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Hitachi Virtual Storage Platform
Hitachi Compatible XRC User Guide

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Preface

This document describes and provides instructions for using the Hitachi Compatible Replication for IBM® XRC software of the Hitachi Virtual Storage Platform.

This preface includes the following information:

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 Virtual Storage Platform .

Readers of this document should meet the following requirements:

- You should have a background in data processing and understand RAID storage systems and their basic functions.
- You should be familiar with the Hitachi Virtual Storage Platform storage system, and you should have read the *Hitachi Virtual Storage Platform User and Reference Guide*.
- You should be familiar with the Hitachi Storage Navigator software for the Hitachi Virtual Storage Platform, and you should have read the *Hitachi Storage Navigator User Guide*.
- You should be familiar with the storage systems that are connected to the Hitachi Virtual Storage Platform as external storage.

Product version

This document revision applies to VSP microcode 70-06-1*x* and later.

Document revision level

Revision	Date	Description
MK-90RD7011-00	October 2010	Initial Release
MK-90RD7011-01	October 2010	Supersedes and replaces MK-90RD7011-00
MK-90RD7011-02	April 2011	Supersedes and replaces MK-90RD7011-01
MK-90RD7011-03	August 2011	Supersedes and replaces MK-90RD7011-02
MK-90RD7011-04	November 2011	Supersedes and replaces MK-90RD7011-03
MK-90RD7011-05	March 2012	Supersedes and replaces MK-90RD7011-04
MK-90RD7011-06	November 2012	Supersedes and replaces MK-90RD7011-05
MK-90RD7011-07	April 2014	Supersedes and replaces MK-90RD7011-06

Changes in this revision

- Updated table in Volume sharing between Compatible XRC and other copy functions on page 3-2.

Referenced documents

- *Hitachi SNMP Agent User Guide*, MK-90RD7007
- *Hitachi Copy-on-Write Snapshot User Guide*, MK-90RD7013
- *Performance Guide*, MK-90RD7020
- *Provisioning Guide for Mainframe Systems*, MK-90RD7021
- *Provisioning Guide for Open Systems*, MK-90RD7022

- *Hitachi ShadowImage® User Guide*, MK-90RD7024
- *Hitachi Storage Navigator User Guide*, MK-90RD7027
- *Hitachi TrueCopy® User Guide*, MK-90RD7029
- *Hitachi Universal Replicator User Guide*, MK-90RD7032
- *Hitachi Universal Volume Manager User Guide*, MK-90RD7033
- *Hitachi Virtual Storage Platform User and Reference Guide*, MK-90RD7041

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.

Chapter	Description
Overview of Hitachi Compatible Replication for IBM® XRC on page 1-1	Provides an overview of the Compatible XRC program product.
Requirements and restrictions on page 2-1	Provides system requirements and restrictions for Compatible XRC.
Interoperability with other products and functions on page 3-1	Provides interoperability with other products and functions.
Using Compatible XRC on page 4-1	Provides instructions for performing Compatible XRC operations.
Troubleshooting on page 5-1	Provides troubleshooting information and instructions for calling technical support.

Document conventions

The term Virtual Storage Platform refers to all models of the Virtual Storage Platform 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**.
Italic	Indicates a variable, which is a placeholder for actual text provided by the user or system. Example: copy *source-file target-file* *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 oradb`
< > 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.

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

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

Icon	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 (disk drive capacity) are calculated based on the following values:

Physical capacity unit	Value
1 KB	1,000 bytes
1 MB	$1,000^2$ bytes
1 GB	$1,000^3$ bytes
1 TB	$1,000^4$ bytes
1 PB	$1,000^5$ bytes
1 EB	$1,000^6$ bytes

Logical storage capacity values (logical device capacity) are calculated based on the following values:

Logical capacity unit	Value
1 KB	1,024 bytes
1 MB	1,024 KB or $1,024^2$ bytes
1 GB	1,024 MB or $1,024^3$ bytes

Logical capacity unit	Value
1 TB	1,024 GB or $1,024^4$ bytes
1 PB	1,024 TB or $1,024^5$ bytes
1 EB	1,024 PB or $1,024^6$ bytes
1 block	512 bytes

Accessing product documentation

The Hitachi Virtual Storage Platform user documentation is available on the Hitachi Data Systems Support Portal: https://Portal.HDS.com. Please 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 Support Portal for contact information: https://Portal.HDS.com

Comments

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

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

1

Overview of Hitachi Compatible Replication for IBM® XRC

This topic provides an overview of the Hitachi Compatible Replication for IBM® XRC (Compatible XRC) feature and configuration.

- ☐ Features
- ☐ Resources that can be executed for each function
- ☐ Configuration

Features

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

Compatible XRC, used in mainframe systems, has interoperability with the XRC feature and is provided as the program product. Compatible XRC is compatible with System Data Mover (SDM) in Data Facility Storage Management Subsystem (DFSMS), which is common to the XRC environment. Compatible XRC operations are performed in a similar way of XRC by issuing Time Sharing Option (TSO) commands from the host system to the logical devices on the Virtual Storage Platform.

In Compatible 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 VSP 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.

The following shows an overview of Compatible XRC operations.

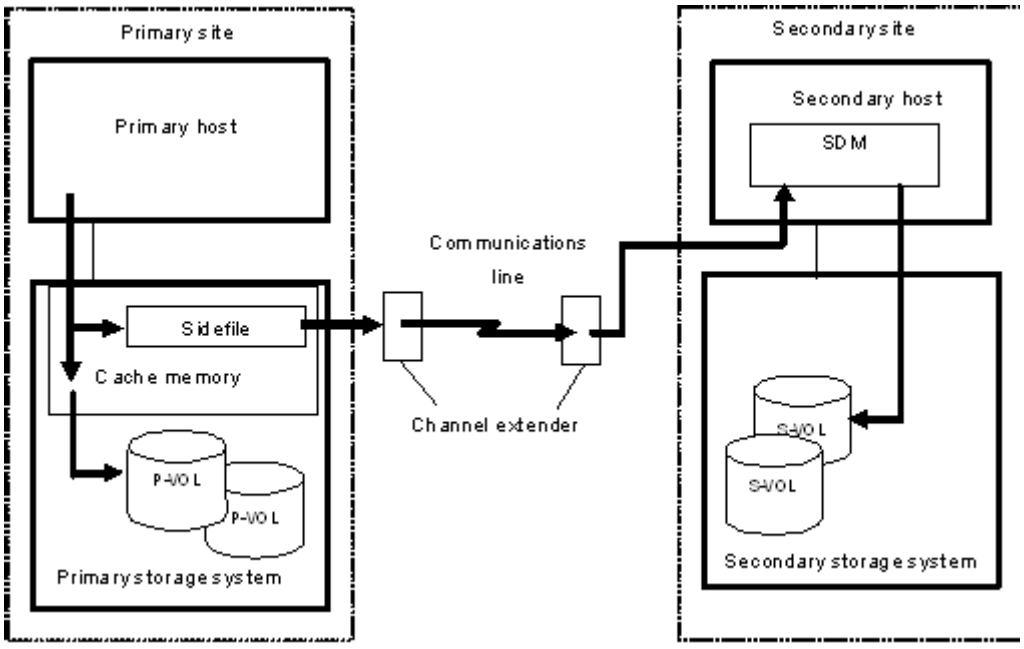

Figure 1-1 Overview of Compatible XRC operations

Sessions

In Compatible 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 for each volume. SDM reads the data written to the VSP 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 Time Sharing Option (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 Compatible XRC operations, see the IBM document *DFSMS Advanced Copy Services* (SC35-0428-18).

Note: The last 2 digits of the IBM document number are the version. Version 18 is the version of the *Advanced Copy Services* document for z/OS 1.12.

Resources that can be executed for each function

For the software in the Storage Navigator secondary window

The Storage Navigator secondary window shows all the resources in the storage system. However, the functions described in this manual are only available to the resources that are assigned to the account of users who log

into Storage Navigator. Verify the resource group ID in the Basic Information Display dialog boxes, and then execute the operations for the resources assigned to the user account. When you use the functions, the resources for each operation must satisfy the specific conditions.

For details on user accounts, see the *Hitachi Storage Navigator User Guide*. For details on the conditions of the resources, see the *Provisioning Guide for Open Systems* or the *Provisioning Guide for Mainframe Systems.*

Configuration

Compatible 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 be capable 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 feature needs to be installed in the primary storage system, and the Storage Navigator is required at the primary site for setting XRC options.

The following shows the connection configuration of channel extenders for Compatible XRC operations.

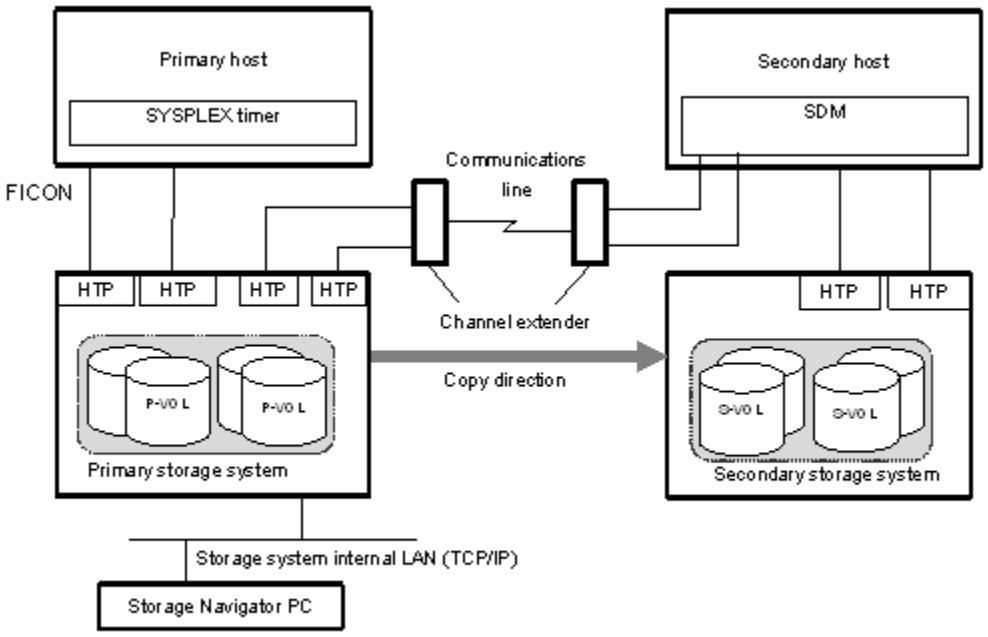

Figure 1-2 Channel Extender connection configuration for Compatible XRC

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Requirements and restrictions

This topic provides system requirements and restrictions for using Compatible XRC.

- ☐ System requirements
- ☐ Requirements and restrictions for Compatible XRC
- ☐ Restrictions on usage

System requirements

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 Virtual Storage Platform**

  The Compatible XRC program product must be installed in the primary Virtual Storage Platform.

  When the controller emulation type is 2105 or 2107, the Compatible XRC program product must be installed.

- **Secondary Virtual Storage Platform**

  The secondary storage system does not have to be the same make and model as the primary, but we recommend that you use the Virtual Storage Platform as a secondary storage system. The installation of the Compatible XRC program product is not required for the secondary storage system.

- **Communication path connection**

  - If a director (such as Ultranet) is used for connection, the maximum distance between the primary storage system and secondary host is 20 km.
  - If a director and repeater are used for connection, the maximum distance between the primary storage system 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 Ultranet 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. The web browser is required to operate Storage Navigator Java application including the Compatible XRC program product. Additionally, the license key code is required to use the Compatible XRC program product.

For instructions on installing and using Storage Navigator and the Compatible XRC program product, see the *Hitachi Storage Navigator User Guide*.

Requirements and restrictions for Compatible XRC

Supported XRC functions in XRC2 and XRC3

The following table lists the supported Compatible XRC features in IBM XRC functions (XRC2 and XRC3).

Table 2-1 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	Feature to set arbitrary Sleep Time from SDM when the amount of write data is controlled.	Not supported	Supported[4]
Multiple Reader	This function enables SDM to read the sidefile parallel using the primary session and its auxiliary sessions in the primary storage control session. It reduces data stagnation of the sidefile compared with ordinary Single Reader.	Not supported	Supported[5]
Extended Distance FICON	This function is used to reduce the handshake time to connect the channel and control unit, and then uses the extended IU Pacing protocol to maintain the long distance communication status.	Not supported	Supported

Notes:

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 will be 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 will not operate when Block Option is set to Cache Level.
5. Functioning on DKC emulation type 2107 and later.
6. Install Compatible PAV or Compatible Hyper PAV, if you use this function. See Using Compatible XRC with Compatible Hyper PAV Software on page 3-7, when you use Compatible Hyper PAV.

When the controller emulation type is 2105 or 2107, both XRC2 and XRC3 are supported.

Number of sessions for Compatible XRC and CC

The following table shows the number of supported sessions in Compatible XRC.

Table 2-2 Number of Compatible XRC sessions

Unit	Number of Sessions
Per storage system	Number of CUs x 64
Per CU	64*
Per volume	1
*Primary and auxiliary sessions are assigned when Multiple Reader function is used. The number of auxiliary sessions is a parameter of NumberReaderTasks which is defined in a XRC PARMLIB data set. This parameter defines multiplicity of auxiliary sessions on a primary session. For example, the following example shows that the three auxiliary sessions are enabled and multiply on a primary session. `NumberReaderTasks *,4`	

The number of Concurrent Copy (CC) and Compatible XRC sessions for each volume depends on the combination of CC and XRC (XRC2 and XRC3). The following table shows the number of sessions for each volume.

Table 2-3 Number of sessions per volume

Session Type	Device Emulation Type (3390-1, 3390-2, 3390-3, 3390-3R, 3390-9, 3390-A, 3390-L, 3390-M)	
	Number of CC Sessions	Number of Compatible XRC Sessions
CC only	16	N/A
CC and XRC2	15	1
CC and XRC3 Single Reader	15	1
CC and XRC3 Multiple Reader	15	1 (Primary session) 0-15 (Auxiliary Sessions)

Performance considerations

Note the following important performance considerations for Compatible XRC operations:

- *Block size.* Consider the block sizes 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 Compatible 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*.

Restrictions on usage

Behavior of option settings

The behavior of options set in the Change Option window is affected by the *Do not Block* parameter of the *XADDPAIR* command of SDM. The following shows the Compatible XRC options and the behavior of the VSP storage system of the *Do not Block* parameter of the *XADDPAIR* command of SDM.

Table 2-4 Behavior of storage system - block option is "Volume Level"

Compatible XRC Options		Behavior of the VSP 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*	N/A	N/A
Level 1 Sleep	Enable*	N/A	N/A
	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 2-5 Behavior of storage system - block option is "Cache Level"

Compatible XRC Options		Behavior of the VSP storage system	
Option	**Setting**	**Do not Block is specified by SDM and Do not Block (Volume Level) is enabled**	**Do not Block is Not specified by SDM (Block is specified) or Do not Block (Volume Level) is disabled**
Level 1 SIM	Enable	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.
Level 1 Sleep	Enable	The storage system does not perform “Sleep” - “Wait” command retry. Level 2 Suspend does not occur when the amount of used sidefile capacity exceeds the level 2 threshold. And the storage system does not report SCP-SCI to the host. [1,3]	The storage system performs “Sleep” - “Wait” command retry when excess of the sleep wait threshold occurs. Level 2 Suspend does not occur when the amount of used sidefile capacity exceeds the level 2 threshold. And the storage system reports SCP-SCI to the host. [2] (The storage system restricts the host I/O data flow to prioritize the retention of XRC pair status when the used sidefile capacity is overloaded.)
Level 2 Suspend	Disable		
Level 1 Sleep	Disable		The storage system does not perform “Sleep” - “Wait” command retry when excess of the sleep wait threshold occurs. Level 2 Suspend occurs when the amount of used sidefile capacity exceeds the level 2 threshold. [3] (The storage system suspends the XRC pair to prioritize the retention of host I/O performance when the used sidefile capacity is overloaded.)
Level 2 Suspend	Enable		

Compatible XRC Options		Behavior of the VSP storage system	
Option	**Setting**	**Do not Block is specified by SDM and Do not Block (Volume Level) is enabled**	**Do not Block is Not specified by SDM (Block is specified) or Do not Block (Volume Level) is disabled**
Notes: 1. When you specify the [Do not Block] in the **Xaddpair** command parameter, enable the [Do not Block] in the Compatible XRC option settings. 2. When you prioritize the retention of XRC pair status, set the [Level 1 Sleep] to Enable and [Level 2 Suspend] to Disable. 3. When you prioritize the retention of host I/O performance, specify the [Do not Block], or set the [Level 1 Sleep] to Disable and [Level 2 Suspend] to Enable.			

Multiple CLPR use

If you want to use Compatible XRC and more than one cache logical partition (CLPR), we recommend that you use SC sessions in the same CLPR. Compatible 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 Compatible 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 Compatible XRC is enabled) or *level-3*, the session that occupies the largest capacity in the sidefile in the cache is suspended.

3390-A and 3390-M devices

To use a 3390-A or 3390-M device as Compatible XRC P-VOL or S-VOL, apply 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
```

If this PTF has not been applied to the SDM, the 3390-A or 3390-M devices cannot be used as P-VOLs or S-VOLs in Compatible XRC operations.

Offline microcode replacement or volatile PS on

When offline microcode replacement, which requires PS OFF and PS ON, or volatile PS ON after the battery has discharged, is performed while Compatible XRC is operating, the storage control (SC) session of the storage system is automatically terminated. When this session is terminated, the session of the SDM side of the secondary site is suspended but the following RESUME operation may fail. To avoid the RESUME failure:

- Before replacing the microcode offline, delete all Compatible XRC pairs with the XDELPAIR command before PS OFF, and then create all pairs again with the XADDPAIR command after PS ON.
- When performing volatile PS ON, delete all Compatible XRC pairs with the XDELPAIR command immediately after PS ON, and then create all pairs again with the XADDPAIR command.

Maintenance

When a maintenance operation is needed while Compatible XRC is being used, I/O for Compatible XRC pair volumes or Compatible XRC itself should be stopped before the maintenance operation.

If a maintenance operation must be done while Compatible XRC is being used, before you start the maintenance operation, confirm that the usage of the Sidefile monitor is less than 20% of total Cache capacity by monitoring each combination of MPPK and CLPR usage. Do not perform the maintenance operation unless the Sidefile monitor usage is less than 20% of total Cache capacity.

Setting change of the processor blade assigned to LDEVs

The processor blade assigned to the LDEV that is used as a utility volume for Compatible XRC can be changed only when the XRC session is suspended and the number of the side files of the target session is zero.

Replacing online microcode

Execution of DEVSERV command on user terminal may display RDF status in EFC field when the device is online to the IBM host and the online microcode is replaced earlier than 70-03-3x with 70-03-3x and later.

```
DS QD,9600
IEE459I 17.17.17 DEVSERV QDASD 000
  UNIT VOLSER SCUTYPE DEVTYPE  CYL SSID SCU-SERIAL DEV-SERIAL EFC
09600 FI9600 2107900 2107900 3339 1900 XX75-64554 XX75-64554 RDF
```

This shows a difference of functions between DEVSERV command and the device of which host recognizes. You can resolve this inconsistency by executing following command (xxxx is device address).

```
DS QD,xxxx,VALIDATE
```

```
DS QD,9600,VALIDATE
IEE459I 17.18.09 DEVSERV QDASD 006
  UNIT VOLSER SCUTYPE DEVTYPE  CYL SSID SCU-SERIAL DEV-SERIAL EFC
09600 FI9600 2107900 2107900 3339 1900 XX75-64554 XX75-64554 *OK
```

For the detailed recovery procedure, see DEVSERV Command > Parameter > QDASD section of the *z/OS MVS System Commands* manual.

Though RDF appears, the system does not malfunction when this status is shown.

The Extended Manufacture in the XQUERY storage control features report is the same as before the microcode replacement, if you replace the microcode earlier than 70-03-3x or after 70-03-3x is included in the version while the XRC session is running. The reason is that the Extended Manufacture in the report is from the information of the current XADDPAIR command.

Use the RESUME feature of the XADDPAIR command to resume the session after suspending for XRC session if you would like to see the latest information in the report.

3

Interoperability with other products and functions

This topic provides information about Compatible XRC interoperability with other products and functions.

- ☐ Terminology
- ☐ Volume sharing between Compatible XRC and other copy functions
- ☐ Using two Compatible XRC pairs together
- ☐ Using Compatible XRC with TrueCopy for Mainframe
- ☐ Using Compatible XRC with ShadowImage for Mainframe
- ☐ Using Compatible XRC with Compatible FlashCopy® V2
- ☐ Using Compatible XRC with Compatible Hyper PAV Software
- ☐ Using Compatible XRC with other VSP software

Terminology

ShadowImage for Mainframe volumes displayed in the Storage Navigator windows and messages differ between Storage Navigator main windows and secondary windows. The differences are shown below.

Table 3-1 Volumes displayed in the window and messages

Window	Original volumes	Copied volumes
Storage Navigator main window	Primary Volume	Secondary Volume
Storage Navigator secondary window	S-VOL	T-VOL

For details on the Storage Navigator main window and secondary window, see the *Hitachi Storage Navigator User Guide.*

Volume sharing between Compatible XRC and other copy functions

The Virtual Storage Platform supports concurrent operations of Compatible XRC with other copy functions. The following table indicates whether Compatible XRC volumes can be shared with other copy functions.

Table 3-2 Volume sharing between Compatible XRC and other copy functions

Compatible XRC volumes	Volumes of other copy functions									
	Compatible XRC P-VOL	Compatible XRC S-VOL	URz P-VOL[1]	URz S-VOL[2]	TCz M-VOL[3]	TCz R-VOL[4]	SIz S-VOL[5]	SIz T-VOL[6]	FCv2 S-VOL[5]	FCv2 T-VOL[6]
Compatible XRC P-VOL	N/A	Yes[7]	No	No	Yes	No	Yes[8]	No	Yes	No
Compatible XRC S-VOL	Yes[7]	N/A	No	No	Yes	No	Yes	No	Yes	No

Notes:

1. Primary volume of a URz pair.
2. Secondary volume of a URz pair.
3. Main volume of a TCz pair.
4. Remote volume of a TCz pair.
5. Source volume of an SIz and FlashCopy pair.
6. Target volume of an SIz and FlashCopy pair.
7. A Compatible XRCS-VOL cannot be used as a Compatible XRC P-VOL within the same Compatible XRC session, but it can be used as an Compatible XRC P-VOL in another Compatible XRC session.
8. When the Compatible XRC P-VOL and the SIz are the same volume, you cannot use the Reverse Copy or Quick Restore commands of SIz.

Using two Compatible XRC pairs together

You can use two Compatible XRC pairs togetherto maintain three copies of data at multiple secondary sites for disaster recovery purposes. The following figure shows the configuration in which two Compatible XRC operations are performed. Data is copied from the primary site to the first secondary site using Compatible XRC, and then the same data is copied from the first secondary site to the second secondary site using Compatible XRC.

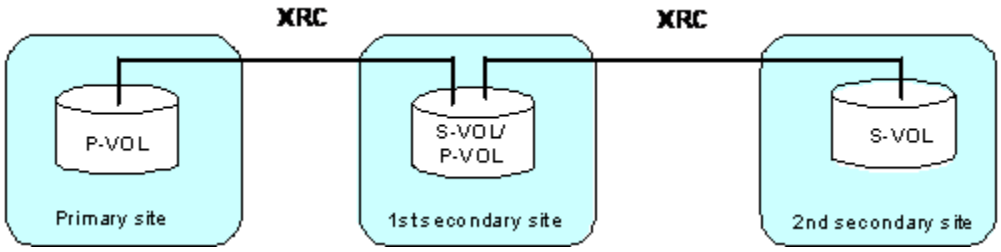


Figure 3-1 Double Compatible XRC Pairs

Using Compatible XRC with TrueCopy for Mainframe

The Virtual Storage Platform supports the use of Compatible XRC with TrueCopy for Mainframe (TCz) to maintain three copies of critical data at your primary and/or secondary sites for disaster recovery purposes.

Volume functioning as Compatible XRC P-VOL and TCz M-VOL

The following figure shows the configuration in which a volume is functioning as both a Compatible 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.

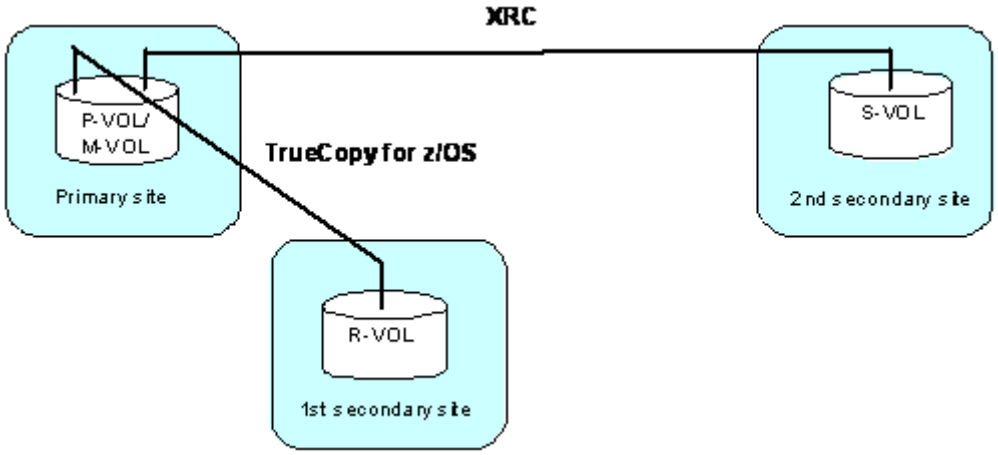


Figure 3-2 Volume Functioning as Compatible XRC P-VOL and TCz M-VOL

Volume Functioning as Compatible XRC S-VOL and TCz M-VOL

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

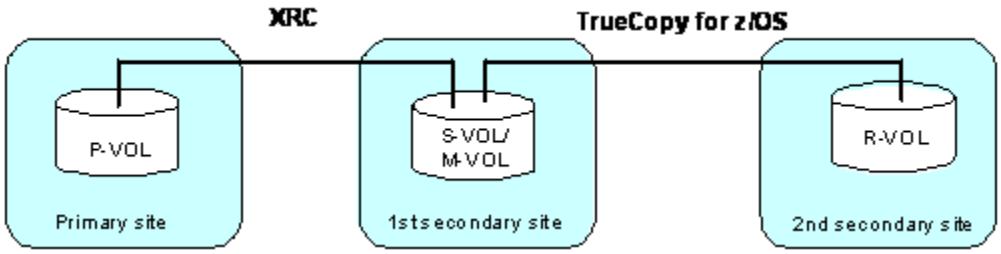


Figure 3-3 Volume Functioning as Compatible XRC S-VOL and TCz M-VOL

Using Compatible XRC with ShadowImage for Mainframe

The Virtual Storage Platform supports the use of Compatible XRC with ShadowImage for Mainframe (SIz) to maintain data in the secondary site and the primary site for disaster recovery and data migration purposes.

Volume functioning as Compatible XRC P-VOL and SIz S-VOL

The following figure shows the configuration in which a volume is functioning as both a Compatible 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 Compatible XRC.

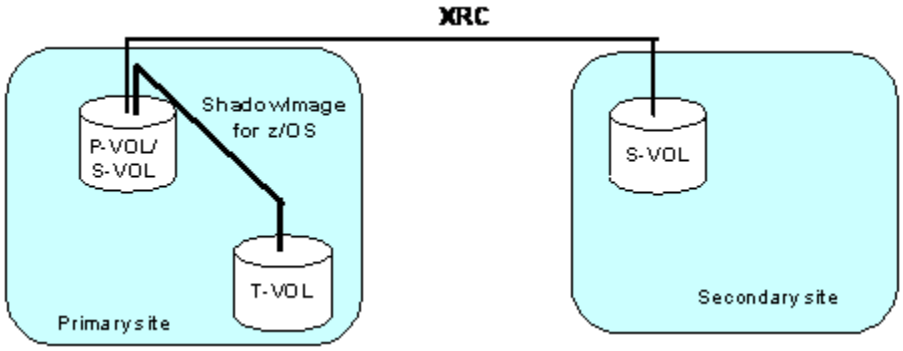


Figure 3-4 Volume Functioning as Compatible XRC P-VOL and SIz S-VOL

Volume functioning as Compatible XRC S-VOL and SIz S-VOL

The following figure shows the configuration in which a volume is functioning as both a Compatible 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 Compatible XRC, and then it is copied within the secondary site using SIz.

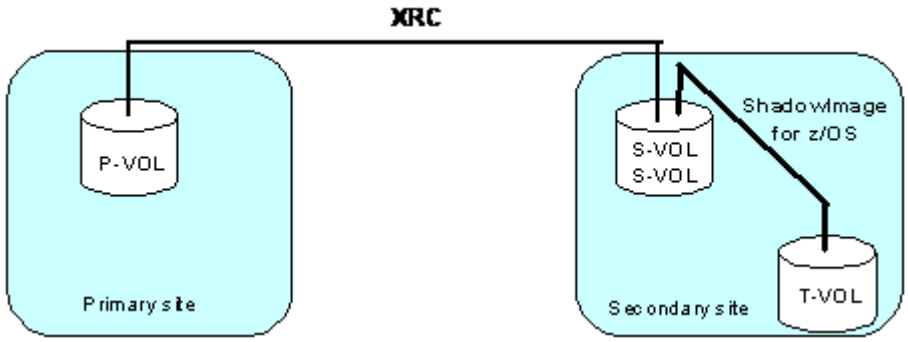


Figure 3-5 Volume Functioning as Compatible XRC S-VOL and SIz S-VOL

Volume as Compatible XRC P-VOL and SIz S-VOL, another volume as Compatible XRC S-VOL and SIz S-VOL

The following figure shows the configuration in which one volume is functioning as both a Compatible XRC P-VOL and an SIz S-VOL (source volume) and another volume is functioning as both a Compatible 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 Compatible XRC. Afterward, it is copied within the secondary site using SIz.

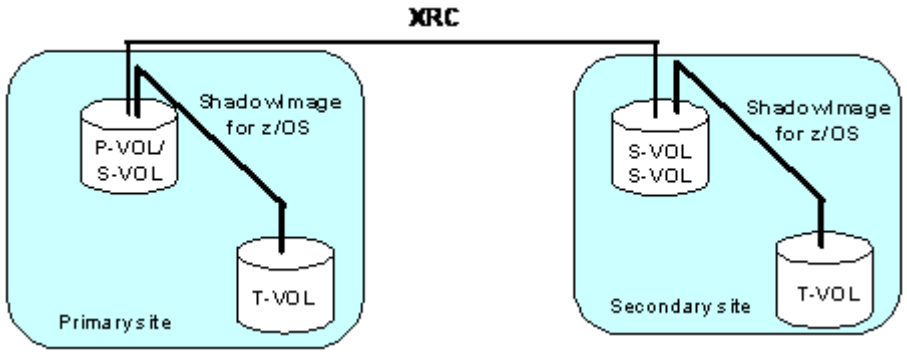


Figure 3-6 Volume as Compatible XRC P-VOL and SIz S-VOL, Another Volume as XRC S-VOL and SIz S-VOL

Using Compatible XRC with Compatible FlashCopy® V2

The Virtual Storage Platform supports the use of Compatible XRC with Hitachi Compatible Mirroring for IBM® FlashCopy® V2 (Compatible FlashCopy® V2) to maintain data in the secondary site and the primary site for disaster recovery and data migration purposes.

Volume functioning as Compatible XRC P-VOL and Compatible FlashCopy® V2 S-VOL

The following figure shows the configuration in which a volume is functioning as both a Compatible XRC P-VOL and a Compatible FlashCopy® V2 S-VOL. In this configuration, data is copied within the primary site using Compatible FlashCopy® V2, and it is copied from the primary site to the secondary site using Compatible XRC.

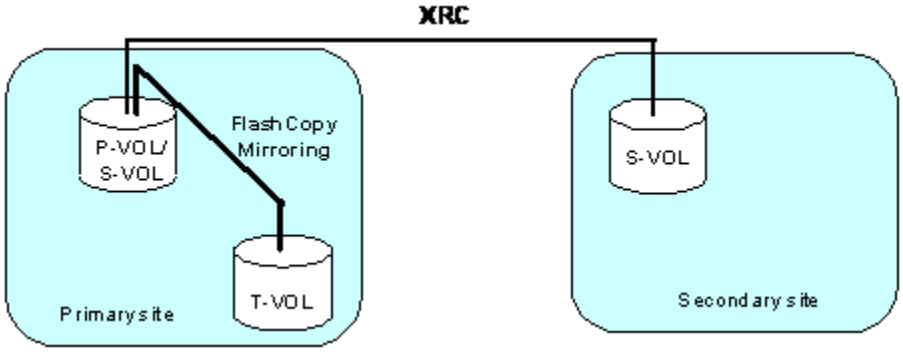


Figure 3-7 Volume Functioning as Compatible XRC P-VOL and Compatible FlashCopy® V2 S-VOL

Volume functioning as Compatible XRC S-VOL and Compatible FlashCopy® V2 S-VOL

The following figure shows the configuration in which a volume is functioning as both a Compatible XRC S-VOL (secondary volume) and a Compatible FlashCopy® V2 S-VOL (source volume). In this configuration, data is copied from the primary site to the secondary site using Compatible XRC, and it is copied within the secondary site using Compatible FlashCopy® V2.

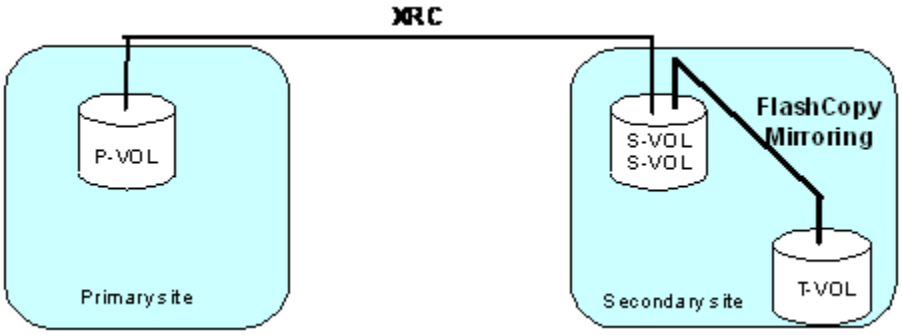


Figure 3-8 Volume Functioning as Compatible XRC S-VOL and Compatible FlashCopy® V2 S-VOL

One volume functioning as P-VOL and S-VOL, and another volume functioning as S-VOL and S-VOL

The following figure shows the configuration in which one volume is functioning as both a Compatible XRC P-VOL and a Compatible FlashCopy® V2 S-VOL, and another volume is functioning as both a Compatible XRC S-

VOL and a Compatible FlashCopy® V2 S-VOL. In this configuration, data is copied within the primary site using Compatible FlashCopy® V2, and then it is copied within the secondary site using Compatible FlashCopy® V2.

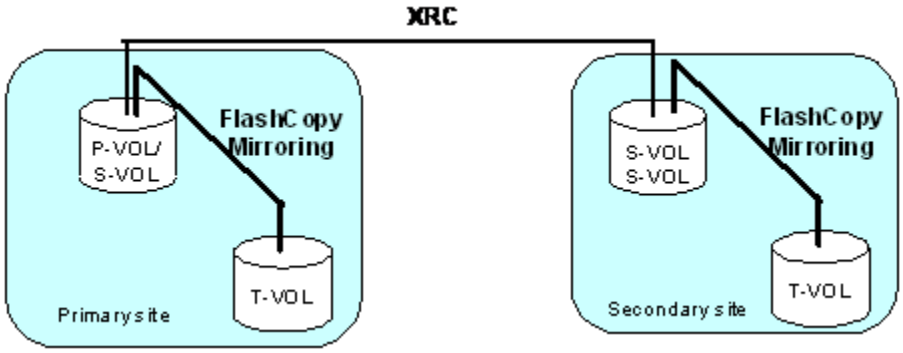


Figure 3-9 One Volume Functioning as P-VOL and S-VOL, and Another Volume Functioning as S-VOL and S-VOL

Using Compatible XRC with Compatible Hyper PAV Software

Be caregful when using Compatible Hyper PAV Software with the XRC Multiple Reader function, except when using XRC Single Reader function.

You may be unable to use the XRC Multiple Reader function because of abnormally terminated of the I/O in XRC Multiple Reader when the base volume for the alias is used in the following functions on Compatible PAV in Storage Navigator.

- The Mapping Volume (P-VOL for FICON DM pair) in FICON® Data Migration.
- The System Volume.
- Make sure the base volume on the Compatible PAV in Storage Navigator whether the volume is used to above functions and do not distribute the alias in the volume if it is in use.

Using Compatible XRC with other VSP software

- You can use Compatible XRC with Compatible Software for IBM® FlashCopy® SE. For details, see the topic on interoperability with other products and functions in the *Hitachi Compatible FlashCopy® User Guide*.
- You can use Dynamic Provisioning for Mainframe or Dynamic Tiering for Mainframefor the Compatible XRC P-VOL and S-VOL.

4

Using Compatible XRC

This topic provides instructions for using the features of Compatible XRC.

- ☐ Launching Compatible XRC
- ☐ Setting the Compatible XRC options
- ☐ Changing the settings in the preview list
- ☐ Deleting the settings in the preview list

Launching Compatible XRC

To open the Compatible XRC window:

1. Log on to the Virtual Storage Platform
2. Log into Storage Navigator.

   The Storage Navigator main window appears.
3. On the Storage Navigator menu bar, click **Action** > **Mainframe Connection** > **XRC**.

   The **Compatible XRC** window appears.
4. Change to Modify mode.

   For the information about changing to modify mode, see the *Hitachi Storage Navigator User Guide*.

For instructions on using Storage Navigator, see the *Hitachi Storage Navigator User Guide*.

To complete the Compatible XRC operations, click **Close** ().

Setting the Compatible XRC options

Use Compatible XRC to set the Compatible XRC options.

1. In the XRC options table, right-click the CLPRs for which you want to make option settings.
2. On the pop-up menu, select **Change Option**.
3. In the **Change Option** dialog box, set the desired Compatible XRC options.

   To apply the same Compatible XRC options to all CLPRs, select **The same setting is applied** check box, and click **OK** on the confirmation message.
4. When you have finished changing Compatible XRC options, click **OK** to save your changes and close the **Change Option** dialog box.

   The requested Compatible XRC option settings are displayed in the **Preview** list, and the requested changes are displayed in blue, bold, italics in the XRC option list.
5. Click **Apply**.

   Depending on your settings, a confirmation dialog box may appear and inform you that one or more pairs may be suspended.
6. When you have finished confirming the dialog box, click **OK**.

   A confirmation dialog box appears and asks whether you apply the settings to the storage system.
7. When you have finished confirming the dialog box, click **OK**.

   A confirmation dialog box appears and informs you that the operation is finished.
8. Click **OK**.

The settings are reflected in the XRC option list in the **Compatible XRC** window. This completes the setting of the Compatible XRC options.

Changing the settings in the preview list

Use the **XRC Option** window to change the settings of the Preview list.

1. On the **Preview** list in the **XRC Option** window, right-click the CLPR for which you want to change the option settings.
2. Click **Change** on the pop-up menu.

   The **Change Option** window appears.
3. In the **Option Change** window, change the settings of the Compatible XRC.
4. When you have finished changing the settings, click **OK**.

   The **Change Option** window closes and the new settings are reflected on the **Preview** list in the **XRC Option** window.

   This completes the changing of settings of the Preview list.

Deleting the settings in the preview list

Use the **XRC Option** window to delete the settings of the Preview list.

1. On the **Preview** list in the **XRC Option** window, right-click CLPR for which you want to delete the option settings.
2. Click **Delete** on the pop-up menu.

   A confirmation dialog box appears and informs you that the settings are deleted from the **Preview** list.
3. When you have finished confirming the dialog box, click **OK**.

   The deleted CLPR disappears from the **Preview** list, and the settings displayed in blue, bold italics in the XRC option disappears.

   This completes the deletion of settings in the Preview List

5

Troubleshooting

This topic provides troubleshooting information for Compatible XRC and instructions for calling technical support.

- ☐ Getting help
- ☐ General troubleshooting
- ☐ Console messages

Getting help

If you have difficulty with any of the procedures included in this topic, or if a procedure does not provide the answer or results you expect, please contact the Hitachi Data Systems Customer Support team. See Getting help on page Preface-xi in the Preface for information about accessing the support portal.

General troubleshooting

For troubleshooting errors encountered during the Compatible XRC operation, see the *Hitachi Storage Navigator Messages*.

For troubleshooting the general errors of Storage Navigator, see the *Hitachi Storage Navigator User Guide*.

Console messages

The table shows how to solve the problems when the console messages appear while you are operating the Compatible XRC.

Table 5-1 Compatible XRC console messages and troubleshooting

Console message	Description
ANTX5001E *Device number**, *CMD**, F7, 0001, 0041, 0E00, SSB EC=4946, *occurred VOLSER**, - - -	When the message is indicated during a delete operation for the Compatible XRC pairs, the problem may be the delete pair operation. When the error occurs, the retained pair status information between the SDM and VSP may differ because the SDM, which issued XDELPAIR, changes the pair status to DELETE while the pair status remains unchanged in the VSP since the session remains in it. Execute the LISTSESS command to confirm whether the session remains. If the session remains, execute the TERMSESS command to terminate the session.
ANTX5104E (RC=0901)	If you execute XADDPAIR command within a half minutes after executing XDELPAIR command, ANTX5104E(RC=0901) console message appears and the Compatible XRC pairs may be suspended. In this case, execute RESUME operation to the suspended pairs. When you execute XADDPAIR command, wait 5 minutes after executing XDELPAIR command.

Console message	Description
ANTX5105E (RC=1017)	When the message is indicated during a delete operation for the Compatible XRC pairs, the problem may be the delete pair operation. When the error occurs, the retained pair status information between the SDM and VSP may differ because the SDM, which issued XDELPAIR, changes the pair status to DELETE while the pair status remains unchanged in the VSP since the session remains in it. Execute the LISTSESS command to confirm whether the session remains. If the session remains, execute the TERMSESS command to terminate the session.
ANTX5106E LIC ERROR, REAS=00000020	With the Compatible XRC session suspended, when the RESUME operation is performed after adding a new utility volume or migrating one with the XADDPAIR command, this error may occur. In this case, perform the RESUME operation again.
ANTA5107E (RC=9014, REAS=604 or REAS=608)	If the ANTA5107E (RC=9014, REAS=604 or REAS=608) console message appears during the XADDPAIR operation, the Compatible XRC program product may not be installed on the VSP storage system. If the Compatible XRC program product is not installed, install it.
ANTX5123W	If the ANTX5123W console message is displayed during the RESUME operation for Compatible 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.
ANTX5124W	If the Compatible XRC pairs are deleted when a number of sidefiles of the Compatible XRC pairs remain in cache, this message appears, and a time-out error might occur. Deleting the Compatible XRC pairs must not be performed. When the time-out error occurs, the XQUERY TSO command or SCDATA operation must be performed to check that no sidefiles of the Compatible XRC pairs exist on cache before deleting the Compatible XRC pairs. Additionally, in the case of a time-out error, the pair information managed in SDM and DKC may not match. This is because the sessions remain in DKC though the pair-status in SDM where XDELPAIR was performed is deleted. Performing the LISTSESS command can check for the sessions. If you find the remaining sessions, complete the sessions by the TERMSESS command. When the XADDPAIR command is performed after completing sessions, the ANTA5107E (RC=608) message appears, and the XADDPAIR command may fail to perform. You must perform the XADDPAIR command again.

Console message	Description
Time-out error	If you resume the Compatible XRC pair when the sidefiles of the Compatible XRC pair remain on cache in the following condition, the time-out error occurs. The Compatible XRC pair must not be performed. • The XSUSPEND TSO command was performed to suspend the pair-volume. • Any failure made the pair-volume suspended. When the time-out error occurs, the XQUERY TSO command must be performed to check that no sidefiles of the Compatible XRC pairs exist on cache before resuming the Compatible XRC pairs. If you delete Compatible XRC pairs after the time-out error occurs, the session might remain on the disk controller side. Execute the LISTSESS command to confirm whether the session remains. If the session remains, execute the TERMSESS command to terminate the session.
*The device number, CMD, and occurred VOLSER are unique for your system.	

A

Controlling the amount of write data

This topic describes how to control the amount of write data the storage system performs according to the sidefile capacity.

- When block option is set to cache level
- When do not block (volume level) option is set to disable

When block option is set to 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.

- **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 (that is, level-1 threshold) is exceeded.

  When **Level 1 Sleep** is set to **Disable**, write I/Os to volumes will not be 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 (that is, level-2 threshold) is exceeded.

  When **Level 2 Suspend** is set to **Enable**, the storage system will not report SCP-SCI to hosts. Sidefile puncture will occur and the target session will be 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.

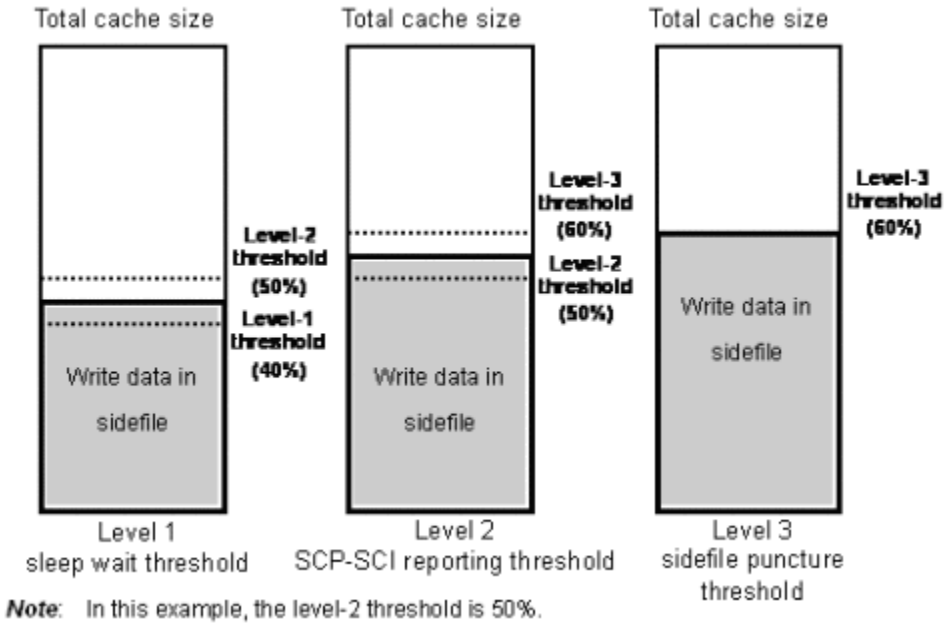


Figure A-1 Controlling the Amount of Write Data (1)

When do not block (volume level) option is set to 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.

- **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 for each 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 (that is, 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 (that is, 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.

  Sidefile puncture will occur.

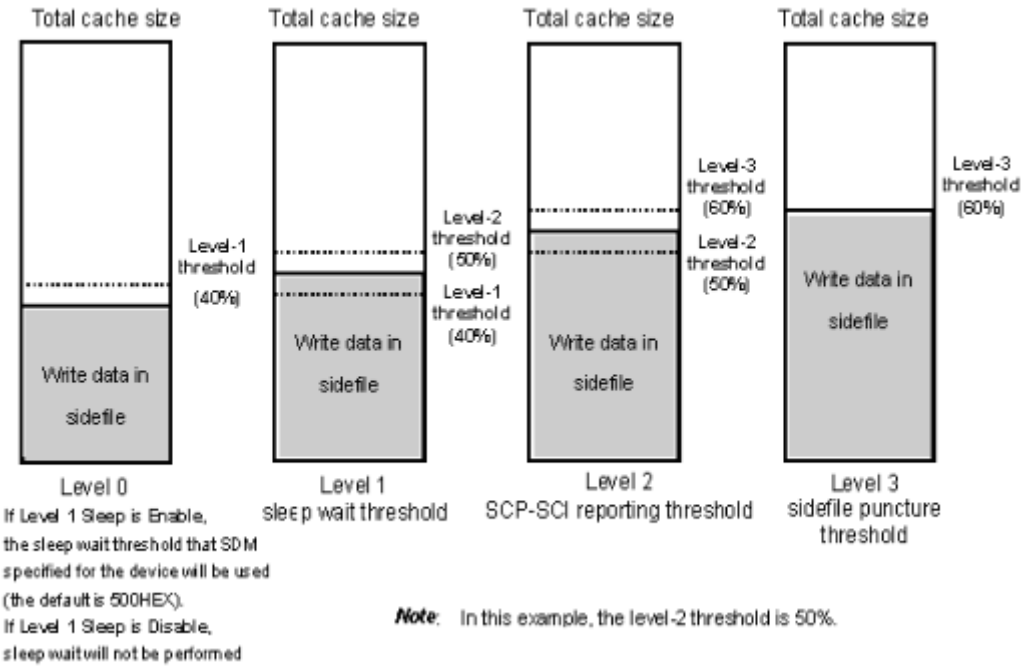


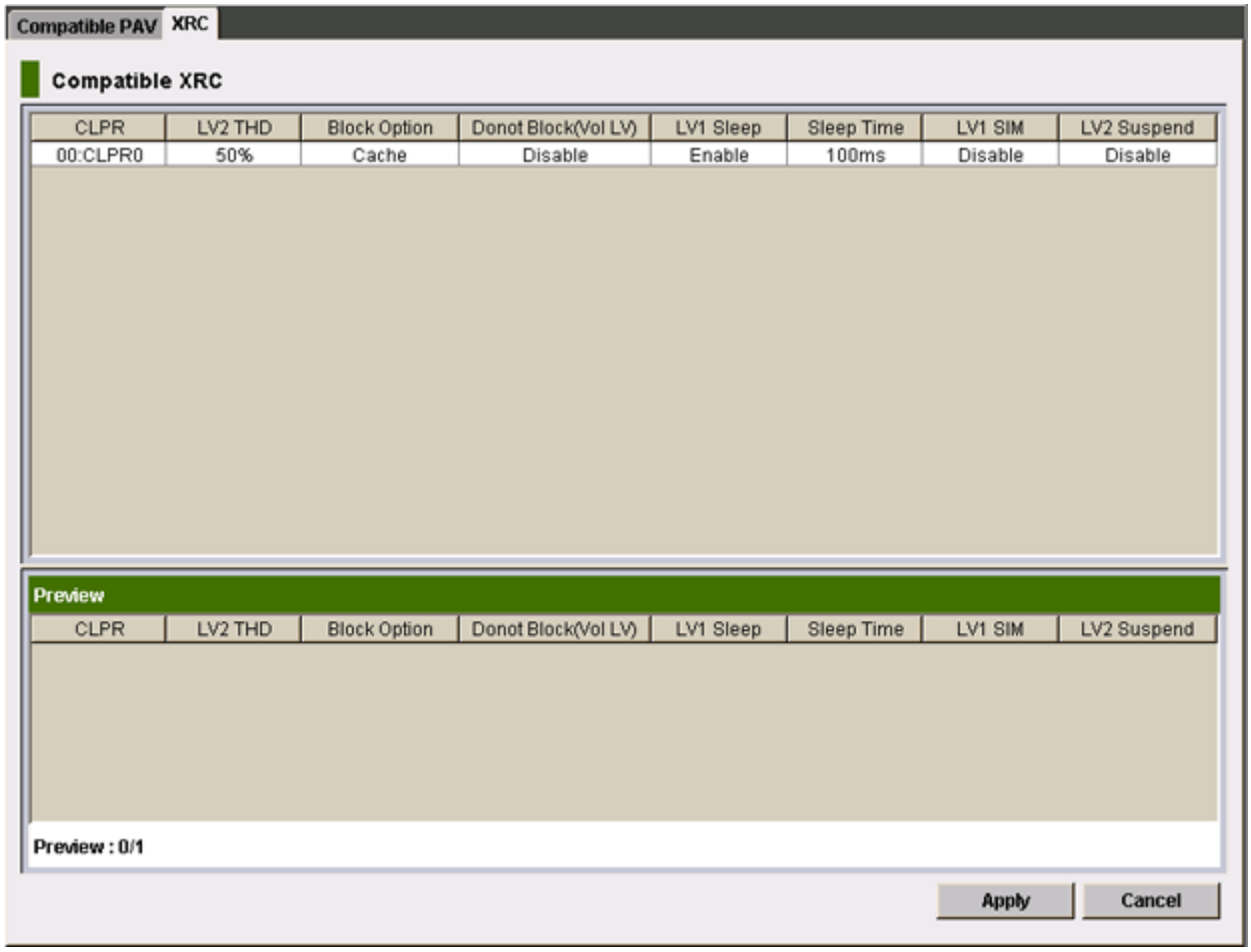
Figure A-2 Controlling the Amount of Write Data (2)

B

Compatible XRC GUI reference

This topic describes the Compatible XRC window and the Change Option window.

Compatible XRC window

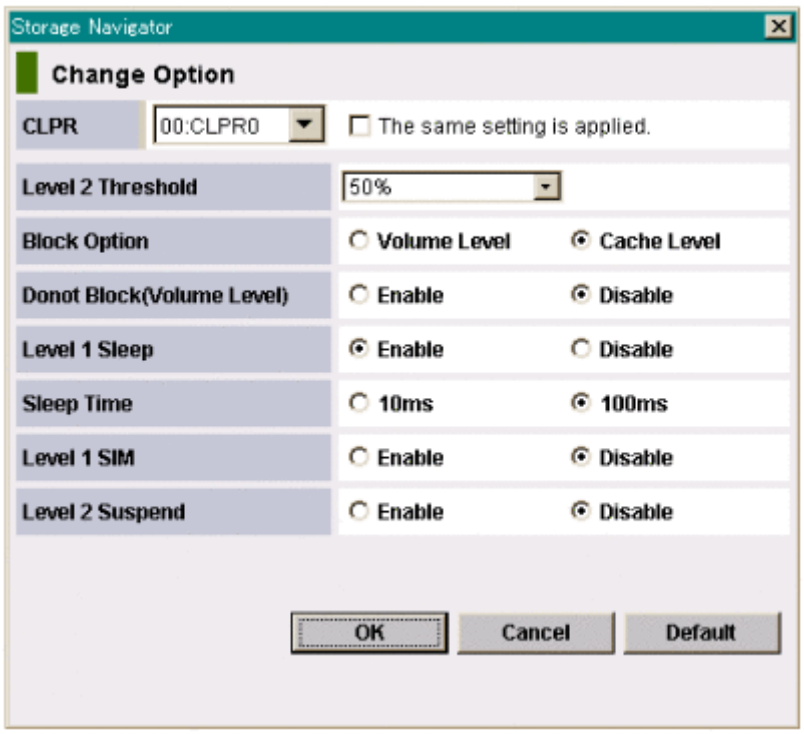


The following table shows the items in the Compatible XRC window.

Item		Description
Compatible XRC option list	CLPR	CLPR number.
	LV2 THD	Threshold shown in Level 2 Threshold in the Change Option window.
	Block Option	Setting shown in Block Option in the Change Option window.
	Do not Block (Vol LV)	Setting shown in Do not Block (Volume Level) in the Change Option window.
	LV1 Sleep	Setting shown in Level 1 Sleep in the Change Option window.
	Sleep Time	Setting shown in Sleep Time in the Change Option window.
	LV1 SIM	Setting shown in Level 1 SIM in the Change Option window.
	LV2 Suspend	Setting shown in Level 2 Suspend in the Change Option window.

Item	Description
Preview list	Displays the settings in the Change Option window. The settings in this list will not be applied to the storage system until you click Apply in the XRC Option window.
Apply	Applies the settings in the Preview list to the storage system.
Cancel	Cancels the settings in the Preview list.

Change option window



To open the Change Option window, right-click the desired CLPR in the Compatible XRC option list, and then select Change Option.

The following table shows the items in the Change Option window.

Item	Description
CLPR list	Select the desired CLPR.
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.

Item	Description
Level 2 Threshold list	Select the desired threshold (SCP-SCI reporting threshold or level 2 threshold) of the sidefiles of which the storage system performs an SCP (State Change Pending)-SCI (State Change Interrupt) reporting to the host. The level-2 threshold can be set from 30 percent to 70 percent in 10 percent increments. The default level-2 threshold setting is 50 percent. The level-2 threshold setting for SCP-SCI reporting applies to Concurrent Copy. When the level-2 threshold setting is changed, all of these functions are affected. To calculate the level-1 threshold, subtract 10 percent from the level-2 threshold, and add 10 percent to the level-2 threshold to calculate the level-3 threshold.
Block Option	Sets the IBM-compatibility mode for device blocking, which controls the amount of write data according to the sidefile capacity. • **Volume Level** - sets the IBM-compatible mode of the Device Block feature. When the "Sleep"- "Wait" command is retried, the system monitors the I/O written to the volume. When the amount of I/O write data exceeds the threshold for the number of record sets for each volume specified by SDM, the following settings are made: When Volume Level is selected, Enable is set to Do not Block (Volume Level), Disable for Level 1 is set to Sleep, and Disable for Level 2 three is set to Suspend. • **Cache Level** - disables the "Sleep"- "Wait" command retry according to the threshold for the number of record sets for each volume. The storage system controls the amount of three levels of write data based on the sidefile capacity. For details, see Controlling the amount of write data on page A-1.
Do not Block (Volume Level)	Sets whether the storage system controls the amount of write I/Os to the specified volume. • **Enable** - does not control the amount of data to be written to the specified volume. Write I/Os from hosts are not put in a wait status. When Block Option is set to Volume Level, Enable is set. For details, see Controlling the amount of write data on page A-1. • **Disable** - controls four levels of write data based on the sidefile capacity.
Level 1 Sleep	Sets whether the storage system retries the "Sleep"- "Wait" command when the sidefile threshold exceeds the sleep wait threshold (level-1 threshold). • **Enable** - retires the "Sleep"-"Wait" command. • **Disable** - does not retry the "Sleep"-"Wait" command. When Block Option is set to Volume Level, Disable is set.
Sleep Time	Sets the sleep wait time for the "Sleep"- "Wait" command retry. • 10 ms - The storage system waits 10 milliseconds. • 100 ms - The storage system waits 100 milliseconds.

Item	Description
Level 1 SIM	Sets whether the storage system reports SIM (Service Information Message) to the host when the sidefile threshold exceeds the sleep wait threshold (level-1 threshold). • **Enable** - reports SIM indicating that the sidefile exceeds the sleep wait threshold to the host. • **Disable** - does not report SIM to the host even when the sidefile exceeds the sleep wait threshold.
Level 2 Suspend	Sets whether the storage system reports SCP-SCI when the sidefile threshold reaches the SCP-SCI reporting threshold (level-2 threshold). • **Enable** - does not report SCP-SCI to the host. The sidefile is filled up and the target session is suspended. • **Disable** - reports SCP-SCI to the host. The host is unable to issue write I/Os until the host receives SCI after receiving SCP from the storage system. When Block Option is set to Volume Level, Disable is set.
OK	Saves the requested Compatible XRC option changes, and closes the Change Option dialog box. The requested Compatible XRC option changes are displayed in the Preview list and in blue, bold and italics in the Compatible XRC options table.
Cancel	Cancels the requested Compatible XRC option changes.
Default	Sets the Compatible XRC options to their default values.

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Hitachi Data Systems

Corporate Headquarters
2845 Lafayette Street
Santa Clara, California 95050-2639
U.S.A.
www.hds.com

Regional Contact Information

Americas
+1 408 970 1000
info@hds.com

Europe, Middle East, and Africa
+44 (0)1753 618000
info.emea@hds.com

Asia Pacific
+852 3189 7900
hds.marketing.apac@hds.com

Hitachi Data Systems

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