigator User's Guide</i> for instructions on installing program products.

Calling the Hitachi Data Systems 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.
- The exact content of any error messages displayed on the host system(s).
- The exact content of any error messages displayed by Storage Navigator.
- The Storage Navigator configuration information (use the FD Dump Tool).
- The service information messages (SIMs), including reference codes and severity levels, displayed by Storage Navigator.

The Hitachi Data Systems customer support staff is available 24 hours a day, seven days a week. If you need technical support, log on to the Hitachi Data Systems Portal for contact information: <https://hdssupport.hds.com>



Acronyms and Abbreviations

async	asynchronous
CC	Concurrent Copy
CLPR	cache logical partition
DASD	direct access storage device
DEV	device
DFSMS™	Data Facility Storage Management Subsystem
DFSMSdss™	Data Facility Storage Management Subsystem Data Set Services
FC	FlashCopy
FD	floppy disk
GB	gigabyte (see Convention for Storage Capacity Values)
GUI	graphical user interface
KB	kilobyte (see Convention for Storage Capacity Values)
I/O	input/output
ICKDSF	IBM Device Support Facility
IBM	International Business Machines Corporation
LAN	local-area network
MB	megabyte (see Convention for Storage Capacity Values)
ms	millisecond
M-VOL	main volume for TrueCopy for z/OS
PB	petabyte (see Convention for Storage Capacity Values)
PC	personal computer system
PTF	program temporary fix
P-VOL	primary volume for Compatible XRC
RAID	redundant array of independent disks
R-VOL	remote volume for TrueCopy for z/OS
SC	storage control
SCI	state-change interrupt
SCP	state-change pending
SDM	system data mover
Siz	Hitachi ShadowImage for IBM z/OS

SIM	service information message
S-VOL	secondary volume for Compatible XRC
	source volume for ShadowImage for z/OS and FlashCopy
SVP	service processor
sync	synchronous
TB	terabyte (see Convention for Storage Capacity Values)
TCz	Hitachi TrueCopy for IBM z/OS
TSO	Time Sharing Option
T-VOL	target volume for ShadowImage for z/OS and FlashCopy
USP V	Hitachi Universal Storage Platform V
USP VM	Hitachi Universal Storage Platform VM
XRC	Extended Remote Copy

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