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Glossary

Index
The Hitachi Compatible FlashCopy® User Guide describes and provides instructions for using the Hitachi Compatible Software for IBM® FlashCopy® V2 and Hitachi Compatible Software for IBM® FlashCopy® SE for the Hitachi Virtual Storage Platform (VSP) storage system.

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

- Intended audience
- Product version
- Document revision level
- Changes in this revision
- Referenced documents
- Document organization
- Document conventions
- Convention for storage capacity values
- Accessing product documentation
- Getting help
- Comments
Intended audience

This document is intended for system administrators, Hitachi Data Systems representatives, and authorized service providers who install, configure, or operate the Hitachi Virtual Storage Platform storage system.

Readers of this document should be familiar with the following:

- Data processing and RAID storage systems and their basic functions.
- The IBM® FlashCopy® host software.

Product version

This document revision applies to VSP microcode 70-06-0x or later.

Document revision level

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Changes in this revision

- Updated the FCSETGOTOK parameter in the example in Using DFMSdss to establish Compatible FlashCopy® V2 relationships by volumes on page 3-8.
- Corrected the description of “TW” displayed by the FCQUERY command (Table 3-16 Information displayed by the FCQUERY command on page 3-33).
- Corrected the command example for step (4) in Using ICKDSF to establish relationships on page 4-12.
Referenced documents

Hitachi Virtual Storage Platform documents:
- *Hitachi Copy-on-Write Snapshot User Guide*, MK-90RD7013
- *Hitachi Storage Navigator Messages*, MK-90RD7028
- *Hitachi TrueCopy® for Mainframe User Guide*, MK-90RD7030
- *Hitachi Universal Volume Manager User Guide*, MK-90RD7033
- *Hitachi Thin Image User Guide*, MK-90RD7179

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.

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<th>Topic</th>
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<tr>
<td><strong>Chapter 1, About Hitachi Compatible FlashCopy® operations</strong></td>
<td>Provides an overview of Hitachi Compatible FlashCopy® operations.</td>
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<tr>
<td><strong>Chapter 2, Preparing for Hitachi Compatible FlashCopy® operations</strong></td>
<td>Provides the requirements and instructions for preparing for Hitachi Compatible FlashCopy® operations.</td>
</tr>
<tr>
<td><strong>Chapter 3, Performing Compatible FlashCopy® V2 operations</strong></td>
<td>Provides instructions for performing Compatible FlashCopy® V2 operations.</td>
</tr>
<tr>
<td><strong>Chapter 4, Performing Compatible Software for IBM® FlashCopy® SE operations</strong></td>
<td>Provides instructions for performing Compatible Software for IBM® FlashCopy® SE operations.</td>
</tr>
<tr>
<td><strong>Chapter 5, Feature comparison with IBM® product</strong></td>
<td>Describes the differences between the IBM® FlashCopy® mainframe product and the Hitachi Compatible FlashCopy® products.</td>
</tr>
<tr>
<td><strong>Chapter 6, Troubleshooting</strong></td>
<td>Provides troubleshooting information for Hitachi Compatible FlashCopy® and instructions for calling technical support.</td>
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<tr>
<td><strong>Appendix A, Compatible FlashCopy® V2 GUI reference</strong></td>
<td>Describes the Hitachi Compatible FlashCopy® windows and dialog boxes in Storage Navigator.</td>
</tr>
<tr>
<td><strong>Appendix B, Performing Compatible FlashCopy® V2 operations (secondary window)</strong></td>
<td>Provides instructions for performing Hitachi Compatible FlashCopy® operations using the previous Storage Navigator GUI, which displays in a secondary window.</td>
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Document conventions

This document uses the following terminology conventions:

<table>
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<td>Hitachi VSP</td>
<td>Refers to all models of the VSP, unless otherwise noted.</td>
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<tr>
<td>FlashCopy®</td>
<td>Refers to both IBM® FlashCopy® V2 and IBM® FlashCopy® SE, unless otherwise noted.</td>
</tr>
<tr>
<td>Hitachi Compatible FlashCopy®</td>
<td>Refers to both Hitachi Compatible Software for IBM® FlashCopy® V2 and Hitachi Compatible Software for IBM® FlashCopy® SE, unless otherwise noted.</td>
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This document uses the following typographic conventions:

<table>
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<tr>
<td><strong>Bold</strong></td>
<td>Indicates the following:</td>
</tr>
<tr>
<td></td>
<td>• Text in a window or dialog box, such as menus, menu options, buttons, and labels. Example: On the <strong>Add Pair</strong> dialog box, click <strong>OK</strong>.</td>
</tr>
<tr>
<td></td>
<td>• Text appearing on screen or entered by the user. Example: The <strong>-split</strong> option.</td>
</tr>
<tr>
<td></td>
<td>• The name of a directory, folder, or file. Example: The <strong>horcm.conf</strong> file.</td>
</tr>
<tr>
<td><em>Italic</em></td>
<td>Indicates a variable, which is a placeholder for actual text provided by the user or system. Used for variables in regular text. Example: copy <em>source-file target-file</em></td>
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<tr>
<td>Monospace</td>
<td>Indicates text that is displayed on screen or entered by the user. Example: <code># pairdisplay -g oradb</code></td>
</tr>
<tr>
<td><code>&lt; &gt;</code> angle brackets</td>
<td>Indicates a variable, which is a placeholder for actual text provided by the user or system. Used for variables in monospace text. Example: <code># pairdisplay -g &lt;group&gt;</code></td>
</tr>
<tr>
<td><code>[ ]</code> square brackets</td>
<td>Indicates optional values. Example: `[ a</td>
</tr>
<tr>
<td><code>{ }</code> braces</td>
<td>Indicates required or expected values. Example: `{ a</td>
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<tr>
<td>`</td>
<td>` vertical bar</td>
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<tr>
<td></td>
<td>`{ a</td>
</tr>
<tr>
<td>Underline</td>
<td>Indicates the default value. Example: `[ a</td>
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This document uses the following icons to draw attention to information:
Convention for storage capacity values

Physical storage capacity values (for example, disk drive capacity) are calculated based on the following values:

<table>
<thead>
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<th>Physical capacity unit</th>
<th>Value</th>
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<tr>
<td>1 KB</td>
<td>$1,000 \times 10^3$ bytes</td>
</tr>
<tr>
<td>1 MB</td>
<td>1,000 KB or $1,000^2$ bytes</td>
</tr>
<tr>
<td>1 GB</td>
<td>1,000 MB or $1,000^3$ bytes</td>
</tr>
<tr>
<td>1 TB</td>
<td>1,000 GB or $1,000^4$ bytes</td>
</tr>
<tr>
<td>1 PB</td>
<td>1,000 TB or $1,000^5$ bytes</td>
</tr>
<tr>
<td>1 EB</td>
<td>1,000 PB or $1,000^6$ bytes</td>
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Logical storage capacity values (for example, logical device capacity) are calculated based on the following values:

<table>
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<th>Value</th>
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<tr>
<td>1 block</td>
<td>512 bytes</td>
</tr>
<tr>
<td>1 KB</td>
<td>$1,024 \times 2^{10}$ bytes</td>
</tr>
<tr>
<td>1 MB</td>
<td>$1,024 \times 2^{10}$ bytes</td>
</tr>
<tr>
<td>1 GB</td>
<td>$1,024 \times 2^{10}$ bytes</td>
</tr>
<tr>
<td>1 TB</td>
<td>$1,024 \times 2^{10}$ bytes</td>
</tr>
<tr>
<td>1 PB</td>
<td>$1,024 \times 2^{10}$ bytes</td>
</tr>
<tr>
<td>1 EB</td>
<td>$1,024 \times 2^{10}$ bytes</td>
</tr>
</tbody>
</table>
Accessing product documentation

The Hitachi Virtual Storage Platform user documentation is available on the Hitachi Data Systems 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 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 and number, including the revision level (for example, -07), and refer to specific sections and paragraphs whenever possible. All comments become the property of Hitachi Data Systems.

Thank you!
About Hitachi Compatible FlashCopy® operations

This chapter provides an overview of Hitachi Compatible FlashCopy® operations on the Hitachi Virtual Storage Platform storage system.

- About Hitachi Compatible FlashCopy®
- Establishing a Compatible FlashCopy® relationship
- Copy modes
- Copying by volume
- Copying by dataset
- Using Consistency Groups for Dataset Copies that Span Volumes
- Incremental FlashCopy® function
- Reverse Restore function
- Fast Reverse Restore function
- FlashCopy® to PPRC Primary Volume function
- Remote Compatible FlashCopy® V2 function
- Compatible FlashCopy® V2 to Universal Replicator for Mainframe Primary Volume Function
- Preserve Mirror Compatible FlashCopy® V2 Function
- Releasing Compatible FlashCopy® V2 relationships
- Interoperability with other products and functions
- Optimizing Volumes
About Hitachi Compatible FlashCopy®

The Virtual Storage Platform is functionally compatible with the IBM®FlashCopy® V2 (FCV2) and IBM® FlashCopy® SE (FCSE) host control functions. Once the Hitachi Compatible FlashCopy® features are enabled, you can perform FlashCopy® operations on the Virtual Storage Platform by issuing PPRC TSO, DFSMSdss, ICKDSF, or ANTRQST Macro commands from the host, and you can monitor FlashCopy® operations from Storage Navigator.

Hitachi Compatible Software for IBM® FlashCopy® V2 delivers FlashCopy® V2 data mirroring compatibility and interoperability for the Virtual Storage Platform. Compatible FlashCopy® V2 provides dataset-level copy functionality and enables unattended point-in-time, full-volume, mirror-based data backup under a FlashCopy® operating environment.

Hitachi Compatible Software for IBM® FlashCopy® SE provides an in-system solution for data protection that is IBM® mainframe compatible. It combines snapshots and virtual data management to create logical point-in-time (PIT) copies. Once a source-target volume relationship is established, Compatible Software for IBM® FlashCopy® SE enables thin-provisioned storage capacity that is allocated and used only when a change occurs in the source volume. As backup copies are made to the target volume, storage resources are consumed only on an as-needed basis, depending on the amount of changed data, resulting in lower overall storage costs compared with full-volume physical mirroring.

The following Hitachi Compatible FlashCopy® operations are performed from Storage Navigator. All other operations are performed from the mainframe host.

- Enabling the Hitachi Compatible FlashCopy® features:
  - Hitachi Compatible Software for IBM® FlashCopy® V2
  - Hitachi Compatible Software for IBM® FlashCopy® SE
- Viewing Hitachi Compatible FlashCopy® pair configuration and history.
- Setting the FC Slower Copy option.
- Changing the state change pending (SCP) time for control units (CUs).

Establishing a Compatible FlashCopy® relationship

Hitachi Compatible FlashCopy® provides a fast data replication capability that enables you to copy the source data to a targeted volume virtually or physically. A pair created by Compatible FlashCopy® is called a relationship. Once a relationship has been created, hosts can access the data that is copied to the targeted volume.

You can also specify a range of data to be copied, which is called an extent, when you establish a Compatible FlashCopy® relationship. In addition, you can make multiple copies of data from one copy source. When you specify only a part of a volume (that is, an extent) as the copy source, the capacity of the source volume (S-VOL) and the target volume (T-VOL) can be
different. However, the specified target volume or extent must have a minimum size equal to that of the source volume or extent. You can even specify both copy source and copy target within the same volume.

To establish a Compatible FlashCopy® relationship, you need to specify a source volume (S-VOL) and target volume (T-VOL). When you want to copy data according to dataset, you specify the copy range as an extent in addition to the source and target. The smallest extent is a track.

Compatible FlashCopy® V2 enables you to establish up to 16 relationships from one extent, as shown in the following figure.

![Multiple relationships](image)

**Figure 1-1 Multiple relationships**

You cannot create a cascaded relationship. That is, an extent that is already set as a copy target cannot be used as a copy source to create a new relationship, as shown in the following figure.
Copy modes

When you establish a Compatible FlashCopy® relationship, you select the mode, COPY or NOCOPY, for the copy operation. NOCOPY mode can be selected only for Compatible Software for IBM® FlashCopy® SE.

When you select COPY mode, all data in the S-VOL is copied to the T-VOL. This process is called background copying. When the background copying is complete, the pair is automatically withdrawn. When you select NOCOPY mode, the background copying operation is not performed.

If there is a request for a write operation to an S-VOL in which the requested data is not yet copied, or a request for a read/write operation to a T-VOL in which the requested data is not yet copied, the old data is copied from the S-VOL to the T-VOL first, and then the read/write operation is performed. This process is called on-demand copying. The following figure shows the process of on-demand copying.

![Figure 1-2 Cascaded Compatible FlashCopy® relationship not supported](image)
1. From the host, there is a write request to an S-VOL from where the data has not been copied, or there is a Read or Write request to the space in the T-VOL to where the data has not been copied.

2. When an operation as described is made to the space in the S-VOL or T-VOL where the data has not been copied, Compatible FlashCopy® performs on-demand copying before the Read or Write operation. By on-demand copying, the data is copied from the S-VOL to the T-VOL.

3. When on-demand copying is completed, the Read or Write operation is performed.

**Figure 1-3 On-demand copying**

1. **Write** request to the space from where the data is not yet copied
2. Copy operation (On-demand copy)
3. Write operation
4. Read or Write operation

Legend
- **Time flow**
On-demand copy may not always be executed when there is a read request from the host. In that case, the host directly reads the S-VOL data instead of the T-VOL data.

**WARNING:** When the NOCOPY mode is selected, even if all the data in the S-VOL is copied to the T-VOL by the on-demand copying process, Compatible Software for IBM® FlashCopy® SE does not automatically withdraw the relationship. Therefore, when you selected NOCOPY mode, you must withdraw the pair by using the FCWITHDR command. If you select the NOCOPY2COPY mode for the relationship made by NOCOPY mode, the background copying process is performed. When all the data are copied, the relationship is released automatically.

---

**Copying by volume**

If you do not specify an extent when you establish a relationship, the entire volume is copied. This is called *volume copying*. To perform volume copying, the capacity of the copy source volume must be equal to or larger than the capacity of the copy target volume. Only a complete volume can be copied using Compatible Software for IBM® FlashCopy® SE.

**Copying by dataset**

If you specify the extent when you establish a relationship, only a part of the volume will be copied. This is called *dataset copying*. Dataset copying establishes the relationship only to the specified extent or extents. You can specify up to 16 target extents per one source extent. To perform dataset copying, the number of tracks of the copy source extent and the copy target extent must be the same.

The following list shows the available and unavailable combinations of the extents to establish the relationships in the case of dataset copying.

**Dataset copying can be performed when:**

- The position of the copy source extent is different from the position of the copy target extent.
- The volume of the copy source extent is different from the volume of the copy target extent.
- The copy source extent and the copy target extent are in the same volume, provided that they do not overlap.
- The data in a single source extent is to be copied simultaneously to multiple target extents.
- Volume copying is also performed simultaneously in the same sourced volume.
- Two source extents overlap, or one of them is an inclusive part of the other (see the following figure), provided that the number of overlapping extents in each overlapped area is not more than 16 extents.
Dataset copying cannot be performed when:

- Any one of the copy target extents overlaps a copy target extent.
- Any one of the copy target extents overlaps a copy source extent.
- A copy target extent that already has a relationship established is used to establish a new relationship with a copy source or target extent that overlaps.
- A copy source extent that already has a relationship established is used to establish a new relationship with a copy target extent that overlaps.

The following table shows the compatibility between the Compatible FlashCopy® V2 functions and the user interface functions.

Table 1-1 Compatibility between Compatible FlashCopy® V2 and user interface functions

<table>
<thead>
<tr>
<th>Functions</th>
<th>User interface</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TSO</td>
</tr>
<tr>
<td>Volume copy</td>
<td></td>
</tr>
<tr>
<td>Multi relationship</td>
<td>OK</td>
</tr>
<tr>
<td>NOCOPY mode</td>
<td>OK</td>
</tr>
<tr>
<td>COPY mode</td>
<td>OK</td>
</tr>
<tr>
<td>Dataset copy</td>
<td></td>
</tr>
<tr>
<td>Multi relationship</td>
<td>OK</td>
</tr>
<tr>
<td>NOCOPY mode</td>
<td>OK</td>
</tr>
<tr>
<td>COPY mode</td>
<td>OK</td>
</tr>
<tr>
<td>COPY mode</td>
<td></td>
</tr>
<tr>
<td>Multi relationship</td>
<td>OK</td>
</tr>
<tr>
<td>Change to NOCOPY mode</td>
<td>No</td>
</tr>
<tr>
<td>NOCOPY mode</td>
<td></td>
</tr>
<tr>
<td>Multi relationship</td>
<td>OK</td>
</tr>
<tr>
<td>Change to COPY mode</td>
<td>OK</td>
</tr>
<tr>
<td>Incremental FlashCopy®</td>
<td></td>
</tr>
<tr>
<td>Multi relationship</td>
<td>No</td>
</tr>
<tr>
<td>NOCOPY mode</td>
<td>No</td>
</tr>
<tr>
<td>COPY mode</td>
<td>OK</td>
</tr>
</tbody>
</table>
Using Consistency Groups for Dataset Copies that Span Volumes

If you use a consistency group, you may create copied data that keeps consistency even when the source data depends on each other and are stored in multiple volumes.

The following figures show examples of using a consistency group:
The first figure shows copying the data stored over volumes #1-#3 to volumes #4-#6. You need to establish relationships of volume #1 and #4, #2 and #5, and #3 and #6, then copy the data. However, if volume #1 is updated before the creation of the Relationship B (pair of #2 and #5) is completed, the consistency of the data in the copy target cannot be maintained.

The second figure shows Data 2 in volume #2 references Data 1 in volume #1, and Data 3 in volume #3 references Data 2 in volume #2. Therefore, when you try to copy Data 1-3 to volume #4-#6, if Data 1 is updated before the copying processing of Data 2 is completed, the consistency of copied Data 1 and copied Data 2 cannot be maintained.

To prevent the problems indicated above, Compatible FlashCopy® V2 regards volumes #1-#3 as one consistency group, and enables you to suspend the write operation from the host to the Compatible FlashCopy® V2 S-VOLs until the Relationship A, Relationship B, and Relationship C are
all created and all the copying processing is finished. To suspend the write
operation from the host to Compatible FlashCopy® V2 S-VOLs by using
consistency groups, you need to issue the pair creation command with an
option parameter.

When Compatible FlashCopy® V2 and TrueCopy for Mainframe (TCz) share
volumes, the results of operations such as creating pairs will differ according
to whether or not you are using a consistency group.

**Incremental FlashCopy® function**

Incremental FlashCopy® maintains a relationship even after the copy
operation from copy source to target is completed. Later, when the S-VOL
or T-VOL is updated, the updated data is managed in a track as differential
data. If the command to establish a relationship is re-executed on the
volumes originally related using the Incremental FlashCopy® function, only
differential data is copied. The following figure shows the workflow from
establishing the relationship (using Compatible FlashCopy® V2) to
executing the update copy operation using the Incremental FlashCopy®
function.
The previous figure shows Data 2A managed as differential data. If you re-execute the command to establish the relationship, only the differential data of Data 2A is copied to the T-VOL.

However, you cannot perform the Restore function:

- When the original relationship was established without using the Incremental FlashCopy® function.
- When the original relationship was re-established by the Fast Reverse Restore function, and then the relationship was re-established by the Restore function twice more.

For details about Fast Reverse Restore function, see Fast Reverse Restore function on page 1-13.
Reverse Restore function

The Reverse Restore function enables you to simplify data recovery in a time of disaster. This recovery function reverses the original S-VOL and T-VOL relationship established by the Incremental FlashCopy® function. This reversal reestablishes the relationship with the data flowing in the opposite direction. However, you cannot perform the Reverse Restore function in the following cases.

- If the original relationship was established without using the Incremental FlashCopy® function.
- If a copy operation established in COPY mode is not yet completed.
- If the original relationship was established in NOCOPY mode.
- If the relationship being reversed includes a relationship established with multiple volumes.
- If the S-VOL capacity exceeds the T-VOL capacity in the relationship being reversed.
- If the original relationship was reestablished using the Fast Reverse Restore function.

For details about Fast Reverse Restore function, see Fast Reverse Restore function on page 1-13.

You can judge whether the Reverse Restore function can be used by examining the results of the FLASHCOPY QUERY RELATIONS command of ICKDSF. For details, see Displaying information about Compatible FlashCopy® V2 pairs: FLASHCPY QUERY RELATIONS on page 3-36.

When you perform the Reverse Restore function, only the updated data is copied from newly specified S-VOL to T-VOL.

The following figure shows the workflow that occurs from establishing the Compatible FlashCopy® V2 relationship by the Incremental FlashCopy® function to the executing of the update copy operation (Reverse Restore).
Fast Reverse Restore function

The Fast Reverse Restore function enables you to simplify data recovery in a time of disaster. This recovery function reverses the original S-VOL and T-VOL relationship established by the Compatible FlashCopy® V2 relationships function. This reversal reestablishes the relationship with the data flowing in the opposite direction. However, you cannot perform the Fast Reverse Restore function in the following cases.

- If the relationships to be reversed include a relationship established with multiple volumes.
- If the S-VOL capacity exceeds the T-VOL capacity in the relationship to be reversed.
- If the original relationship was reestablished using the Fast Reverse Restore function.

You can perform the Fast Reverse Restore function on a relationship established in NOCOPY mode or on a relationship undergoing copy process. If you perform the Fast Reverse Restore function undergoing copy process, the copy process will end at that time.
After you re-establish a relationship by using the Fast Reverse Restore function, the contents of the new S-VOL are not ensured.

You can judge whether the Fast Reverse Restore function can be used by examining the results of the FLASHCOPY QUERY RELATIONS command of ICKDSF. For details, see Displaying information about Compatible FlashCopy® V2 pairs: FLASHCPY QUERY RELATIONS on page 3-36.

When you perform the Fast Reverse Restore function by using the Incremental FlashCopy® function, only the updated data is copied from the newly specified S-VOL to the T-VOL. This function cannot be used in Compatible Software for IBM® FlashCopy® SE.

When you perform the Fast Reverse Restore function without using the Incremental FlashCopy® function, already copied data is copied from the newly specified S-VOL to the T-VOL.

The following figure shows the workflow that occurs from the time of establishing a Compatible FlashCopy® V2 relationship with the Incremental FlashCopy® function to the time of executing the update copy operation (Fast Reverse Restore).
The FlashCopy® to PPRC (Peer-to-Peer Remote Copy) Primary Volume function enables you to share Compatible FlashCopy® V2 T-VOLs and TCz M-VOLs. When you share Compatible FlashCopy® V2 T-VOLs and TCz M-VOLs, the status of the TCz pairs must be Duplex, Pending duplex, or Suspend. Also, you can either create TCz pairs after creating Compatible FlashCopy® V2 pairs, or create Compatible FlashCopy® V2 pairs after creating TCz pairs. However, Compatible FlashCopy® V2 pairs can be created after creating TCz pairs only when the following options are used:
• DFSMSdss: FCTOPPRCPRIMARY
• TSO: TGTPPRIM (YES)
• ICKDSF: TGOKASPPRCPRIM (YES)
• ANTRQST Macro: TGTPPRIM (YES)

For details about using Compatible FlashCopy® V2 with TCz, see Using Compatible FlashCopy® V2 with TrueCopy for Mainframe on page 1-31.

• TCz program product is required for using the FlashCopy® to PPRC Primary Volume function.
• FlashCopy® to PPRC Primary Volume function cannot be used for TCz pairs that are registered in consistency groups.
• Data that Compatible FlashCopy® V2 copies to TCz P-VOLs are transferred to TCz S-VOLs asynchronously. TCz displays the progress of this asynchronous data transfer. Depending on the timing of the Compatible FlashCopy® V2 and TCz copy operations, a time delay may occur between the Compatible FlashCopy® V2 copy operation and the TCz copy operation, and the TCz asynchronous data transfer may progress slowly.
• If the Compatible FlashCopy® V2 S-VOL and T-VOL are both Dynamic Provisioning for Mainframe volumes, the number of pages remaining in T-VOL may differ depending on the timing.

The following figures show the copy process of Compatible FlashCopy® V2 pairs and TCz pairs by the FlashCopy® to PPRC Primary Volume function.
The relationship is established by specifying the parameter for FlashCopy to FPRC Primary Volume function.
(The S-VOL data is copied to T-VOL (FPRC P-VOL) between the Compatible FlashCopy® V2 pair. At that time, the TCz pair status becomes Pending duplex, and the TCz M VOL (FC T-VOL) data is copied to TCz R-VOL)

After copy operation is completed, the TCz pair status shifts to Duplex.

Figure 1-10 Creating Compatible FlashCopy® V2 pair in TCz pair
Figure 1-11 Creating TCz pair in Compatible FlashCopy® V2 pair
**Comparison of Results of TCz Pair operations**

TCz pair operations sometimes produce different results depending on whether differential data of the TCz pair are stored in units of tracks or cylinders. See the following table.

**Table 1-2 Comparison of results of TCz pair operations**

<table>
<thead>
<tr>
<th>Comparison Item</th>
<th>If differential data of the TCz pair are stored in units of tracks</th>
<th>If differential data of the TCz pair are stored in units of cylinders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is it possible to use TCz pair volumes that are not suspended to create FCv2 relationships?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Is it possible to use suspended TCz pair volumes to create FCv2 relationships?</td>
<td>Yes</td>
<td>Yes. However, you cannot resynchronize a TCz pair when a volume in the TCz pair is also used as a FCv2 volume.</td>
</tr>
<tr>
<td>Is it possible to use FCv2 relationships to create TCz pairs?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Will background copy be performed if a FCv2 relationship has been created in NOCOPY mode?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>When will differential data of the TCz pair be updated? Transition of Pair Synchronized is different depending on whether the data were stored in units of tracks or cylinders.</td>
<td>When the FCv2 relationship is created.</td>
<td>When the FCv2 relationship is copied in units of tracks.</td>
</tr>
</tbody>
</table>
Remote Compatible FlashCopy® V2 function

The Remote Compatible FlashCopy® V2 function enables you to perform operations on Compatible FlashCopy® V2 relationships on the TCz remote storage system from the host connected to the TCz main storage system. This function cannot be used for Compatible Software for IBM® FlashCopy® SE pairs.

The Remote Compatible FlashCopy® V2 operation proceeds in the following order:

- First, you issue a Compatible FlashCopy® V2 operation command to the TCz M-VOL.
- Then, the command is transmitted from the Main Control Unit (MCU) to the Remote Control Unit (RCU).
- Finally, the storage system identifies the TCz R-VOL as a Compatible FlashCopy® V2 S-VOL and performs a Remote Compatible FlashCopy® V2 operation on the Compatible FlashCopy® V2 V2 relationships (for example, it creates a relationship, releases a relationship, and displays information about a relationship).

However, you cannot perform the Remote Compatible FlashCopy® V2 function in the following cases:

- The Compatible FlashCopy® V2 operation command is not issued to the TCz M-VOL.
- The S-VOL is not the TCz R-VOL.
- An extent is specified when you establish a relationship. You cannot use extents to establish a relationship for a dataset copying.
- The TCz R-VOL is in Simplex status.
- The TCz R-VOL is in Pending duplex status.
- The TCz R-VOL is in Duplex, Suspend, or SSWS status and the TCz M-VOL is in Simplex, or Pending duplex status.
- The specified T-VOL is a TSE-VOL. You cannot establish Compatible Software for IBM® FlashCopy® SE relationships by using the Remote Compatible FlashCopy® V2 function.

Note: If the Compatible Software for IBM® FlashCopy® SE license is not installed in the local site, only the remote-site Compatible Software for IBM® FlashCopy® SE relationships are released. The TSE-VOL area specified as the T-VOL cannot be released when relationships are released using the Remote Compatible FlashCopy® V2 function in the mode used to release allocated areas.

The following figure shows the Remote Compatible FlashCopy® V2 function.
The following table shows whether the Remote Compatible FlashCopy® V2 function can be combined with other Compatible FlashCopy® V2 functions.

**Table 1-3 Combining the Remote Compatible FlashCopy® V2 function with other Compatible FlashCopy® V2 functions**

<table>
<thead>
<tr>
<th>Remote Compatible FlashCopy® V2 function</th>
<th>Can the Remote Compatible FlashCopy® V2 function be combined with other functions?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume copy</td>
<td>Yes</td>
</tr>
<tr>
<td>Dataset copy</td>
<td>No</td>
</tr>
<tr>
<td>COPY mode</td>
<td>Yes</td>
</tr>
<tr>
<td>NOCOPY mode</td>
<td>Yes</td>
</tr>
<tr>
<td>Incremental FlashCopy®</td>
<td>Yes</td>
</tr>
<tr>
<td>Using Consistency Groups for Dataset Copies</td>
<td>No</td>
</tr>
</tbody>
</table>
Compatible FlashCopy® V2 to Universal Replicator for Mainframe Primary Volume Function

The Compatible FlashCopy® V2 to URz Primary Volume function enables you to share Compatible FlashCopy® V2 T-VOLs and URz P-VOLs. When you share Compatible FlashCopy® V2 T-VOLs and URz P-VOLs, the status of the URz pairs must be Duplex, Pending duplex, Suspend or Suspending. Also, you can either create URz pairs after creating Compatible FlashCopy® V2 pairs, or create Compatible FlashCopy® V2 pairs after creating URz pairs. However, Compatible FlashCopy® V2 pairs can be created after creating URz pairs only when the following options are used:

- DFSMSdss: FCTOPPRCPRI
- TSO: TGTPPRIM (YES)
- ICKDSF: TGTOKLASPPRCPRI
- ANTRQST Macro: TGTPPRIM (YES)

For details about using Compatible FlashCopy® V2 with URz, see Using Compatible FlashCopy® V2 with Universal Replicator for Mainframe on page 1-38.

- The Universal Replicator for Mainframe program product is required for using the Compatible FlashCopy® V2 to URz Primary Volume function.
- The FlashCopy® to PPRC Primary Volume function can be used regardless of the status of URz.
- Data that Compatible FlashCopy® V2 copies to URz P-VOLs is transferred to URz S-VOLs asynchronously. URz displays the progress of this asynchronous data transfer. Depending on the timing of the Compatible FlashCopy® V2 and URz copy operations, a time delay may occur between the Compatible FlashCopy® V2 copy operation and the URz copy operation, and the URz asynchronous data transfer may progress slowly.
- If the Compatible FlashCopy® V2 S-VOL and T-VOL are both Dynamic Provisioning for Mainframe volumes, the number of pages remaining in T-VOL may differ depending on the timing.
- A volume shared by two URz pairs in a 3DC multi-target configuration in three URz sites cannot be used as a Compatible FlashCopy® V2 T-VOL.

<table>
<thead>
<tr>
<th>Remote Compatible FlashCopy® V2 function</th>
<th>Can the Remote Compatible FlashCopy® V2 function be combined with other functions?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reverse Restore</td>
<td>No</td>
</tr>
<tr>
<td>FlashCopy® to PPRC Primary Volume</td>
<td>Yes</td>
</tr>
<tr>
<td>Fast Reverse Restore</td>
<td>No</td>
</tr>
<tr>
<td>Compatible Software for IBM® FlashCopy® SE</td>
<td>Yes</td>
</tr>
</tbody>
</table>
The copy process of Compatible FlashCopy® V2 pairs and URz pairs by the Compatible FlashCopy® V2 to URz Primary Volume function is the same as that of the FlashCopy® to PPRC Primary Volume function.

**Preserve Mirror Compatible FlashCopy® V2 Function**

If a Compatible FlashCopy® V2 T-VOL is a TCz M-VOL, the FlashCopy® to PPRC Primary Volume function copies data from the Compatible FlashCopy® V2 T-VOL to the TCz R-VOL. During this function’s data copy, the TCz pair is in Pending status. If a failure occurs while copying, the data on the TCz R-VOL cannot be guaranteed. The Preserve Mirror Compatible FlashCopy® V2 function allows you to copy the Compatible FlashCopy® V2 data to the remote site with the TCz pairs in Duplex status.

The two methods to establish a Compatible FlashCopy® V2 relationship using the Preserve Mirror Compatible FlashCopy® V2 function are:

- **REQUIRED**: Perform the copying operation only when the Compatible FlashCopy® V2 relationship can be established using the Preserve Mirror Compatible FlashCopy® V2 function. When the relationship cannot be established, the command is rejected.
- **PREFERRED**: Perform the copying operation using the Compatible FlashCopy® V2-to-PPRC Primary Volume function even if the Compatible FlashCopy® V2 relationship cannot be established using the Preserve Mirror Compatible FlashCopy® V2 function. In this case, the TCz pair status becomes Pending.

The following options are required when establishing a Compatible FlashCopy® V2 relationship using the Preserve Mirror Compatible FlashCopy® V2 function.

- **DFSMSdss**: FCTOPPRCPRIMARY(PRESMIRREQ or PRESMIRRPREF)
- **TSO**: PRESERVEMIRROR(REQUIRED or PREFERRED)
- **ICKDSF**: PRESERVEMIRROR(REQUIRED or PREFERRED)
• ANTRQST Macro: PRESMIR(REQ or PREF)

The following options of Compatible FlashCopy® V2-to-PPRC Primary Volume must be specified at the same time.

• DFSMSdss: FCTOPPRCPRIMARY
• TSO: TGTPPRIM(YES)
• ICKDSF: TGOKASPPRCPRI(YES)
• ANTRQST Macro: TGTPPRIM(YES)

Notes:
• TCz is required.
• Only TCz synchronous pairs can be used.
• TCz differential data must be stored in units of tracks. This function cannot be used when differential data is stored in units of cylinders.
• The two TCz pairs must be in Duplex status. If they are not in Duplex, the operation differs depending on the specified option (PRESMIRREQ or PRESMIRRPF).
• It is recommended that you set the missing interrupt handler (MIH) timer to 45 seconds when working with TCz synchronous pairs.
• It is recommended that you turn ON system option mode 787 when sending a Host I/O to secondary volumes using the Preserve mirror Compatible FlashCopy® V2 function. Depending on the I/O pattern to the secondary volumes, system option mode 787 may improve the response performance.

Caution:
• When you establish Compatible FlashCopy® V2 relationships with Preserve Mirror Compatible FlashCopy® V2 function in COPY mode, a relationship in the MCU and a relationship in the RCU are established, but a progress of a copy operation for a pair in the MCU and that in the RCU are not synchronized. If you issue Withdraw during the copy operation, both copies of the Compatible FlashCopy® V2 relationship are suspended. Therefore, the consistency of the data between M-VOL and R-VOL is not ensured even though the TCz pair is in Duplex status. This status is confirmed by the PPRC CQUERY command to a TCz volume or the TCz Pair Operation window of Storage Navigator. To release this status, delete the TCz pair.
• If the relationship in the local site cannot be established, the relationship in the remote site could be established, depending on the type of error. Even if you try again to create a Compatible FlashCopy® V2 relationship using the Preserve Mirror Compatible FlashCopy® V2 function, the relationship cannot be established in the local site. Release the relationship in the remote site, and try again.

The following figures show the copying process of Compatible FlashCopy® V2 pairs and TCz pairs with the Preserve Mirror Compatible FlashCopy® V2 function (shown using COPY mode).
Preserve Mirror Compatible FlashCopy® V2 function starts to copy after the following:

- The TCz M-VOL in DKC#1 becomes the Compatible FlashCopy® V2 S-VOL.
- The TCz R-VOL in #2 becomes the Compatible FlashCopy® V2 S-VOL.
- The Compatible FlashCopy® V2 relationship is established.

After the relationship is established, the TCz T-VOL in DKC#2 becomes the Compatible FlashCopy® V2 S-VOL, and the TCz T-VOL in #2 becomes the Compatible FlashCopy® V2 T-VOL.

Data is copied in each Compatible FlashCopy® V2 pair, but not in the TCz pairs. If the Withdraw command is issued to release the Compatible FlashCopy® V2 pair, M-VOL and R-VOL in TCz#2 becomes inconsistent.
Each Compatible FlashCopy® V2 pair is released after the copying process is completed.

The following table shows the Preserve Mirror Compatible FlashCopy® V2 functions that can be used with other Compatible FlashCopy® V2 functions.

<table>
<thead>
<tr>
<th>Preserve Mirror Compatible FlashCopy® V2 Function</th>
<th>Other Compatible FlashCopy® V2 functions possible?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume copy</td>
<td>Yes</td>
</tr>
<tr>
<td>Dataset copy</td>
<td>Yes</td>
</tr>
<tr>
<td>COPY mode</td>
<td>Yes</td>
</tr>
<tr>
<td>NOCOPY mode</td>
<td>Yes</td>
</tr>
<tr>
<td>Incremental FlashCopy®</td>
<td>Yes</td>
</tr>
<tr>
<td>Using Consistency Groups for Dataset Copies</td>
<td>Yes</td>
</tr>
<tr>
<td>Reverse Restore</td>
<td>Yes</td>
</tr>
<tr>
<td>FlashCopy® to PPRC Primary</td>
<td>Yes</td>
</tr>
<tr>
<td>Fast Reverse Restore</td>
<td>No</td>
</tr>
<tr>
<td>Compatible Software for IBM® FlashCopy® SE</td>
<td>No</td>
</tr>
</tbody>
</table>

**Releasing Compatible FlashCopy® V2 relationships**

This section describes an issue with the TSO FCWITHDR command in releasing a Compatible FlashCopy® V2 relationship. There is no DFSMSdss command for releasing a Compatible FlashCopy® V2 relationship.

If the following operation is executed, the FCWITHDR command may be issued automatically by a host server and relationships may be deleted:

- A user deletes dataset.
- A user initializes a volume.
- Temporary dataset is deleted when a job completes.
You can release allocated space for a space-efficient target volume (TSE-VOL) by using the following parameters:

- IDCKDSF: RELATSPACE
- ANTRQST Macro: SPACEREL

If you do not specify these parameters when releasing relations of TSE-VOLs, relations can be deleted but the capacity of targets cannot be released.

**Interoperability with other products and functions**

Compatible FlashCopy® V2 can share volumes with the following software:

- ShadowImage for Mainframe
- TrueCopy for Mainframe
- Universal Replicator for Mainframe
- IBM® Extended Remote Copy (XRC)
- IBM® Concurrent Copy (CC)

Compatible FlashCopy® V2 cannot share volumes with the following software:

- Volume Migration

The following table describes whether you can perform VSP operations of other products to the S-VOL or T-VOL of Compatible FlashCopy® V2 or Compatible Software for IBM® FlashCopy® SE.

**Table 1-4 Performing operations on Compatible FlashCopy® V2 and Compatible Software for IBM® FlashCopy® SE volumes**

<table>
<thead>
<tr>
<th>Operations</th>
<th>Compatible FlashCopy® V2 Volume</th>
<th>Compatible Software for IBM® FlashCopy® SE Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S-VOL</td>
<td>T-VOL</td>
</tr>
<tr>
<td>Volume Retention Manager</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setting Protect attribute</td>
<td>This attribute can be set.</td>
<td>This attribute cannot be set.</td>
</tr>
<tr>
<td>Setting Read enabled/Write disabled attribute</td>
<td>This attribute can be set.</td>
<td>This attribute can be set.</td>
</tr>
<tr>
<td>Setting Read/Write enabled attribute</td>
<td>This attribute can be set.</td>
<td>This attribute can be set.</td>
</tr>
<tr>
<td>Cache Residency Manager</td>
<td>Making data in volume reside in cache</td>
<td>This attribute can be set.</td>
</tr>
</tbody>
</table>
The following table describes whether you can create Compatible FlashCopy® V2 or Compatible Software for IBM® FlashCopy® SE relationship to volumes used for another product.

**Table 1-5 Creating Compatible FlashCopy® V2 or Compatible Software for IBM® FlashCopy® SE relationships with volumes used by other products**

<table>
<thead>
<tr>
<th>Operations</th>
<th>Compatible FlashCopy® V2 Volume</th>
<th>Compatible Software for IBM® FlashCopy® SE Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S-VOL</td>
<td>T-VOL</td>
</tr>
<tr>
<td>Volume Retention Manager</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volume with Protect attribute</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Volume with Read enabled/Write disabled attribute</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Volume with Read/Write enabled attribute</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Cache Residency Manager</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volume in which data resides in cache</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Universal Volume Manager</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External volume</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Dynamic Provisioning for Mainframe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Virtual volume</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Dynamic Tiering for Mainframe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Virtual volume</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

The following table describes whether you can set attributes to the S-VOL or T-VOL of a Compatible FlashCopy® V2 relationship by using other solutions.

**Table 1-6 Compatibility of volumes shared by Compatible FlashCopy(R) and security solutions**

<table>
<thead>
<tr>
<th>Solutions</th>
<th>Compatible FlashCopy® V2 Volume</th>
<th>Compatible Software for IBM® FlashCopy® SE Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S-VOL</td>
<td>T-VOL</td>
</tr>
<tr>
<td>Cache Residency Manager</td>
<td>This attribute can be set.</td>
<td>This attribute can be set.</td>
</tr>
<tr>
<td>Universal Volume Manager</td>
<td>This attribute can be set.</td>
<td>This attribute can be set.</td>
</tr>
<tr>
<td>Dynamic Provisioning for Mainframe</td>
<td>This attribute can be set.</td>
<td>This attribute can be set.</td>
</tr>
</tbody>
</table>
- External volumes are the volumes in the external storage system that are mapped as the internal volumes. For details about Universal Volume Manager and external volumes, see the Hitachi Universal Volume Manager User Guide.

- If an external volume is specified as a Compatible FlashCopy® V2 T-VOL, be careful about the setting of the time of path blockade watch, which is the time from when the external storage system is disconnected to when the path is blocked. If the time of path blockade watch set for the T-VOL is longer than the time of the MIH (Missing Interrupt Handler) timer which is set for the S-VOL on the host side, MIH may occur on the S-VOL and the processing may end abnormally when the external storage system is powered off or when failures occur.

- If the host I/O to the S-VOL is more important than the host I/O to the T-VOL, make sure that the time of the path blockade watch for the T-VOL is smaller than the time of the MIH timer, which is set for the S-VOL. In this way, the Compatible FlashCopy® V2 relationship will be suspended when the T-VOL is blocked because of the path blockade watch, therefore the host I/O to the S-VOL can be maintained.

- If the host I/O to the T-VOL and the T-VOL data are more important than the host I/O to the S-VOL, use the default setting of the path blockade watch for the external volume that is to be specified as the T-VOL.

The following table describes whether you can perform Reverse Restore and Fast Reverse Restore on the S-VOL or the T-VOL of a Compatible FlashCopy(R) pair to which attributes are set by other solutions.

**Table 1-7 Reverse Restore and Fast Reverse Restore when a Compatible FlashCopy(R) volume is used as volume of other solutions**

<table>
<thead>
<tr>
<th>Solutions</th>
<th>Compatible FlashCopy® V2 Volume</th>
<th>Compatible Software for IBM® FlashCopy® SE Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S-VOL</td>
<td>T-VOL</td>
</tr>
<tr>
<td>Volume Retention Manager</td>
<td>Protect attribute</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Read enabled/Write disabled attribute</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Read/Write enabled attribute</td>
<td>OK</td>
</tr>
<tr>
<td>Cache Residency Manager</td>
<td>OK</td>
<td>OK</td>
</tr>
<tr>
<td>Universal Volume Manager</td>
<td>OK</td>
<td>OK</td>
</tr>
<tr>
<td>Dynamic Provisioning for Mainframe</td>
<td>OK</td>
<td>OK</td>
</tr>
</tbody>
</table>
The following volumes cannot be used as the S-VOL or the T-VOL of a Compatible FlashCopy(R) pair.

- Command devices used by Business Continuity Manager
- Journal volumes of Universal Replicator for Mainframe
- Reserve volumes used by ShadowImage for Mainframe
- Alias volumes used by Compatible PAV feature
- System disks

### Using Compatible FlashCopy® V2 with ShadowImage for Mainframe

The following figure shows an example of combining Compatible FlashCopy® V2 with ShadowImage for Mainframe.

![Figure 1-17 Pair configuration: Compatible FlashCopy(R) S-VOL is shared with a ShadowImage for Mainframe pair](image)

Usually, you need to specify a volume in Simplex status as a copy source (S-VOL) or a copy target (T-VOL). When you specify a SIz S-VOL as a copy source, you can establish a Compatible FlashCopy® V2 relationship only if the SIz pair is not in Resync-R/REVRSY status.

You can establish or release a Compatible FlashCopy® V2 relationship if you meet the requirements described above. When there is a Compatible FlashCopy® V2 relationship, you cannot perform the backward resynchronization (Reverse Resync or Quick Restore) on the SIz pair.

Even if the SIz S-VOL already has three T-VOLs, you can create up to 16 pairs by specifying the volumes of Compatible FlashCopy® V2 relationships as the copy source.

In the following cases, you cannot create SIz pairs (see the following figure).
- Compatible FlashCopy® V2 S-VOL and the T-VOL of the SIz pair are shared.
- Compatible FlashCopy® V2 T-VOL and the T-VOL of the SIz pair are shared.
- Compatible FlashCopy® V2 T-VOL and the S-VOL of the SIz pair are shared.

When you use Compatible FlashCopy® V2 volumes, you cannot create pairs sharing the volumes shown in the following figure.

![Diagram showing non-sharable combinations of volumes](image)

**Figure 1-18 Compatible FlashCopy® V2 and SIz: Non-Sharable combination**

### Using Compatible FlashCopy® V2 with TrueCopy for Mainframe

**Volumes that can be shared:**

The following tables describe the combinations of the volumes when you share Compatible FlashCopy® V2 and TCz volumes.

**Table 1-8 Compatible FlashCopy® V2 and TCz shared volume**

<table>
<thead>
<tr>
<th>Compatible FlashCopy® V2</th>
<th>TrueCopy for Mainframe</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M-VOL</td>
</tr>
<tr>
<td>S-VOL</td>
<td>OK</td>
</tr>
<tr>
<td>T-VOL</td>
<td>OK</td>
</tr>
</tbody>
</table>
Table 1-9 Compatible Software for IBM® FlashCopy® SE and TCz shared volume

<table>
<thead>
<tr>
<th>Compatible Software for IBM® FlashCopy® SE</th>
<th>TrueCopy for Mainframe</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M-VOL</td>
</tr>
<tr>
<td>S-VOL</td>
<td>OK</td>
</tr>
<tr>
<td>T-VOL (TSE-VOL)</td>
<td>NO</td>
</tr>
</tbody>
</table>

Volumes that cannot be shared:

The Compatible FlashCopy® V2 and TCz shared configuration is different from the Compatible FlashCopy® V2 and PPRC shared configuration. For Compatible FlashCopy® V2 and TCz, you cannot create the following pairs (see the following figure):

- A TCz pair that includes a volume functioning as both a Compatible FlashCopy® V2 T-VOL and a TCz R-VOL.
- A TCz pair that includes a volume functioning as a Compatible Software for IBM® FlashCopy® SE TSE-VOL and a TCz M-VOL.

Figure 1-19: Compatible FlashCopy® V2 and TCz: Non-Sharable combination
Sharing a Compatible FlashCopy® V2 S-VOL and a TCz volume:

You must do the following when you share a Compatible FlashCopy® V2 S-VOL and a TCz volume, or when you use the Remote Compatible FlashCopy® V2 function.

- Specify only one Compatible FlashCopy® V2 T-VOL if the Compatible FlashCopy® V2 S-VOL is shared with TCz R-VOL.
- Specify the volume of the same emulation type and same capacity as the Compatible FlashCopy® V2 S-VOL to TCz S-VOL if the Compatible FlashCopy® V2 S-VOL is shared with TCz R-VOL.
- Set the local mode (system option modes 20 and 190) to ON at the RCU. For details on how to set the local mode to ON, call the Support Center.
- Use the volume whose emulation type is shown in Table 2-2 Emulation types supported by Compatible FlashCopy® V2 on page 2-2.

When you share a Compatible FlashCopy® V2 S-VOL and a volume of a TCz pair, the status of the TCz pair must be either duplex, pending duplex, or suspend. However, if the shared TCz volume is an R-VOL, there may be cases when you cannot create the Compatible FlashCopy® V2 relationship. See the following table for details.
### Table 1-10 Shared volume: Compatible FlashCopy® V2 S-VOL and TCz

<table>
<thead>
<tr>
<th>Shared TCz volume</th>
<th>Status of TCz pair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Duplex</td>
</tr>
<tr>
<td>TCz M-VOL</td>
<td>OK</td>
</tr>
<tr>
<td>TCz R-VOL</td>
<td>OK</td>
</tr>
</tbody>
</table>

**Notes:**

1. If a TCz M-VOL is in pending status and you execute an ICKDSF command for Compatible FlashCopy® V2, the ICKDSF job will end abnormally with CC=12 error. For information on how to avoid that abnormal ending, see [If ICKDSF command ends abnormally on page 6-2](#).

2. You cannot establish the Compatible FlashCopy® V2 relationship, because the data consistency of the Compatible FlashCopy® V2 T-VOL will not be ensured.

3. If you establish a Compatible FlashCopy® V2 relationship with the FREEZE option when the Compatible FlashCopy® V2 S-VOL and TCz R-VOL are shared, the results of Compatible FlashCopy® V2 operations and TCz operations will be as follows:

   - **Results of Compatible FlashCopy® V2 operations**
     
     When the status of the TCz pair is Suspend, the command will end normally, and you can establish a Compatible FlashCopy® V2 relationship. However, when the status of the TCz pair is either Duplex or Pending duplex, the command will be rejected and you cannot establish a Compatible FlashCopy® V2 relationship.

   - **Results of TCz operations**
     
     If a Compatible FlashCopy® V2 relationship is established with the FREEZE option, and when the TCz R-VOL is in extended long busy (ELB) status, the command to create or resume a pair will be rejected. However, the command to suspend or delete a pair will be executed normally.

When you use a Compatible FlashCopy® V2 S-VOL as the TCz R-VOL, configure the system as follows:

- Connect the different hosts to the main storage system and remote storage system, or connect the host of the main storage system to both the main and remote storage systems.
- Use fibre-channel interface to connect the main storage system with the remote storage system.

However, the above-mentioned system configuration differs from the system configuration that is used when Compatible FlashCopy® V2 and PPRC are used in conjunction.

The following table describes whether Reverse Restore can be performed when you share a Compatible FlashCopy® V2 S-VOL and a volume of a TCz pair.
Table 1-11 Whether Reverse Restore can be performed when a Compatible FlashCopy® V2 S-VOL is used as a TCz volume

<table>
<thead>
<tr>
<th>Shared TCz pair volume</th>
<th>Status of TCz pair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Duplex</td>
</tr>
<tr>
<td>TCz</td>
<td>M-VOL</td>
</tr>
<tr>
<td></td>
<td>R-VOL</td>
</tr>
</tbody>
</table>

*You can perform Reverse Restore when you specify the following options.
- DFSMSdss: FCTOPPRCPRIMARY (You cannot perform Fast Reverse Restore when you specify DFSMSdss.)
- TSO: TGTPPRIM(YES)
- ICKDSF: TGTOKASPPRCPRIM(YES)
- ANTRQST Macro: TGTPPRIM(YES)

The following table shows whether Fast Reverse Restore can be performed when you share a Compatible FlashCopy® V2 S-VOL and a volume of a TCz pair.

Table 1-12 Whether Fast Reverse Restore can be performed when a Compatible FlashCopy® V2 S-VOL is used as a TCz volume

<table>
<thead>
<tr>
<th>Shared TCz pair volume</th>
<th>Status of TCz pair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Duplex</td>
</tr>
<tr>
<td>TCz</td>
<td>M-VOL</td>
</tr>
<tr>
<td></td>
<td>R-VOL</td>
</tr>
</tbody>
</table>

*You can perform Fast Reverse Restore when you specify the following options.
- TSO: TGTPPRIM(YES)
- ICKDSF: TGTOKASPPRCPRIM(YES)
- ANTRQST Macro: TGTPPRIM(YES)

• Using a volume both as a Compatible FlashCopy® V2 T-VOL and a TCz M-VOL

Volumes may be used as both a Compatible FlashCopy® V2 T-VOL and a TCz M-VOL as long as they are of any combination shown in Table 2-2 Emulation types supported by Compatible FlashCopy® V2 on page 2-2.

The following table shows whether you can share the Compatible FlashCopy® V2 T-VOL and the TCz M-VOL.
Table 1-13 Whether Compatible FlashCopy® V2 T-VOL can be used as TCz

<table>
<thead>
<tr>
<th>Shared TCz pair volume</th>
<th>Status of TCz pair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>duplex</td>
</tr>
<tr>
<td>TCz</td>
<td>M-VOL</td>
</tr>
</tbody>
</table>

The following table describes the TCz pair status that is required when performing a Reverse Restore and Fast Reverse Restore if a Compatible FlashCopy® V2 T-VOL and the volume of a TCz pair is shared.

Table 1-14 TCz status that determines whether Reverse Restore and Fast Reverse Restore can be performed

<table>
<thead>
<tr>
<th>Shared TCz pair volume</th>
<th>Status of TCz pair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>duplex</td>
</tr>
<tr>
<td>TCz</td>
<td>M-VOL</td>
</tr>
</tbody>
</table>

If S-VOL and T-VOL of Compatible FlashCopy® V2 are both Dynamic Provisioning for Mainframe volumes, the number of pages remaining in T-VOL may differ depending on the timing.

The procedures when you use a DFSMS, TSO, or ICKDSF command are as follows. You cannot perform Fast Reverse Restore when you use DFSMSdss.

Using DFSMS commands to share Compatible FlashCopy® V2 and TCz volumes

**Note:** If the status of the TCz pair is duplex, you need to use a TSO command instead of a DFSMS command.

To share a Compatible FlashCopy® V2 S-VOL and a TCz R-VOL:

1. To maintain the consistency of data, terminate I/O operations to the volumes of TCz pairs.
2. Suspend the TCz pair. Example:
   ```
   CSUSPEND DEVN(X'dev#') PRIM(X'ssid') serial# X'cca' X'lss')
   SEC(X'ssid' serial# X'lss')
   ```
3. Vary the TCz R-VOL online.
   The host will be able to recognize the dataset on the TCz R-VOL and determine the extent for establishing a Compatible FlashCopy® V2 relationship.
   If the same host is connected to both TCz M-VOL and R-VOL, the R-VOL label must be rewritten.
4. Establish the Compatible FlashCopy® V2 relationship. Example:
   ```
   COPY FULL INDYNAM(xxxxxx) OUTDYNAM(yyyyyy) FASTREP(REQ)
   ```
5. When step 4 completes, vary the TCz R-VOL offline.
6. Resynchronize the TCz pair.

To share a Compatible FlashCopy® V2 T-VOL and a TCz M-VOL:
1. To maintain the consistency of data, terminate I/O operations to the volumes of TCz pairs.
2. Confirm that the TCz pair status is Duplex.
3. Establish the Compatible FlashCopy® V2 relationship. Example:

   COPY FULL INDYNAM(xxxxxxx) OUTDYNAM(yyyyyy) FASTREP(REQ)
   TCTOPPRCPRIMAR

Using TSO commands to share Compatible FlashCopy® V2 and TCz volumes

To share a Compatible FlashCopy® V2 S-VOL and a TCz R-VOL:
1. To maintain the consistency of data, terminate I/O operations to the volumes of TCz pairs.
2. Establish the Compatible FlashCopy® V2 relationship. Example:

   FCESTABL SDEVN(X'xxxx') TDEVN(X'yyyy') MODE(COPY) ONLINTGT(YES)

To share a Compatible FlashCopy® V2 T-VOL and a TCz M-VOL:
1. To maintain the consistency of data, terminate I/O operations to the volumes of TCz pairs.
2. Confirm that the TCz pair status is Duplex.
3. Establish the Compatible FlashCopy® V2 relationship. Example:

   COPY FULL INDYNAM(xxxxxxx) OUTDYNAM(yyyyyy) FASTREP(REQ)
   TCTOPPRCPRIMAR

Using ICKDSF commands to share Compatible FlashCopy® V2 and TCz volumes

For details about the ICKDSF command for creating Compatible FlashCopy® V2 pairs, see Establishing relationships by volumes for Compatible FlashCopy® V2 on page 3-4.

To share a Compatible FlashCopy® V2 S-VOL and a TCz R-VOL:
1. To maintain the consistency of data, terminate I/O operations to the volumes of TCz pairs.
2. Establish the Compatible FlashCopy® V2 pair. Example:

   FLASHCPY ESTABLISH UNIT(X'dev#') TARGETVOL(X'ssid',X'cca',lss)
   ONLINTGT(YES)

To share a Compatible FlashCopy® V2 T-VOL and TCz M-VOL:
1. To maintain the consistency of data, terminate I/O operations to the volumes of TCz pairs.
2. Confirm that the TCz pair status is Duplex.
3. Establish the Compatible FlashCopy® V2 relationship. Example:

   COPY FULL INDYNAM(xxxxxxx) OUTDYNAM(yyyyyy) FASTREP(REQ)
   TCTOPPRCPRIMAR
Using Compatible FlashCopy® V2 with Universal Replicator for Mainframe

The following tables describe the combinations of the volumes when you share Compatible FlashCopy® V2 and URz volumes.

**Table 1-15 Whether a Compatible FlashCopy® V2 volume can be used as a URz volume**

<table>
<thead>
<tr>
<th>Compatible FlashCopy® V2</th>
<th>URz</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P-VOL</td>
</tr>
<tr>
<td>S-VOL</td>
<td>OK</td>
</tr>
<tr>
<td>T-VOL</td>
<td>OK</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Compatible Software for IBM® FlashCopy® SE</th>
<th>URz</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P-VOL</td>
</tr>
<tr>
<td>S-VOL</td>
<td>OK</td>
</tr>
<tr>
<td>T-VOL</td>
<td>NO</td>
</tr>
</tbody>
</table>

**When you use a Compatible FlashCopy® V2 S-VOL as a URz P-VOL**

You can use a Compatible FlashCopy® V2 S-VOL as a URz P-VOL when the URz pair is in any status.

A volume shared by two URz pairs in a 3DC multi-target configuration in three URz sites cannot be used as a Compatible FlashCopy® V2 S-VOL.

**When you use a Compatible FlashCopy® V2 T-VOL as a URz P-VOL**

You can use a Compatible FlashCopy® V2 T-VOL as a URz P-VOL when the URz pair is in any status.

**Caution:**

- If a Compatible FlashCopy® V2 volume and a URz volume cannot be shared, the host may receive a report that a Compatible FlashCopy® V2 T-VOL is a PPRC P-VOL.
- If the S-VOL and T-VOL of a Compatible FlashCopy® V2 pair are both Dynamic Provisioning for Mainframe volumes, the number of pages remaining in the T-VOL may differ depending on the timing.
- A volume shared by two URz pairs in a 3DC multi-target configuration in three URz sites cannot be used as a Compatible FlashCopy® V2 T-VOL.
Using Compatible FlashCopy® V2 with Concurrent Copy and Extended Remote Copy

The following table describes the combinations of the volumes when you use Compatible FlashCopy® V2 with Concurrent Copy (CC) and Extended Remote Copy (XRC).

Table 1-17 Whether a Compatible FlashCopy® V2 volume can be used as a CC or XRC volume

<table>
<thead>
<tr>
<th>Compatible FlashCopy® V2</th>
<th>CC / XRC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P-VOL</td>
</tr>
<tr>
<td>S-VOL</td>
<td>OK</td>
</tr>
<tr>
<td>T-VOL</td>
<td>NO</td>
</tr>
</tbody>
</table>

*Do not share Compatible FlashCopy® V2 T-VOL with a CC or XRC S-VOL. If a T-VOL (S-VOL) is shared by both Compatible FlashCopy® V2 and CC or XRC, the data in the T-VOL (S-VOL) will be overwritten by the two programs and destroyed.

The following table indicates whether Reverse Restore and Fast Reverse Restore can be performed when a Compatible FlashCopy® V2 volume is used as a CC or XRC volume.

Table 1-18 Whether Reverse Restore and Fast Reverse Restore can be performed when a Compatible FlashCopy® V2 volume is used as a CC or XRC volume

<table>
<thead>
<tr>
<th>Compatible FlashCopy® V2</th>
<th>CC / XRC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P-VOL</td>
</tr>
<tr>
<td>S-VOL</td>
<td>NO¹</td>
</tr>
<tr>
<td>T-VOL</td>
<td>N/A¹</td>
</tr>
</tbody>
</table>

1. NO - cannot be performed.
   N/A - cannot be shared
2. Do not execute Reverse Restore or Fast Reverse Restore when an S-VOL is shared by Compatible FlashCopy® V2 and CC or XRC. If you execute Reverse Restore or Fast Reverse Restore when an S-VOL is shared by Compatible FlashCopy® V2 and CC or XRC, the data in the S-VOL will be overwritten by the two programs and destroyed.

Using Compatible FlashCopy® V2 with Dynamic Provisioning for Mainframe

When you use a Compatible FlashCopy® V2 T-VOL as a DP-VOL, the host cannot access it if the relationship status becomes suspended because the pool becomes full. To recover from suspended status, you must release the Compatible FlashCopy® V2 relationship.
Optimizing Volumes

Volumes can be optimized by Compatible FlashCopy® V2 if you use the DEFrag command of the DFSMSdss utility with the FASTREPLICATION option. See the IBM® FlashCopy® manual for details of the option.

**Caution:** The DEFrag command may generate an error because the number of relationships per volume exceeds the maximum when all the following conditions are met.

- The parity group including the volume is overloaded when accessed too many times.
- The DEFrag command is executed with FASTREPLICATION(REQUIRED).

To avoid an error, avoid using the FASTREPLICATION option or specify FASTREPLICATION(PREFERRED). If you specify FASTREPLICATION(REQUIRED), you must reduce workloads on the parity group.
Preparing for Hitachi Compatible FlashCopy® operations

This chapter describes how to prepare for Hitachi Compatible FlashCopy® operations.

- Requirements of Compatible FlashCopy® V2
- Calculating the maximum number of Compatible FlashCopy® V2 relationships
- Selecting Prior operation
- FC Ext. Slower Copy1 Option
- FC Ext. Slower Copy2 Option
- Cautions on turning off the power while using Compatible FlashCopy® V2
- Installing and removing Compatible FlashCopy® V2
- License Capacity Requirements
Requirements of Compatible FlashCopy® V2

You can establish a Compatible FlashCopy® V2 relationship not only for simplex volumes, but also for non-simplex SIZ S-VOLs or T-VOLs in the status other than simplex.

The following table shows other requirements on using Compatible FlashCopy® V2.

**Table 2-1 Requirements of Compatible FlashCopy® V2**

<table>
<thead>
<tr>
<th>Item</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controller emulation type</td>
<td>I-2105 and I-2107</td>
</tr>
<tr>
<td></td>
<td>The controller emulation type of an S-VOL and a T-VOL must be the same.</td>
</tr>
<tr>
<td>Available volume</td>
<td>FCv2 can use the volume whose LDKC:CU:LDEV (LDKC: control unit image: logical device ID) is between 00:00:00 and 00:FE:FF.</td>
</tr>
</tbody>
</table>

The following table shows the emulation types supported by Compatible FlashCopy® V2 and the condition for the combination of S-VOL and T-VOL.

**Table 2-2 Emulation types supported by Compatible FlashCopy® V2**

<table>
<thead>
<tr>
<th>Emulation type of S-VOL</th>
<th>3380-3</th>
<th>3390-1</th>
<th>3390-2</th>
<th>3390-3</th>
<th>3390-9</th>
<th>3390-L</th>
<th>3390-M</th>
<th>3390-A</th>
</tr>
</thead>
<tbody>
<tr>
<td>3380-3</td>
<td>OK</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>3390-1</td>
<td>NO</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>3390-2</td>
<td>NO</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>3390-3</td>
<td>NO</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>3390-9</td>
<td>NO</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>3390-L</td>
<td>NO</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>3390-M</td>
<td>NO</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>3390-A</td>
<td>NO</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td></td>
</tr>
</tbody>
</table>

If the emulation type is started with 3390, you can specify the volumes of different emulation types for S-VOL and T-VOL. However, you cannot establish a relationship using a 3380-3 volume and a volume whose emulation type is started with 3390. In case of 3380-3 volume, you must specify 3380-3 volumes both for S-VOL and T-VOL.

The specified extent must be within the range of the user cylinders in each volume.
Calculating the maximum number of Compatible FlashCopy® V2 relationships

Compatible FlashCopy® V2 can establish up to 1,048,575 relationships. However, it may not be able to establish up to 1,048,575 relationships depending on the number of resources that are required for the copy operation. These resources vary according to the attributes such as emulation type, capacity, size of the data that is copied, and position of the extent of the volumes. These resources also vary due to the extents that are used for establishing the relationships.

You can use the Compatible FlashCopy® V2 Information dialog box to check the number of remaining resources that are currently available. Check the FCv2 Information dialog box when you create a FCv2 relationship.

The following software programs share the resources used for copy operations:

- ShadowImage for Mainframe
- ShadowImage
- Thin Image
- Copy-on-Write Snapshot
- Volume Migration

The resources used by ShadowImage for Mainframe, ShadowImage, Thin Image, Copy-on-Write Snapshot, and Volume Migration cannot be used for Compatible FlashCopy® V2. The resources that remain, when you exclude the resources used by ShadowImage for Mainframe, ShadowImage, Thin Image, Copy-on-Write Snapshot, and Volume Migration from the total resources, are available resources for Compatible FlashCopy® V2. See the following manuals for details about the calculation of the resources used by each software program.

- Hitachi ShadowImage® for Mainframe User Guide
- Hitachi ShadowImage® User Guide
- Hitachi Thin Image User Guide
- Hitachi Copy-on-Write Snapshot User Guide

Establishing relationships by volume copying

Use the following expression to calculate the total number of the resources to be used per relationship.

\[ \text{Total number of the differential tables per relationship} = \text{ceil}\left(\frac{(X + Y) \times 15}{Z}\right) \]

(X): The number of the cylinders of the volume.
(Y): The number of the control cylinders. (See the following table.)
(Z): The number of the slots that can be managed by a differential table.

\(639 \times 32\)

ceil: Round up the number to the nearest whole number.
The following table shows the number of the control cylinders for each emulation type.

<table>
<thead>
<tr>
<th>Emulation type</th>
<th>Number of the control cylinders</th>
</tr>
</thead>
<tbody>
<tr>
<td>3380-3</td>
<td>7</td>
</tr>
<tr>
<td>3390-1</td>
<td>5</td>
</tr>
<tr>
<td>3390-2</td>
<td>6</td>
</tr>
<tr>
<td>3390-3</td>
<td>6</td>
</tr>
<tr>
<td>3390-9</td>
<td>25</td>
</tr>
<tr>
<td>3390-A</td>
<td>ceil(number of user-defined cylinders/1113) × 7</td>
</tr>
<tr>
<td>3390-L</td>
<td>23</td>
</tr>
<tr>
<td>3390-M</td>
<td>53</td>
</tr>
</tbody>
</table>

The number of resources to be used per a relationship is the total number of the resources of the copy source and copy target. For example, in case of a 3390-3 volume and when the number of the cylinders of the divided volume is 3,390 ((X) in the expression that calculates the total number of the resource) the calculation of the total number of the differential table is as follows:

Copy source: \((3339 + 6) \times 15 \div (639 \times 32) = \lceil 2.45379 \rceil = 3\)

Copy target: \((3339 + 6) \times 15 \div (639 \times 32) = \lceil 2.45379 \rceil = 3\)

When you round up 2.45379 to the nearest whole number, it becomes 3. Therefore, the total number of the resources to be used for one relationship is 6 when emulation type is 3390-3.

Note: For details about the calculation of the total number of the resources to be used per a relationship, see the expression described above.

When volumes that differ in the emulation type and capacity, the number of relationships that can be established is determined according to the following condition:

The maximum number of relationships that can be established is the largest number that meets the equation, \(\Sigma(\alpha) \leq (\beta)\), where:

\(\Sigma(\alpha)\) means the total number of resources used per a relationship, and

\((\beta)\) means the total number of resources available in the storage system.

\((\beta) = 26,176 \text{ or } 104,768 \text{ or } 209,600\).

Establishing relationships by dataset copying

To establish relationships between extents, the number of required resources is the same as the number of resources used per relationship, provided that no extents in the same volume overlap. If the extents used...
for establishing the relationships overlap, the number of resources required to establish the relationships is the number of resources to be used multiplied by the number of extents that overlap.

The following figures show the different cases of dataset copying when the extents overlap or do not overlap. For information about the calculation example of the used resources, see Table 2-4 Reference examples for calculating the number of resources required to create the Compatible FlashCopy® V2 relationships on page 2-7.

Figure 2-1 Copying data in two extents that do not overlap (One T-VOL)

Figure 2-2 Copying data in two extents that do not overlap (Two T-VOLs)
Figure 2-3 Copying data in two extents that do not overlap (Two S-VOLs)

Figure 2-4 Copying data in three extents that overlap (One T-VOL)

Figure 2-5 Copying data in two extents that overlap (Two T-VOLs)
Figure 2-6 Copying one extent to another in the same volume

The following table provides the calculation examples of the required resources according to the patterns of copying.

Table 2-4 Reference examples for calculating the number of resources required to create the Compatible FlashCopy® V2 relationships

<table>
<thead>
<tr>
<th>Emulation type</th>
<th>Copying data in two extents that do not overlap (One T-VOL)</th>
<th>Copying data in two extents that do not overlap (Two T-VOLs)</th>
<th>Copying data in two extents that do not overlap (Two S-VOLs)</th>
<th>Copying data in three extents that overlap (One T-VOL)</th>
<th>Copying data in two extents that overlap (Two T-VOLs)</th>
<th>Copying one extent to another in the same volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>3380-3 or 3390-3 *1</td>
<td>S-VOL 3 ( \times 3) = (3 + 3) = 6 )</td>
<td>((3 \times 3) = 9)</td>
<td>((3 \times 2) = 6)</td>
<td>(6 \times 5)</td>
<td>T-VOL 3 ((3 + 3) = 6)</td>
<td>(3)</td>
</tr>
<tr>
<td></td>
<td>Total 6 ( \times 9) = (3 + 3) = 6 )</td>
<td>(9)</td>
<td>(12)</td>
<td>(12)</td>
<td>(6)</td>
<td></td>
</tr>
<tr>
<td>3390-1</td>
<td>S-VOL 1 ((1 + 1) = 2)</td>
<td>((1 \times 3) = 3)</td>
<td>((1 \times 2) = 2)</td>
<td>(2 \times 5)</td>
<td>T-VOL 1 ((1 + 1) = 2)</td>
<td>(1)</td>
</tr>
<tr>
<td></td>
<td>Total 2 ((1 + 1) = 2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(4)</td>
<td>(2)</td>
<td></td>
</tr>
<tr>
<td>3390-2</td>
<td>S-VOL 2 ((2 + 2) = 4)</td>
<td>((2 \times 3) = 6)</td>
<td>((2 \times 2) = 4)</td>
<td>(4 \times 5)</td>
<td>T-VOL 2 ((2 + 2) = 4)</td>
<td>(2)</td>
</tr>
<tr>
<td></td>
<td>Total 4 ((2 + 2) = 4)</td>
<td>(6)</td>
<td>(8)</td>
<td>(8)</td>
<td>(4)</td>
<td></td>
</tr>
<tr>
<td>3390-9 *2</td>
<td>S-VOL 8 ((8 + 8) = 16)</td>
<td>((8 \times 3) = 24)</td>
<td>((8 \times 2) = 16)</td>
<td>(16 \times 5)</td>
<td>T-VOL 8 ((8 + 8) = 16)</td>
<td>(8)</td>
</tr>
<tr>
<td></td>
<td>Total 16 ((8 + 8) = 16)</td>
<td>(24)</td>
<td>(32)</td>
<td>(32)</td>
<td>(16)</td>
<td></td>
</tr>
<tr>
<td>3390-L *3</td>
<td>S-VOL 25 ((25 + 25) = 50)</td>
<td>((25 \times 3) = 75)</td>
<td>((25 \times 2) = 50)</td>
<td>(50 \times 5)</td>
<td>T-VOL 25 ((25 + 25) = 50)</td>
<td>(25)</td>
</tr>
<tr>
<td></td>
<td>Total 50 ((25 + 25) = 50)</td>
<td>(75)</td>
<td>(100)</td>
<td>(100)</td>
<td>(50)</td>
<td></td>
</tr>
</tbody>
</table>
The number of pairs that can be created is determined according to the following condition:

The maximum number of relations that can be established is the largest number that meets the equations, \( \Sigma(\alpha) \leq (\beta) \) and \( \Sigma(\gamma) \leq 1,048,575 \), where:

\( \Sigma(\alpha) \) means the total number of resources that need to be used,

\( (\beta) \) means the total number of resources available in the storage system,

\( (\beta) = 26,176 \) or \( 104,768 \), or \( 209,600 \).

For details, see Table 2-2 Emulation types supported by Compatible FlashCopy® V2 on page 2-2.

And \( \Sigma(\gamma) \) stands for the total number of relationships.

The following figure shows seven relationships that are created with 3390-3 volumes, and three relationships that are created with 3390-L volumes (32,769 CYL).
As shown in this figure, the total number of resources used per pair is calculated as:

Resources used for A - I = (9 + 3) + 3 + 3 + 3 + 3 + 3 + (25 x 3) + 25 + 25 = 152.

The conditions for the number of relationships you can create are:

\[ \Sigma(\alpha) \leq (\beta) \] and \[ \Sigma(\gamma) \leq 1,048,575 \]

In the case of the example shown in the figure, \( \Sigma(\alpha) \leq (\beta) \) is:

- 54 \leq 26,176 or 104,768, or 209,600.

While \( \Sigma(\gamma) \leq 1,048,575 \) is:
Since the example shown in the figure above meets the conditions shown above, you can establish all of the relationships in that figure.

### Selecting Prior operation

You can use the options in the following table for Compatible FlashCopy® V2 and Compatible Software for IBM® FlashCopy® SE operations. The available option types depend on the storage system settings.

Table 2-5 Types of Compatible FlashCopy® V2 and Compatible Software for IBM® FlashCopy® SE options

<table>
<thead>
<tr>
<th>Option type</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC Slower Copy1</td>
<td>Suppresses the background copy operations by Compatible FlashCopy(R), and prioritizes the host I/O operations. For details, see topic FC Slower Copy1 option on page 2-10. Note: You need to set FC Slower Copy2 option invalid.</td>
</tr>
<tr>
<td>FC Slower Copy2</td>
<td>Suppresses the background copy operations by Compatible FlashCopy(R), and prioritizes the host I/O operations. You can suppress more Compatible FlashCopy(R) background copy operations by using this option instead of the FC Slower Copy1 option. For details, see FC Slower Copy2 Option on page 2-11.</td>
</tr>
<tr>
<td>FC Ext. Slower Copy1</td>
<td>Suppresses the background copy operations by Compatible FlashCopy(R), and prioritizes the host I/O operations. For details, see FC Ext. Slower Copy1 Option on page 2-11. Note: You need to set FC Ext. Slower Copy1 option invalid.</td>
</tr>
<tr>
<td>FC Ext. Slower Copy2</td>
<td>Suppresses the background copy operations by Compatible FlashCopy(R), and prioritizes the host I/O operations. You can suppress more Compatible FlashCopy(R) background copy operations by using this option instead of the FC Ext. Slower Copy1 option. For details, see FC Ext. Slower Copy2 Option on page 2-11.</td>
</tr>
</tbody>
</table>

### FC Slower Copy1 option

The FC Slower Copy1 option is used to prioritize host I/O response over background copying processing of Compatible FlashCopy(R) relationships. When the FC Slower Copy1 option is in effect, the maximum number of the Compatible FlashCopy(R) relationships that can be copied simultaneously in the background is halved, and consequently host I/O response improves.

Caution: If the FC Slower Copy2 option is in effect, the FC Slower Copy1 option becomes invalid.

When background copying processing of Compatible FlashCopy(R) is suppressed by the FC Slower Copy1 option, the time taken for background copying increases. However, since the background copying processing time of relationships is not always same, the background copying processing time is not necessarily doubled.

If ShadowImage pairs exist in the same parity group, host I/O responses might not be improved.
FC Slower Copy2 Option

The FC Slower Copy2 option is used to prioritize host I/O response over background copying processing of Compatible FlashCopy(R) relationships. When the FC Slower Copy2 option is in effect, the number of Compatible FlashCopy(R) relationships that can be copied simultaneously in the background is suppressed to one-quarter, and consequently host I/O response improves.

The two options, FC Slower Copy1 and FC Slower Copy2, have the same function. The difference between them is that FC Slower Copy2 provides the best host I/O response because it suppresses more background copy operations than the FC Slower Copy1 option.

Caution: When the FC Slower Copy2 option is in effect, the FC Slower Copy1 option becomes invalid.

When background copy processing of Compatible FlashCopy(R) is suppressed by the FC Slower Copy2 option, the time taken for background copying increases. However, since the background copy processing time of relationships is not always same, the background copy processing time does not necessarily quadruple.

If ShadowImage pair relationships exist in the same parity group, host I/O responses might not be improved.

FC Ext. Slower Copy1 Option

The FC Ext. Slower Copy1 option is used to prioritize host I/O response over background copying processing of Compatible FlashCopy(R) relationships. When the FC Ext. Slower Copy1 option is in effect and the MP operating ratio of the MP blade exceeds 65%, background copy operations are suppressed, and consequently host I/O response improves.

When background copying processing of Compatible FlashCopy(R) is suppressed by the FC Ext. Slower Copy1 option, the time taken for background copying increases.

Caution: If the FC Ext. Slower Copy2 option is in effect, the FC Ext. Slower Copy1 option becomes invalid.

FC Ext. Slower Copy2 Option

The FC Ext. Slower Copy2 option is used to prioritize host I/O response over background copying processing time of Compatible FlashCopy(R) relationships. When the FC Ext. Slower Copy2 option is in effect and the MP operating ratio of the MP blade exceeds 50%, background copy operations are suppressed, and consequently host I/O response improves.
When background copying processing of Compatible FlashCopy(R) is suppressed by the FC Ext. Slower Copy2 option, the time taken for background copying increases.

**Caution:** If the FC Ext. Slower Copy2 option is in effect, the FC Ext. Slower Copy1 option becomes invalid.

### Cautions on turning off the power while using Compatible FlashCopy® V2

This section describes what occurs if you power off the storage system during Compatible FlashCopy® V2 operations and then power on the storage system later. What occurs depends on the status of the shared memory when powering on the storage system:

**WARNING:** If data on the shared memory is volatilized and lost after the power turns on, problems may occur during operations. To avoid possible problems, withdraw as many relationships as possible before powering off the storage system.

**If data on the shared memory is not volatilized and not lost:**

The status before powering off will be maintained. As for the relationships that are in COPY mode, background copying automatically restarts when you power on the storage system.

**If data on the shared memory is volatilized and lost:**

If relationships exist before you power off the storage system, the T-VOLs become blocked and inaccessible from hosts when you power on the storage system again. The reason for making the T-VOLs inaccessible is to prevent access to inconsistent data. To restore the T-VOLs to normal status, force the restoration of LDEVs.

If the T-VOL is an external volume, the storage system may start normally and the T-VOL may not become blocked, even if data on the shared memory is lost. However, although the storage system starts normally, it is feared that data in the T-VOL is not normal. Therefore, delete data in the T-VOL or initialize the T-VOL.

### Installing and removing Compatible FlashCopy® V2

This section describes how to install and remove Compatible FlashCopy® V2. To enable Compatible FlashCopy® V2 to function on the storage system, the Compatible FlashCopy® V2 features and software must be installed and enabled on the storage system.

In some cases, you may need to install additional shared memory before installing Compatible FlashCopy® V2. For details, contact your Hitachi Data Systems account representative.

For details about the license operation, see the Hitachi Storage Navigator User Guide.
Installing Compatible FlashCopy® V2

To install Compatible FlashCopy® V2 (FCv2):

1. Check whether you need to install additional shared memory.
   For details, contact your Hitachi Data Systems account representative.
2. Set all the devices to be used with FCv2 offline.
3. In the Storage Navigator window, enter the FCv2 license key and click **Apply**.
4. Set all the devices to be used with FCv2 online.
5. Execute the `devserv` command with the VALIDATE option of QDASD to the devices in the storage system.
   Example of the `devserv` command:
   ```
   devserv QDASD, 4200, VALIDATE
   ``
   By executing the `devserv` command, you can view the information on the direct access memory device 4200 and on the magnetic disk controller. Based on the information displayed, update the information on the expanded functions that are maintained in the storage of the host processor. By these expanded functions, the host recognizes that FCv2 is supported.
6. Establish FCv2 relationships.
7. Use Storage Navigator or the FCQUERY command to confirm that all of the FCv2 relationships that you wanted to create have been created.

Removing Compatible FlashCopy® V2

To remove (uninstall) Compatible FlashCopy® V2:

1. Use a host command to withdraw all Compatible FlashCopy® V2 relationships.
2. Use Storage Navigator or the FCQUERY command to confirm that all the Compatible FlashCopy® V2 relationships have been deleted.
3. Vary all devices used by Compatible FlashCopy® V2 offline.
4. In the Storage Navigator window, select Compatible FlashCopy® V2, click Uninstall, and click **Apply**.
5. Vary all devices used by Compatible FlashCopy® V2 back online.
   The host recognizes that Compatible FlashCopy® V2 was removed.
6. Execute the `devserv` command with the VALIDATE option of QDASD to the devices in the storage system. For an example of the `devserv` command, see *Installing Compatible FlashCopy® V2 on page 2-13*.
7. From your host, perform the mainframe host path offline/online operation.
   Compatible FlashCopy® V2 does not support the REMOVEFCPY parameter of the command.
License Capacity Requirements

The total volume capacity that is used in Compatible FlashCopy® V2 must be less than the license capacity you purchased. You need to maintain the total volume capacity that is used in Compatible FlashCopy® V2 that is less than or equal to the license capacity that you purchased.

- The total capacity of P-VOL and S-VOL of Compatible FlashCopy® V2 must be less than or equal to the license capacity that you purchased.

- When you use the volumes of Dynamic Provisioning as the P-VOL and S-VOL of Compatible FlashCopy® V2, the pool capacity of Dynamic Provisioning is added to the license capacity of Compatible FlashCopy® V2. The license capacity of Dynamic Provisioning volumes cannot be renewed in real time. Therefore, by the multiple write requests against the pools, the purchased license capacity may be exceeded.

- If the total volume capacity that is used in Compatible FlashCopy® V2 exceeds the volume capacity that you purchased, you can still continue to use Compatible FlashCopy® V2 for another 30 days. After that, you can delete Compatible FlashCopy® V2 pairs but cannot perform any other Compatible FlashCopy® V2 operations.
Performing Compatible FlashCopy® V2 operations

This chapter describes how to perform operations using Compatible FlashCopy® V2.

- Operating commands for Compatible FlashCopy® V2
- Operating systems supporting Compatible FlashCopy® V2
- Setting options
- Establishing relationships by volumes for Compatible FlashCopy® V2
- Establishing relationships by extents for Compatible FlashCopy® V2
- Using z/VM CP to establish relationships for Compatible FlashCopy® V2
- Suspending Write Operations to S-VOLs while establishing relationships for Compatible FlashCopy® V2
- Viewing relationship states of Compatible FlashCopy® V2
- Viewing resource information
- Releasing Compatible FlashCopy® V2 relationships
Operating commands for Compatible FlashCopy® V2

Compatible FlashCopy® V2 supports commands that enable you to perform operations from the zSeries and S/390 host systems.

These commands include the following:

- PPRC TSO
- DFSMSdss
- ICKDSF
- ANTRQST Macro
- z/VM CP

For detailed information on using these operating commands, see the IBM® user documents.

PPRC TSO commands

PPRC TSO commands include the following:

- FCESTABL
- FCWITHDR
- FCQUERY

To use the PPRC TSO commands, you must add the command names to the AUTHCMD PARM of IKJTSOxx, which is a member of SYS1.PARMLIB, because the host system is protected by RACF Facility.

DFSMSdss commands

DFSMSdss commands include the following:

- COPY FULL
- COPY DS

Compatible FlashCopy® V2 supports VSAM datasets. However, when the user specifies attributes for the copy source extents that differ from those specified for the copy target extents, DFSMSdss invokes a different program (such as IDCAMS), and, as a result, Compatible FlashCopy® V2 may not be able to use VSAM datasets.

ICKDSF commands

ICKDSF commands include the following:

- FLASHCPY ESTABLISH
- FLASHCPY WITHDRAW
- FLASHCPY QUERY
- FLASHCPY QUERY RELATIONS
ANTRQST Macro commands

ANTRQST macro commands include the following:

• REQUEST=FCESTABLISH
• REQUEST=FCWITHDRAW
• REQUEST=FCQUERY

z/VM CP commands

z/VM CP commands include the following:

• FLASHCOPY
• FLASHCOPY ESTABLISH
• FLASHCOPY BACKGNDCOPY
• FLASHCOPY RESYNC
• FLASHCOPY TGTWRITE
• FLASHCOPY WITHDRAW
• QUERY VIRTUAL FLASHCOPY

Operating systems supporting Compatible FlashCopy® V2

Operating systems that support Compatible FlashCopy® V2 include the following:

• OS/390 V2R10
• z/OS V1R0
• z/VM V5R3 and higher

Each operating system needs an appropriate PTF.

Setting options

1. In the tree, click Replications > Local Replications.
2. Click Edit Local Replica Options.
3. In the Edit Local Replica Options window, select the System Type.
4. Select one of the following System Options:
   - Swap & Freeze: Saves data immediately after a Quick Restore. When you enable this option and execute Quick Restore, update copying is inhibited and the T-VOL in PAIR status is saved without being updated.
   - Host I/O Performance: Gives I/O Response a higher priority than Volume Copy Time.
   - FC Slower Copy1: Reduces background copying to half, thereby improving host I/O response.
   - FC Slower Copy2: Reduces background copying to one quarter, thereby improving host I/O response.
5. Click Finish.
6. On the **Confirm** window, enter a **Task Name** and click **Apply**.

**Establishing relationships by volumes for Compatible FlashCopy® V2**

To establish relationships by volumes for Compatible FlashCopy® V2, you use one of the following sets of commands:

- PPRC TSO
- DFSMSdss
- ICKDSF
- ANTRQST Macro

---

**Caution:** A time-out may occur when more than 100 FlashCopy® relationships are established at the same time with storage systems that are shared with an IBM® OS or a Fujitsu OS. To avoid timeouts, divide the tasks into small groups and establish relationships at intervals of about 5 seconds per 100 relationships.

The timing to copy the data when the relationship is established is different between Compatible FlashCopy® V2 and Compatible Software for IBM® FlashCopy® SE. Compatible Software for IBM® FlashCopy® SE copies data when data is updated in either the source or target volume.

**Using PPRC TSO to establish Compatible FlashCopy® V2 relationships by volumes**

The following table shows the settings that you can use with the `FCESTABL` command when you establish Compatible FlashCopy® V2 relationships by volumes:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDEVN</td>
<td>Source device number</td>
<td>Specify the device address of the S-VOL on which you want to perform the FCESTABL command. (This parameter is required.)</td>
</tr>
<tr>
<td>TDEVN</td>
<td>Target device number</td>
<td>Specify the device address of the T-VOL on which you want to perform the FCESTABL command. (This parameter is required.)</td>
</tr>
</tbody>
</table>
Performing Compatible FlashCopy® V2 operations

### Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>COPY</td>
<td>Default setting. All the data in the copy range of the volume specified as the source by SDEVN is background-copied to the volume specified as the target by TDEVN. The relationship ends automatically, and all the data is copied.</td>
</tr>
<tr>
<td>NOCOPY</td>
<td>Data is not copied in the background. The relationship does not end automatically even when all the data is copied. To withdraw the relationship, use the FCWITHDR command. In the following data, access occurs. The data subject to read/write processing is copied from the source to the target before FCv2 read/write processing starts.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- When there is access to write data on the copy source of the specified area (within the extent)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- When there is access to write data on the copy target of the specified area (within the extent) or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- When there is access to read data on the copy target of the specified area (within the extent)</td>
</tr>
<tr>
<td>NOCOPY2COPY</td>
<td>The relationship made by NOCOPY mode is copied in the background. When all the data are copied, the relationship is released automatically.</td>
<td></td>
</tr>
<tr>
<td>ONLINTGT</td>
<td>YES</td>
<td>The path group is not checked. The relationship is established even when the copy target is online.</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>Default setting. The path group is checked. The relationship is not established when the copy target is online.</td>
</tr>
</tbody>
</table>
### Incremental YES

Establish a relationship including all the tracks in the volume. If you specify YES for this parameter and COPY for the MODE parameter, the relationship will be maintained even after the background copying process is completed, and the differential data between the S-VOL and the T-VOL will be managed. As long as the relationship is maintained, you cannot update the T-VOL.

The differential data between the S-VOL and the T-VOL will be copied when you execute the FCESTABL command with INCREMENTAL parameter specified or you execute the FCESTABL command (Reverse Restore) with the S-VOL and the T-VOL reversed.

- **NO**: Relationship will be deleted after background copying completes. The default setting of this parameter is NO.
- **YTW**: The relationship remains in effect after background copying completes. Data can be written to the T-VOL. Subsequent changes are tracked so that future operations are performed incrementally. This relationship continues until explicitly terminated with a Withdraw request.

#### Note

The target is writable while the incremental relationship is active. Any writes done to the target during this period are overwritten if a subsequent increment is done, keeping the target a true copy of the source. If the relationship is reversed, the changes made to the target are reflected on the source.

### TGTPRIM YES

To be specified when the FCv2 T-VOL and the TCz M-VOL (or URz P-VOL) are shared.

- **NO**: To be specified when the FCv2 T-VOL and the TCz M-VOL (or URz P-VOL) are not shared.
  - NO is the default setting.

### TGTCNVR

YES

Specifies the device number (device address) of the T-VOL on which you want to perform the FCESTABL command. To specify this number, use the TDEVN parameter.

YES is the default setting.

- **NO**: Specifies the serial number, the CU number, and the LDEV number of the T-VOL on which you want to perform the FCESTABL command. To specify this number, use the TARGET parameter instead of TDEVN.

### TARGET

Serial number, CU number, LDEV number of the T-VOL

Specifies the serial number, the CU number, and the LDEV number of the T-VOL on which you want to perform the FCESTABL command.

Use this parameter when TGTCNVR is NO.
To perform volume copying:

1. Set the T-VOL to offline.
2. Without specifying the EXTENTS and XTNTLST parameters, execute the FCESTABL command.
3. Change the VOLSER of the T-VOL.
   
   When VTOC is copied, the VOLSER of the S-VOL and the T-VOL will become the same. This step must be performed before setting the T-VOL back to online.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>REMOTE</td>
<td>YES</td>
<td>You use the Remote FlashCopy® function to establish a relationship.</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>You do not use the Remote FlashCopy® function. NO is the default setting.</td>
</tr>
<tr>
<td>DEVN</td>
<td>TCz source device number</td>
<td>Specifies the TCz source device number (device address). Use this parameter when REMOTE is YES.</td>
</tr>
<tr>
<td>SOURCE</td>
<td>Serial number, CU number, LDEV number of the S-VOL</td>
<td>Specifies the serial number, the CU number, and the LDEV number of the S-VOL on which you want to perform FCESTABL command. Use this parameter when REMOTE is YES.</td>
</tr>
<tr>
<td>SSID</td>
<td>SSID</td>
<td>Specifies the SSID of the CU on which you establish the FlashCopy® relationship. Use this parameter when REMOTE is YES.</td>
</tr>
<tr>
<td>ACTION</td>
<td>FREEZE</td>
<td>Suspends the write operations from the host to all the S-VOL. See Suspending Write Operations to S-VOLs while establishing relationships for Compatible FlashCopy® V2 on page 3-28.</td>
</tr>
<tr>
<td></td>
<td>FRR</td>
<td>Only the copied part from the S-VOL to the T-VOL of the established relationship will be copied. You reverse the S-VOL and the T-VOL of the relationship.</td>
</tr>
<tr>
<td>PRESERVEMIRROR or PRESMIR</td>
<td>NO</td>
<td>Establishes the relationship without using the Preserve Mirror FlashCopy® function. If PRESERVEMIRROR is not specified, NO is set by default.</td>
</tr>
<tr>
<td></td>
<td>REQUIRED or REQ</td>
<td>Establishes the relationship using the Preserve Mirror FlashCopy® function. If the relationship cannot be established, the command is rejected. TGTPPRIM(YES) must be specified as well.</td>
</tr>
<tr>
<td></td>
<td>PREFERRED or PREF</td>
<td>Establishes the relationship using the Preserve Mirror FlashCopy® function. If the relationship cannot be established, the copy operation is executed using the existing FlashCopy®-to-PPRC Primary Volume function. TGTPPRIM(YES) must be specified as well.</td>
</tr>
<tr>
<td>SETGTOK*</td>
<td>YES</td>
<td>Can specify the target T-VOLs as TSE-VOLs.</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>Cannot specify the target T-VOLs as TSE-VOLs.</td>
</tr>
</tbody>
</table>

*Valid in Compatible Software for IBM® FlashCopy® SE.
4. Set the T-VOL back to online.

The following example shows another way that the FCESTABL command is used. In this example, the FCESTABL command specifies that the data in the source device numbered 4202 is to be copied to target device numbered 4203 by COPY mode while 4203 is online. Example of the FCESTABL command (COPY mode):

FCESTABL SDEVN(X'4202') TDEVN(X'4203') MODE(COPY) ONLINTGT (YES)

Using DFMSdss to establish Compatible FlashCopy® V2 relationships by volumes

COPY FULL is the DFMSdss command that is used to process the Compatible FlashCopy® V2 volume copy operation.

The following table shows the parameters that you can use with the DFMSdss command when you establish FCv2 relationships by volumes:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>COPYVOLID *1</td>
<td>N/A</td>
<td>The COPYVOLID command option enables you to select whether you want to copy the ID label (VOLSER). When you specify COPYVOLID, the ID label of the volume set as the source is copied to the volume set as the target. When COPYVOLID command is executed, the volume used as the target is set to offline automatically. The COPYVOLID command had to be specified for volumes controlled by SMS. However, when DUMPCONDITIONINO command added by APAR OW45674 is specified, the VOLSER of the source volume is copied to the backup tape or disk. In this case, it is not necessary to specify COPYVOLID to copy the volume label.</td>
</tr>
<tr>
<td>DUMPCONDITIONINO *1</td>
<td>N/A</td>
<td>DUMPCONDITIONINO is used when you want to specify that the purpose of the copy operation is to create a backup copy and not for using the copied volume for application.</td>
</tr>
<tr>
<td>FCNOCOPY</td>
<td>N/A</td>
<td>This command sets the copy operation mode to NOCOPY mode. When this command is specified, the background copying process is omitted from the copy operation.</td>
</tr>
<tr>
<td>FCNOCOPYTOCOPY</td>
<td>N/A</td>
<td>The relationship made by NOCOPY mode is copied in the background. When all the data are copied, the relationship is released automatically.</td>
</tr>
<tr>
<td>FASTREPLICATION</td>
<td>PREFERRED</td>
<td>Executes FCv2 copy operation as a priority. If FCv2 cannot be used, executes Concurrent Copy or copy operation via the host. When FASTREPLICATION is not specified, the copy operation will be performed in the same way when PREFERRED is specified.</td>
</tr>
<tr>
<td>REQUIRED</td>
<td></td>
<td>Executes FCv2 copy operation unconditionally. If FCv2 cannot be used, reports error.</td>
</tr>
<tr>
<td>NONE</td>
<td></td>
<td>Does not execute FCv2 copy operation.</td>
</tr>
</tbody>
</table>
**Performing Compatible FlashCopy® V2 operations**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCFULLVOLUMERELATION</td>
<td>N/A</td>
<td>Creates an FCv2 relationship for all areas of the P-VOL (areas that have datasets and areas that do not have datasets are included).</td>
</tr>
<tr>
<td>FCFASTREVERSERESTORE</td>
<td>N/A</td>
<td>Replaces the S-VOL and T-VOL of an FCv2 relationship with each other, and then performs the FastReverseRestore function.</td>
</tr>
<tr>
<td>FCCGFREEZE</td>
<td>N/A</td>
<td>Temporarily suspends the write operation from the host to the S-VOLS when you establish relationships to maintain the consistency of data. To resume the write operation from the host to the S-VOLS, use the DFSMSdss CGCREATE command or the TSO FCWITHDR command.</td>
</tr>
</tbody>
</table>
| FCINCREMENTAL              | N/A   | To use the Incremental FlashCopy® function, use FCINCREMENTAL. For details about the Incremental FlashCopy® function, see the Reverse Restore function on page 1-12. When FCINCREMENTAL is specified, a relationship covering the entire volume is created. This relationship is maintained after the background copying process is completed. When FCINCREMENTAL is specified, the following additional functionality becomes available.  
  • Manage the differential data between the S-VOL and the T-VOL.  
  • When you re-execute the COPY command, only the differential data will be copied to the T-VOL.  
If you reverse the S-VOL and the T-VOL and execute the COPY command (Reverse Restore), only the differential data will be copied to the resulting T-VOL. *2 |
| FCINCREMENTALLAST          | N/A   | Use FCINCREMENTALLAST to delete the relationship after completing the copy operation of the differential data.  
When you re-execute the COPY command by specifying FCINCREMENTALLAST on a relationship created by specifying FCINCREMENTAL, only the differential data will be copied to the T-VOL. After the copy has completed, the relationship is be deleted.  
If you reverse the S-VOL and the T-VOL and execute the COPY command (Reverse Restore), only the differential data will be copied to the resulting T-VOL. After Reverse Restore has completed, the relationship will be deleted. |
| FCINCRVERIFY                | N/A   | Use FCINCRVERIFY to verify the condition established when re-executing the COPY command by specifying FCINCREMENTAL on the relationship created by using FCINCREMENTAL. |
| NOREVERSE                  |       | The copy operation will be executed only when you specify the S-VOL and the T-VOL in the same way as when the relationship was created.        |
| REVERSE                     |       | The copy operation will be executed only when you specify the S-VOL and the T-VOL in the opposite way as when the relationship was created.   |
When the `COPY FULL` command is issued, **DFSMSdss** checks whether the selected volumes meet the requirements for use as Compatible FlashCopy® V2 volumes. **DFSMSdss** automatically determines whether to process the requested job via the host. **DFSMSdss** processes the `COPY FULL` command in a few seconds. It also establishes the FCv2 relationship simultaneously as it completes the processing. The completion of this process is not reported to the user.

The following example shows the **DFSMSdss** `COPY FULL` command for processing Compatible FlashCopy® V2 volume copy operations. If you execute the command as shown in this example, the entire data in a volume numbered FCPY05 is copied to a volume numbered FCPY06.

```
//COPY FULL JOB
//*
//INSTIMG EXEC PGM=ADRDSSU
//SYSPRINT DD SYSOUT=*  
//SYSUDUMP DD SYSOUT=V,OUTLIM=3000
//VOL1 DD UNIT=3390,VOL=SER=FCPY05,DISP=OLD
//VOL2 DD UNIT=3390,VOL=SER=FCPY06,DISP=OLD
//SYSIN DD *
COPY FULL INDYNAM (FCPY05) OUTDYNAM (FCPY06) COPYVOLID /*
```

The following example shows the `COPY FULL` command (FCCGFREEZE):

```
//SYSPRINT DD SYSOUT=*  
//VOL1 DD UNIT=3390,VOL=SER=FCv200,DISP=OLD
//VOL2 DD UNIT=3390,VOL=SER=FCv201,DISP=OLD
```
Performing Compatible FlashCopy® V2 operations

The following example shows the `CGCREATE` command:

```
//SYSPRINT DD SYSOUT=*  
//SYSIN DD*  
CGCREATE ACCESSVOLUME(FCv200) FCCGVERIFY(FCv200)
```

The following example shows the `COPY FULL` command with `FCINCREMENTAL`:

```
//SYSPRINT DD SYSOUT=*  
//VOL1 DD UNIT=3390,VOL=SER=FCv200,DISP=OLD  
//VOL2 DD UNIT=3390,VOL=SER=FCv201,DISP=OLD  
//SYSIN DD *  
COPY FULL INDDNAME(VOL1) OUTDDNAME(VOL2)  
FCINCREMENTAL
```

When the `DFSMsdss` command `COPY FULL` is executed, all the datasets on the S-VOL are copied to the T-VOL (see the following figure). Volume area that is not allocated as a dataset is not copied. When the `FCFULLVOLUMERELATION` parameter is specified, all areas on the S-VOL, including areas that are not allocated as a dataset, are copied to the T-VOL.

If the capacity of the copy source volume is larger than the capacity of the copy target volume, and if `REQUIRED` is specified for the `FASTREPLICATION` parameter, the ADR920I message displays and the `COPY` command ends abnormally.

If the `COPY` command ends abnormally, perform one of the following tasks:

- Select the volume that has the same capacity as the copy source volume, and specify it as the copy target volume.
- Do not specify the `FASTREPLICATION` parameter.
- Specify `PREFERRED` for the `FASTREPLICATION` parameter.
- Specify `NONE` for the `FASTREPLICATION` parameter.

For detailed information about the ADR920I message, see the IBM® document.

![Figure 3-1 Copying all datasets using the COPY FULL command](image-url)
Using ICKDSF to establish Compatible FlashCopy® V2 relationships by volumes

The following table shows the parameters you can use with the ICKDSF command when you establish Compatible FlashCopy® V2 relationships by volumes.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDNAME or DNAME</td>
<td>JCL statement</td>
<td>Specifies the JCL statement identifying the volume. If the OS of the host server is MVS, this parameter or the UNITADDRESS parameter is required.</td>
</tr>
<tr>
<td>SYSNAME</td>
<td>SYSNAME</td>
<td>Specifies the SYSNAME in the ASSGN system control statement. If the OS of the host server is VSE, this parameter is required.</td>
</tr>
<tr>
<td>UNITADDRESS, UNITADDR,</td>
<td>Source device</td>
<td>Specifies the device number (device address) of the S-VOL on which you want to perform the FLASHCPY ESTABLISH command. If the OS of the host server is MVS, this parameter or the DDNAME parameter is required.</td>
</tr>
<tr>
<td>UNIT</td>
<td>number</td>
<td></td>
</tr>
<tr>
<td>TARGETVOL or TGTVD</td>
<td>CU number</td>
<td>Specifies the CU number, LDEV number, and device number (device address) of the T-VOL on which you want to perform the FLASHCPY ESTABLISH command. This parameter is required.</td>
</tr>
<tr>
<td></td>
<td>LDEV number</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Target device</td>
<td></td>
</tr>
<tr>
<td></td>
<td>number</td>
<td></td>
</tr>
<tr>
<td>CHANOERECORDINO,</td>
<td>YES</td>
<td>Establishes the relationship which covers the entire volume. The relationship will be maintained even after the background copying process is completed, and if the S-VOL and the T-VOL are updated, the updated part will be managed as the differential data.</td>
</tr>
<tr>
<td>CHANOERCD, or CHRCD</td>
<td>NO</td>
<td>Establishes the relationship which covers the entire volume. The relationship will be deleted after the background copying process is completed. The default setting of this parameter is NO.</td>
</tr>
<tr>
<td>INHIBITTARGETWRITES,</td>
<td>YES</td>
<td>If the relationship is maintained after the background copying process is completed, the T-VOL cannot be written until the relationship is deleted, or the command the prohibition of the writing is executed.</td>
</tr>
<tr>
<td>INHIBWRTS, or NOTGTWR</td>
<td>NO</td>
<td>Even when the relationship is maintained after the background copying process is completed, the T-VOL can be written. Default setting of this parameter is NO.</td>
</tr>
<tr>
<td>MODE</td>
<td>COPY</td>
<td>Establishes the relationship which covers the entire volume, and execute the background copying process. The default setting of this parameter is COPY.</td>
</tr>
<tr>
<td></td>
<td>NOCOPtY</td>
<td>Establishes the relationship which covers the entire volume. The background copying process will not be performed.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Value</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>-------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ONLINTGT or ONTGT</td>
<td>YES</td>
<td>The relationship is established even when the S-VOL is online.</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>The relationship is not established when the copy target is online. The default setting of this parameter is NO.</td>
</tr>
<tr>
<td>RESTORE</td>
<td>N/A</td>
<td>If the S-VOL or the T-VOL of the relationship established by specifying YES for CHANOERECORDINO is updated, only the updated part will be copied. And if you specify YES for CHANOERECORDINO and you reverse the S-VOL or the T-VOL, Reverse Restore will be executed and only the updated part will be copied in this case, too. The relationship will be maintained after the copying operation is completed if you specify YES for CHANOERECORDINO. If you specify NO or nothing for INCREMENTAL CHANGERECORDING, the relationship will be withdrawn after the copying operation is completed.</td>
</tr>
<tr>
<td>FASTREVERSERESTORE or FASTREVREST</td>
<td>N/A</td>
<td>Specify the S-VOL and the T-VOL of the relationship into reverse. Specify the S-VOL and the T-VOL of the relationship into reverse.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If you specify YES for CHANOERECORDINO, only the updated part of the S-VOL or the T-VOL of the established relationship will be copied.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If you specify NO for CHANOERECORDINO or specify nothing, only the copied part from the S-VOL to the T-VOL of the established relationship will be copied.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The relationship will be maintained after the copying operation is completed if you specify YES for CHANOERECORDINO. If you specify NO or nothing for INCREMENTAL CHANGERECORDING, the relationship will be withdrawn after the copying operation is completed.</td>
</tr>
<tr>
<td>TGTCANCOMEONLINE or TGTONLINE</td>
<td>YES</td>
<td>The T-VOL can be set to online after the relationship is established. The default setting of this parameter is YES.</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>The T-VOL cannot be set to online until the relationship is deleted.</td>
</tr>
<tr>
<td>TGTOKASPPRCPRIM</td>
<td>YES</td>
<td>To be specified when the FCv2 T-VOL and the TCz M-VOL (or URz P-VOL) are shared.</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>To be specified when the FCv2 T-VOL and the TCz M-VOL (or URz P-VOL) are not shared. NO is the default setting.</td>
</tr>
<tr>
<td>SOURCEVOL or SRCVOL</td>
<td>CU number</td>
<td>Specifies the CU number, the LDEV number, or the device number of the S-VOL when you use the Remote FlashCopy® function.</td>
</tr>
<tr>
<td></td>
<td>LDEV number</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Source device number</td>
<td></td>
</tr>
</tbody>
</table>
Performing Compatible FlashCopy® V2 operations

To create an FCv2 pair using the ICKDSF command FLASHCPY ESTABLISH:

1. Set the T-VOL to offline.
   If the ONLINTGT parameter is set to YES, the T-VOL will automatically be offline when creating pairs.
2. Specify the JCL statement in the DDNAME parameter, or specify the S-VOL device number in the UNITADDRESS parameter.
3. Specify the CU number, LDEV number, and device number of the T-VOL for the TARGETVOL parameter.
4. Execute the FLASHCPY ESTABLISH command, for example:

   FLASHCPY ESTABLISH UNIT(X'7000')
   TARGETVOL(X'00',X'01',7001) CHANOERECORDINO(YES)
   ONLINTGT(YES)

### Creating Compatible FlashCopy® V2 pairs using Incremental FlashCopy® (Reverse Restore): FLASHCPY ESTABLISH

To create Compatible FlashCopy® V2 pairs, you use the Incremental FlashCopy® function and then reverse the S-VOL and the T-VOL (Reverse Restore) so that the differential data is copied.

To create Compatible FlashCopy® V2 pairs:

1. Set the T-VOL to offline.
2. Specify the JCL statement in the DDNAME parameter or specify the S-VOL device number in the UNITADDRESS parameter.
3. Specify the CU number, LDEV number, and device number of the T-VOL for the TARGETVOL parameter.
4. Execute the FLASHCPY ESTABLISH command (Incremental FlashCopy®), specifying YES for the CHANOERECORDINO parameter, for example:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESERVEMIRROR or PRESMIR</td>
<td>REQUIRED</td>
<td>Establishes the relationship using the Preserve Mirror FlashCopy® function. If the relationship cannot be established, the system rejects the command. TGTOKASPPRCPRIM(YES) must be specified as well.</td>
</tr>
<tr>
<td></td>
<td>PREFERRED</td>
<td>Establishes the relationship using the Preserve Mirror FlashCopy® function. If the relationship cannot be established, the copy operation is executed using the existing FlashCopy® to PPRC Primary Volume function. TGTOKASPPRCPRIM(YES) must be specified as well.</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>Establishes the relationship without using the Preserve Mirror FlashCopy® function. If PRESERVEMIRROR is not specified, NO is set by default.</td>
</tr>
<tr>
<td>SETGTOK*</td>
<td>YES</td>
<td>Can specify the target T-VOLs as TSE-VOLs.</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>Cannot specify the target T-VOLs as TSE-VOLs.</td>
</tr>
</tbody>
</table>

*Valid in Compatible Software for IBM® FlashCopy® SE.
Performing Compatible FlashCopy® V2 operations

5. Execute the `FLASHCPY ESTABLISH` command (Reverse Restore), specify the RESTORE parameter, and reverse the S-VOL and the T-VOL, for example:

   `FLASHCPY ESTABLISH UNIT(X'7000') TARGETVOL(X'00',X'01',7001) CHANOERECORDINO(YES) RESTORE`

If the S-VOL is updated before executing the Reverse Restore command, then only the data of the updated part of the S-VOL (differential data) is copied to the T-VOL. When the T-VOL is updated, before performing Reverse Restore, only the data of the updated part of the T-VOL is copied from the S-VOL.

Set the CHANOERECORDINO parameter to YES to maintain the relationship after the copying process is completed and to manage the differential data between the S-VOL and the T-VOL. If the CHANOERECORDINO parameter is not specified, then the relationship is deleted after the copying process is completed.

Creating pairs using Incremental FlashCopy® (Fast Reverse Restore):

You can create pairs with the Incremental FlashCopy® function. You can then copy the differential data by reversing the S-VOL and the T-VOL with the Fast Reverse Restore function.

To create pairs and copy differential data:

1. Set the T-VOL to offline.
2. Specify the JCL statement in the DDNAME parameter, or specify the S-VOL device number in the UNITADDRESS parameter.
3. Specify the CU number, LDEV number, and device number of the T-VOL for the TARGETVOL parameter.
4. Execute the `FLASHCPY ESTABLISH` command (Incremental FlashCopy®), specifying YES for the CHANOERECORDINO parameter. See the following example:

   `FLASHCPY ESTABLISH UNIT(X'7000') TARGETVOL(X'00',X'01',7001) CHANOERECORDINO(YES)`

   The pair is created.

5. Execute the `FLASHCPY ESTABLISH` command (Fast Reverse Restore), specifying the FASTREVREST parameter and reversing the S-VOL and the T-VOL. See the following example:

   `FLASHCPY ESTABLISH UNIT(X'7001') TARGETVOL(X'00',X'00',7000) FASTREVREST`

By using Fast Reverse Restore, the S-VOL becomes a T-VOL and T-VOL becomes an S-VOL. After that, the data of the resulting S-VOL is copied to the resulting T-VOL in the following manner:
If the S-VOL was updated before performing Fast Reverse Restore, Fast Reverse Restore copies only the updated data to the resulting T-VOL.

If the T-VOL was updated before performing Fast Reverse Restore, Fast Reverse Restore copies only the updated data from the resulting S-VOL to the resulting T-VOL.

Recreating pairs with Incremental FlashCopy® (Restore): FLASHCPY ESTABLISH

To recreate pairs and copy the differential data:
1. Set the T-VOL to offline.
2. Specify the JCL statement in the DDNAME parameter or specify the S-VOL device number in the UNITADDRESS parameter.
3. Specify the CU number, LDEV number, and device number of the T-VOL for the TARGETVOL parameter.
4. Specify YES for the CHANOERECORDINO parameter and execute the FLASHCPY ESTABLISH command (Incremental FlashCopy®), for example:
   
   
   FLASHCPY ESTABLISH UNIT(X'7000')
   TARGETVOL(X'00', X'01', 7001) CHANOERECORDINO(YES)

   The pair will be created.
5. Specify the RESTORE parameter and execute the FLASHCPY ESTABLISH command, for example:

   FLASHCPY ESTABLISH UNIT(X'7000') TARGETVOL(X'00', X'01', 7001) RESTORE

   When the S-VOL is updated, only the data of the updated part of the S-VOL (differential data) will be copied to the T-VOL. When the T-VOL is updated, only the data of the updated part of the T-VOL will be copied from the S-VOL.

   Set the CHANOERECORDINO parameter to YES to maintain the relationship after the copying process is completed and to manage the differential data between the S-VOL and the T-VOL. If CHANOERECORDINO parameter is not specified, the relationship will be deleted after the copying process is completed.

Using ANTRQST macro to establish Compatible FlashCopy® V2 relationships by volumes

The following table shows the parameters that you can use with the ANTRQST command when you establish Compatible FlashCopy® V2 relationships by volumes:
### Table 3-4 ANTRQST macro command parameters (REQUEST=FCESTABLISH)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDEVN</td>
<td>Source device number</td>
<td>Specifies the device number (device address) of the S-VOL on which you want to perform the FCESTABLISH command.</td>
</tr>
<tr>
<td>TDEVN</td>
<td>Target device number</td>
<td>Specifies the device number (device address) of the T-VOL on which you want to perform the FCESTABLISH command.</td>
</tr>
<tr>
<td>INCREMENTAL</td>
<td>YES</td>
<td>Establishes a relationship including all the tracks in the volume. If you specify YES for this parameter and COPY for the MODE parameter, the relationship will be maintained even after background copying completes, and the differential data between the S-VOL and the T-VOL will be managed. As long as the relationship is maintained, you cannot update the T-VOL. The differential data between the S-VOL and the T-VOL will be copied when you execute the ANTRQST command with INCREMENTAL parameter specified.</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>The relationship will be deleted after background copying completes. NO is the default setting.</td>
</tr>
<tr>
<td></td>
<td>YTW</td>
<td>The relationship remains in effect after background copying completes. Subsequent changes are tracked so that future operations are performed incrementally. This relationship continues until explicitly terminated with a Withdraw request. Note: The target is writable while the incremental relationship is active. Any writes done to the target during this period are overwritten if a subsequent increment is done, keeping the target a true copy of the source. If the relationship is reversed, the changes made to the target are reflected on the source.</td>
</tr>
<tr>
<td>TGTPPRIM</td>
<td>YES</td>
<td>Specify this parameter to use the FCv2 T-VOL as the TCz M-VOL (or URz P-VOL).</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>Specify this parameter not to use the FCv2 T-VOL as the TCz M-VOL (or URz P-VOL). NO is the default setting.</td>
</tr>
<tr>
<td>RETINFO</td>
<td>Return value</td>
<td>Obtains the return code and the reason code of the execution results. For details about the codes, see the IBM® manual.</td>
</tr>
</tbody>
</table>
Performing Compatible FlashCopy® V2 operations

MODE

**COPY**

All the data in the copy range of the volume specified as the source by SDEVN is copied in the background to the volume specified as the target by TDEVN. The relationship ends automatically, and the FCv2 pair is deleted when all the data is copied.

COPY is the default setting.

**NOCOPY**

Data is not copied in the background. The relationship does not end automatically even when all the data is copied. To withdraw the relationship, use the FCWITHDR command. In the following data access occurs, the data subject to read/write processing is copied from the source to the target before FCv2 read/write processing starts.

- When there is access to write data on the copy source of the specified area (within the extent),
- When there is access to write data on the copy target of the specified area (within the extent), or,
- When there is access to read data on the copy target of the specified area (within the extent).

**NO2CPY**

The relationship made by NOCOPY mode is copied in the background. When all the data are copied, the relationship is released automatically.

ONLINTGT

**YES**

The path group is not checked. The relationship is established even when the copy target is online.

**NO**

The path group is checked. The relationship is not established when the copy target is online. NO is the default setting.

ACTION

**FREEZE**

Suspends the write operations from the host to S-VOLs. To resume the write operation, you need to issue the FCWITHDRAW command with the ACTION parameter. However, if a timeout occurs, the write operation may be resumed although you do not issue the FCWITHDRAW command. The default setting of timeout is 120 seconds (2 minutes), but you may change it.

For detailed information about changing the timeout period, see FCv2 Window.

**FRR**

Specify the S-VOL and the T-VOL of the relationship into reverse.

- If you specify YES for INCREMENTAL, only the updated part of the S-VOL or the T-VOL of the established relationship will be copied.
- If you specify NO for INCREMENTAL or specify nothing, only the copied part from the S-VOL to the T-VOL of the established relationship will be copied.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TGTUCB</td>
<td>YES</td>
<td>Specifies the device number (device address) of the T-VOL on which you want to perform the FCESTABLISH command. To specify this number, use the TDEVN parameter. YES is the default setting.</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>Specifies the serial number, the CU number, and the LDEV number of the T-VOL on which you want to perform the FCESTABLISH command. To specify this number, use the TGTSERIAL, TGLSS, TGDVC parameters instead of TDEVN.</td>
</tr>
<tr>
<td>PRESMIR</td>
<td>NO</td>
<td>Establishes the relationship without using the Preserve Mirror FlashCopy® function. If PRESMIR is not specified, NO is set by default.</td>
</tr>
<tr>
<td></td>
<td>REQ</td>
<td>Establishes the relationship using the Preserve Mirror FlashCopy® function. If the relationship cannot be established, the system rejects the command. TGTPPRIM=YES must be specified at the same time.</td>
</tr>
<tr>
<td></td>
<td>PREF</td>
<td>Establishes the relationship using the Preserve Mirror FlashCopy® function. If the relationship cannot be established, the copy operation is executed using the existing FlashCopy® to PPRC Primary Volume function. TGTPPRIM=YES must be specified at the same time.</td>
</tr>
<tr>
<td>TGTSERIAL</td>
<td>Serial number of the storage system containing the T-VOL</td>
<td>Specifies the serial number of the storage system containing the T-VOL on which you want to perform the FCESTABLISH command. Use this parameter when the TGTUCB parameter is NO or the REMOTE parameter is YES.</td>
</tr>
<tr>
<td>TGLSS</td>
<td>T-VOL CU number</td>
<td>Specifies the CU number of the T-VOL on which you want to perform the FCESTABLISH command. Use this parameter when the TGTUCB parameter is NO or the REMOTE parameter is YES.</td>
</tr>
<tr>
<td>TGDVC</td>
<td>T-VOL LDEV number</td>
<td>Specifies the LDEV number of the T-VOL on which you want to perform the FCESTABLISH command. Use this parameter when the TGTUCB parameter is NO, or the REMOTE parameter is YES.</td>
</tr>
<tr>
<td>REMOTE</td>
<td>YES</td>
<td>You use the Remote FlashCopy® function to establish a relationship.</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>You do not use the Remote FlashCopy® function. NO is the default setting.</td>
</tr>
<tr>
<td>DEVN</td>
<td>TCz source device number</td>
<td>Specifies the TCz source device number (device address). Use this parameter when REMOTE is YES.</td>
</tr>
<tr>
<td>SRCSERIAL</td>
<td>Serial number of the storage system containing the S-VOL</td>
<td>Specifies the serial number of the storage system containing the S-VOL on which you want to perform the FCESTABLISH command. Use this parameter when REMOTE is YES.</td>
</tr>
<tr>
<td>SRCLSS</td>
<td>S-VOL CU number</td>
<td>Specifies the CU number of the S-VOL on which you want to perform the FCESTABLISH command. Use this parameter when REMOTE is YES.</td>
</tr>
</tbody>
</table>
Performing Compatible FlashCopy® V2 operations

### Establishing relationships by extents for Compatible FlashCopy® V2

To establish relationships by extents for Compatible FlashCopy® V2, you use one of the following sets of commands:

- PPRC TSO
- DFSMSdss
- ANTQRST

### Using TSO to establish Compatible FlashCopy® V2 relationships by extents

When you establish Compatible FlashCopy® V2 relationships by extents with the FCESTABL command, the parameters in the following table become available:

#### Table 3-5 Parameters for the FCESTABL command (Compatible FlashCopy® V2 / Dataset copying)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRCDVCS-VOL</td>
<td>LDEV number</td>
<td>Specifies the LDEV number of the S-VOL on which you want to perform the FCESTABLISH command. Use this parameter when REMOTE is YES.</td>
</tr>
<tr>
<td>SSID</td>
<td>SSID</td>
<td>Specifies the SSID of the CU on which you establish the FlashCopy® relationship. Use this parameter when REMOTE is YES.</td>
</tr>
<tr>
<td>SETGTOKEN*</td>
<td>YES</td>
<td>Can specify the target T-VOLs as TSE-VOLs.</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>Cannot specify the target T-VOLs as TSE-VOLs.</td>
</tr>
</tbody>
</table>

*Valid in Compatible Software for IBM® FlashCopy® SE.
Performing Compatible FlashCopy® V2 operations

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To execute the XTNTLST parameter, the size of the copy source extent and the copy target extent must be the same.

When the `FCESTABL` command with the EXTENTS parameter specified is executed, only the data on the copy source extents specified by the EXTENTS parameter are copied from the volume specified as the source by SDEVN to the volume specified as the target by TDEVN. For example, when you copy only the "dataset 2", the copy operation processes as shown in the following figure. When you do not specify the EXTENTS parameter, the entire source volume is copied to the target volume.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>XTNTLST</td>
<td>Extents (copy range)</td>
<td>Specifies the extent (copy range) by setting the starting and ending addresses of the source, and the starting and ending addresses of the target with ccccccc (cylinder and head numbers), when either of both the copy source and target exceed 65,520 cylinders. From the copy source, the specified data is copied to a different offset position on the copy target. Up to 32 extents can be specified. When XTNTLST is not specified, the data on all the tracks are copied.</td>
</tr>
</tbody>
</table>

Figure 3-2 Dataset copying with EXTENTS parameter specified (Compatible FlashCopy® V2)

When the `FCESTABL` command with the XTNTLTS or XXTNTLST parameter specified is executed, only the data on the copy source extents specified by the XTNTLTS or XXTNTLST parameter are copied to the copy target extents specified by the XTNTLTS or XXTNTLST parameter.

For example, when you copy only the "dataset 2", the copy operation processes as shown in the following figure:
When you establish a Compatible FlashCopy® V2 dataset relationship per extent for a volume with CATALOG, you trigger a write operation from the host on both VTOC and CATALOG.

To perform dataset copying by using the FCESTABL command:

1. Use the VTOC list stored in the S-VOL to check the VTOC (INDEX, VTOC, etc.) and the position of the extent (CCHH, SIZE) used for the dataset copy operation.
2. Create the copy target dataset on the T-VOL.
3. Acquire the VTOC list stored in the T-VOL.
4. Set the T-VOL to offline.
5. Execute the FCESTABL command with the XTNTLST or XXTNTLST parameter.

Use the XTNTLST or XXTNTLST parameter of the FCESTABL command to specify the information on the source and target extents. When there are multiple extents, specify the information on all of the extents of the relevant datasets.

Compatible FlashCopy® V2 enables you to use the XTNTLST or XXTNTLST parameter as follows:

- Specify multiple copy target datasets to be copied simultaneously from a single copy source dataset.
- Specify the simultaneous execution of volume copying and dataset copying from a single source volume.
- Specify multiple source datasets that are overlapping or are an inclusive part of another dataset. However, the number of extents that you may specify per dataset is limited to 16.
- Do not specify multiple target datasets that are overlapping.
- Specify source and target datasets that differ in position.
- Specify the source and target datasets that are in the same volume, provided that they do not overlap.
6. If the T-VOL is set to offline in step 4, set this-VOLUME back to online. This step is not necessary if the ONLINTGT parameter of the FCESTABL command is set to YES.

FCESTABL command can only be executed once per Compatible FlashCopy® V2 relationship. You cannot execute this command repeatedly for the same FCv2 relationship.

The following example shows an example of how the FCESTABL command is used. In this example the FCESTABL command specifies the following:

- The data on the extent starting from CCHH '01000004' and ending at CCHH '0357000A' in the source device numbered 4202 is to be copied to the extent starting from CCHH '13000001' and ending at CCHH '15570007' in the target device numbered 4203.

- The data on the extent starting from CCHH '02AC0006' and ending at CCHH '02FF000C' in the source device numbered 4202 is to be copied to the extent starting from CCHH '18A00000' and ending at CCHH '18F30006' in the target device numbered 4203 (the operation mode for copying is set to NOCOPY mode). Example of FCESTABL command (Compatible FlashCopy® V2 / XTNTLST and NOCOPY are specified):

```
FCESTABL SDEVN(X'4202') TDEVN(X'4203') MODE(NOCOPY)
XTNTLST(X'01000004' X'0357000A' X'13000001' X'15570007',
 X'02AC0006' X'02FF000C' X'18A00000' X'18F30006')
```

### Using DFSMSdss to establish Compatible FlashCopy® V2 relationships by extents

The DFSMSdss command that is used to process Compatible FlashCopy® V2 dataset copy operations is COPY DS. For information about the available parameters for the DFSMSdss command, see Table 3-2 Parameters for DFSMSdss, Volume copying on page 3-8.

When the COPY DS command is issued, DFSMSdss checks whether the selected volumes meet the requirements for use as FCv2 volumes or not, and automatically determines whether to process the requested job via the host or not. DFSMSdss processes the COPY DS command in a few seconds and establishes the FCv2 relationship simultaneously as it completes the processing. The completion of this process is not reported to the user.

Following is an example using the DFSMSdss command to process Compatible FlashCopy® V2 dataset copy operations. In this example, the dataset on the volume numbered FCPY05 is copied to a volume numbered FCPY06.

```
//DSSCOPY JOB
/**
 //INSTIMG EXEC PGM=ADRDSSU
 //SYSPRINT DD SYSOUT=* 
 //SYSUDUMP DD SYSOUT=V,OUTLIM=3000
 //VOL1 DD UNIT=3390, VOL=SER=FCPY05, DISP=OLD
 //VOL2 DD UNIT=3390, VOL=SER=FCPY06, DISP=OLD
 //SYSIN DD * 
COPY DS(INCL(SAM020.**)) INDDNAME(FCPY05)
```
Compatible FlashCopy® V2 enables you to establish up to 16 relationships simultaneously from a single copy source extent.

**Using ANTRQST Macro to establish Compatible FlashCopy® V2 relationships by extents**

When you establish Compatible FlashCopy® V2 relationships by extents with the **ANTRQST Macro** command, the parameters in the following table are available.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRCEXTENTS</td>
<td>Copy source extent</td>
<td>Specifies the copy source extent (copy range) by setting the starting and</td>
</tr>
<tr>
<td></td>
<td>(copy range)</td>
<td>ending addresses of the source and target with CCHH (cylinder and head</td>
</tr>
<tr>
<td></td>
<td></td>
<td>numbers). Up to 32 extents can be specified. When SRCEXTENTS is not</td>
</tr>
<tr>
<td></td>
<td></td>
<td>specified, the data on all the tracks are copied. Note that you cannot</td>
</tr>
<tr>
<td></td>
<td></td>
<td>specify this parameter if you specify YES for the INCREMENTAL parameter.</td>
</tr>
<tr>
<td>TGTEXTENTS</td>
<td>Copy target extent</td>
<td>Specifies the copy target extent (copy range) by setting the starting and</td>
</tr>
<tr>
<td></td>
<td>(copy range)</td>
<td>ending addresses of the source and target with CCHH (cylinder and head</td>
</tr>
<tr>
<td></td>
<td></td>
<td>numbers). Up to 32 extents can be specified. When TGTEXTENTS is not</td>
</tr>
<tr>
<td></td>
<td></td>
<td>specified, the data on all the tracks are copied. Note that you cannot</td>
</tr>
<tr>
<td></td>
<td></td>
<td>specify this parameter if you specify YES for the INCREMENTAL parameter.</td>
</tr>
</tbody>
</table>

**Using z/VM CP to establish relationships for Compatible FlashCopy® V2**

The following table shows the **z/VM CP** commands that you can use to establish Compatible FlashCopy® V2 relationships:

<table>
<thead>
<tr>
<th>CP command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLASHCOPY</td>
<td>Establishes the relationship in the Copy mode. Cancels the relationship</td>
</tr>
<tr>
<td></td>
<td>after the completion of the background copy.</td>
</tr>
<tr>
<td>FLASHCOPY ESTABLISH</td>
<td>Creates the Persistent relationship. Does not cancel the relationship even</td>
</tr>
<tr>
<td></td>
<td>after the completion of the copy (The Incremental FlashCopy® function, the</td>
</tr>
<tr>
<td></td>
<td>Nocopy mode, and the S-VOL write-protect specification are available.).</td>
</tr>
<tr>
<td>FLASHCOPY BACKGNDCOPY</td>
<td>Starts the background copy of the relationship created in the Nocopy mode.</td>
</tr>
<tr>
<td></td>
<td>Does not cancel the relationship even after the completion of the copy.</td>
</tr>
<tr>
<td>FLASHCOPY RESYNC</td>
<td>Performs the restoration (resync) of the relationship created by the</td>
</tr>
<tr>
<td></td>
<td>Incremental FlashCopy® function. Does not cancel the relationship even</td>
</tr>
<tr>
<td></td>
<td>after the restoration.</td>
</tr>
</tbody>
</table>
Performing Compatible FlashCopy® V2 operations

For details about the z/VM CP commands, see the IBM® manual.

Using z/VM FlashCopy® to establish relationships

Various parameters of the Z/VM FLASHCOPY command can be used to establish relationships.

The following table shows the parameters that can be used with the FLASHCOPY to establish relationships:

### Table 3-8 Parameters available with FLASHCOPY command

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>vdev1</td>
<td>Primary device number</td>
<td>Specifies the device number of the copy source (device address or mini disk number).</td>
</tr>
<tr>
<td>scyl1</td>
<td>Starting cylinder of source</td>
<td>Specifies the starting cylinder of the copy source. Specify 0 if the entire volume is the target.</td>
</tr>
<tr>
<td>ecyl1</td>
<td>Ending cylinder of source</td>
<td>Specifies the ending cylinder of the copy source. END can be specified if the entire volume is the target.</td>
</tr>
<tr>
<td>vdev2</td>
<td>Secondary device number</td>
<td>Specifies the device number of the copy destination (device address or mini disk number).</td>
</tr>
<tr>
<td>scyl2</td>
<td>Starting cylinder of target</td>
<td>Specifies the starting cylinder of the copy destination. Specify 0 if the entire volume is the target.</td>
</tr>
<tr>
<td>ecyl2</td>
<td>Ending cylinder of target</td>
<td>Specifies the ending cylinder of the copy destination. END can be specified if the entire volume is the target.</td>
</tr>
</tbody>
</table>

A usage example of the FLASHCOPY command is shown below. This example copies cylinders 0 to 99 from device 10 to device 20 in copy mode. The relationship is canceled after the completion of copy.

FLASHCOPY 10 0 END 20 0 END Command complete: FLASHCOPY 0010 0 99 TO 0020 0 99

---

Note: The FLASHCOPY command cancels the relationship after the completion of the copy.

Using z/VM FLASHCOPY ESTABLISH to establish relationships

The FLASHCOPY ESTABLISH command does not cancel the relationship even after the completion of the copy. The following table shows the parameters are available when establishing relationships by using the FLASHCOPY ESTABLISH command.
Table 3-9 Parameters for the FLASHCOPY ESTABLISH command

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOURCE</td>
<td>Primary device number, Starting cylinder of source, Ending cylinder of source</td>
<td>Specifies the device number (device address or mini disk number), the starting cylinder, and the ending cylinder of the copy source.</td>
</tr>
<tr>
<td>TARGET</td>
<td>Secondary device number, Starting cylinder of target, Ending cylinder of target</td>
<td>Specifies the device number (device address or mini disk number), the starting cylinder, and the ending cylinder of the copy destination.</td>
</tr>
<tr>
<td>CHGRECORD</td>
<td>-</td>
<td>Establishes a relationship whose target is the entire volume. If the P-VOL and the S-VOL are updated, the updated part is managed as differential data.</td>
</tr>
<tr>
<td>NOTGWRITE</td>
<td>-</td>
<td>Write to the S-VOL is not allowed until the command for cancelling write-protect is executed.</td>
</tr>
<tr>
<td>REVERSIBLE</td>
<td>-</td>
<td>Establishes a relationship whose target is the entire volume. If the P-VOL and the S-VOL are updated, the updated part is managed as differential data, and write to the S-VOL is not allowed until the command for cancelling write-protect is executed.</td>
</tr>
<tr>
<td>NOCOPY</td>
<td>-</td>
<td>Does not perform the background copy when establishing the relationship.</td>
</tr>
</tbody>
</table>

For details about the values, see the IBM® manual.

A usage example of the FLASHCOPY ESTABLISH command is shown below. This example copies cylinders 0 to 99 from device 10 to device 20 in copy mode. The relationship remains even after the completion of copy.

flashcopy establish source 10 0-end target 20 0-end
Command complete: FLASHCOPY 0010 0 99 TO 0020 0 9

To cancel the relationship remaining after the completion of the copy, use the FLASHCOPY WITHDRAW command. For the FLASHCOPY WITHDRAW command, see Using z/VM CP to release Compatible FlashCopy® V2 relationships on page 3-61.

**Note:** If the relationship is established with the FLASHCOPY ESTABLISH command, 0010 might be displayed as the reference code in the History dialog box of StorageNavigator regardless of the parameter. When you operate in the NOCOPY mode, code 0023 might be displayed.

### Using z/VM FLASHCOPY BACKGNDCOPY to start up background copying

The FLASHCOPY BACKGNDCOPY command starts up the background copy of the relationship established in the NOCOPY mode. The relationship remains even after the completion of the background copy.
Performing Compatible FlashCopy® V2 operations

Table 3-10 Parameters for the FLASHCOPY command

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOURCE</td>
<td>Primary device number, Starting cylinder of source, Ending cylinder of source</td>
<td>Specifies the device number (device address or mini disk number), the starting cylinder, and the ending cylinder of the copy source.</td>
</tr>
</tbody>
</table>

Using z/VM FLASHCOPY RESYNC to re-establish relationships

The FLASHCOPY RESYNC command is used to re-establish the relationship that is initially established by using the CHGRECORD or REVERSIBLE parameter.

The following table shows the parameters that are available with the FLASHCOPY RESYNC command:

Table 3-11 Parameters for the FLASHCOPY RESYNC command

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOURCE</td>
<td>Primary device number, Starting cylinder of source, Ending cylinder of source</td>
<td>Specifies the device number (device address or mini disk number), the starting cylinder, and the ending cylinder of the copy source.</td>
</tr>
<tr>
<td>TARGET</td>
<td>Secondary device number, Starting cylinder of target, Ending cylinder of target</td>
<td>Specifies the device number (device address or mini disk number), the starting cylinder, and the ending cylinder of the copy destination.</td>
</tr>
</tbody>
</table>

Only the updated part of the data in the S-VOL (differential data) is copied to the S-VOL if the P-VOL is updated. Only the updated part of the data in the S-VOL is copied from the P-VOL if the S-VOL is updated. The Reverse Restore function operates if the FLASHCOPY RESYNC command is re-established by reversing the P-VOL and the S-VOL of the relationship established by specifying the INCREMENTAL. An example of re-establishing the relationship established by the CHGRECORD option of the FLASHCOPY ESTABLISH command is shown below. The FLASHCOPY ESTABLISH command establishes a relationship from the device number 30 to the device number 40 and manages differential data. The FLASHCOPY RESYNC command copies only the updated data from the device number 30 to the device number 40.

```
flashcopy establish source 30 0-end target 40 0-end chgrecord reversibleCommand complete: FLASHCOPY 0030 0 END TO 0040 0 END
flashcopy resync source 30 0-end target 40 0-end RESYNC COMPLETED
```

Using z/VM FLASHCOPY TGTWRITE command to remove write-protection from an S-VOL

To remove write protection from the S-VOL of a relationship, use the FLASHCOPY TGTWRITE command.

The following table shows the parameter that is available with the FLASHCOPY TGTWRITE command:
### Table 3-12 Parameters for the FLASHCOPY TGTWRITE command

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TARGET</td>
<td>Secondary device number, Starting cylinder of target, Ending cylinder of target</td>
<td>Specifies the device number (device address or mini disk number), the starting cylinder, and the ending cylinder of the copy destination.</td>
</tr>
</tbody>
</table>

### Suspending Write Operations to S-VOLs while establishing relationships for Compatible FlashCopy® V2

When you use `FCESTABL` to establish Compatible FlashCopy® V2 relationships, you can suspend the write operations to S-VOLs. Suspending write operations to S-VOLS helps to keep data consistent.

The ACTION parameter in the following table is available, in addition to the parameters in [Table 3-1 Parameters for the FCESTABL command (Volume copying) on page 3-4](#) and [Table 3-5 Parameters for the FCESTABL command (Compatible FlashCopy® V2 / Dataset copying) on page 3-20](#).

### Table 3-13 Parameters for the FCESTABL command (Compatible FlashCopy® V2 / In case of suspending write operations to S-VOLs)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTION</td>
<td>FREEZE</td>
<td>Suspend the write operations from the host to S-VOLS. Although if you establish a relationship specifying extents, the ACTION parameter will suspend the write operation to the whole volume.</td>
</tr>
</tbody>
</table>

The following example shows how to use the `FCESTABL` command (ACTION specified) to suspend the write operation to an S-VOL when you establish a Compatible FlashCopy® V2 relationship. In this example, the `FCESTABL` command establishes a relationship of the volumes (devices) numbered 4202 and 4203, and at the same time, suspends the write operation from the host to the source device numbered 4202.

```
FCESTABL SDEVN(X'4202') TDEVN(X'4203') ACTION(FREEZE)
```

To resume the write operation to S-VOLs, you need to issue the `FCWITHDR` command with the ACTION parameter specified.

If a timeout occurs, the write operation may be resumed although you do not issue the `FCWITHDR` command. The default setting of timeout is 120 seconds (2 minutes), however, you can change it.

### Changing the SCP Time

1. In the tree, click **Replications > Local Replications**.
2. Click **Edit SCP Time**.
3. In the **Edit SCP Time** window, select the CU for which you want to change the state-change-pending time and click **Change SCP Time**.
4. In the **Change SCP Time** window, enter the state-change-pending time you want to set and click **OK**.
5. Click **Finish**.
6. In the **Confirm** window, enter a **Task Name** and click **Apply**.

### Viewing relationship states of Compatible FlashCopy® V2

To view the states of Compatible FlashCopy® V2 relationships, use any of the following **PPRC TSO** commands:

- **FCQUERY**
- **ICKDSF**
- **ANTRQST Macro**
- **z/VM CP**

### Using TSO FCQuery command to view relationship states of Compatible FlashCopy® V2

The following table shows the parameter you can use with the **FCQUERY** command to view relationship states:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEVN</td>
<td>Device number</td>
<td>Specify the number (device address) of the FCv2 volume on which you want to see its status.</td>
</tr>
<tr>
<td>REMOTE</td>
<td>YES</td>
<td>You use the Remote FlashCopy® function to establish a relationship.</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>You do not use the Remote FlashCopy® function. NO is the default setting.</td>
</tr>
<tr>
<td>QRYSSID</td>
<td>SSID</td>
<td>Specifies the SSID of the CU on which you establish the FlashCopy® relationship. Use this parameter when REMOTE is YES.</td>
</tr>
<tr>
<td>QRYDVC</td>
<td>Device number</td>
<td>Specifies the device number, the CU number, or the LDEV number of the S-VOL when you use the Remote FlashCopy® function. Use this parameter when REMOTE is YES.</td>
</tr>
<tr>
<td></td>
<td>CU number</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LDEV number</td>
<td></td>
</tr>
<tr>
<td>SHOWRELS</td>
<td>ALL</td>
<td>Displays detailed relationship information.</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>Does not display detailed information about relationships. If the SHOWRELS parameter is not specified, NO is set by default.</td>
</tr>
<tr>
<td></td>
<td>Relationship number</td>
<td>Displays detailed information about the specified relationship number.</td>
</tr>
<tr>
<td>STARTADDR</td>
<td>CCHH number</td>
<td>Specifies the CCHH number of the starting address. Use this parameter when the relationship number is specified in the SHOWRELS parameter.</td>
</tr>
</tbody>
</table>

The **FCQUERY** command can be used to display information including the attributes set to the devices specified by DEVN and the number of Compatible FlashCopy® V2 relationships established with the specified devices.
The following is an example of the FCQUERY command. This example requests information on the device numbered 4202 to be displayed.

FCQUERY DEVN(1900)

The following example shows the information that is displayed as a result of executing the FCQUERY command described in the previous example.

ANTF0090IF CQUERY Formatted
DEVN SSID LSS CCA CU SERIAL ACT MAX XC PC CC RV SEQNUM
4202 0102 02 02 2105 00000045029 1 1000 N N N N 00000000

The following table shows the information that is displayed by the FCQUERY Command (Compatible FlashCopy® V2):

**Table 3-15 Information displayed by the FCQUERY command**

<table>
<thead>
<tr>
<th>Displayed item</th>
<th>Displayed content</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEVN</td>
<td>-</td>
<td>Device number recognized by the host</td>
</tr>
<tr>
<td>SSID</td>
<td>-</td>
<td>Storage subsystem ID</td>
</tr>
<tr>
<td>LSS</td>
<td>-</td>
<td>CU number</td>
</tr>
<tr>
<td>CCA</td>
<td>-</td>
<td>Device number</td>
</tr>
<tr>
<td>CU</td>
<td>-</td>
<td>DKC emulation type</td>
</tr>
<tr>
<td>SERIAL</td>
<td>-</td>
<td>Serial number</td>
</tr>
<tr>
<td>ACT</td>
<td>-</td>
<td>Number of active Compatible FlashCopy® V2 and Compatible Software for IBM® FlashCopy® SE relationships. See the following figure.</td>
</tr>
<tr>
<td>MAX</td>
<td>-</td>
<td>Maximum number of pairs that can be created with the device specified by DEVN.</td>
</tr>
</tbody>
</table>
| XC             | S                 | Volume specified by DEVN is in one of the following status.  
  - P-VOL of the XRC pair  
  - SIZ S-VOL using At-Time Split function (online)*  
  - M-VOL of the TCz pair (Timer Type is SYSTEM or NONE, and the pair status is Duplex or Pending Duplex)  
  - P-VOL of the URz pair (Timer Type is SYSTEM or NONE, and the pair status is Duplex or Pending Duplex) |
<p>|               | N                 | Volume specified by DEVN is not in the status described above, or the volume is not used. |</p>
<table>
<thead>
<tr>
<th>Displayed item</th>
<th>Displayed content</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC P</td>
<td>Volume specified by DEVN is currently used as the S-VOL (M-VOL) of the S1z or TCz pair.</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>Volume specified by DEVN is currently used as the T-VOL (R-VOL) of the S1z or TCz pair. When system option mode 20 is &quot;ON&quot; and when the REMOTE parameter value of the TSO command is &quot;YES&quot;, &quot;S&quot; will be displayed for this item. When system option mode 20 is &quot;OFF&quot;, &quot;S&quot; will always be displayed for this item. For details about system option mode 20, see the Hitachi TrueCopy® for Mainframe User Guide.</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>Volume specified by DEVN is currently not used for S1z or TCz. When system option mode 20 is &quot;ON&quot; and when the REMOTE parameter value of the TSO command is &quot;NO&quot;, &quot;N&quot; will be displayed for this item. For details about system option mode 20, see the Hitachi TrueCopy® for Mainframe User Guide.</td>
<td></td>
</tr>
<tr>
<td>CC S</td>
<td>Volume specified by DEVN is currently used as the S-VOL of the Concurrent Copy pair.</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>Volume specified by DEVN is currently used as the T-VOL of the Concurrent Copy pair, or not used for Concurrent Copy.</td>
<td></td>
</tr>
<tr>
<td>RV -</td>
<td>Displays whether the volume specified by DEVN is Revertible or not. However, since Compatible FlashCopy® V2 does not support this function, &quot;N&quot; will always be displayed for this item. For details about Revertible, see the IBM® manual.</td>
<td></td>
</tr>
<tr>
<td>SE S Y</td>
<td>The volumes specified by DEVN are TSE-VOLs.</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>The volumes specified by DEVN are not TSE-VOLs.</td>
<td></td>
</tr>
<tr>
<td>E N</td>
<td>The volumes specified by DEVN are not source volumes of relationships containing TSE-VOLs.</td>
<td></td>
</tr>
<tr>
<td>Y</td>
<td>The volumes specified by DEVN are source volumes of relationships containing TSE-VOLs.</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>The volumes specified by DEVN are source volumes of relationships containing TSE-VOLs, and at least one relationship is in Failed State.</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>The volumes specified by DEVN are source volumes of relationships containing TSE-VOLs, and at least one relationship is in Write Inhibit.</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>The volumes specified by DEVN are source volumes of relationships containing TSE-VOLs, and there are relationships in Failed State and Write Inhibit.</td>
<td></td>
</tr>
<tr>
<td>SEQNUM -</td>
<td>Displays the Sequence Number. However, since Compatible FlashCopy® V2 does not support this function, &quot;00000000&quot; will always be displayed for this item. For details about Sequence Number, see the IBM® manual.</td>
<td></td>
</tr>
</tbody>
</table>

*In case the volume is set online in more than one LPAR defined by the mainframe system host.
ACT shows the total number of the active Compatible FlashCopy® V2 relationships in each extent. Therefore, in the example in the figure, the total number of the active Compatible FlashCopy® V2 relationships in the VOL#0 and VOL#1 is both two, and the digit two (2) displays as the content of ACT. Example of **FCQUERY** command with the SHOWRELS parameter:

`FCQUERY DEVN(1900) SHOWRELS(ALL)`

The result of the **FCQUERY** command with the SHOWRELS parameter is shown below. The items above the “RELATIONSHIP DETAIL STARTING TRACK” are the same as when the SHOWRELS parameter is not specified. **Table 3-15 Information displayed by the FCQUERY command on page 3-30** (above) describes these items. **Table 3-16 Information displayed by the FCQUERY command on page 3-33** describes items below “RELATIONSHIP DETAIL STARTING TRACK”.

```
FCQUERY DEVN(1900) SHOWRELS(ALL)  
ANTIP揭露 FCQUERY Relationship 
DEVN SSID LSS ICA CU SERIAL ACT MAX XC PC CC RV SE SSNUM 
1000 locations 00 00 00 307 000008 852 I 1000 N N N N NN 00000000 
RELATIONSHIP DETAIL STARTING TRACK: 00000000 
DEVICE LONG BUSY FOR G: NO WRITE INHIBITED: NO 

<table>
<thead>
<tr>
<th>PARTNER</th>
<th>SOURCE</th>
<th>TARGET</th>
<th>SFC</th>
<th>CPR</th>
<th>TSEP</th>
<th>FFF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>00 01 1200 00000000</td>
<td>00 20000</td>
<td>Y N N N N N N N N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO. OF TRACES: 0000000</td>
<td>ERRORS TO COPY: 0000000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>00 01 1200 00000000</td>
<td>00 40000</td>
<td>Y N N N N N N N N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO. OF TRACES: 0000000</td>
<td>ERRORS TO COPY: 0000000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

**Figure 3-5 FCQUERY command execution result**
### Table 3-16 Information displayed by the FCQUERY command

<table>
<thead>
<tr>
<th>Displayed item</th>
<th>Displayed content</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>RELATIONSHIP DETAIL STARTING TRACK</td>
<td>-</td>
<td>CCHH number of the starting address. The CCHH number specified here is displayed if the STARTADDR parameter is specified. “00000000” is displayed if the STARTADDR parameter is not specified.</td>
</tr>
<tr>
<td>DEVICE LONG BUSY FOR CG</td>
<td>Y</td>
<td>The consistency of the extent is maintained.</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>The consistency of the extent is not maintained.</td>
</tr>
<tr>
<td>WRITE INHIBITED</td>
<td>Y</td>
<td>Writing is not allowed.</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>Writing is allowed.</td>
</tr>
<tr>
<td>LSS</td>
<td>-</td>
<td>CU number</td>
</tr>
<tr>
<td>CCA</td>
<td>-</td>
<td>Device number</td>
</tr>
<tr>
<td>SSID</td>
<td>-</td>
<td>Storage subsystem ID</td>
</tr>
<tr>
<td>SOURCE START</td>
<td>-</td>
<td>The starting CCHH number of the copy source extent</td>
</tr>
<tr>
<td>TARGET START</td>
<td>-</td>
<td>The starting CCHH number of the copy target extent</td>
</tr>
<tr>
<td>SO</td>
<td>Y</td>
<td>Copy source (S-VOL) of the relationship.</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>Copy target (T-VOL) of the relationship.</td>
</tr>
<tr>
<td>FV</td>
<td>Y</td>
<td>The relationship is established for the entire volume.</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>The relationship is established in each extent unit.</td>
</tr>
<tr>
<td>CO</td>
<td>Y</td>
<td>The relationship is created with COPY mode.</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>The relationship is created with NOCOPY mode.</td>
</tr>
<tr>
<td>CA</td>
<td>Y</td>
<td>Background copy is running.</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>Background copy is not running.</td>
</tr>
<tr>
<td>PR</td>
<td>Y</td>
<td>It is a persistent relationship.</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>It is not a persistent relationship.</td>
</tr>
<tr>
<td>CR</td>
<td>Y</td>
<td>The updated part is managed as differential data if the S-VOL and T-VOL are updated.</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>The updated part is not managed as differential data even if the S-VOL and T-VOL are updated.</td>
</tr>
<tr>
<td>TW</td>
<td>Y</td>
<td>Writing to the T-VOL is allowed.</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>Writing to the T-VOL is not allowed.</td>
</tr>
<tr>
<td>SE</td>
<td>N</td>
<td>The T-VOL is not a TSE-VOL.</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>The T-VOL is a TSE-VOL.</td>
</tr>
<tr>
<td>FS</td>
<td>N</td>
<td>The relationship is not in Failed State.</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>The relationship is in Failed State.</td>
</tr>
</tbody>
</table>
**Table 3-17 Parameters for the ICKDSF command**

<table>
<thead>
<tr>
<th>Command</th>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLASHCPY QUERY</td>
<td>DDNAME or DNAME</td>
<td>JCL statement</td>
<td>Sets the JCL statement identifying the volume. If the OS of the host server is MVS, this parameter or the UNITADDRESS parameter is required.</td>
</tr>
<tr>
<td></td>
<td>SYSNAME</td>
<td>SYSNAME</td>
<td>Sets the SYSNAME in the ASSGN system control statement. If the OS of the host server is VSE, this parameter is required.</td>
</tr>
<tr>
<td></td>
<td>UNITADDRESS, UNITADDR, or UNIT</td>
<td>Source device number</td>
<td>Specifies the device number (device address) of the S-VOL on which you want to perform the FLASHCPY QUERY command. If the OS of the host server is MVS, this parameter or the DDNAME parameter is required.</td>
</tr>
<tr>
<td></td>
<td>SOURCEVOL or SRCVOL</td>
<td>CU number LDEV number Source device number</td>
<td>Specifies the CU number, the LDEV number, or the device number of the S-VOL when you use the Remote FlashCopy® function.</td>
</tr>
</tbody>
</table>
Performing Compatible FlashCopy® V2 operations

Displaying information about pairs: FLASHCPY QUERY

To display information about a Compatible FlashCopy® V2 pair, execute the ICKDSF FLASHCPY QUERY command. See the following example:

FLASHCPY QUERY UNIT(X'7000')

The following is an example of information displayed as a result of executing the FLASHCPY QUERY command:

FLASHCOPY VOLUME CAPABILITY INFORMATION TABLE

<table>
<thead>
<tr>
<th>MAXIMUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXISTINO RELATIONS</td>
</tr>
<tr>
<td>RELATIONS</td>
</tr>
<tr>
<td>ALLOWED</td>
</tr>
<tr>
<td>------------------</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>1000</td>
</tr>
<tr>
<td>NO</td>
</tr>
<tr>
<td>SRC CAP</td>
</tr>
<tr>
<td>TGT CAP</td>
</tr>
</tbody>
</table>

CAPABILITY LEGEND

ASY PVOL = ASYCHRONOUS PPRC REMOTE COPY PRIMARY
CC SRC = CONCURENT COPY SOURCE
INACCESS = VOLUME INACCESSIBLE, DATA NOT OBTAINABLE
INHIBIT = FLASHCOPY INHIBITED O. THIS-VOLUME
MAX EXCD = MAXIMUM RELATIONS EXCEEDED AT- VOLUME OR ESS LEVEL
NEITHER = VOLUME NEITHER FC SOURCE NOR FC TARGET CAPABLE
PPRC PRI = PPRC PRIMARY
PPRC SEC = PPRC SECONDARY
PHASE 1 = PHASE 1 (VERSION 1) RELATIONSHIP EXISTS O. VOLUME
SRC CAP = FLASHCOPY SOURCE CAPABLE
TGT CAP = FLASHCOPY TARGET CAPABLE
XRC SRC = XRC SOURCE

The following table shows the information that is displayed after executing the FLASHCPY QUERY command:

<table>
<thead>
<tr>
<th>Displayed item</th>
<th>Displayed content</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXISTINO RELATIONS</td>
<td>Number of relations</td>
<td>Displays the number of relationships in the specified volumes.</td>
</tr>
<tr>
<td>MAXIMUM ALLOWED RELATIONS</td>
<td>Number of relations</td>
<td>Displays the maximum number of relationships that can be created in the specified volumes.</td>
</tr>
</tbody>
</table>
### Displayed item | Displayed content | Meaning
--- | --- | ---
MAXIMUM RELATIONS EXCEEDED | NO | The number of relationships in the specified volume does not reach the maximum number of relationships that can be created in the specified volume.
YES(VOL) | The maximum number of relationships that can be created in the specified volume is already created.
YES(ESS) | The maximum number of the relationships that can be created in the storage system is already created.

### CAPABILITY
- SRC CAP | The specified volume can be specified as the S-VOL of the FCv2.
- TGT CAP | The specified volume can be specified as the T-VOL of the FCv2.
- NEITHER | The specified volume cannot be specified as the S-VOL or T-VOL of the FCv2.
- PPRCOPY PRI | The specified volume is the copy source volume of TrueCopy for Mainframe.
- PPRCOPY SEC | The specified volume is the copy target volume of TrueCopy for Mainframe.
- CC SRC | The specified volume is the copy source volume of the Concurrent Copy.
- INHIBIT | The specified volume cannot be used by FCv2.
- MAX EXCD | The maximum number of relationships that can be created in the specified volume is already created.
- PHASE 1 | A Version 1 relationship exists in the specified volume.
- INACCESS | Cannot access the specified volume.

The previous example displays the description of "ASY PVOL" in the "CAPABILITY LEGEND", but VSP does not support the program product corresponding to this item. Therefore, even if the `FLASHCPY QUERY` command is executed on the Compatible FlashCopy® V2 pair, the "ASY PVOL" will not be displayed in the "CAPABILITY".

### Displaying information about Compatible FlashCopy® V2 pairs: FLASHCPY QUERY RELATIONS

To view information about all pairs in a specified volume, execute the `ICKDSF FLASHCPY QUERY RELATIONS` command. See the following example.

```
FLASHCPY QUERY RELATIONS UNIT(X'7001')
```

The following is an example of information that is displayed by executing the `FLASHCPY QUERY RELATIONS` command.
### Table 3-19 Information displayed by the FLASHCPY QUERY RELATIONS command

<table>
<thead>
<tr>
<th>Displayed item</th>
<th>Displayed content</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLASHCOPY SEQUENCE NUMBER</td>
<td>00000000</td>
<td>Displays the sequence number. However, since Compatible FlashCopy® V2 does not support sequence numbers, &quot;00000000&quot; will be always displayed for this item. For details about the sequence number, see the IBM® manual.</td>
</tr>
<tr>
<td>R/T</td>
<td>SRC</td>
<td>Displays the copy source (S-VOL) of the relationship.</td>
</tr>
<tr>
<td></td>
<td>TGT</td>
<td>Displays the copy target (T-VOL) of the relationship.</td>
</tr>
<tr>
<td>R</td>
<td>F</td>
<td>Displays whether the device (volume) specified by DEVN is revertible or not. Since Compatible FlashCopy® V2 does not support this function, F will always be displayed. For details, see the IBM® manual.</td>
</tr>
<tr>
<td>FV</td>
<td>T</td>
<td>The relationship is established at the volume level.</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>The relationship is established at the extent level.</td>
</tr>
<tr>
<td>BCE</td>
<td>T</td>
<td>The background copying process is set to execute.</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>The background copying process is set not to execute.</td>
</tr>
</tbody>
</table>

Figure 3-6 FLASHCPY QUERY RELATIONS command execution result

The following table shows the meaning of information displayed as a result of executing the FLASHCPY QUERY RELATIONS command.
<table>
<thead>
<tr>
<th>Displayed item</th>
<th>Displayed content</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCP</td>
<td>T</td>
<td>The background copying process is running.</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>The background copying process is not running.</td>
</tr>
<tr>
<td>CRA</td>
<td>T</td>
<td>The updated part is managed as a differential data when the S-VOL and the T-VOL are updated.</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>The updated part is not managed as a differential data when the S-VOL and the T-VOL are updated.</td>
</tr>
<tr>
<td>VR</td>
<td>T</td>
<td>It is verified whether the displayed information is the latest or not.</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>It is not verified whether the displayed information is the latest or not.</td>
</tr>
<tr>
<td>SWI</td>
<td>T</td>
<td>The writing to the S-VOL is not allowed.</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>The writing to the S-VOL is allowed.</td>
</tr>
<tr>
<td>TWP</td>
<td>T</td>
<td>The writing to the T-VOL is not allowed.</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>The writing to the T-VOL is allowed.</td>
</tr>
<tr>
<td>P</td>
<td>T</td>
<td>The consistency of the extent is maintained.</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>The consistency of the extent is not maintained.</td>
</tr>
<tr>
<td>START OF EXTENT(SOURCE)</td>
<td>CCHH number</td>
<td>Displays the starting CCHH of the extent of the copy source.</td>
</tr>
<tr>
<td>START OF EXTENT(TARGET)</td>
<td>CCHH number</td>
<td>Displays the starting CCHH of the extent of the copy target.</td>
</tr>
<tr>
<td># CONTIG TRKS IN EXTENT</td>
<td>Number of tracks</td>
<td>Displays the number of tracks in the relationship.</td>
</tr>
<tr>
<td># TRACKS YET TO BE COPIED</td>
<td>Number of tracks</td>
<td>Displays the number of tracks that are not finished copying in the relationship.</td>
</tr>
<tr>
<td>SSID</td>
<td>Storage subsystem ID</td>
<td>Displays the SSID (storage subsystem ID) of the storage system where the relationship belongs.</td>
</tr>
<tr>
<td>LSS</td>
<td>CU number</td>
<td>Displays the CU number of the volume where the relationship exists.</td>
</tr>
<tr>
<td>CCA</td>
<td>Device number</td>
<td>Displays the device number of the storage system where the relationship exists.</td>
</tr>
<tr>
<td>S</td>
<td>T</td>
<td>This volume is a TSE-VOL.</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>This volume is a normal volume.</td>
</tr>
<tr>
<td>E</td>
<td>T</td>
<td>When the command is issued to the S-VOL, the T-VOL is a TSE-VOL.</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>When the command is issued to the S-VOL, the T-VOL is a normal volume. If the command is issued to the T-VOL, the T-VOL is a normal volume or a TSE-VOL.</td>
</tr>
<tr>
<td>V</td>
<td>T</td>
<td>When a pool of the T-VOL becomes full, the relationship will be in FAILED State.</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>When a pool of the T-VOL becomes full, the relationship will not be in FAILED State.</td>
</tr>
<tr>
<td>I</td>
<td>T</td>
<td>The relationship is in Failed State.</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>The relationship is in Normal State.</td>
</tr>
</tbody>
</table>
The contents displayed in the "ADRESSED VOLUME INFORMATION" is the information on the relationships in the volume to which the **FLASHCPY QUERY RELATIONS** command is issued. The contents displayed in the "PARTNER VOLUME INFO" is the information on the volume that has the relationships paired with the relationships in the volume to which the **FLASHCPY QUERY RELATIONS** command is issued.

You can judge whether the Restore function or the Reverse Restore function can be executed from the execution result of the **FLASHCOPY QUERY RELATIONS** command.

When the result meets the following requirement, the Restore function can be executed:

- CRA = T

When the result meets all the following requirements, the Reverse Restore function can be executed.

- BCE = T
- BCP = F
- CRA = T
- #TRACKS YET TO BE COPIED = 0

### Using ANTRQST macro to view relationship states of Compatible FlashCopy® V2

The following table shows the parameters that you can use with the **ANTRQST** macro command.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEVN</td>
<td>Device number</td>
<td>Specifies the number (device address) of the device on which you want to perform the FCQUERY command.</td>
</tr>
</tbody>
</table>
Using z/VM CP to view relationship states for Compatible FlashCopy® V2

You can use the z/VM CP QUERY VIRTUAL FLASHCOPY command to view information about a Compatible FlashCopy® V2 relationship.

The available parameters are shown in the following table:

**Table 3-21 Parameters for the QUERY VIRTUAL FLASHCOPY command**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL</td>
<td>Displays information about all the virtual devices. If no parameter is specified, ALL is the default.</td>
</tr>
<tr>
<td>vdev</td>
<td>Only displays information about the specified virtual device.</td>
</tr>
<tr>
<td>vdev1-vdev2</td>
<td>Displays information about the virtual devices in the specified range.</td>
</tr>
</tbody>
</table>

A usage example of the QUERY VIRTUAL FLASHCOPY command is shown below.

---

**Performing Compatible FlashCopy® V2 operations**

Hitachi Virtual Storage Platform Hitachi Compatible FlashCopy® User Guide
Performing Compatible FlashCopy® V2 operations

Viewing resource information

You can check status and other details related to your pairs in the following:

- View license information on the Replications window.
- Viewing consistency group information on page 3-41

Viewing consistency group information

You can check the number of consistency groups and the details and individual properties for consistency groups.

- View the number of consistency groups in the Summary section on the Local Replication window.
- View a list of consistency groups with status and number of pairs on the Consistency Groups tab in the Local Replication window.
- View a consistency group’s properties by clicking the CTG ID link on the Consistency Groups tab in the Local Replication window.

Viewing a pair’s operations history

You can review the operations that have been performed on a pair using the View History window.

To view pair history

1. Click Replications > View Histories in the tree.
2. In the View Histories window, select FCv2/FCSE in Copy Type.
3. The Description column displays operations that were run. The Descriptions are explained below.

History window operation messages for FCv2

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| 0010  | COPY STARTED (FC)                  | The background copy operation started. This message displays:
|       |                                    | - When the relationship is established, not when the copy operation starts
<p>|       |                                    | - When the relationship is established without specifying the CHGRECORD option of the FLASHCOPY ESTABLISH command of z/VM.                 |
| 0011  | 1st INCREMENTAL COPY STARTED       | The initial copy operation has started. This message displays when the relationship is established and not when the copy operation starts.   |
| 0012  | 2nd or LATER INCREMENTAL COPY STARTED | The second or later incremental copy has started. This message is displayed when the relationship is established and not when the copy operation starts. |</p>
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0013</td>
<td>1st NOCOPY RELATIONSHIP ESTABLISHED (INCREMENTAL)</td>
<td>The pair was established by the Incremental FlashCopy® function in NOCOPY mode.</td>
</tr>
<tr>
<td>0014</td>
<td>2nd or LATER NOCOPY RELATIONSHIP ESTABLISHED (INCREMENTAL)</td>
<td>The pair initially established by the Incremental FlashCopy® function was reestablished in NOCOPY mode.</td>
</tr>
<tr>
<td>0015</td>
<td>2nd or LATER INCREMENTAL COPY STARTED (REVERSE RESTORE)</td>
<td>The Reverse Restore function started a second or later incremental copy with a pair that was initially established by the Incremental FlashCopy® function. This message is displayed when the relationship is reestablished and not when the copy operation starts.</td>
</tr>
<tr>
<td>0016</td>
<td>2nd or LATER NOCOPY RELATIONSHIP ESTABLISHED (RESERVE RESTORE)</td>
<td>The pair initially established by the Incremental FlashCopy® function was reestablished by Reverse Restore in the NOCOPY mode.</td>
</tr>
<tr>
<td>0019</td>
<td>INITIALIZE STARTED (FC)</td>
<td>Initialization processing began.</td>
</tr>
<tr>
<td>0020</td>
<td>COPY ENDED (FC)</td>
<td>The background copy operation ended.</td>
</tr>
<tr>
<td>0022</td>
<td>RELATIONSHIP DELETED (FC)</td>
<td>The pair was deleted.</td>
</tr>
<tr>
<td>0023</td>
<td>NOCOPY RELATIONSHIP ESTABLISHED (FC)</td>
<td>The pair was created in NOCOPY mode. This message displays when you establish the relationship for NOCOPY mode without specifying the CHGRECORD option of FLASHCOPY ESTABLISH command of z/VM.</td>
</tr>
<tr>
<td>0024</td>
<td>COPY ENDED (Relationship maintained)</td>
<td>The copy operation ended and the pair is still maintained. This message displays after the copy operation is completed when the pair is established without specifying the CHGRECORD option of the FLASHCOPY ESTABLISH command of z/VM.</td>
</tr>
<tr>
<td>0029</td>
<td>INITIALIZE ENDED NORMAL (FC)</td>
<td>Initialization processing terminated normally.</td>
</tr>
<tr>
<td>002A</td>
<td>COPY ENDED ABNORMAL (FC)</td>
<td>The copy operation ended abnormally.</td>
</tr>
<tr>
<td>002F</td>
<td>INITIALIZE ENDED ABNORMAL (FC)</td>
<td>Initialization processing terminated abnormally.</td>
</tr>
<tr>
<td>0030</td>
<td>COPY STARTED AFTER MODE CHANGED (FC)</td>
<td>The background copy operation started after the pair changed to copy mode.</td>
</tr>
<tr>
<td>003A</td>
<td>DELETED BY SM VOLATILIZING (FC)</td>
<td>The pair was deleted due to volatilization of the shared memory.</td>
</tr>
<tr>
<td>003B</td>
<td>SUSPEND (FC)</td>
<td>The pair was suspended due to error or failure.</td>
</tr>
<tr>
<td>0040</td>
<td>2nd or LATER INCREMENTAL COPY STARTED (FAST REVERSE RESTORE)</td>
<td>The Fast Reverse Restore function started a second or later incremental copy with a pair initially established by the Incremental FlashCopy® function. This message displays when the pair is reestablished and not when the copy operation starts.</td>
</tr>
<tr>
<td>0041</td>
<td>COPY STARTED (FAST REVERSE RESTORE)</td>
<td>The Fast Reverse Restore function started a second or later incremental copy. This message displays when the pair is reestablished and not when the copy operation starts.</td>
</tr>
<tr>
<td>0042</td>
<td>2nd or LATER INCREMENTAL NOCOPY RELATIONSHIP ESTABLISHED (FAST REVERSE RESTORE)</td>
<td>The pair initially established by the Incremental FlashCopy® function was reestablished by the Fast Reverse Restore in the NOCOPY mode.</td>
</tr>
</tbody>
</table>
History window operation messages for FCSE

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0043</td>
<td>NOCOPY RELATIONSHIP ESTABLISHED (FAST REVERSE RESTORE)</td>
<td>The pair established by the Fast Reverse Restore function was reestablished in the NOCOPY mode.</td>
</tr>
</tbody>
</table>

Releasing Compatible FlashCopy® V2 relationships

To release Compatible FlashCopy® V2 relationships, you can use one of the following sets of commands:

- PPRC TSO
- DFSMSdss
- ICKDSF
- ANTRQST Macro
- z/VM CP

Caution: A time-out may occur when more than 100 FlashCopy® relationships are released at the same time with storage systems that are shared with an IBM® OS or a Fujitsu OS. To avoid timeouts, divide the tasks into small groups and release relationships at intervals of about 5 seconds per 100 relationships.
Using PPRC TSO to release Compatible FlashCopy® V2 relationships

The FCWITHDR command can be used to release relationships established for copy operations set either in COPY or NOCOPY mode.

**Caution:** If you use the FCWITHDR command a single time when deleting numerous relationships, a timeout may occur with the host. Therefore, use the FCWITHDR command repetitively when releasing numerous relationships. Also, after you execute the FCWITHDR command the first time, wait for a period of time before you execute the command again. For example, if you execute the FCWITHDR command one time when deleting more than 100 relationships, wait for approximately 5 seconds until you execute the command again.

The following table shows the parameters you can use with the FCWITHDR command when you release Compatible FlashCopy® V2 relationships:

**Table 3-22 Parameters for the FCWITHDR command (Compatible FlashCopy® V2)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDEVN</td>
<td>Source device number.</td>
<td>Specify the number (device address) of the S-VOL on which you want to perform FCWITHDR command.</td>
</tr>
<tr>
<td>TDEVN</td>
<td>Target device number.</td>
<td>Specify the number (device address) of the T-VOL on which you want to perform FCWITHDR command.</td>
</tr>
<tr>
<td>DEVN</td>
<td>Device number.</td>
<td>Specify the number (device address) of the device on which you want to perform FCWITHDR command with ACTION parameter.</td>
</tr>
<tr>
<td>TCz source device number</td>
<td></td>
<td>Specifies the TCz source device number (device address). Use this parameter when REMOTE is YES.</td>
</tr>
<tr>
<td>DDSW</td>
<td>YES</td>
<td>The relationships established on the volume specified as the copy source by SDEVN are withdrawn. The relationships are withdrawn after the contents of the volume specified as the copy target by TDEVN are fixed.</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>Default setting. The relationships established on the copy target are all withdrawn. The relationship is not established when the copy target is online.</td>
</tr>
<tr>
<td>XTNTLST</td>
<td>Extent (range to withdraw the relationship)</td>
<td>Specifies the extent (the range to withdraw the relation) the starting and ending addresses of the source and the starting and ending addresses of the target with CCHH. Up to 32 extents can be specified. When XTNTLST is not specified, the relationships on all the tracks are withdrawn.</td>
</tr>
<tr>
<td>XXTNTLST</td>
<td>Extent (range to withdraw the relationship)</td>
<td>Specifies the extent (the range to withdraw the relationship) by setting the starting and ending addresses of the source, and the starting and ending addresses of the target with ccccccch (cylinder and head numbers), when either or both the copy source and target exceed 65,520 cylinders. Up to 32 extents can be specified. When XXTNTLST is not specified, the data on all the tracks are withdrawn.</td>
</tr>
</tbody>
</table>
Performing Compatible FlashCopy® V2 operations

To execute the XTNTLST or XXTNTLST parameter, the size of the copy source extent and the copy target extent must be the same.

When the **FCWITHDR** command to release relationships established for copy operations is executed with the following settings and parameters, certain results will proceed. Review the Results column of the following table.

### Table 3-23 Results from FCWITHDR command

<table>
<thead>
<tr>
<th>Setting</th>
<th>Parameter</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unspecified</td>
<td>• DDSW parameter set to NO</td>
<td>The relationships specified in the command are withdrawn when the command is executed.</td>
</tr>
<tr>
<td></td>
<td>• DDSW parameter un-set</td>
<td></td>
</tr>
<tr>
<td>Set in Copy mode while the background copy operation is in progress</td>
<td>Ongoing background copy operation is stopped and cancelled.</td>
<td>The relationships specified in the command are withdrawn.</td>
</tr>
<tr>
<td>Set in COPY mode</td>
<td>DDSW parameter set to YES</td>
<td>The relationships established with the specified copy source extents on the volume specified by SDEVN are withdrawn after the background copy is completed.</td>
</tr>
</tbody>
</table>

**Parameter** | **Value** | **Description** |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTION</td>
<td>THAW</td>
<td>Resume the write operation from the host to the volumes that belong to the same CU of the device specified by the DEVN parameter.</td>
</tr>
<tr>
<td>TGTUCB</td>
<td>YES</td>
<td>Specifies the device number (device address) of the T-VOL on which you want to perform the FCWITHDR command. To specify this number, use the TDEVN parameter. YES is the default setting.</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>Specifies the serial number, the CU number, and the LDEV number of the T-VOL on which you want to perform the FCWITHDR command. To specify this number, use the TARGET parameter instead of TDEVN.</td>
</tr>
<tr>
<td>TARGET</td>
<td>Serial number, CU number, LDEV number of the T-VOL</td>
<td>Specifies the serial number, the CU number, and the LDEV number of the T-VOL on which you want to perform the FCWITHDR command. Use this parameter when TGTUCB is NO.</td>
</tr>
<tr>
<td>REMOTE</td>
<td>YES</td>
<td>You use the Remote FlashCopy® function to withdraw the relationship.</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>You do not use the Remote FlashCopy® function. NO is the default setting.</td>
</tr>
<tr>
<td>SOURCE</td>
<td>Serial number, the CU number and the LDEV number of the S-VOL</td>
<td>Specifies the serial number, the CU number and the LDEV number of the S-VOL on which you want to perform the FCWITHDR command. Use this parameter when REMOTE is YES.</td>
</tr>
<tr>
<td>SSID</td>
<td>SSID</td>
<td>Specifies the SSID of the CU on which you withdraw the FlashCopy® relationship. Use this parameter when REMOTE is YES.</td>
</tr>
</tbody>
</table>
There are several effective combination patterns of the parameters of the `FCWITHDR` command. All combinations, other than those listed in the following table, will result in rejection of this command. The table shows the parameters of `FCWITHDR` command and the applicable combinations.

**Table 3-24 Combinations of parameters of the FCWITHDR command (Compatible FlashCopy® V2)**

<table>
<thead>
<tr>
<th>Combination</th>
<th>SDEVN</th>
<th>TDEVN</th>
<th>DEVN</th>
<th>DDSW</th>
<th>XTNTLST or XXTNTLST Target</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case 1</td>
<td>Not specified</td>
<td>Specified</td>
<td>Not specified</td>
<td>NO</td>
<td>Not specified, Not specified</td>
<td>Not specified</td>
</tr>
<tr>
<td>Case 2</td>
<td>Not specified</td>
<td>Specified</td>
<td>Not specified</td>
<td>NO</td>
<td>Specified, Specified</td>
<td>Not specified</td>
</tr>
<tr>
<td>Case 3</td>
<td>Specified</td>
<td>Specified</td>
<td>Not specified</td>
<td>NO</td>
<td>Not specified, Not specified</td>
<td>Not specified</td>
</tr>
<tr>
<td>Case 4</td>
<td>Specified</td>
<td>Specified</td>
<td>Not specified</td>
<td>NO</td>
<td>Specified, Specified</td>
<td>Not specified</td>
</tr>
<tr>
<td>Case 5</td>
<td>Specified</td>
<td>Specified or not specified</td>
<td>Not specified</td>
<td>YES</td>
<td>Not specified, Not specified</td>
<td>Not specified</td>
</tr>
<tr>
<td>Case 6</td>
<td>Specified</td>
<td>Specified or not specified</td>
<td>Not specified</td>
<td>YES</td>
<td>Specified, Specified</td>
<td>Not specified</td>
</tr>
<tr>
<td>Case 7</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Specified</td>
<td>NO</td>
<td>Not specified, Not specified</td>
<td>THAW</td>
</tr>
</tbody>
</table>

The information specified by the XTNTLST or XXTNTLST parameter is supported only when the following conditions are fully met:
The information specified by the XTNTLST parameter must be for both the source and target. If the information specified by the XTNTLST parameter is only for one of the two, the copy operation results in an error.

The size of the specified copy source and target extents must be the same.

The relationship must be established with INCREMENTAL = NO or must be established without INCREMENTAL.

**WARNING:** When the relationships are withdrawn by the FCWITHDR command executed with the DDSW parameter set to NO or without setting the DDSW parameter, the data integrity of the T-VOL cannot be guaranteed.

**Case 1: TDEVN Specified, DDSW = NO**

All the relationships established with the copy target extents existing in the device specified by TDEVN are withdrawn. The relationships established with the copy source extents existing in the specified volume are not withdrawn.

The following is an example of the command description for Case 1. This example requests the withdrawal of all the relationships established with the copy target extents existing in the device numbered 4203.

`FCWITHDR TDEVN(X'4203')`

By executing the command described in the example, the relationship established with the specified target, Dataset 3, in the device numbered 4203, is withdrawn (see the following figure). But the relationship established with Dataset 4 is not withdrawn because it is specified as the dataset source. In short, there are two relationships before executing the command above, and after executing the command, there is only one relationship.
Case 2: TDEVN Specified, DDSW = NO, XTNTLST Parameter Specified

The relationships included in the extents specified by the XTNTLST parameter are withdrawn. The relationships that are only partly included in the specified extents are not withdrawn.

The following is an example of the command description for Case 2. This example requests the withdrawal of all the relationships established with the copy target extents included in the specified extents within the device numbered 4203.

```
FCWITHDR TDEVN(X'4203') XTNTLST(X'00000000' X'03000000E' X'20000000' X'2300000E')
```

In this case, the specified extents in the device numbered 4203 are contained in Dataset 3. See the following figure: Therefore, by executing the FCWITHDR command described in the example, the relationship established with Dataset 3 is withdrawn. In short, there are two relationships before executing the FCWITHDR command, and after executing the FCWITHDR command, there is only one relationship.
The following is another example of the command description for Case 2. Similar to the previous example, this example requests the withdrawal of all the relationships established with the copy target extents included in the specified extents within the device numbered 4203.

```
FCWITHDR TDEVN(X'4203') XTNTLST(X'00000000' X'0000000E' X'20000000' X'2000000E')
```

**Example 3-1 Example(2B): the FCWITHDR command description (TDEVN: specified, DDSW = NO, XTNTLST specified)**

By executing the command described in the example, the relationship established with the specified target, Dataset 3, is not withdrawn because the specified extent within the device numbered 4203 is only a part of Dataset 3. See the following figure:
All the relationships established between the source device specified by SDEVN and the target device specified by TDEVN are withdrawn.

The following figure shows an example of the command description for Case 3. This example requests the withdrawal of all the relationships established between the device numbered 4202, which in this case is the source, and the device numbered 4203, which in this case is the target.

**FCWITHDR SDEVN(X'4202') TDEVN(X'4203')**

**Example 3-2 FCWITHDR command description (SDEVN and TDEVN: specified, DDSW = NO) (for Case 3)**
In this case, only the relationships established with Dataset 3 in the device numbered 4203 are relevant. See the following figure: Therefore, by executing the FCWITHDR command described in the example, the relationship established with Dataset 3 is withdrawn. Dataset 6 is specified as the copy target extent, but since the dataset specified as the source, Dataset 5, is not in the device numbered 4202, Dataset 6 is not withdrawn. In short, there are three relationships before executing the FCWITHDR command shown in the example, and after executing the command, there are only two relationships.

![Diagram showing the relationships before and after executing the FCWITHDR command](image)

**Case 4 (a, b): SDEVN and TDEVN Specified, DDSW = NO, XTNTLST Parameter Specified**

Among the relationships established between the source device specified by SDEVN and the target device specified by TDEVN, the relationships included in the extents specified by the XTNTLST parameter are withdrawn. The relationships that are only partly included in the specified extents are not withdrawn.

Even when the FCWITHDR command set as: SDEVN and TDEVN specified, DDSW = NO, and XTNTLST parameter specified is executed, this command will do nothing and end normally if either the copy source or target extent specified by the XTNTLST parameter does not cover the extent to which any relationship is established.
The following is an example of the command description for Case 4. This example requests the withdrawal of the relationships established within the copy source extent in the device numbered 4202 and the copy target extent in the device numbered 4203.

FCWITHDR SDEVN(X'4202') TDEVN(X'4203')
XTNTLST(X'00000000' X'0300000E' X'20000000' X'2300000E')

Example 3-3 FCWITHDR command description (SDEVN and TDEVN: specified, DDSW = NO, XTNTLST specified) Example(4A)

In this case, the specified extent in the device numbered 4202 includes all of Dataset 1. See the following figure: Therefore, by executing the FCWITHDR command described in the example, the relationship established with Dataset 1 is withdrawn. In short, there are two relationships before executing the FCWITHDR command, and after executing the FCWITHDR command, there is only one relationship.

![Diagram](image-url)

Figure 3-11 FCWITHDR command processing (SDEVN and TDEVN: specified, DDSW = NO, XTNTLST specified) (for Example 4A)
The following is another example of the command description for Case 4. Similar to the previous example, this example requests the withdrawal of the relationships that are established within the copy source extent in the device numbered 4202 and the copy target extent in the device numbered 4203.

```
FCWITHDR SDEVN(X'4202') TDEVN(X'4203')
XTNTLST(X'00000000' X'0300000E' X'20000000'
X' 2000000E')
```

**Example 3-4 FCWITHDR command description (SDEVN and TDEVN: specified, DDSW = NO, XTNTLST specified) (Example (4B))**

When you execute the `FCWITHDR` command described in the example, the relationship established with Dataset 1 is not withdrawn because the specified extent in the device numbered 4202 is included as a part of Dataset 1. See the following figure:

![Figure 3-12 FCWITHDR command processing (SDEVN and TDEVN: specified, DDSW = NO, XTNTLST specified) (for Example 4B)]
The following is an example of the command description that indicates that the extent specified by the XTNTLST parameter is located in the center of Dataset 1, and the specified extent in the device numbered 4202 is included as a part of Dataset 1. Therefore, the relation established with Dataset 1 is not withdrawn.

FCWITHDR SDEVN(X'4202') TDEVN(X'4203')
XTNTLST(X'01000000' X'0100000E' X'21000000'
X'2100000E')

Example 3-5 FCWITHDR command description (SDEVN and TDEVN specified, DDSW=NO, XTNTLST specified) (Example(4C))

Case 5: SDEVN and TDEVN Specified, DDSW = YES

All the relationships established with the extents in the source or target device specified by SDEVN are withdrawn.

If the device specified by SDEVN is the source and if the relationships are set to the COPY mode, the relationships are withdrawn after the background copy process is completed.

If the device specified by SDEVN is the source and if the relationships are set to the NOCOPY mode, the relationships are withdrawn after the copy operation mode is changed to COPY mode and then the background copy process is completed. If the device specified by SDEVN is the target, the relationships are withdrawn immediately. If the device specified by SDEVN is the source and the relationship is established with INCREMENTAL = YES, the relationship will be maintained after the background copy operation is completed. The information on the device specified by TDEVN is ignored.

The following figure is an example of the command description for Case 5. When YES is selected for the DDSW parameter, the parameter value for TDEVN is ignored. Therefore, the following two examples show the same content represented by a different description, both requesting the withdrawal of all the relationships established with the device numbered 4202.

FCWITHDR SDEVN(X'4202') DDSW(YES)
FCWITHDR SDEVN(X'4202') TDEVN(X'4203') DDSW(YES)

Example 3-6 FCWITHDR command description (SDEVN and TDEVN: specified, DDSW = YES)

By executing the FCWITHDR command described in the example, the relations established with Dataset 1 and Dataset 2 in the device numbered 4202 are withdrawn. As a result, there are no longer any relationships established with the device numbered 4202 after executing this command. See the following figure:
Case 6: SDEVN and TDEVN Specified, DDSW = YES, XTNTLST Parameter Specified

Among the relationships established with the device specified by SDEVN:

- Relationships that partly or entirely include the copy target extents specified by the XTNTLST parameter are withdrawn.
- Information about the specified TDEVN and the copy target extents that are specified by the XTNTLST parameter are ignored.

When the FCWITHDR command is executed with the DDSW parameter set to YES, and the XTNTLST parameter is specified, only the XTNTLST parameter values that are specified for the copy source extent are put into effect. When there are no relationships existing within the copy source extent that is specified by the XTNTLST parameter values, the FCWITHDR command does nothing and ends normally.

The following shows two examples of the command descriptions for Case 6. Both examples request the withdrawal of all those relationships among the relationships established with the device numbered 4202 that are included in the extent specified by the XTNTLST parameter. When DDSW parameter is set to YES, the TDEVN parameter values and the XTNTLST parameter values for the copy target extent are ignored. Therefore, the two command descriptions in the example both give the same result.
Before executing the `FCWITHDR` command in the example, there are three relationships. After executing the command, there is only one relationship.

### Case 7: DEVN Specified, ACTION = THAW

Resume the write operation to the volumes that belong to the CU specified by the DEVN parameter. Relationships (pairs) will not be withdrawn.

The following example shows the instruction to resume the write operation to the volumes that belong to the CU with device number 4202.
Since no relationship is withdrawn by performing the above mentioned command, there is no change in the number of relationships after using the command.

Even if you do not issue this command, the write operation to volumes may be resumed programatically if the state-change-pending time elapses.

**USING ICKDSF to release Compatible FlashCopy® V2 relationships**

The following table shows the parameters that you can use with the ICKDSF command when you release Compatible FlashCopy® V2 relationships:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDNAME or DNAME</td>
<td>JCL statement</td>
<td>Specifies the JCL statement identifying the volume. If the OS of the host server is MVS, this parameter or the UNITADDRESS parameter is required.</td>
</tr>
<tr>
<td>SYSNAME</td>
<td>SYSNAME</td>
<td>Specifies the SYSNAME in the ASSGN system control statement. If the OS of the host server is VSE, this parameter is required.</td>
</tr>
<tr>
<td>UNITADDRESS, UNITADDR, or UNIT</td>
<td>Source device number</td>
<td>Specifies the device number (device address) of the S-VOL on which you want to perform the FLASHCPY WITHDRAW command. If the OS of the host server is MVS, this parameter or the DDNAME parameter is required.</td>
</tr>
<tr>
<td>TARGETVOL or TGTVOL</td>
<td>CU number LDEV number Target device number</td>
<td>Specifies the CU number, LDEV number, and device number (device address) of the T-VOL on which you want to perform the FLASHCPY WITHDRAW command. This parameter is required.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Value</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td>MODE</td>
<td>COPY</td>
<td>Executes the background copying operation on the relationship which has a copy source in the volume specified in the DDNAME, SYSNAME, or UNITADDRESS. If YES is specified for CHANOERECORDINO when creating the relationship, the relationship will be maintained after the background copying process is completed. If NO or nothing is specified for CHANOERECORDINO when creating the relationship, the relationship will be deleted after the background copying process is completed.</td>
</tr>
<tr>
<td>NOCOPY</td>
<td></td>
<td>Deletes the relationship between volumes specified in the TARGETVOL and DDNAME, SYSNAME, or UNITADDRESS without executing the background copying operation. The default setting of this parameter is NOCOPY.</td>
</tr>
<tr>
<td>ALL</td>
<td></td>
<td>Executes the background copying operation on all the relationships that have copy sources in the volume specified in DDNAME, SYSNAME, or UNITADDRESS. If YES is specified for the CHANOERECORDINO when creating the relationship, the relationship will be maintained even after the background copying process completes. If NO or nothing is specified for the CHANOERECORDINO when creating the relationship, the relationship will be deleted after the background copying process is completed. The relationships that have copy targets in the volume specified in DDNAME, SYSNAME or UNITADDRESS will be deleted without the background copying process.</td>
</tr>
<tr>
<td>RESETTGTWRTINHIBIT, RESETTGTWRTINHB, or RTWI</td>
<td>-</td>
<td>Permits to execute the writing operation on the T-VOL that is write-protected. The relationship will not be deleted.</td>
</tr>
<tr>
<td>SOURCEVOL or SRCVOL</td>
<td>CU number, LDEV number, Source device number</td>
<td>Specifies the CU number, the LDEV number, or the device number of the S-VOL when you use the Remote FlashCopy® function.</td>
</tr>
<tr>
<td>FORCE</td>
<td>YES</td>
<td>Releases the relationship established by the Preserve Mirror FlashCopy® function without executing background copying process. Releases the relationship defined to the copy target.</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>Releases the relationship established by the Preserve Mirror FlashCopy® function after the background copying process completes. If FORCE is not specified, NO is set by default.</td>
</tr>
<tr>
<td>RELATSPACE*</td>
<td>-</td>
<td>If T-VOL is TSE-VOL, the physical capacity of the allocated TSE-VOL is released.</td>
</tr>
</tbody>
</table>

*Valid in Compatible Software for IBM® FlashCopy® SE.
Releasing pairs: FLASHCPY WITHDRAW

To withdraw a pair:

1. If the OS of the host server is MVS, do one of the following:
   - Specify the JCL statement in the DDNAME parameter.
   - Specify the S-VOL device number of the pair that you want to delete for the UNITADDRESS parameter.

2. If the OS of the host server is VSE, specify the SYSNAME of the ASSGN system control statement in the SYSNAME parameter.

3. In the TARGETVOL parameter, specify the CU number, LDEV number, and device number of the T-VOL.

4. As shown in the following table, specify any other necessary parameters and execute the FLASHCPY WITHDRAW command. See the next example.

FLASHCPY WITHDRAW UNIT(X'7000') TARGETVOL(X'00',X'01',7001) MODE(COPY)

Example 3-9 FLASHCPY WITHDRAW command description

Note: When the FLASHCPY WITHDRAW command is executed, all of the dataset relationships in the specified volume are deleted.

The FLASHCPY WITHDRAW command and the applicable combinations are predetermined. If you specify a parameter that is not one of the predetermined combinations, the FLASHCPY WITHDRAW command is normally ended without executing any processes.

The following table shows the FLASHCPY WITHDRAW parameters and applicable combinations:

Table 3-26 Parameters of FLASHCPY WITHDRAW command and applicable combinations

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Background copying</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDNAME, SYSNAME, UNITADDRESS</td>
<td>TARGETVOL, MODE, Execute, Relationship after completion</td>
</tr>
<tr>
<td>S-VOL T-VOL or some other volume</td>
<td>COPY, Yes</td>
</tr>
<tr>
<td>S-VOL T-VOL</td>
<td>NOCOPY or not specified</td>
</tr>
<tr>
<td>S-VOL T-VOL or some other volume</td>
<td>ALL, Yes</td>
</tr>
<tr>
<td>T-VOL S-VOL or some other volume</td>
<td>ALL, No</td>
</tr>
</tbody>
</table>
The background copying process is executed on the relationship when the copy source of the relationship is in the DDNAME, SYSNAME, or UNITADDRESS-VOLUME. In addition, the relationship is released when its copy source is in the DDNAME, SYSNAME, or UNITADDRESS-VOLUME.

**Using ANTRQST macro to release Compatible FlashCopy® V2 relationships**

The following table shows the parameters that you use with the ANTRQST Macro command when you release Compatible FlashCopy® V2 relationships:

<table>
<thead>
<tr>
<th>Table 3-27 Parameters for the ANTRQST macro command (REQUEST=FCWITHDRAW)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parameter</strong></td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>SDEVN</td>
</tr>
<tr>
<td>TDEVN</td>
</tr>
<tr>
<td>DEVN</td>
</tr>
<tr>
<td>ACTION</td>
</tr>
<tr>
<td>RETINFO</td>
</tr>
<tr>
<td>DDSW</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>SRCEXTENTS</td>
</tr>
<tr>
<td>TGTEXTENTS</td>
</tr>
</tbody>
</table>
Performing Compatible FlashCopy® V2 operations

Using z/VM CP to release Compatible FlashCopy® V2 relationships

The relationship that is established by the FLASHCOPY ESTABLISH command of the z/VM CP commands is not released even after the completion of the copy.

To release a Compatible FlashCopy® V2 relationship, use the FLASHCOPY WITHDRAW command.

The parameters that are available with the FLASHCOPY WITHDRAW command are shown in the following table:

**Table 3-28 Parameters for the FLASHCOPY WITHDRAW command**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOURCE</td>
<td>Primary device number, Starting cylinder of source, Ending cylinder of source</td>
<td>Specifies the device number (device address or mini disk number), the starting cylinder, and the ending cylinder of the copy source.</td>
</tr>
<tr>
<td>TARGET</td>
<td>Secondary device number, Starting cylinder of target, Ending cylinder of target</td>
<td>Specifies the device number (device address or mini disk number), the starting cylinder, and the ending cylinder of the copy destination. Up to 110 extents of copy target can be specified.</td>
</tr>
<tr>
<td>FORCE</td>
<td>-</td>
<td>The relationship can be immediately cancelled even if the background copy is not completed.</td>
</tr>
</tbody>
</table>
Performing Compatible Software for IBM® FlashCopy® SE operations

This chapter provides information about performing operations with Compatible Software for IBM® FlashCopy® SE.

- Overview of FlashCopy® SE
- Best practice for using Compatible Software for IBM® FlashCopy® SE
- Requirements for using Compatible Software for IBM® FlashCopy® SE
- Creating and modifying pools and TSE-VOLs for Compatible Software for IBM® FlashCopy® SE
- About Operating Pools and TSE-VOLS
- Notes when sharing pool with DP-VOL
- Establishing relationships for FlashCopy® SE
- Viewing relationship states of Compatible Software for IBM® FlashCopy® SE
- Releasing relationships for Compatible Software for IBM® FlashCopy® SE
- Viewing TSE-VOL or pool information using LISTDATA
Overview of FlashCopy® SE

FlashCopy SE® (FCSE) can reduce the physical volume size of the T-VOL by using a virtual volume that is a track space-efficient volume (TSE-VOL) as the FlashCopy® T-VOL.

Before you can use FCSE, both Compatible Software for IBM® FlashCopy® SE and Dynamic Provisioning for Mainframe must be installed.

You can perform FCSE operations by using one of the following commands from the host:

- PPRC TSO
- DFMSdss
- ICKDSF
- ANTRQST Macro
- z/VM CP

The following table shows functions that are supported by Compatible Software for IBM® FlashCopy® SE:

<table>
<thead>
<tr>
<th>Category</th>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establishing relationships</td>
<td>Volume copy</td>
<td>Copies S-VOL updates to the T-VOL. This function does not perform a background copy. If a relationship with no copy is deleted, the data of copy target is not guaranteed.</td>
</tr>
<tr>
<td></td>
<td>Multiple relationships</td>
<td>Can establish up to 16 copy targets.</td>
</tr>
<tr>
<td></td>
<td>Consistency group</td>
<td>FlashCopy</td>
</tr>
<tr>
<td></td>
<td>Fast reverse restore</td>
<td>Creates snapshot data consistent across multiple volumes.</td>
</tr>
<tr>
<td>Releasing relationships</td>
<td>Deletes the relationship between the specified S-VOL and T-VOL. Because the NOCOPY option is used with FCSE, the relationship is deleted immediately after the Withdraw command is issued. When you execute the Withdraw command, you can select whether or not to release already allocated areas.</td>
<td></td>
</tr>
<tr>
<td>Displaying relationship status</td>
<td>Displays the status of the relation by using a host command or Storage Navigator.</td>
<td></td>
</tr>
</tbody>
</table>

Best practice for using Compatible Software for IBM® FlashCopy® SE

As best practice, use Compatible Software for IBM® FlashCopy® SE when saving data temporarily for short-term backup or when executing backup for tapes or for other media.
Before using the TSE-VOL, the volume must be initialized.

Compatible Software for IBM® FlashCopy® SE operates only in NOCOPY mode. The consistency of the T-VOL (TSE-VOL) data cannot be ensured if you release the relationship before an operation that is copying the T-VOL completes. Operations that access the T-VOL after the relationship is released are not supported. Do not execute the TSE-VOL operation after releasing the Compatible Software for IBM® FlashCopy® SE relationship.

**Requirements for using Compatible Software for IBM® FlashCopy® SE**

You can establish a Compatible FlashCopy® V2 relationship for simplex volumes.

The following table describes other requirements for using Compatible Software for IBM® FlashCopy® SE:

<table>
<thead>
<tr>
<th>Item</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controller emulation type</td>
<td>I-2107 The controller emulation type for an S-VOL and a T-VOL must be the same.</td>
</tr>
<tr>
<td>Available volume</td>
<td>Compatible FlashCopy® V2 can use the volume whose LDKC:CU:LDEV (LDKC: control unit image: logical device ID) is between 00:00:00 and 00:FE:FF.</td>
</tr>
</tbody>
</table>

**Creating and modifying pools and TSE-VOLs for Compatible Software for IBM® FlashCopy® SE**

After you create a TSE-VOL, the volume is in blocked status. To resolve this issue, you must format the LDEV after creating the TSE-VOL and then initialize the volume. Formatting the LDEV creates two pages of control information.

**Creating pools for Dynamic Provisioning for Mainframe**

Before you can create a TSE-VOL (which can be used as an FCSE T-VOL), you must create a Dynamic Provisioning for Mainframe pool. You use Storage Navigator to create pools for Dynamic Provisioning for Mainframe.

To create pools for Dynamic Provisioning for Mainframe:

1. In the **Storage Systems** tree on the left pane of the top window, select **Pool**.
   - The **Pool** window appears.
2. Click **Create Pools**.
   - The **Create Pools** window appears.
3. From the **Pool Type** list, select Dynamic Provisioning.
4. From the **System Type** list, select Mainframe.
5. From the **Multi-Tier PoolSmart Pool** field, select **Disable**.

6. Follow the steps below to select pool-VOLs:
   a. From the **Drive Type/RPM** list, select a hard disk drive type and RPM.
   b. From the **RAID Level** list, select the RAID level.
      If you select **External Storage** from the **Drive Type/RPM** list, a
      hyphen (-) appears and you cannot select the RAID level.
   c. Click **Select Pool VOLs**.
      The **Select Pool Volumes** window appears.
   d. In the **Available Pool Volumes** table, select the pool-VOL line to be
      associated with a pool, and then click **Add**.
      The selected pool-VOL is registered in the **Selected Pool Volumes**
      table.
      When adding external volumes, the **Cache Mode** of all of the
      volumes to be added must be set to enable or disable.
   e. Click **OK**.
      The information in the **Selected Pool Volumes** table is applied to
      **Total Selected Pool Volumes** and **Total Selected Capacity**.

7. In the **Pool Name** text box, enter the pool name as follows:
   In the **Prefix** text box, enter up to 23 alphanumeric characters. These
   are fixed characters of the head of the pool name; they are case-
   sensitive.
   In the **Initial Number** text box, enter up to 9 numbers.
   The **Prefix** and the **Initial Number** combined can contain as many as
   32 characters.

8. Click **Option**.

9. In the **Initial Pool ID** text box, enter a number from 0 through 127.
   The smallest available non-zero number appears in the text box by
   default. No number appears in the text box if no available pool ID exists.
   When the registered pool ID is entered, the smallest available pool ID is
   registered.

10. In the **Subscription Limit** text box, enter an integer value from 0 to
    65534 as the subscription rate (%) for the pool. The Subscription Limit
    defines a limit of how much capacity can be defined in the pool compared
    to the actual pool capacity. A value of 1000% means that the defined
    thin-provisioned volumes for the pool will be limited to ten times the
    installed capacity of the pool volumes defined.
    If no subscription limit is entered, the subscription rate is set to
    unlimited.

11. In the **Warning Threshold** text box, enter an integer value from 1 to
    100 as the rate (%) for the pool. The default value is 70%.

12. In the **Depletion Threshold** text box, enter an integer value from 1 to
    100 as the rate (%) for the pool. The default value is 80%.
    Enter the value more than the value of **Warning Threshold**.
13. Click **Add**.
   The created pool is added to the right **Selected Pools** table. If an invalid value is set, an error message appears.
   Values for all required items must be entered or selected before you click **Add**. Required items are marked with an asterisk (*) and include **Pool Type**, **Pool Volume Selection**, and **Pool Name**.

14. Click **Next**.
   The **Create LDEVs** window appears. Go to [Creating TSE-VOLs on page 4-5](#) to create TSE-VOL.
   If the pool ID is an even number, you can only create TSE-VOL that has a CU# value that is an even number. If the pool ID is an odd number, you can only create a TSE-VOL that has CU# value that is an odd number.
   If the **Subscription Limit** for all of the created pool is set to 0%, the **Create LDEVs** window does not appear.
   To finish the wizard, click **Finish**. The **Confirm** window appears.

15. In the **Confirm** window, click **Apply** to register the settings.
   If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

### Creating TSE-VOLs

You can create TSE-VOLs from any of the following tabs:

- The **LDEVs** tab, which appears when **Logical Devices** is selected.
- The **Pools** tab, which appears when **Pools** is selected.
- The **Virtual Volumes** tab, which appears when a pool in **Pools** is selected.

**Note:** You cannot specify a pool when creating TSE-VOLs unless the pool is in one of following states:

- Normal state
- Exceeded Threshold state
- In progress of pool-capacity shrinking

Perform the following steps if necessary:

- Click **Filter** to open the menu, specify the filtering, and then **Apply**.
- Click **Options** to specify the units of pools or the number of lines to be displayed.

To create a TSE-VOL:

1. Click **Create LDEVs**.
   The **Create LDEVs** window appears.
2. Go to the **Provisioning Type** list and confirm that **Dynamic Provisioning** is selected.
   If it is not already selected, select **Dynamic Provisioning** from the list.
3. In the **System Type** option, select a system type.
   To create mainframe system volumes, select **Mainframe**.
4. Go to the **Emulation Type** list and confirm that **3390-A** is selected.
5. Because you are creating a TSE-VOL, change the TSE attribute to **Enable**.
6. Select the pool according to the following steps.
   a. From the **Drive Type/RPM** list in **Pool Selection**, select the hard disk drive type and RPM.
   b. From the **RAID level** list, select the RAID level.
   c. Click **Select Pool**.
      The **Select Pool** window appears.
   d. In the **Available Pools** table, select a pool.
   e. Click **OK**.
      The **Select Pool** window closes. The selected pool name appears in **Selected Pool Name**, and the total capacity of the selected pool appears in **Selected Pool Capacity**.
7. In the **LDEV Capacity** text box, enter the TSE-VOL capacity to be created.
   You can change the capacity unit from the list. The capacity unit is fixed to **Cyl**.
8. In the **Number of LDEVs** text box, enter the number of LDEVs to be created.
   You can enter the number of LDEVs within a range of the figures displayed below the text box.
9. In the **LDEV Name** text box, enter the TSE-VOL name.
   In the **Prefix** text box, enter the alphanumeric characters, which are fixed characters of the head of the TSE-VOL name. The characters are case-sensitive.
   In the **Initial Number** text box, enter the initial number following the prefix name, which can be up to 9 digits.
   You can enter up to the 32 characters including the initial number.
10. Click **Option**.
11. In the **Initial LDEV ID** field, make sure that LDEV ID is set.
    To confirm the used number and unavailable number, click **View LDEV IDs** to display the **View LDEV IDs** window.
12. In the **Initial SSID** text box, type the 4-digit SSID of a hexadecimal number (0004 to FFFE).
    To confirm the created SSID, click **View SSID** to display the **View SSID** windows.
13. From the **Cache Partition** list, select CLPR.
14. From the **Processor Blade** list, select a processor blade.
Select a processor blade to be used by the LDEVs. To assign a specific processor blade, select the ID of the processor blade. To allow the storage system to assign processor blades to the LDEVs being created, click Auto.

15. If necessary, change the settings of the TSE-VOLs.
   
   You can change the following settings:
   
   o Editing SSID
     
     Click Edit SSIDs to open the SSIDs window. For details about how to edit SSIDs, see Editing the TSE-VOL SSID on page 4-7.
   
   o Changing the LDEV settings
     
     Click Change LDEV Settings to open the Change LDEV Settings window. For details about how to change the LDEV settings, see Changing the TSE-VOL settings on page 4-8.
   
16. If necessary, delete a line from the Selected LDEVs table.
   
   Select a line to be deleted, and then click Remove. For details about how to remove a line, see Removing the TSE-VOL from the registering task on page 4-8.

17. Click Add.
   
   The created TSE-VOLs are added to the right Selected LDEVs table. If invalid values are set, an error message appears.
   
   You cannot click Add until after all required items have been entered or selected. Required items are marked by an asterisk (*) and include Provisioning Type, System Type, Emulation Type, Pool Selection, LDEV Capacity, and Number of LDEVs.

18. Click Finish.
   
   The Confirm window appears.

19. In the Task Name in the text box, enter the task name.
   
   You can enter up to 32 ASCII characters and symbols in all, except for \ / : ; " ? < > |. "yymmdd-window name" is entered as a default.

20. Click Apply.
   
   If the Go to tasks window for status check box is selected, the Tasks window appears.

**Editing the TSE-VOL SSID**

Before registering a TSE-VOL, you may need to edit its SSID.

To edit the TSE-VOL SSID:

1. Go to the Selected LDEVs table in the Create LDEVs window and click Edit SSIDs.
   
   The Edit SSIDs window appears. The SSIDs table shows the SSID existing and to be added.

2. If you change SSID, select the appropriate line and click Change SSID.
   
   The Change SSID window appears.

3. Enter the new SSID and click OK.
The Edit SSIDs window appears.

4. Click OK.

The Create LDEVs window appears.

5. Click Finish.

The Confirm window appears.

6. Click Apply.

If the Go to tasks window for status check box is selected, the Tasks window appears.

**Changing the TSE-VOL settings**

Before registering a TSE-VOL, you may need to change the TSE-VOL settings.

To change the TSE-VOL settings:

1. In the Selected LDEVs table in the Create LDEVs window, select LDEV and click Change LDEV Settings.

   The Change LDEV Settings window appears.

2. In the Change LDEV Settings window, you can change the setting of LDEV Name, Initial LDEV ID, or Processor Blade.
   - If you change LDEV Name, specify the prefix characters and the initial number of LDEV.
   - If you change Initial LDEV ID, specify the number of LDKC, CU, DEV, and Interval. To check used LDEVs, click View LDEV IDs to confirm the used LDEVs. The View LDEV IDs window appears.
   - If you change Processor Blade, click the list and specify the processor blade ID. If the specific processor blade is specified, click the processor blade ID. To allow the storage system to assign the processor blade, click Auto.

3. Change the settings and click OK.

   The Create LDEVs window appears.

4. Click Finish.

   The Confirm window appears.

5. Click Apply.

   The setting is changed.

   If the Go to tasks window for status check box is selected, the Tasks window appears.

**Removing the TSE-VOL from the registering task**

If you do not want to register the TSE-VOL, you can remove it from the registering task.
To remove the TSE-VOL from the registering task:

1. In the **Selected LDEVs** table in the **Create LDEVs** window, select LDEV and click **Remove**.

2. Click **Finish**.
   
   The **Confirm** window appears.

3. Click **Apply**.

   The LDEV is removed.

   If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

**About Operating Pools and TSE-VOLS**

**Operating when Pool is full**

The usage amount in a pool is controlled in units of pages along with Dynamic Provisioning for Mainframe, and the usage amount for TSE-VOL is controlled in units of track in that page. Even if a pool becomes full, the data that is updated in the S-VOL can be successfully copied to T-VOL if HDPz pages that are allocated to that TSE-VOL have space.

When the accessed location is unallocated and the T-VOL page has no space, usually read and write processing cannot be performed. However, if the location has been already allocated, read processing can be performed. When performing an update operation with the S-VOL in a state of no space in allocated pages, the copying of corresponding data to the T-VOL fails and the relationship will enter the Failed State, making the read and write operations for T-VOL to be not available. To restore from the Failed State, the relationship must be released.

Even if the pool is in a 100% used state (area becomes insufficient), you can create a relationship in which the T-VOL is a TSE-VOL. However, when write processing is done to the S-VOL for the relationship in this situation, the relationship enters the Failed state.

**Managing failed states**

Because of running short of physical capacity in a pool that is allocated to one or more TSE-VOLs, the data copy to the FC T-VOL before updating the S-VOL fails, resulting in that FC relationship entering the Failed State. Once the FC relationship enters the Failed State, any Read/Write operations performed to the T-VOL will not be available until the relationship is released. Read/Write operations to the S-VOL remain available, but the data is not copied to T-VOL.

To restore the FC relationship from a Failed state, the relationship must be released.
Pool capacity warning to the host

When the used capacity of a pool that is associated with TSE-VOL exceeds the threshold value that is set by the user, a warning message is issued to the mainframe host.

Examples of warning messages include the following:

- If the user sets the warning threshold at 70% and the pool usage capacity exceeds this threshold, the following warning message is issued:
  
  ```
  REPOSITORY VOLUME WARNING: AT 30% CAPACITY REMAINING
  ```

- If the user sets the exhaustion threshold at 80% and the pool usage capacity exceeds this threshold, the following warning message is issued:
  
  ```
  REPOSITORY VOLUME WARNING: AT 20% CAPACITY REMAINING
  ```

- If the pool usage rate reaches 100%, the following warning message is issued:
  
  ```
  REPOSITORY VOLUME EXHAUSTED
  ```

The above message is issued regardless of FCSE relationships when I/O operation is performed on a single TSE-VOL.

Messages are reported to all hosts in which one of the following volumes is online. If one host has more than one such volume, only one of the volumes is mentioned in the message.

- TSE-VOL (FCSE target volume or volume in Simplex status) associated with the pool.
- Source volume in FCSE relationship.

Notes when sharing pool with DP-VOL

TSE-VOL and DP-VOL can share a pool. However, if DP-VOL and TSE-VOL share a pool, the capacity of the pool must be designed by estimating the combined capacity of the DP-VOLs and the TSE-VOLs.

Establishing relationships for FlashCopy® SE

Keeping data consistent while establishing relationships

When you use the `FCESTABL` command to establish FlashCopy® SE relationships, you can keep data consistent by suspending write operations to S-VOLs using the ACTION parameter. The ACTION parameter, which is a parameter for the `FCESTABL` command, is described in the following table.
Table 4-3 Parameters for the FCESTABL command (FlashCopy® SE / Suspending write operations to S-VOLs)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTION</td>
<td>FREEZE</td>
<td>Suspend the write operations from the host to S-VOLs. Although if you establish a relationship specifying extents, the ACTION parameter will suspend the write operation to the whole volume.</td>
</tr>
</tbody>
</table>

The following example shows how to use the FCESTABL command to suspend write operations to an S-VOL when you establish a FlashCopy® SE relationship. In this example, the FCESTABL command creates a relationship between volumes (devices) numbered 4202 and 4203, and at the same time suspends write operations from the host to the source device numbered 4202.

FCESTABL SDEVN(X'4202') TDEVN(X'4203') ACTION(FREEZE) SETGTOK(YES) MODE(NOCOPY)

Example 4-1 FCESTABL command (Compatible Software for IBM® FlashCopy® SE / ACTION specified)

To resume writing to S-VOLs, issue the FCWITHDR command with the ACTION parameter specified.

If a timeout occurs before you issue the FCWITHDRAW command, write operations resume. The default setting of timeout is 120 seconds (2 minutes). For details about changing the timeout setting, see FCv2/FCSE window on page C-10.

Commands for establishing relationships

To establish Compatible Software for IBM® FlashCopy® SE relationships, you use one of the following sets of commands:

- **PPRC TSO**
- **DFSMSdss**
- **ICKDSF**
- **z/VM CP**

Using PPRC TSO to establish relationships

The following steps show how to use PPRC TSO with the FCESTABL command when you establish Compatible Software for IBM® FlashCopy® SE relationships.

1. Specify FCSETGTOK(YES) and MODE(NOCOPY), and then execute the FCESTABL command. The EXTENTS, XTNTLST, and XXTNTLST parameters cannot be specified for Compatible Software for IBM® FlashCopy® SE.

2. Change the VOLSER of the T-VOL.

   When the VTOC is copied, the VOLSER of the S-VOL and T-VOL become the same. The VOLSER of the T-VOL must be changed before varying the T-VOL back online.
The following example shows how the \texttt{FCESTABL} command is used. In this example, the \texttt{FCESTABL} command establishes a relationship to copy the data from the source device, numbered 4202, to the target device, numbered 4203. This relationship is established in NOCOPY mode after 4203 is offline.

\texttt{FCESTABL SDEVN(X'4202') TDEVN(X'4203') MODE(NOCOPY) SETGTOCK(YES)}

\textbf{Example 4-2 Example of the FCESTABL command (COPY mode)}

**Using DFSMSdss to establish relationships**

The DFSMSdss copy command is used to process Compatible Software for IBM® FlashCopy® SE volume copy operations. The FCSETGTOCK and FCNOCOPY parameters must be specified when performing Compatible Software for IBM® FlashCopy® SE operations.

DFSMSdss processes the \texttt{COPY FULL} command in a few seconds and establishes the Compatible Software for IBM® FlashCopy® SE relationship simultaneously as it completes the processing. The completion of this process is not reported to the user.

The following example shows the \texttt{DFSMSdss} command for processing volume copy operations with Compatible Software for IBM® FlashCopy® SE.

In this example, all data in volume FCPY05 is copied to volume FCPY06.

\texttt{COPY FULL INDYNAM (FCPY05) OUTDYNAM (FCPY06) COPYVOLID FCSETGTOCK(FAILRELATION) FCNOCOPY}

\textbf{Example 4-3 COPY FULL command}

**Using ICKDSF to establish relationships**

The following steps show how to use the \texttt{ICKDSF FLASHCPY ESTABLISH} command to create a Compatible Software for IBM® FlashCopy® SE pair.

1. Set the T-VOL to offline. If the ONLINTGT parameter is set to YES, the T-VOL will automatically be offline when creating pairs.
2. Specify a JCL DD statement with the DDNAME parameter, or specify the S-VOL device number in the UNITADDRESS parameter.
3. Specify the CU number, the LDEV number, and the device number of the T-VOL for the TARGETVOL parameter.
4. Execute \texttt{FLASHCPY ESTABLISH} command. See the following example.

\begin{verbatim}
FLASHCPY ESTABLISH UNIT(X'7000') TARGETVOL(X'00',X'01',7001) ONLINTGT(YES) SETGTOK(YES) MODE(NOCOPY)
\end{verbatim}

\textbf{Example 4-4 FLASHCPY ESTABLISH command execution}
Using z/VM CP to establish relationships

The FLASHCOPY ESTABLISH command of z/VM CP command can be used. The S-VOL and T-VOL must be a whole volume or a full pack mini disk.

Viewing relationship states of Compatible Software for IBM® FlashCopy® SE

Using FQUERY to view relationship states

The FQUERY command can be used to display information including the attributes set to the devices specified by DEVN and the number of Compatible Software for IBM® FlashCopy® SE relationships established with the specified devices.

The following example of the FQUERY command requests information be displayed on on the device numbered 1900.

FQUERY DEVN(1900)

Example 4-5 FQUERY command description

The next example shows the information that is displayed by the FQUERY command in Example 4-5 FQUERY command description on page 4-13.

```
QUERY VIRTUAL FLASHCOPY
 VDEVN SSID LSS UA CU SERIAL ACTIVE MAX PPRC
 0010 0132 02 00 2107 000000043151 1 50099
 0020 0132 02 01 2107 000000043151 1 50099
```

Example 4-6 FQUERY command execution result

The information that is displayed by the FQUERY Command (when using Compatible Software for IBM® FlashCopy® SE) is the same as the information shown in Table 3-15 Information displayed by the FQUERY command on page 3-30.

Using ICKDSF to view relationship states

Viewing information on FLASHCPY QUERY RELATIONS

To view information about the Compatible FlashCopy® V2 pairs in the specified volume, execute the ICKDSF FLASHCPY QUERY RELATIONS command that is shown in the following example.

FLASHCPY QUERY RELATIONS UNIT(X'7001')

Example 4-7 FLASHCPY QUERY RELATIONS command execution

Following is an example of information that is displayed by executing the FLASHCPY QUERY RELATIONS command:
Performing Compatible Software for IBM® FlashCopy® SE operations

Hitachi Virtual Storage Platform Hitachi Compatible FlashCopy® User Guide

Releasing relationships for Compatible Software for IBM® FlashCopy® SE

The FCWITHDR command can be used with Compatible FlashCopy® V2. However, DDSW=YES cannot be specified. The allocated area remains even if the relationship is released, because withdrawal of the allocated area of the TSE-VOL cannot be specified.

The following example shows a request to the release all relationships established with copy target extents in device 4203.

```
FCWITHDR TDEVN(X'4203')
```

**Example 4-9 Example: the FCWITHDR command description (TDEVN Specified, DDSW=NO)**

To release Compatible Software for IBM® FlashCopy® SE relationships, you can use one of the following sets of commands:

- ICKDSF
Using ICKDSF to release relationships

The `FLASHCOPY WITHDRAW` command can be used for Compatible Software for IBM® FlashCopy® SE as well as for Compatible FlashCopy® V2. However, `MODE(COPY)` cannot be specified. By specifying the `RELATSPACE` parameter you can withdraw the allocated area of TSE-VOL.

To release a relationship using the `ICKDSF FLASHCOPY WITHDRAW` command:

1. If the OS of the host server is MVS, specify the appropriate JCL DD statement in the `DDNAME` parameter, or specify the S-VOL device number of the pair that you want to delete for the `UNITADDRESS` parameter.
2. Specify `SYSNAME` of the ASSGN system control statement in the `SYSNAME` parameter if the OS of the host server is VSE.
3. Specify the `CU` number, `LDEV` number, and device number of the `T VOL` in the `TARGETVOL` parameter.
4. Execute the `FLASHCOPY WITHDRAW` command in `NOCOPY` mode. See the next example.

   ```
   FLASHCOPY WITHDRAW UNIT(X'7000') TARGETVOL(X'00',X'01',7001) MODE(NOCOPY)
   ```

   **Example 4-10 FLASHCOPY WITHDRAW command description**

   **Note:** When the `FLASHCOPY WITHDRAW` command is executed, all of the dataset relationships existing in the specified volume will be withdrawn.

The `FLASHCOPY WITHDRAW` command and the applicable combinations are predetermined. If you specify any other parameter than the predetermined combinations, the `FLASHCOPY WITHDRAW` command is normally ended without executing any process.

The following table describes the parameters and the applicable combinations of the `FLASHCOPY WITHDRAW` command. See the following table and specify any other necessary parameters.

**Table 4-4 Parameters and applicable combinations of FLASHCOPY WITHDRAW**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Background copying</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DDNAME, SYSNAME, UNITADDR</strong></td>
<td><strong>TARGETVOL</strong></td>
</tr>
<tr>
<td>S-VOL</td>
<td>T-VOL</td>
</tr>
<tr>
<td>T-VOL</td>
<td>S-VOL or some other volume</td>
</tr>
</tbody>
</table>
The relationship whose copy source exists in the volume specified as DDNAME, SYSNAME, or UNITADDRESS is to be released.

**Using ANTRQST Macro to release relationships**

The FCWITHDRAW command can be used just as Compatible FlashCopy® V2. However, DDSW=YES cannot be specified. By specifying the SPACEREL=YES parameter, the allocated area of TSE-VOL can be withdrawn.

**Using z/VM CP to release relationships**

The FLASHCOPY WITHDRAW command of z/VM CP can be used to release relationships. By specifying the RELEASE parameter, the allocated area of a TSE-VOL can be released.

**Viewing TSE-VOL or pool information using LISTDATA**

The LISTDATA command can be used to display information of a TSE-VOL or a pool in the storage system. The pool information here means the pool information for Dynamic Provisioning for Mainframe. The other pool information is not displayed.

The following table shows the LISTDATA command parameters:

<table>
<thead>
<tr>
<th>Category</th>
<th>Parameter(s)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPACEEFFICIENTVOL</td>
<td>DEVICE</td>
<td>Displays the information about the TSE-VOL for a device that is issuing a command.</td>
</tr>
<tr>
<td></td>
<td>SUBSYSTEM</td>
<td>Displays information about the TSE-VOL in the storage system that is issuing a command.</td>
</tr>
<tr>
<td></td>
<td>ALL</td>
<td>Displays the information about the TSE-VOLs in all of the connected storage systems. ALL is selected by default when the range to be displayed is not specified.</td>
</tr>
<tr>
<td>EXTENTPOOLCONFIG</td>
<td>SUMMARY</td>
<td>Displays an summary information for all the pools.</td>
</tr>
<tr>
<td></td>
<td>EXTENTPOOLID (ID)</td>
<td>Displays detailed information about the specified pool ID.</td>
</tr>
<tr>
<td>MAPVOLUME</td>
<td>-</td>
<td>Displays all the TSE-VOLs associated with pools in bitmap style.</td>
</tr>
</tbody>
</table>

The following example shows the LISTDATA command for the volume whose VOLSER is FCF6B6.

**Example 4-11 LISTDATA command execution for TSE-VOL information**

When issuing the LISTDATA command, the TSE-VOL information is displayed as shown in the following example and table:
Table 4-6 Contents displayed by LISTDATA command for TSE-VOL information

<table>
<thead>
<tr>
<th>Category</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEVICE</td>
<td>The device number recognized by the host.</td>
</tr>
<tr>
<td>VOLSER</td>
<td>The serial number of a volume.</td>
</tr>
<tr>
<td>REPOSITORY SPACE CONSUMED</td>
<td>The number of cylinders allocated to this TSE-VOL. Unlike the display in the Storage Navigator, it does not include the controlled area.</td>
</tr>
<tr>
<td>SIZE</td>
<td>The capacity of this TSE-VOL (The number of cylinders).</td>
</tr>
<tr>
<td>EXT POOL ID</td>
<td>A Pool ID.</td>
</tr>
<tr>
<td>REPOSITORY SIZE</td>
<td>The capacity of a pool (the number of cylinders) where this TSE-VOL is associated with.</td>
</tr>
<tr>
<td>TOTAL NUMBER OF SPACE EFFICIENT VOLUME(S)</td>
<td>The number of TSE-VOLS in the storage system. the contents of Example 4-9 will be displayed for the TSE-VOL.</td>
</tr>
</tbody>
</table>

REPOSITORY and EXT POOL are used for the same meaning as a pool.

**Example 4-12 LISTDATA command for TSE-VOL information**

```
LISTDATA EXTENTPOOLCONFIG VOLUME(FCF6B6) UNIT(3390) SUMMARY
```

**Example 4-13 LISTDATA command for a pool information (summary)**

When the above command is issued, the summary information of all the pools is displayed as follows.

```
2107 STORAGE CONTROL
EXTENT POOL CONFIGURATION REPORT
STORAGE FACILITY IMAGE ID 002107.900.HTC.75.000000064561
......EXTENT POOL ID 0002 SUMMARY............
REPOSITORY FULL WARNING PERCENTAGE:  30
EXT POOL FULL WARNING PERCENTAGE:  30
EXTENT POOL STATUS
FIXED BLOCK EXT POOL: NO
REPOSITORY CONFIGURED: YES
EXTENT POOL AT WARNING PERCENTAGE: NO
EXTENT POOL FULL: NO
```

**Example 4-14 A display example of LISTDATA command for a pool information (summary)**
### Table 4-7 LISTDATA command for pool information summary

<table>
<thead>
<tr>
<th>Category</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>REPOSITORY FULL WARNING PERCENTAGE</td>
<td>The value after subtracting the warning value of threshold value defined by the user in the pool window in Storage Navigator from 100 (Displays &quot;30&quot; when the setting value is &quot;70&quot;).</td>
</tr>
<tr>
<td>EXT POOL FULL WARNING PERCENTAGE</td>
<td>The value after subtracting the warning value of threshold value defined by the user in the pool window in Storage Navigator from 100 (Displays &quot;30&quot; when the setting value is &quot;70&quot;). Here displays the same value as in the REPOSITORY FULL WARNING PERCENTAGE.</td>
</tr>
<tr>
<td>FIXED BLOCK EXT POOL</td>
<td>NO (fixed) For the case of Hitachi, the fixed block pool is not displayed. Therefore, NO is displayed.</td>
</tr>
<tr>
<td>REPOSITORY CONFIGURED</td>
<td>YES (fixed) For the case of Hitachi, if the pool exists, YES is displayed.</td>
</tr>
<tr>
<td>EXTENT POOL AT WARNING PERCENTAGE</td>
<td>YES The value has reached the warning value of threshold value defined by the user in the pool window in Storage Navigator.</td>
</tr>
<tr>
<td></td>
<td>NO The value does not reach the warning value of threshold value defined by the user in the pool window in Storage Navigator. Alternatively, the pool usage becomes full after reaching the warning value of threshold value defined by the user in the pool window in Storage Navigator.</td>
</tr>
<tr>
<td>EXTENT POOL FULL</td>
<td>YES The pool usage amount is full.</td>
</tr>
<tr>
<td></td>
<td>NO The pool usage amount is not full</td>
</tr>
</tbody>
</table>

REPOSITORY and EXT POOL are used for the same meaning as a pool.

**Example 4-15 LISTDATA command for detailed pool information**

When issuing above command, the pool information of specified pool ID is displayed as follows. The meanings of items are shown in the next table.

```
2107 STORAGE CONTROL
EXTENT POOL CONFIGURATION REPORT
STORAGE FACILITY IMAGE ID 002107.900.HTC.75.000000064561
......EXTENT POOL ID 0000 SUMMARY............
REPOSITORY FULL WARNING PERCENTAGE: 30
EXT POOL FULL WARNING PERCENTAGE: 30
EXTENT POOL STATUS
FIXED BLOCK EXT POOL: NO
REPOSITORY CONFIGURED: YES
EXTENT POOL AT WARNING PERCENTAGE: NO
EXTENT POOL FULL: YES
...EXTENT POOL 0000 DETAILED REPORT....
EXTENT POOL REPOSITORY STATUS
REPOSITORY AT WARNING PERCENTAGE: NO
REPOSITORY FULL: YES
SIZE ALLOCATED
EXTENT POOL  8915  8915
REPOSITORY  8915  8915
```

**Example 4-16 LISTDATA command for detailed pool information**
### Table 4-8 Pool information displayed by LISTDATA command

<table>
<thead>
<tr>
<th>Category</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>REPOSITORY FULL WARNING PERCENTAGE</strong></td>
<td>The value after subtracting the warning value of threshold value defined by the user in the pool window in Storage Navigator from 100 (Displays &quot;30&quot; when the setting value is &quot;70&quot;).</td>
</tr>
<tr>
<td><strong>EXT POOL FULL WARNING PERCENTAGE</strong></td>
<td>The value after subtracting the warning value of threshold value defined by the user in the pool window in Storage Navigator from 100 (Displays &quot;30&quot; when the setting value is &quot;70&quot;). Here displays the same value as in the REPOSITORY FULL WARNING PERCENTAGE.</td>
</tr>
<tr>
<td><strong>FIXED BLOCK EXT POOL</strong></td>
<td>NO (fixed) For the case of Hitachi, the fixed block pool is not displayed. Therefore, NO is displayed.</td>
</tr>
<tr>
<td><strong>REPOSITORY CONFIGURED</strong></td>
<td>YES (fixed) For the case of Hitachi, if the pool exists, YES is displayed.</td>
</tr>
<tr>
<td><strong>EXTENT POOL AT WARNING PERCENTAGE</strong></td>
<td>YES The value has reached the warning value of threshold value defined by the user in the pool window in Storage Navigator.</td>
</tr>
<tr>
<td></td>
<td>NO The value has not reached the warning value of threshold value defined by the user in the pool window in Storage Navigator. Alternatively, the pool usage becomes full after reaching the warning value of threshold value defined by the user in the pool window in Storage Navigator.</td>
</tr>
<tr>
<td><strong>EXTENT POOL FULL</strong></td>
<td>YES The pool usage amount is full.</td>
</tr>
<tr>
<td></td>
<td>NO The pool usage amount is not full</td>
</tr>
<tr>
<td><strong>REPOSITORY AT WARNING PERCENTAGE</strong></td>
<td>YES The value has reached the warning value of threshold value defined by the user in the pool window in Storage Navigator.</td>
</tr>
<tr>
<td></td>
<td>NO The value has not reached the warning value of threshold value defined by the user in the pool window in Storage Navigator. Or the pool usage becomes full after reaching the warning value of threshold value defined by the user in the pool window in Storage Navigator.</td>
</tr>
<tr>
<td><strong>REPOSITORY FULL</strong></td>
<td>YES The pool usage amount is full.</td>
</tr>
<tr>
<td></td>
<td>NO The pool usage amount is not full</td>
</tr>
<tr>
<td><strong>EXTENT POOL SIZE</strong></td>
<td>- The capacity of the pool (the number of cylinders).</td>
</tr>
<tr>
<td><strong>EXTENT POOL ALLOCATED</strong></td>
<td>- The number of cylinders allocated to a pool. (Because the allocation for the pool area is done in units of pages, this value is displayed by converting the number of allocated pages into the number of cylinders.)</td>
</tr>
<tr>
<td><strong>REPOSITORY SIZE</strong></td>
<td>- The capacity of the pool (the number of cylinders). (The same value as in the EXTENT POOL SIZE.)</td>
</tr>
<tr>
<td><strong>REPOSITORY ALLOCATED</strong></td>
<td>- The number of cylinders allocated to a pool. (The same value as in the EXTENT POOL ALLOCATED.)</td>
</tr>
</tbody>
</table>

REPOSITORY and EXT POOL indicate the same meaning as a pool.
Feature comparison with IBM® product

This chapter describes the differences between IBM® FlashCopy and Hitachi Compatible FlashCopy®.

- Feature comparison with IBM® product
- Comparison of the maximum number of relationships between IBM® FlashCopy and Hitachi Compatible FlashCopy® V2
- Comparison of copying processes
- Comparison of processing in releasing relationships
- Comparing IBM® FlashCopy® SE and Compatible Software for IBM® FlashCopy® SE
- Comparison of supporting commands
Feature comparison with IBM® product

The following table shows the differences between IBM® FlashCopy and Hitachi Compatible FlashCopy®.

Table 5-1 Differences between IBM® FlashCopy and Hitachi Compatible FlashCopy® V2

<table>
<thead>
<tr>
<th>Compared item</th>
<th>IBM® FlashCopy</th>
<th>Hitachi FCv2</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLOBAL Mirror status</td>
<td>Supported.</td>
<td>Not supported.</td>
</tr>
<tr>
<td></td>
<td>For details about GLOBAL Mirror status, see the IBM® manual.</td>
<td></td>
</tr>
</tbody>
</table>

Comparison of the maximum number of relationships between IBM® FlashCopy and Hitachi Compatible FlashCopy® V2

The following table shows the maximum number of relationships between IBM® FlashCopy and Hitachi Compatible FlashCopy® V2.

Table 5-2 Maximum number of relationships between IBM® FlashCopy and Hitachi Compatible FlashCopy® V2

<table>
<thead>
<tr>
<th>Compared item</th>
<th>IBM® FlashCopy</th>
<th>Hitachi FCv2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of multiple relationships</td>
<td>Up to 12 relationships can be created per extent (the smallest unit: track).</td>
<td>Up to 16 relationships can be created per extent (the smallest unit: track).</td>
</tr>
<tr>
<td>Maximum number of pairs that can be created per volume</td>
<td>50,099 relationships (for 3390-3)</td>
<td>1,000 relationships (for all volume types)</td>
</tr>
<tr>
<td></td>
<td>65,534 relationships (except 3390-3)</td>
<td></td>
</tr>
</tbody>
</table>

Comparison of copying processes

The following table compares the copying processes of IBM® FlashCopy and Hitachi Compatible FlashCopy® V2.

Table 5-3 Comparison of copying processes

<table>
<thead>
<tr>
<th>Compared item</th>
<th>IBM® FlashCopy</th>
<th>Hitachi FCv2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read access to the area not specified as the copy range in the copy target during the background copying process in NOCOPY mode</td>
<td>The data on the tracks subject to read operation are not copied from the copy source to the copy target.</td>
<td>Sometimes the data on the tracks subject to read operation are copied from the copy source to the copy target, and other times the data are not copied to the target.</td>
</tr>
<tr>
<td>Status of the pairs when on-demand copy is processed</td>
<td>Relationships are withdrawn automatically when all the copy operations processed by On-demand copy are completed.</td>
<td>Relationships are maintained even when all the copy operations processed by On-demand copy are completed.</td>
</tr>
<tr>
<td>Compared item</td>
<td>IBM® FlashCopy</td>
<td>Hitachi FCv2</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Establishing relationships by using the TSO command when you specify a copy target volume of PPRC as a source volume</td>
<td>Supported. The ACTION (FREEZE) option can be used.</td>
<td>Not supported. The command will be rejected.</td>
</tr>
<tr>
<td>Reverse Restore</td>
<td>After all the copy operations processed by on-demand copy are completed, the Reverse Restore operation can be performed on the relationship created by Incremental FlashCopy function. If differential data does not exist, the Reverse Restore operation can be performed on the relationship after Restore or Reverse Restore is performed with NOCOPY specified.</td>
<td>After all the copy operations processed by on-demand copy are completed, the Reverse Restore operation cannot be performed on the relationship created by the Incremental FlashCopy function. Regardless of whether differential data exists, the Reverse Restore operation cannot be performed on the relationship after Restore or Reverse Restore is performed with NOCOPY specified.</td>
</tr>
<tr>
<td>Fast Reverse Restore</td>
<td>Regardless of whether or not the option of the Incremental FlashCopy function is specified, if you perform the Fast Reverse Restore, the part of data which is copied from the S-VOL to the T-VOL will be copied from the T-VOL to the S-VOL.</td>
<td>When you perform the Fast Reverse Restore specifying the option of the Incremental FlashCopy function, only the updated part of the S-VOL or the T-VOL before then will be copied from the T-VOL to the S-VOL. When you perform the Fast Reverse Restore without specifying the option of the Incremental FlashCopy function, only the copied part of data from the S-VOL to the T-VOL will be copied before the Fast Reverse Restore is executed.</td>
</tr>
<tr>
<td>Copying in NOCOPY mode in FlashCopy® to PPRC Primary Volume function</td>
<td>When a FlashCopy pair in NOCOPY mode is created using a PPRC P-VOL, the data is not copied from FlashCopy S-VOL to FlashCopy T-VOL, and the FlashCopy S-VOL data is copied to the PPRC S-VOL. When the FlashCopy pair is deleted, the PPRC P-VOL data is copied to the PPRC S-VOL data.</td>
<td>When FCv2 pair in NOCOPY mode is created using TCz pair M-VOL, the copy operation is executed to FCv2 pair T-VOL and TCz pair R-VOL. Copy operation is not executed even if FCv2 pair is deleted. The value of BCE or BCP displays as F(FALSE) though the value of &quot;#TRACKS YET TO BE COPIED&quot; displayed by the FLASHCPY QUERY RELATIONS command of ICKDSF changes, depending on the number of tracks in which the copy has not been completed.</td>
</tr>
</tbody>
</table>
The following table compares the relationship releasing processes of IBM® FlashCopy and Hitachi Compatible FlashCopy® V2.

<table>
<thead>
<tr>
<th>Compared item</th>
<th>IBM® FlashCopy</th>
<th>Hitachi FCv2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copying in NOCOPY mode in FlashCopy to URz Primary Volume function</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When FCv2 pair in NOCOPY mode is created using URz pair P-VOL, the copy operation is executed on FCv2 pair T-VOL and URz pair S-VOL. Copy operation is not executed even if FCv2 pair is deleted. The value of BCE or BCP displays as F(FALSE) though the value of &quot;#TRACKS YET TO BE COPIED&quot; displayed by the FLASHCPY QUERY RELATIONS command of ICKDSF changes, depending on the number of tracks in which the copy has not been completed.</td>
</tr>
<tr>
<td>Receiving Failover/Failback command to TCz pairs in FlashCopy® to PPRC Primary Volume function</td>
<td>Receives Failover/Failback command.</td>
<td>Failover command is received, but after that, FCv2 pair T-VOL will be used as TCz R-VOL. Therefore Failback command is rejected.</td>
</tr>
<tr>
<td>Executing ReverseResync command on URz pairs in FlashCopy to URz Primary Volume function</td>
<td>-</td>
<td>ReverseResync command is rejected because FCv2 pair T-VOL will be used as URz pair S-VOL.</td>
</tr>
<tr>
<td>Execute ICKDSF command for FCv2 to TCz pair M-VOL in pending status</td>
<td>Ends Normally.</td>
<td>Ends abnormally with CC=12.</td>
</tr>
<tr>
<td>Establishing a TCz pair in NOCOPY mode whose M-VOL is a FCv2 pair T-VOL that you establish in NOCOPY mode</td>
<td>Neither FlashCopy data nor PPRC data can be copied.</td>
<td>Data can be copied from the FCv2 pair S-VOL to T-VOL but not to the TCz R-VOL. In this state if you release the FCv2 pair, the data of TCz M-VOL and R-VOL will be different.</td>
</tr>
<tr>
<td>Establishing a URz pair in NOCOPY mode whose P-VOL is a FCv2 pair T-VOL that you establish in NOCOPY mode</td>
<td>-</td>
<td>Data can be copied from the FCv2 pair S-VOL to T-VOL but not to the URz S-VOL. In this state if you release the FCv2 pair, the data of URz P-VOL and S-VOL will be different.</td>
</tr>
<tr>
<td>The operation used when relationship-creation fails in the remote site for Preserve Mirror FlashCopy</td>
<td>The relationship on the remote site is not created, though the local relationship may be created. In this case, the TCz volume associated with the FCv2 T-VOL is in suspend status.</td>
<td>Neither local or remote relationships are created.</td>
</tr>
</tbody>
</table>
### Table 5-4 Differences of relationship releasing process between IBM® FlashCopy and Hitachi Compatible FlashCopy® V2

<table>
<thead>
<tr>
<th>Compared item</th>
<th>IBM® FlashCopy</th>
<th>Hitachi FCv2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Withdraw command (specifies extent area). See the following figure.</td>
<td>The command deletes the relationships existing within the specified extent area. When the specified extent area is included only in a part of the central existing relationship area, only the existing relationships of the area will be divided up.</td>
<td>When a part of the existing relationship area is included in the extent area specified by the Withdraw command, all existing relationships are withdrawn.</td>
</tr>
<tr>
<td>REMOVEFCPY (ICKDSF CONTROL command)</td>
<td>The command will finish normally. Relationships will not be deleted.</td>
<td>Not supported. The command will finish abnormally. Relationships will not be deleted.</td>
</tr>
<tr>
<td>The operation for establishing a dataset relationship using DFSMSdss command, and specifying the source or target volume of a volume relationship as the copy target</td>
<td>Part of the volume relationship is withdrawn.</td>
<td>• When you specify the source volume of a volume relationship as the copy target, the entire volume relationship will be withdrawn. • When you specify the target volume of a volume relationship as the copy target, the volume relationship will be withdrawn.</td>
</tr>
<tr>
<td>The operation when you delete multiple relationships by one withdraw command</td>
<td>If undeletable relationships exist in the multiple target relationships, the command ends abnormally or normally. The deletable relationships are all deleted.</td>
<td>If undeletable relationships exist in the multiple target relationships, the command ends abnormally. Even the deletable relationships are not deleted.</td>
</tr>
<tr>
<td>Deleting the S-VOL dataset relationship of volumes that are not Incremental</td>
<td>The dataset is deleted correctly. The volume relationships are not withdrawn.</td>
<td>The dataset is deleted correctly. The volume relationships are withdrawn when the copy operation is completed.</td>
</tr>
</tbody>
</table>
Notes

- Creation of relationships can fail if any of the following has been performed:
  - A scratch operation
  - Deletion of datasets
  - Volume initialization

Correct the situation by using the FCWITHDR command to withdraw the relationship, or by waiting until the background copy operation completes and the relationship disappears.

- When only a part of the copy target relationship is included in the specified extent as the copy target, the volume relationship will not be withdrawn.

Comparing IBM® FlashCopy® SE and Compatible Software for IBM® FlashCopy® SE

The following table compares IBM® FlashCopy SE and Compatible Software for IBM® FlashCopy® SE.
Table 5-5 Comparing IBM® FlashCopy SE and Compatible Software for IBM® FlashCopy® SE

<table>
<thead>
<tr>
<th>Item</th>
<th>IBM® FlashCopy SE</th>
<th>Compatible Software for IBM® FlashCopy® SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action when the pool is full</td>
<td>Since usage amount in the pool is managed in units of tracks, you cannot write to the pool when the pool is full.</td>
<td>The usage amount in the pool is managed in units of pages, and the usage amount of the TSE-VOL in the page is managed in units of tracks. When pages cannot be allocated because the pool is full, you can write to the pool until all tracks in the page are used.</td>
</tr>
<tr>
<td>Changing volumes to online</td>
<td>After you change the T-VOL status of a FlashCopy pair to online and then change it to offline and execute Fast Reverse Restore, you can change the new S-VOL status to online.</td>
<td>After you change the T-VOL status of a Compatible Software for IBM® FlashCopy® SE pair to online and then change it to offline and execute Fast Reverse Restore, you cannot change the new S-VOL status to online because the data is not guaranteed.</td>
</tr>
</tbody>
</table>

**Comparison of supporting commands**

IBM® FlashCopy supports the ICKDSF commands while Compatible FlashCopy® V2 partly supports them. However, if you execute the commands to a TCz M-VOL or SIz S-VOL that is in pending status, the commands will end abnormally with CC=12. See If ICKDSF command ends abnormally on page 6-2 for details on how to avoid the abnormal ending.

In addition, Compatible FlashCopy® V2 does not support the following parameters of the TSO commands:

**FC Establish command**
- OPENDVCS
- MODE (ASYNC)

**FC Query command**
- OPENDVCS
- UNFORMAT

**FC Withdraw command**
- OPENDVCS
- ACTION (COMMIT/REVERT)

Compatible FlashCopy® V2 does not support the following parameters of ICKDSF commands:
**FLASHCPY WITHDRAW command**

- REVERT | COMMIT

Compatible FlashCopy® V2 does not support the following parameters of ANTRQST commands.

**REQUEST=FCESTABL command**

- OPENDVCS
- MODE (ASYNC)

**REQUEST=FCQUERY command**

- OPENDVCS

**REQUEST=FCWITHDRAW command**

- OPENDVCS
- ACTION (COMMIT/REVERT)

Compatible FlashCopy® V2 does not support the following parameters of z/VM CP commands.

**QUERY FLASHCOPY command**

- All parameters
Troubleshooting

This chapter provides troubleshooting information for Hitachi Compatible FlashCopy® and instructions for calling technical support.

- If a Hitachi Compatible FlashCopy® relationship is suspended
- If ICKDSF command ends abnormally
- SIM Reporting
- Calling the Hitachi Data Systems Support Center
If a Hitachi Compatible FlashCopy® relationship is suspended

Hitachi Compatible FlashCopy® relationships may be suspended if a hardware or software failure occurs during operation. If Compatible FlashCopy® relationships are suspended, hosts may be unable to access copy target datasets.

To find whether suspended Compatible FlashCopy® relationships exist within the volumes, use the Pair Operation window. If the Relationships column of the volume list displays S-Failed or T-Failed, a suspended Compatible FlashCopy® relationship exists within the volume.

To delete a suspended Compatible FlashCopy® relationship, do one of the following:

- Delete the copy target dataset that has the suspended Compatible FlashCopy® relationship (that is, delete the dataset that is inaccessible from the hosts). The operating system will automatically recognize the pair that has the dataset to be deleted, and will issue the Withdraw command.
- Issue the TSO FCWITHDR command. If the suspended Compatible FlashCopy® relationship can be identified, issue the FCWITHDR command to its extent.

If ICKDSF command ends abnormally

When you execute the ICKDSF command to a TCz M-VOL or SIz S-VOL that is in pending status, the ICKDSF job ends abnormally with CC=12.

The following table shows how to avoid the abnormal endings:

**Table 6-1 Avoiding abnormal endings of the ICKDSF commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>How to avoid</th>
</tr>
</thead>
</table>
| FLASHCPY ESTABLISH | • Use the TSO command or the DFSMSdss command.  
|                  | • Check if a TCz pair or SIz pair is in duplex or suspend status, and then execute the FLASHCPY ESTABLISH command. To check the pair status, use the CQUERY command of the TSO. |
| FLASHCPY WITHDRAW | • Use the TSO command.  
|                  | • Check if a TCz pair or SIz pair is in duplex or suspend status, and then execute the FLASHCPY WITHDRAW command. To check the pair status, use the CQUERY command of the TSO. |
| FLASHCPY QUERY   | • Execute the FLASHCPY QUERY or the FLASHCPY QUERY RELATIONS command to the T-VOL of Compatible FlashCopy®. |
| FLASHCPY ESTABLISH | • When you are going to execute the FLASHCPY QUERY or the FLASHCPY QUERY RELATIONS command on the S-VOL of Compatible FlashCopy®, check if a TCz pair or SIz pair is in duplex or suspend status, and then execute the command. Use the CQUERY command of the TSO to check the pair status |
SIM Reporting

The storage system reports a service information message (SIM) to the host when it is necessary to notify the user of a possible service requirement for the storage system.

The SIMs are classified as follows according to severity for reporting and logging purposes:
1. Service
2. Moderate
3. Serious
4. Acute

The larger the number becomes, the more the message becomes important. The SVP reports all SIMs related to Compatible FlashCopy® operations. All SIMs are stored on the SVP for use by Hitachi personnel. The SIMs reported to the zSeries and S/390 host are logged in the SYS1.LOGREC dataset of the host operating system. Each time a SIM is generated, the amber Message LED on the control panel (under the Ready and Alarm LEDs) turns on as an additional alert for the user. The Storage Navigator computer also displays the SIMs to provide an additional source of notification for the user.

For further information on SIM reporting, please contact your Hitachi Data Systems representative or the Hitachi Data Systems Support Center.

The following figure shows a typical 32-byte SIM from the storage system.

![Figure 6-1 Typical SIM showing reference code and SIM type](image)

SIMs are displayed on the host console by reference code (RC) and severity. The six-digit RC (composed of bytes 22, 23, and 13) identifies the possible error and determines the severity. The SIM type (byte 28) indicates the component that experienced the error.

The following table shows the DKC SIM (byte 28 = F1) related to SIz operations:
Calling the Hitachi Data Systems Support Center

If you need to call the Hitachi Data Systems Support Center, make sure to provide as much of the following information as possible.

Information that you need to provide includes:

- The circumstances surrounding the error or failure.
- The exact content of any error messages displayed on the host systems.
- The exact content of any error messages displayed by Storage Navigator.
- The Storage Navigator configuration information (use the 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 Support Portal for contact information: https://portal.hds.com

### Table 6-2 SIM

<table>
<thead>
<tr>
<th>Reference Code</th>
<th>Importance level</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSB22</td>
<td>SSB23</td>
<td></td>
</tr>
<tr>
<td>4B</td>
<td>2x</td>
<td>Moderate</td>
</tr>
</tbody>
</table>
|                |                  | Copying process of FCv2 ends abnormally. Internally the relationship becomes suspended by failure and the T-VOL becomes inaccessible.  
|                |                  | - "x" indicates the last digit of the T-VOL's CU number (0x0 to 0xF).  
|                |                  | - "SSB13" indicates the T-VOL's LDEV number. |
| 47             | E5               | Moderate     |
|                |                  | The FCv2 relationship is automatically withdrawn and the T-VOL becomes inaccessible because the power supply was turned on while the shared memory volatilized. |
Compatible FlashCopy® V2 GUI reference

This appendix describes the Storage Navigator windows and tabs for Compatible FlashCopy® V2. Some of the Compatible FlashCopy® V2 windows and tabs are also used for ShadowImage for Mainframe.

- Replications window
- View Histories window
- Edit Local Replica Option wizard
- Confirm window for Edit Local Replica Options
- Edit SCP Time wizard
Replications window

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Licensed Capacity</td>
<td>The used capacity and the licensed capacity of each product.</td>
</tr>
<tr>
<td>Number of Replica LDEVs</td>
<td>Number of LDEVs used for local replication pairs.</td>
</tr>
<tr>
<td>Number of FCv2/FCSE Relationships</td>
<td>Total number of relationships for Compatible FlashCopy® V2 and Compatible Software for IBM® FlashCopy® SE.</td>
</tr>
<tr>
<td>Number of Differential Tables</td>
<td>Number of differential tables that are already used.</td>
</tr>
<tr>
<td></td>
<td>As differential tables are not used by Thin Image pairs, the number of differential tables is not changed by Thin Image operations.</td>
</tr>
<tr>
<td>View Histories</td>
<td>Displays the View History window.</td>
</tr>
</tbody>
</table>

Replica LDEVs tab

This tab displays FCv2/FCSE primary and secondary pair volume information.
The View Histories window displays FCv2/FCSE primary and secondary pair volumes that have an operation history. Up to 16,384 operation histories are displayed. To view more than 16,384 operation histories, see the History window (secondary window) (Viewing operation history (secondary window) on page B-8).
## Setting fields

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copy Type</td>
<td>• FCv2/FCSE: Compatible FlashCopy® V2 and Compatible Software for IBM® FlashCopy® SE</td>
</tr>
<tr>
<td></td>
<td>• SI: ShadowImage</td>
</tr>
<tr>
<td></td>
<td>• TI: Thin Image</td>
</tr>
<tr>
<td></td>
<td>• SS: Copy-on-Write Snapshot</td>
</tr>
<tr>
<td></td>
<td>• SIMF: ShadowImage for Mainframe</td>
</tr>
</tbody>
</table>

## Histories table

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>Operation date and time</td>
</tr>
<tr>
<td>Source Volume</td>
<td>Displays the following source volume information:</td>
</tr>
<tr>
<td></td>
<td>• LDEV ID: LDEV identifier of the source volume</td>
</tr>
<tr>
<td></td>
<td>• Provisioning Type, which can be one of the following:</td>
</tr>
<tr>
<td></td>
<td>- Basic: Internal volume</td>
</tr>
<tr>
<td></td>
<td>- DP: DP-VOL</td>
</tr>
<tr>
<td></td>
<td>- External: External volume</td>
</tr>
<tr>
<td></td>
<td>• External MF: FICON® Data Migration volume</td>
</tr>
<tr>
<td>Target Volume</td>
<td>Displays the following target volume information:</td>
</tr>
<tr>
<td></td>
<td>• LDEV ID: LDEV identifier of the target volume</td>
</tr>
<tr>
<td></td>
<td>• Provisioning Type, which can be one of the following:</td>
</tr>
<tr>
<td></td>
<td>- Basic: Internal volume</td>
</tr>
<tr>
<td></td>
<td>- DP: DP-VOL</td>
</tr>
<tr>
<td></td>
<td>- External: External volume</td>
</tr>
<tr>
<td>Mirror Unit</td>
<td>Not applicable to FCv2/FCSE. Displayed only for TI (Thin Image) and SS (Copy-on-Write Snapshot).</td>
</tr>
<tr>
<td>Pool ID</td>
<td>Displayed only when TI or SS is selected from the Copy type field.</td>
</tr>
<tr>
<td>Relationship ID</td>
<td>Displayed only when FCv2/FCSE are selected as values in the Copy type field.</td>
</tr>
<tr>
<td>Description Code</td>
<td>The code number of the message.</td>
</tr>
<tr>
<td>Description</td>
<td>Displays the operation message. For details, see Viewing a pair’s operations history on page 3-41.</td>
</tr>
<tr>
<td>Export</td>
<td>Opens a dialog for downloading table information to a file.</td>
</tr>
</tbody>
</table>
Edit Local Replica Option wizard

Edit Local Replica Option window

SIMF/FCv2/FCSE System Options table

This table is displayed when the System Type is Mainframe.
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
</table>
| System Option        | The system options include:<br>• **Swap & Freeze**: Use this option when you want to save data immediately after Quick Restore as-is. When you enable this option and execute Quick Restore, update copying after Quick Restore is inhibited, the secondary volume in the DUPLEX status is saved without being updated.  
  • **Host I/O Performance**: Use this option when you give higher priority on I/O response than volume copy time. Enabling this option inhibits execution of copy processing, thereby improving host I/O response.  
  • **FC Slower Copy1**: Reduces background copying to one half, thereby improving host I/O response.  
  • **FC Slower Copy2**: Reduces background copying to one quarter, thereby improving the host I/O response.  
  • **FC Ext. Slower Copy1**: When the MP operating ratio of the MP blade to which the source volume or target volume in a Compatible FlashCopy(R) relationship is allocated exceeds 65%, background copy operations are suppressed, and consequently host I/O response improves.  
  • **FC Ext. Slower Copy2**: When the MP operating ratio of the MP blade to which the source volume or target volume in a Compatible FlashCopy(R) relationship is allocated exceeds 50%, background copy operations are suppressed, and consequently host I/O response improves. |
| Status               | Enabled or Disabled:<br>• **Enabled**: If you select a system option you want to enable, the **Status** column displays Enabled.  
  • **Disabled**: If you select a system option you want to disable, the **Status** column displays Disabled. |
Confirm window for Edit Local Replica Options

SIMF/FCv2/FCSE System Options table

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Option</td>
<td>Displays the system options.</td>
</tr>
<tr>
<td>Status</td>
<td>Indicates whether the system option is enabled or</td>
</tr>
<tr>
<td></td>
<td>disabled.</td>
</tr>
</tbody>
</table>

Task Name: 120809-EditLocalReplicaOptions
(Max. 32 Characters)
**Edit SCP Time wizard**

**Edit SCP Time window**

![Edit SCP Time window](image)

**SCP Time table**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CU</td>
<td>CU number</td>
</tr>
<tr>
<td>SCP Time (sec.)</td>
<td>SCP (state-change-pending) time set for each CU. The range is 0-518,400 seconds (6 days).</td>
</tr>
<tr>
<td>Change SCP Time</td>
<td>Opens the Change SCP Time dialog.</td>
</tr>
</tbody>
</table>

**Change SCP Time dialog**

![Change SCP Time dialog](image)

**Information Setting area**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCP Time</td>
<td>SCP (state-change-pending) time set for each CU. The range is 0-518,400 seconds (6 days).</td>
</tr>
</tbody>
</table>
## Confirm window for Edit SCP Time

![Confirm window for Edit SCP Time](image)

## SCP Time table

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CU</td>
<td>CU number</td>
</tr>
<tr>
<td>SCP Time</td>
<td>SCP (state-change-pending) time set for each CU. The range is 0-518,400 seconds (6 days).</td>
</tr>
</tbody>
</table>
Performing Compatible FlashCopy® V2 operations (secondary window)

This appendix describes how to perform Compatible FlashCopy® V2 operations using the previous version of the Storage Navigator GUI, which opens in a secondary window.

- Setting options (secondary window)
- Changing the SCP Time (secondary window)
- Viewing resource information (secondary window)
- Viewing the number of relationships and license information (secondary window)
- Viewing operation history (secondary window)
Setting options (secondary window)

1. Click **Actions > Local Replications > SIMF/FCv2 > Option.**

2. Click ![modify mode] to change to the Modify mode.

3. In the **Option** window, select the check box for the option that you want to set.
   - If you want to remove an option, clear the check box in the **Select Option(s)** box.

4. Click **Apply.**
   - The specified option is in effect.

Changing the SCP Time (secondary window)

1. Click **Actions > Local Replications > SIMF/FCv2 > FCv2/FCSE.**

2. Click ![modify mode] to change to the Modify mode.

3. In the Tree of the FCv2/FCSE window, select the LDKC that contains the CU that you want to change the state-change-pending time.
   - The list of CUs displays on the right.

4. Select and right-click the CU for which you want to change the state-change-pending time. You may select multiple CUs at a time. If you select multiple CUs, the same state-change-pending time will be applied to all selected CUs.

5. In the menu, select the **Set SCP Time** command.
   - The **Set SCP Time** dialog box displays.

6. Enter the state-change-pending time you want to set.

7. Click **OK.**
   - The **Set SCP Time** dialog box closes and the changed state-change-pending time displays on the FCv2/FCSE window.

8. If you want to change the state-change-pending time of other CUs, repeat step 3 through step 7.

9. Click **Apply.**
   - The confirmation message displays and asks if it is OK to apply the changes of state-change-pending time to the storage system.

10. Click **OK.**
The setting in the **Set SCP Time** dialog box applies to the storage system, and the state-change-pending time changes.

**Caution:** Remember that the state-change-pending time (SCP time) of Compatible FlashCopy® V2 and TrueCopy for Mainframe is the same. Therefore, when you are going to change the state-change-pending time of Compatible FlashCopy® V2, you need to decide the setting value, considering that the state-change-pending time of TrueCopy for Mainframe will be also changed to the same value. For information about the state-change-pending time of TrueCopy for Mainframe, see the *Hitachi TrueCopy® for Mainframe User Guide*.

![Set SCP Time dialog box](image)

**Figure B-1 Set SCP Time dialog box**

The following items display in the Set SCP Time dialog box:

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCP Time (sec.) text box</td>
<td>Specifies the state-change-pending time in seconds (0 to 518,400 seconds (6 days)). The text box displays the state-change-pending time that is set to the CU selected in the FCv2 window by default. If multiple CUs are selected and the state-change-pending time that is set to each CU is different, the text box will be blank by default.</td>
</tr>
<tr>
<td>OK button</td>
<td>The OK button closes the SCP Time dialog box and displays the changed state-change-pending time in the FCv2 window. If the SCP Time (sec.) text box is blank, the setting in the SCP Time dialog box is invalid.</td>
</tr>
<tr>
<td>Cancel button</td>
<td>The Cancel button cancels the setting in the SCP Time dialog box and closes the dialog box.</td>
</tr>
</tbody>
</table>

**Viewing resource information (secondary window)**

You use Storage Navigator to view resource information for Compatible FlashCopy® V2.

To display the **Compatible FlashCopy® V2 Information** dialog box:

1. Click **Actions > Local Replications > SIMF/FCv2** to open the **FCv2/FCSE** window.
2. Right-click one or more in the list of CU numbers.
   The menu displays.
3. Select the **Compatible FlashCopy® V2 Information** command from the menu.
   The **Compatible FlashCopy® V2 Information** dialog box opens.
Performing Compatible FlashCopy® V2 operations (secondary window)

You need the information in the Compatible FlashCopy® V2 Information dialog box when you calculate the number of the Compatible FlashCopy® V2 relationships that can be established.

**Table B-2 Compatible FlashCopy® V2 Information dialog box**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total relationships</td>
<td>Displays the number of relationships that are already established by Compatible FlashCopy® V2 (on the left side of the slash (/)), and the total number of relationships that can be established by Compatible FlashCopy® V2 (on the right side of the slash (/)).</td>
</tr>
<tr>
<td>Item</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Remaining relationship(s)| Displays the remaining number of relationships that can be established by Compatible FlashCopy® V2.  
The remaining number of relationships is calculated by subtracting the total number of Compatible FlashCopy® V2 relationships and Thin Image and Copy-on-Write Snapshot pairs that are already established or created from the total number of relationships that can be established. |
| Total differential tables| Displays the number of differential tables that are already used (on the left side of the slash (/)), and the total number of differential tables in the storage system (on the right side of the slash (/)). |
| Remaining differential table(s) | Displays the remaining number of differential tables in the storage system.  
In addition to Compatible FlashCopy® V2, ShadowImage, ShadowImage for Mainframe, Copy-on-Write Snapshot, and Volume Migration use differential tables. Therefore, if ShadowImage, ShadowImage for Mainframe, Copy-on-Write Snapshot pairs exist, or if migration plans are being executed by Volume Migration, you may be able to establish a fewer number of relationships than the total number of relationships. |
| FCv2 Used Capacity (TB)  | Displays the license information of FCv2 and will be indicated in the format of X(Y). X indicates license capacity used by FCv2, and Y indicates total license capacity reserved for FCv2. Unlimited will be displayed when there is no limited license capacity for FCv2. |
| FCSE Used Capacity (TB)  | Displays the license information of FCSE and will be indicated in the format of X(Y). X indicates license capacity used by FCSE, and Y indicates total license capacity reserved for FCSE. Unlimited will be displayed when there is no limited license capacity for FCSE. |
Performing Compatible FlashCopy® V2 operations (secondary window)

Viewing the number of relationships and license information (secondary window)

You use Storage Navigator to view the number of relationships and license information.

The Information dialog box displays information such as the number of relationships in the storage system, the number of reserved volumes, and the license capacity.

To display the Information dialog box:

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compatible FlashCopy® V2 Relationships</td>
<td>Displays the information about the Compatible FlashCopy® V2 relationships in the volume list. You can select information displayed in this volume list by using the LDKC drop-down list, CU drop-down list, and the check boxes below.</td>
</tr>
<tr>
<td></td>
<td>• LDKC drop-down list enables you to select the LDKC containing volumes that you want to display in the CU drop-down list.</td>
</tr>
<tr>
<td></td>
<td>• CU Gr. drop-down list enables you to select the CU number as a group of eight CUs. However, in the CU Gr. drop-down list, only the CU numbers in the LDKCs, which are selected in the LDKC drop-down list, are displayed.</td>
</tr>
<tr>
<td></td>
<td>• CU drop-down list enables you to select the CU containing volumes that you want to display in the volume list. Only the CUs that are in the range you selected by the CU Gr. drop-down list will be shown in the CU drop-down list.</td>
</tr>
<tr>
<td></td>
<td>• The check boxes allow you to select the type and status of the volumes that you want to display in the volume list.</td>
</tr>
<tr>
<td></td>
<td>FCv2: Compatible FlashCopy® V2 volumes</td>
</tr>
<tr>
<td></td>
<td>FCSE: Compatible Software for IBM® FlashCopy® SE volumes</td>
</tr>
<tr>
<td>Source</td>
<td>Source volumes</td>
</tr>
<tr>
<td></td>
<td>• Normal: S-VOLs in normal status</td>
</tr>
<tr>
<td></td>
<td>• Failed: S-VOLs in abnormal status</td>
</tr>
<tr>
<td>Target</td>
<td>Target volumes</td>
</tr>
<tr>
<td></td>
<td>• Normal: T-VOLs in normal status</td>
</tr>
<tr>
<td></td>
<td>• Failed: T-VOLs in abnormal status</td>
</tr>
<tr>
<td></td>
<td>• The volume list displays the information about the volumes that form the FCv2 relationships. You can select the volumes displayed in this volume list by using the LDKC drop-down list, CU drop-down list, and the check boxes below.</td>
</tr>
<tr>
<td>Refresh the window after this dialog box is closed. check box</td>
<td>If you select the check box, the information displayed in the Pair Operation window of ShadowImage for Mainframe will be updated after the Compatible FlashCopy® V2 Information dialog box closes. If you do not select the check box, the information in the Pair Operation window will be the same before and after you close the Compatible FlashCopy® V2 Information dialog box.</td>
</tr>
<tr>
<td>Refresh button</td>
<td>Updates the information in the Volume List in FCv2 Relationships according to the settings of the LDKC drop-down list, CU drop-down list, and the check boxes below.</td>
</tr>
<tr>
<td>Close button</td>
<td>Closes the Compatible FlashCopy® V2 Information dialog box.</td>
</tr>
</tbody>
</table>
1. Click **Actions > Local Replications > SIMF/FCv2 > Pair Operation** to open the **Pair Operation** window.

2. Right-click anywhere on the volume list of the **Pair Operation** window of ShadowImage for Mainframe.
   
   A menu is displayed.

3. Select the **Information** command in the menu.
   
   The **Information** dialog box is displayed.

![Information Dialog Box](image)

**Figure B-3 Information Dialog Box**

The Information dialog box shows the following information:

**Table B-3 Information dialog box**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ShadowImage for Mainframe pair(s)</td>
<td>The number of SIz pairs will be displayed in the format of XXXX / YYYY. XXXX indicates the number of SIz pairs, and YYYY indicates the total number of SIz pair tables and ShadowImage pair tables. When the volume size is large, ShadowImage for Mainframe uses multiple pair tables per one pair. Therefore, sometimes you cannot create 16,384 pairs. For information about the number of pairs and the pair tables, see the Hitachi ShadowImage® for Mainframe User Guide.</td>
</tr>
</tbody>
</table>
Performing Compatible FlashCopy® V2 operations (secondary window)

You use Storage Navigator to view operation history.

The History window displays history of operations related to Compatible FlashCopy® V2 and **Compatible Software for IBM® FlashCopy® SE** relationships.

To view the operation history:

1. Click **Actions > Local Replications > SIMF/FCv2 > History** to open the **History** window.

   You may need to wait until the **History** window displays the operation history, if some of the pairs include LUSE volumes, or if the total number of the following pairs and migration plans in the storage system is 500 or more:

   - ShadowImage for Mainframe pairs
   - Compatible FlashCopy® V2 relationships
   - Compatible FlashCopy® V2

---

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCv2/FCSE Relationship(s)</td>
<td>The number of Compatible FlashCopy® V2 relationships displayed. The maximum number of relationships that can be created in one storage system is 1,048,575, including Thin Image and Copy-on-Write Snapshot pairs. Therefore, if Thin Image and Copy-on-Write Snapshot pairs are created in the same storage system, the maximum number of relationships that you can create may be less than 1,048,575 minus the number shown in FCv2/FCSE Relationship or Relationships.</td>
</tr>
<tr>
<td>Reserved volume(s)</td>
<td>The number of reserved volumes of ShadowImage for Mainframe will be displayed in the format of XXXX / YYYY. XXXX indicates the number of reserved volumes of ShadowImage for Mainframe. YYYY indicates the total number of reserved volumes of ShadowImage for Mainframe and ShadowImage. Reserved volumes include the T-VOLs of ShadowImage for Mainframe and ShadowImage pairs.</td>
</tr>
<tr>
<td>Remaining pair table(s)</td>
<td>The number of remaining pair tables in the storage system are displayed on the left side of the slash (/). The total number of pair tables in the storage system are displayed on the right side of the slash (/).</td>
</tr>
<tr>
<td>Remaining differential table(s)</td>
<td>The number of remaining differential tables in the storage system is displayed on the left side of the slash (/). The total number of differential tables in the storage system is displayed on the right side of the slash (/).</td>
</tr>
<tr>
<td>Used Capacity (TB)</td>
<td>License information of ShadowImage for Mainframe will be indicated in the format of X(Y). X indicates license capacity used by ShadowImage for Mainframe, and Y indicates total license capacity reserved for ShadowImage for Mainframe. Unlimited is displayed when there is no limited license capacity for ShadowImage for Mainframe.</td>
</tr>
<tr>
<td>Close button</td>
<td>Closes the Information dialog box.</td>
</tr>
</tbody>
</table>
Performing Compatible FlashCopy® V2 operations (secondary window)

2. See the **Compatible FlashCopy® V2 History** list in the lower area of the **History** window.

3. To change the displaying order, click a column title in the list. The list is sorted based on the items in the clicked column title.
   - If there are more than 16,384 records of operations, the list is divided into multiple pages, and only the list that is currently displayed is sorted.
   - If you click the same column title again, you can switch the sorting order (Ascending or Descending).

4. If the information on the list is not updated, click **File**, and then **Refresh** on the menu bar of the Storage Navigator main window. The list is updated to the latest information.
   - For operations involving the copying process, the History window does not display information about the operations until the copying process starts. If you perform an operation on a relationship before the copying process starts, the History window does not display information about the operation.

5. If there are many records of operations, click the scroll button. The list will scroll, and you can see the operation history that has not been displayed.
   - If you click and drag up the frame border that divides the **History** window into upper and lower panes, you can expand the display area of the list.

6. If there are more than 16,384 records of operations, click **Next**. The list displays subsequent records of operations.
   - If you click **Previous**, the list switches to the previous page.
   - If there are 16,384 or fewer records of operations, you cannot click **Previous** and **Next**.
   - The storage system saves up to 524,288 records of latest operations.
Compatible FlashCopy® V2 GUI reference (secondary window)

This appendix describes the Compatible FlashCopy® V2 windows and dialog boxes in the previous version of the Storage Navigator GUI, which displays in a secondary window.

If you are using the current Storage Navigator GUI, click the Help button to display descriptions of the windows and dialog boxes, or see Compatible FlashCopy® V2 GUI reference on page A-1.

Some of the Compatible FlashCopy® V2 windows and tabs are also used for ShadowImage for Mainframe.

- Pair Operation window
- History window
- Option window
- FCv2/FCSE window
**Pair Operation window**

The Pair Operation window displays the volume and pair information for the selected CU image of the connected storage system.

An LDEV number that ends with a pound or gate symbol (#) indicates that the LDEV is an external volume (for example, 00:00:01 #). For details about the external volumes, see the *Hitachi Universal Volume Manager User Guide*.

When the letter “X” is the end of the LDEV number of P-VOL or S-VOL, the LDEV is the virtual volume for Dynamic Provisioning for Mainframe. For details about the virtual volumes, see the Provisioning Guide for Mainframe Systems.

The Pair Operation window displays Compatible FlashCopy® V2 relationship information and pair information of SiZ, but this section only explains the items related to FCv2 relationships. For details about SiZ pairs, see the *Hitachi ShadowImage® for Mainframe User Guide*. 
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree</td>
<td>Located on the left of the Pair Operation window, enables you to select a defined CU image. By selecting a CU image, the corresponding volume or relationship will be displayed in the Volume List on the upper right of the Pair Operation window. No volume will be displayed when you select Subsystem on the top of the Tree.</td>
</tr>
<tr>
<td>Volume List</td>
<td>Located on the upper right of the Pair Operation window, displays the following information:</td>
</tr>
<tr>
<td></td>
<td>• Message: Displays a message when there is no volume or pair to be displayed. If you see the message in the Volume List, click a different icon in the Tree on the left area of the Pair Operation window.</td>
</tr>
<tr>
<td></td>
<td>• S-VOL: Displays the information of the S-VOL in XX:YY:ZZ (LDKC number: CU number: LDEV ID) format.</td>
</tr>
<tr>
<td></td>
<td>• Status: The status of the SIz pairs. For detailed information for the SIz pair status, see the <em>Hitachi ShadowImage® for Mainframe User Guide</em>.</td>
</tr>
<tr>
<td></td>
<td>• T-VOL: Displays the information of the T-VOL in XX:YY:ZZ (LDKC number: CU number: LDEV ID) format. If there is no T-VOL, --- displays.</td>
</tr>
<tr>
<td></td>
<td>• TvolMode: Displays whether data is written to the SIz T-VOL. See the <em>Hitachi ShadowImage® for Mainframe User Guide</em> for details.</td>
</tr>
<tr>
<td></td>
<td>• Copy Pace: Displays the copy pace of the SIz pair.</td>
</tr>
<tr>
<td></td>
<td>• Sync.: The information displayed under this column varies according to the pair status. For details, see the following.</td>
</tr>
<tr>
<td></td>
<td>Simplex: - - - is displayed.</td>
</tr>
<tr>
<td></td>
<td>Pending: The progress (%) of copying.</td>
</tr>
<tr>
<td></td>
<td>Duplex: Identical data (%) of S-VOL and T-VOL.</td>
</tr>
<tr>
<td></td>
<td>SP-Pend/TRANS, V-Split/SUSPVS, Suspend/SUSPER: Copy completed data (%).</td>
</tr>
<tr>
<td></td>
<td>Split/SUSPOP, Resync/PENDING, Resync-R/REVRSY: Identical data (%) of S-VOL and T-VOL.</td>
</tr>
<tr>
<td></td>
<td>Deleting/TRANS: - - - is displayed.</td>
</tr>
<tr>
<td></td>
<td>• Emulation: Displays the emulation type of the paired volume.</td>
</tr>
<tr>
<td></td>
<td>• Capacity(Cyl): Displays the number of cylinders assigned to the volume.</td>
</tr>
<tr>
<td></td>
<td>• CTG: Displays the registered ID of the consistency group. If there is no consistency group, --- displays.</td>
</tr>
<tr>
<td></td>
<td>• CLPR(S): Displays the cache logical partition of the S-VOL.</td>
</tr>
<tr>
<td></td>
<td>• CLPR(T): Displays the cache logical partition of the T-VOL.</td>
</tr>
<tr>
<td></td>
<td>• Relationship(s): The current state of the volume in terms of whether the FCv2 relationship is established or not. When no relationship is established, --- displays. When a relationship is established, the status of the volume displays as shown in the following table. The parameter displayed in Relationship(s) changes according to whether the volume is S-VOL or T-VOL, or the settings are normal or not.</td>
</tr>
</tbody>
</table>
When you select and right-click a volume in the Volume List, the menu is displayed.

Table C-2 Menu command available

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detail</td>
<td>Displays detailed information about the selected volume.</td>
</tr>
<tr>
<td>Information</td>
<td>Displays information such as the number of SIZ pairs, and the number of Compatible FlashCopy® V2 and Compatible Software for IBM® FlashCopy® SE relationships or reserved volumes.</td>
</tr>
</tbody>
</table>

For detailed information about the dialog box displayed by the Detail command in the following table and for information about the commands that are not in the table, see the Hitachi ShadowImage® for Mainframe User Guide.

Table C-3 Menu commands

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display Filter</td>
<td>Enables you to display the dialog box where you can filter the volumes displayed in the Volume List. For details, see the Hitachi ShadowImage® for Mainframe User Guide.</td>
</tr>
<tr>
<td>Previous</td>
<td>Enables you to return to the previous page of the Volume List. This button is selectable only when the number of volumes defined in the subsystem exceeds 1,024 volumes, which is the maximum number of volumes that can be displayed on one page. It remains dimmed when the total number of volumes defined in the subsystem is less than 1,024 volumes.</td>
</tr>
<tr>
<td>Next</td>
<td>Enables you to turn to the next page of the Volume List. This button is selectable only when the number of volumes defined in the subsystem exceeds 1,024 volumes, which is the maximum number of volumes that can be displayed on one page. It remains dimmed when the total number of volumes defined in the subsystem is less than 1,024 volumes.</td>
</tr>
</tbody>
</table>
## History window

The History window displays the past record of pair and relationship operations.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
</table>
| Preview | Located under the Volume List, displays the content of the operations (volume/pair information) that have been set or specified in the Pair Operation window, displays the following information:  
• S-VOL: The information of the S-VOL displays in XX:YY:ZZ (LDKC number: CU number: LDEV ID) format.  
• T-VOL: The information of the S-VOL displays in XX:YY:ZZ (LDKC number: CU number: LDEV ID) format.  
• Copy Pace: The copying pace for SIZ pairs.  
• CLPR (S): The cache logical partition (CLPR) of the S-VOL.  
• CLPR (T): The cache logical partition (CLPR) of the T-VOL.  
• Error Code: The reason code displays if the preview operations (settings) cannot be applied successfully with the Apply button.  
• Preview: X(Y)/Z, where  
• X = the number of settings remaining in the Preview List that are still not applied to the storage system  
• Y = the type of pair operation  
• Z = command option  
When you select and right-click a volume in the Preview List, the menu will be displayed. If you select the Delete command, the selected setting will be canceled and deleted from the Preview List. If you select the Error Detail command when there is an error, you can see the error code and the error message. For details about the error codes, see the Hitachi Storage Navigator Messages. |
| Apply | Applies the SIZ operations displayed in the Preview List to the subsystem. For details, see the *Hitachi ShadowImage® for Mainframe User Guide*. |
| Cancel | Cancels all the operations set in the Preview List. |
An LDEV number that ends with a pound or gate symbol (#) indicates that the LDEV is an external volume (for example, 00:00:01 #). For details about the external volumes, see the Hitachi Universal Volume Manager User Guide.

When the letter 'X' is the end of the LDEV number of P-VOL or S-VOL, the LDEV is the virtual volume for Dynamic Provisioning for Mainframe (e.g.: 00:00:01 X). For details about the virtual volumes, see the Provisioning Guide for Mainframe Systems.

The upper area of the History window lists the operation history of SIz pairs relationships, and the lower area of the window lists the operation history of FCV2 relationships. For details about the operation history of SIz pairs, see the Hitachi ShadowImage® for Mainframe User Guide. The lower area of the History window displays the following items.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous</td>
<td>Enables you to return to the previous page of the list. This button is selectable only when the number of operation histories in the subsystem exceeds 16,384, which is the maximum number of histories that can be displayed on one page. The button is grayed out if the total number of operation histories in the subsystem is less than 16,384.</td>
</tr>
</tbody>
</table>
Table C-4 Compatible FlashCopy® V2 status and history reference codes and messages

<table>
<thead>
<tr>
<th>Code</th>
<th>Message</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0010</td>
<td>COPY STARTED(FC)</td>
<td>The Compatible FlashCopy® V2 background copy operation started. Note that this message will be displayed when the relationship is established, not when the copy operation starts. This message is displayed when the relationship is established without specifying the CHGRECORD option of the FLASHCOPY ESTABLISH command of z/VM.</td>
</tr>
<tr>
<td>0011</td>
<td>1st INCREMENTAL COPY STARTED</td>
<td>The initial copy operation of the Compatible FlashCopy® V2 relationship established by the Incremental FlashCopy function has started. This message displays when the relationship is established and not when the copy operation begins.</td>
</tr>
<tr>
<td>0012</td>
<td>2nd or LATER INCREMENTAL COPY STARTED</td>
<td>The second or later incremental copy of the Compatible FlashCopy® V2 relationship established by the Incremental FlashCopy function has started. This message displays when the relationship is established and not when the copy operation starts.</td>
</tr>
<tr>
<td>0013</td>
<td>1st NOCOPY RELATIONSHIP ESTABLISHED(INCREMENTAL)</td>
<td>The Compatible FlashCopy® V2 relationship was established by the Incremental FlashCopy function while in NOCOPY mode.</td>
</tr>
<tr>
<td>0014</td>
<td>2nd or LATER NOCOPY RELATIONSHIP ESTABLISHED(INCREMENTAL)</td>
<td>The Compatible FlashCopy® V2 relationship initially established by the Incremental FlashCopy function was reestablished in NOCOPY mode.</td>
</tr>
<tr>
<td>Code</td>
<td>Message</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>-------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>0015</td>
<td>2nd or LATER INCREMENTAL COPY STARTED(REVERSE RESTORE/FAST REVERSE RESTORE)</td>
<td>The Reverse Restore function started a second or later incremental copy with a Compatible FlashCopy® V2 relationship initially established by the Incremental FlashCopy function. This message displays when the relationship is reestablished and not when the copy operation starts.</td>
</tr>
<tr>
<td>0016</td>
<td>2nd or LATER NOCOPY RELATIONSHIP ESTABLISHED(REVERSE RESTORE/FAST REVERSE RESTORE)</td>
<td>The Compatible FlashCopy® V2 relationship initially established by the Incremental FlashCopy function was reestablished by Reverse Restore in the NOCOPY mode.</td>
</tr>
<tr>
<td>0019</td>
<td>INITIALIZE STARTED(FC)</td>
<td>The Compatible FlashCopy® V2 initialization process started.</td>
</tr>
<tr>
<td>0020</td>
<td>COPY ENDED(FC)</td>
<td>The Compatible FlashCopy® V2 or Compatible Software for IBM® FlashCopy® SE background copy operation ended.</td>
</tr>
<tr>
<td>0022</td>
<td>RELATIONSHIP DELETED(FC)</td>
<td>The Compatible FlashCopy® V2 relationship was withdrawn by the FCWITHDR command.</td>
</tr>
<tr>
<td>0023</td>
<td>NOCOPY RELATIONSHIP ESTABLISHED(FC)</td>
<td>The Compatible FlashCopy® V2 relationship was established in NOCOPY mode.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This message is displayed when you establish the relationship for NOCOPY mode without specifying the CHGRECORD option of FLASHPCOPY ESTABLISH command of z/VM.</td>
</tr>
<tr>
<td>0024</td>
<td>COPY ENDED(Relationship maintained)</td>
<td>The copying operation of the Compatible FlashCopy® V2 relationship ended and the relationship is still maintained. When the relationship is established without specifying the CHGRECORD option of the FLASHPCOPY ESTABLISH command of z/VM, this message is displayed after the copying operation is completed.</td>
</tr>
<tr>
<td>0029</td>
<td>INITIALIZE ENDED NORMAL(FC)</td>
<td>The Compatible FlashCopy® V2 initialization process ended.</td>
</tr>
<tr>
<td>002A</td>
<td>COPY ENDED ABNORMAL(FC)</td>
<td>The Compatible FlashCopy® V2 copy operation ended abnormally.</td>
</tr>
<tr>
<td>002F</td>
<td>INITIALIZE ENDED ABNORMAL(FC)</td>
<td>The Compatible FlashCopy® V2 initialization process ended abnormally.</td>
</tr>
<tr>
<td>0030</td>
<td>COPY STARTED AFTER MODE CHANGED(FC)</td>
<td>The Compatible FlashCopy® V2 background copy operation started after the Compatible FlashCopy® V2 relationship changed to copy mode.</td>
</tr>
<tr>
<td>003A</td>
<td>DELETED BY SM VOLATILIZING(FC)</td>
<td>The Compatible FlashCopy® V2 relationship was withdrawn due to volatilization of the shared memory.</td>
</tr>
<tr>
<td>003B</td>
<td>SUSPENDED(FC)</td>
<td>The Compatible FlashCopy® V2 relationship was suspended due to error or failure.</td>
</tr>
<tr>
<td>0040</td>
<td>2nd or LATER INCREMENTAL COPY STARTED(FAST REVERSE RESTORE)</td>
<td>The Fast Reverse Restore function started a second or later incremental copy with a Compatible FlashCopy® V2 relationship initially established by the Incremental FlashCopy function. This message displays when the relationship is re-established and not when the copy operation starts.</td>
</tr>
</tbody>
</table>
If the relationship is established by the FLASHCOPY ESTABLISH command of z/VM, the relationship remains even after the completion of the copy. As the reference code on the History dialog box of Storage Navigator, 0020 COPY ENDED(FC) is displayed.

**Option window**

You can set options for Compatible FlashCopy® V2 on the Option window.
The FCv2/FCSE window displays the state-change-pending (SCP) time that is set on the CUs. The default setting of the state-change-pending time is 120 seconds, but you may change it by using the FCv2/FCSE window.

**Item** | **Description**
--- | ---
Select Option(s) | When you check the checkbox of the option name, that option will be enabled. If you clear the checkbox, that option will be disabled. The options that are available for FCv2 in this box are FC Slower Copy1, FC Slower Copy2, FC Ext. Slower Copy1, and FC Ext. Slower Copy2. Other options are available for ShadowImage for Mainframe. See the *Hitachi ShadowImage® for Mainframe User Guide* for details about these other options. Even if you have selected the checkboxes of other option names, they will not be enabled.
Apply | Applies the FCv2 options checked in the Select Option(s) box to the storage system.
Cancel | Cancels all the options set in the Select Option(s) box.

**FCv2/FCSE window**

The FCv2/FCSE window displays the state-change-pending (SCP) time that is set on the CUs. The default setting of the state-change-pending time is 120 seconds, but you may change it by using the FCv2/FCSE window.
The state-change-pending, in this case, means temporary suspension of the write operation from the host to the Compatible FlashCopy® V2 S-VOL. The period during which the write operation is stopped is called state-change-pending time. When you copy the data that is stored over several volumes by using Compatible FlashCopy® V2, the S-VOL will not be overwritten during the time which is defined as the state-change-pending time so that the consistency of the data will be maintained.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tree</strong></td>
<td>• When you click the Storage System, the LDKC in the storage system will be displayed. If you click the LDKC in the tree, the CU information in that LDKC will be listed in the CU List on the right.</td>
</tr>
</tbody>
</table>
| **CU List** | • CU: Displays the CU number (00-FE).  
• SCP Time(sec.): Displays the state-change-pending time that is set to the CUs in seconds. The state-change-pending time displayed is the same as the state-change-pending time of TrueCopy for Mainframe. For details, see the *Hitachi TrueCopy® for Mainframe User Guide*. |
<p>| <strong>Preview</strong> | Displays the number of CUs where the changes of the state-change-pending time are not applied to the storage system yet. |</p>
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Menu</strong></td>
<td>To change the state-change-pending time, select the desired command from the menu. The menu will be displayed by right-clicking a CU displayed in CU.</td>
</tr>
<tr>
<td></td>
<td>• Compatible FlashCopy® V2 Information: Displays the Compatible FlashCopy® V2 Information dialog box and allows you to see the information of the Compatible FlashCopy® V2 and Compatible Software for IBM® FlashCopy® SE relationships in the selected CU.</td>
</tr>
<tr>
<td></td>
<td>• SCP Time Setting: Displays the SCP Time Setting dialog box.</td>
</tr>
<tr>
<td></td>
<td>• Cancel: If change of the state-change-pending time of the selected CU is not applied to the storage system yet, this command changes the setting of the state-change-pending to the previous status.</td>
</tr>
<tr>
<td><strong>Apply</strong></td>
<td>Applies the settings displayed in the FCv2/FCSE window to the storage system.</td>
</tr>
<tr>
<td><strong>Cancel</strong></td>
<td>Cancels settings displayed in the FCv2/FCSE window without applying them to the storage system.</td>
</tr>
</tbody>
</table>
Glossary

This glossary defines the special terms used in this document. Click the letter links below to navigate.

A

alternate path

A secondary path to a logical volume, in addition to the primary path, that is used as a backup in case the primary path fails.

array

Another name for a RAID storage system.

array group

See RAID group.

async

asynchronous

at-time split

Operation that allows multiple pairsplit operations to be performed at a pre-determined time.

audit log

Files that store a history of the operations performed from Storage Navigator and the service processor (SVP), commands that the storage system received from hosts, and data encryption operations.
B

base emulation type
   Emulation type that is set when drives are installed. Determines the
device emulation types that can be set in the RAID group.

BC
   business continuity

BCM
   Business Continuity Manager

BLK, blk
   block

C

cache

cache logical partition (CLPR)
   Virtual cache memory that is set up to be allocated to different hosts in
contention for cache memory.

capacity
   The amount of data storage space available on a physical storage device,
usually measured in bytes (MB, GB, TB, etc.).

cascade configuration
   In a ShadowImage cascade configuration, two layers of secondary
volumes can be defined for a single primary volume (open-systems
only). Pairs created in the first and second layer are called cascaded
pairs. Compatible FlashCopy® V2 does not support a cascade
configuration.

CCI
   Command Control Interface

CFL
   Configuration File Loader. A Storage Navigator function for validating
and running scripted spreadsheets.

CFW
   cache fast write
CG
See **consistency group (CTG)**.

CTG
See **consistency group (CTG)**.

CH
channel

channel path
The communication path between a channel and a control unit. A channel path consists of the physical channel path and the logical path.

CHAP
challenge handshake authentication protocol

CL
cluster

CLI
command line interface

CLPR
cache logical partition

cluster
Multiple-storage servers working together to respond to multiple read and write requests.

command device
A dedicated logical volume used only by Command Control Interface and Business Continuity Manager to interface with the storage system. Can be shared by multiple hosts.

consistency group (CG, CTG)
A group of pairs on which copy operations are performed simultaneously; the pairs’ status changes at the same time. See also extended consistency group (EXCTG).

consistency time (C/T)
Shows a time stamp to indicate how close the target volume is to the source volume. C/T also shows the time stamp of a journal and extended consistency group.
**controller**

The component in a storage system that manages all storage functions. It is analogous to a computer and contains a processors, I/O devices, RAM, power supplies, cooling fans, and other sub-components as needed to support the operation of the storage system.

**copy-on-write**

Point-in-time snapshot copy of any data volume within a storage system. Copy-on-write snapshots only store changed data blocks, therefore the amount of storage capacity required for each copy is substantially smaller than the source volume.

**copy pair**

A pair of volumes in which one volume contains original data and the other volume contains the copy of the original. Copy operations can be synchronous or asynchronous, and the volumes of the copy pair can be located in the same storage system (local copy) or in different storage systems (remote copy).

A copy pair can also be called a volume pair, or just pair.

**COW**

copy-on-write

**COW Snapshot**

Hitachi Copy-on-Write Snapshot

**CTG**

See *consistency group (CTG)*.

**CTL**

ccontroller

**CU**

ccontrol unit

**currency of data**

The synchronization of the volumes in a copy pair. When the data on the secondary volume (S-VOL) is identical to the data on the primary volume (P-VOL), the data on the S-VOL is current. When the data on the S-VOL is not identical to the data on the P-VOL, the data on the S-VOL is not current.

**CYL, cyl**

cylinder
cylinder bitmap
Indicates the differential data (updated by write I/Os) in a volume of a split or suspended copy pair. The primary and secondary volumes each have their own cylinder bitmap. When the pair is resynchronized, the cylinder bitmaps are merged, and the differential data is copied to the secondary volume.

D

DASD
direct-access storage device

data consistency
When the data on the secondary volume is identical to the data on the primary volume.

data path
The physical paths used by primary storage systems to communicate with secondary storage systems in a remote replication environment.

data pool
One or more logical volumes designated to temporarily store original data. When a snapshot is taken of a primary volume, the data pool is used if a data block in the primary volume is to be updated. The original snapshot of the volume is maintained by storing the to-be-changed data blocks in the data pool.

DB
database

DBMS
database management system

device
A physical or logical unit with a specific function.

device emulation
Indicates the type of logical volume. Mainframe device emulation types provide logical volumes of fixed size, called logical volume images (LVIs), which contain EBCDIC data in CKD format. Typical mainframe device emulation types include 3390-9 and 3390-M. Open-systems device emulation types provide logical volumes of variable size, called logical units (LUs), that contain ASCII data in FBA format. The typical open-systems device emulation type is OPEN-V.
DEVN
device number

DFW
DASD fast write

differential data
Changed data in the primary volume not yet reflected in the copy.

disaster recovery
A set of procedures to recover critical application data and processing after a disaster or other failure.

disk array
Disk array, or just array, is another name for a RAID storage system.

disk controller (DKC)
The hardware component that manages front-end and back-end storage operations. The term DKC is sometimes used to refer to the entire RAID storage system.

DKC
disk controller. Can refer to the RAID storage system or the controller components.

DKCMAIN
disk controller main. Refers to the microcode for the RAID storage system.

DKP
disk processor. Refers to the microprocessors on the back-end director features of the Universal Storage Platform V.

DP-VOL
Dynamic Provisioning-virtual volume. A virtual volume with no memory space used by Dynamic Provisioning.

dynamic provisioning
An approach to managing storage. Instead of “reserving” a fixed amount of storage, it removes capacity from the available pool when data is actually written to disk. Also called thin provisioning.
emulation
The operation of the Hitachi RAID storage system to emulate the characteristics of a different storage system. For device emulation the mainframe host “sees” the logical devices on the RAID storage system as 3390-x devices. For controller emulation the mainframe host “sees” the control units (CUs) on the RAID storage system as 2105 or 2107 controllers.
RAID storage system system operates the same as the storage system being emulated.

emulation group
A set of device emulation types that can be intermixed within a RAID group and treated as a group.

EXCTG
See extended consistency group (ECTG).

extended consistency group (EXCTG)
A set of Universal Replicator for Mainframe journals in which data consistency is guaranteed. When performing copy operations between multiple primary and secondary systems, the journals must be registered in an EXCTG.

external application
A software module that is used by a storage system but runs on a separate platform.
external port
A fibre-channel port that is configured to be connected to an external storage system for Universal Volume Manager operations.

external volume
A logical volume whose data resides on drives that are physically located outside the Hitachi storage system.

F

failback
The process of switching operations from the secondary path or host back to the primary path or host, after the primary path or host has recovered from failure. See also failover.

failover
The process of switching operations from the primary path or host to a secondary path or host when the primary path or host fails. See also failback.

FBA
fixed-block architecture

FC
fibre channel; FlashCopy

FIBARC
Fibre Connection Architecture

FICON
Fibre Connectivity

free capacity
The amount of storage space (in bytes) that is available for use by the host systems.

FV
fixed-size volume

G

GUI
graphical user interface
H

HDP
    Hitachi Dynamic Provisioning

HDS
    Hitachi Data Systems

host failover
    The process of switching operations from one host to another host when
    the primary host fails.

host group
    A group of hosts of the same operating system platform.

host mode
    Operational modes that provide enhanced compatibility with supported
    host platforms. Used with fibre-channel ports on RAID storage systems.

host mode option
    Additional options for fibre-channel ports on RAID storage systems.
    Provide enhanced functionality for host software and middleware.

HUR
    Hitachi Universal Replicator

I

IML
    initial microcode load; initial microprogram load

initial copy
    An initial copy operation is performed when a copy pair is created. Data
    on the primary volume is copied to the secondary volume.

in-system replication
    The original data volume and its copy are located in the same storage
    system. ShadowImage in-system replication provides duplication of
    logical volumes; Thin Image and Copy-on-Write Snapshot in-system
    replication provide “snapshots” of logical volumes that are stored and
    managed as virtual volumes (V-VOLs).
    See also remote replication.
internal volume
A logical volume whose data resides on drives that are physically located within the storage system. See also external volume.

IO, I/O
input/output

IOPS
I/Os per second

IP
internet protocol

IPL
initial program load

J

JNL
journal

JNLG
journal group

journal group (JNLG)
In a Universal Replicator system, journal groups manage data consistency between multiple primary volumes and secondary volumes. See also consistency group (CTG).

journal volume
A volume that records and stores a log of all events that take place in another volume. In the event of a system crash, the journal volume logs are used to restore lost data and maintain data integrity.
In Universal Replicator, differential data is held in journal volumes on until it is copied to the S-VOL.

JRE
Java Runtime Environment

LAN
local-area network
LBA
logical block address

LCP
local control port; link control processor

LCU
logical control unit

LDEV
logical device

LDKC
See logical disk controller (LDKC).

LED
light-emitting diode

license key
A specific set of characters that unlocks an application and allows it to be used.

local copy
See in-system replication.

local site
See primary site.

logical device (LDEV)
An individual logical data volume (on multiple drives in a RAID configuration) in the storage system. An LDEV may or may not contain any data and may or may not be defined to any hosts. Each LDEV has a unique identifier or “address” within the storage system composed of the logical disk controller (LDKC) number, control unit (CU) number, and LDEV number. The LDEV IDs within a storage system do not change. An LDEV formatted for use by mainframe hosts is called a logical volume image (LVI). An LDEV formatted for use by open-system hosts is called a logical unit (LU).

logical disk controller (LDKC)
A group of 255 control unit (CU) images in the RAID storage system that is controlled by a virtual (logical) storage system within the single physical storage system. For example, the Universal Storage Platform V storage system supports two LDKC, LDKC 00 and LDKC 01.
**logical volume**
See volume.

**logical volume image (LVI)**
A logical volume that is configured for use by mainframe hosts (for example, 3390-9).

**LUSE**
Hitachi LUN Expansion; Hitachi LU Size Expansion

**LV**
logical volume

**M**

**main control unit (MCU)**
A storage system at a primary or main site that contains primary volumes of TrueCopy for Mainframe remote replication pairs. The MCU is configured to send remote I/Os to one or more storage systems at the secondary or remote site, called remote control units (RCUs), that contain the secondary volumes of the remote replication pairs. See also remote control unit (RCU).

**main site**
See primary site.

**main volume (M-VOL)**
A primary volume on the main storage system in a TrueCopy for Mainframe copy pair. The M-VOL contains the original data that is duplicated on the remote volume (R-VOL). See also remote volume (R-VOL).

**max.**
maximum

**MB**
megabyte

**Mb/sec, Mbps**
megabits per second

**MB/sec, MBps**
megabytes per second
MCU
See main control unit (MCU).

MF, M/F
mainframe

MIH
missing interrupt handler

modify mode
The mode of operation of Storage Navigator that allows changes to the storage system configuration. See also view mode.

MP
microprocessor

MSCS
Microsoft Cluster Server

multi-pathing
A performance and fault-tolerant technique that uses more than one physical connection between the storage system and host system. Also called multipath I/O.

M-VOL
main volume

N

NVM
number

NVS
nonvolatile storage

O

OPEN-x
A logical unit (LU) of fixed size (for example, OPEN-3 or OPEN-9) that is used primarily for sharing data between mainframe and open-systems hosts using Hitachi Cross-OS File Exchange.

OS
operating system
OS/390
Operating System/390

P

pair
Two logical volumes in a replication relationship in which one volume contains original data to be copied and the other volume contains the copy of the original data. The copy operations can be synchronous or asynchronous, and the pair volumes can be located in the same storage system (in-system replication) or in different storage systems (remote replication).

pair status
Indicates the condition of a copy pair. A pair must have a specific status for specific operations. When an operation completes, the status of the pair changes to the new status.

parity group
See RAID group.

path failover
The ability of a host to switch from using the primary path to a logical volume to the secondary path to the volume when the primary path fails. Path failover ensures continuous host access to the volume in the event the primary path fails.
See also alternate path and failback.

PG
parity group. See RAID group.

physical device
See device.

PiT
point-in-time

point-in-time (PiT) copy
A copy or snapshot of a volume or set of volumes at a specific point in time. A point-in-time copy can be used for backup or mirroring application to run concurrently with the system.

pool
A set of volumes that are reserved for storing Thin Image or Copy-on-Write Snapshot data or Dynamic Provisioning write data.
pool volume (pool-VOL)
A logical volume that is reserved for storing snapshot data for Thin Image or Copy-on-Write Snapshot operations or write data for Dynamic Provisioning.

port block
A group of four fibre-channel ports that have the same port mode.

PPRC
Peer-to-Peer Remote Copy

Preview list
The list of requested operations on Storage Navigator.

primary site
The physical location of the storage system that contains the original data to be replicated and that is connected to one or more storage systems at the remote or secondary site via remote copy connections. A primary site can also be called a “main site” or “local site”.

The term “primary site” is also used for host failover operations. In that case, the primary site is the host computer where the production applications are running, and the secondary site is where the backup applications run when the applications at the primary site fail, or where the primary site itself fails.

primary volume
The volume in a copy pair that contains the original data to be replicated. The data in the primary volume is duplicated synchronously or asynchronously on the secondary pairs.

The following Hitachi products use the term P-VOL: Storage Navigator, Thin Image, Copy-on-Write Snapshot, ShadowImage, ShadowImage for Mainframe, TrueCopy, Universal Replicator, Universal Replicator for Mainframe, and High Availability Manager.

See also secondary volume (S-VOL).

P-site
primary site

P-VOL
See primary volume.
quick format
The quick format feature in Virtual LVI/Virtual LUN in which the formatting of the internal volumes is done in the background. This allows system configuration (such as defining a path or creating a TrueCopy pair) before the formatting is completed. To execute quick formatting, the volumes must be in blocked status.

quick restore
A reverse resynchronization in which no data is actually copied: the primary and secondary volumes are swapped.

quick split
A split operation in which the pair becomes split immediately before the differential data is copied to the secondary volume (S-VOL). Any remaining differential data is copied to the S-VOL in the background. The benefit is that the S-VOL becomes immediately available for read and write I/O.

R

R/W, r/w
read/write

RAID
redundant array of inexpensive disks

RAID group
A redundant array of inexpensive drives (RAID) that have the same capacity and are treated as one group for data storage and recovery. A RAID group contains both user data and parity information, which allows the user data to be accessed in the event that one or more of the drives within the RAID group are not available. The RAID level of a RAID group determines the number of data drives and parity drives and how the data is “striped” across the drives. For RAID1, user data is duplicated within the RAID group, so there is no parity data for RAID1 RAID groups. A RAID group can also be called an array group or a parity group.

RAID level
The type of RAID implementation. RAID levels include RAID0, RAID1, RAID2, RAID3, RAID4, RAID5 and RAID6.

RCU
See remote control unit (RCU).
RD
read

remote console PC
A previous term for the personal computer (PC) system that is LAN-connected to a RAID storage system. The current term is Storage Navigator PC.

remote control unit (RCU)
A storage system at a secondary or remote site that is configured to receive remote I/Os from one or more storage systems at the primary or main site.

remote copy
See remote replication.

remote copy connections
The physical paths that connect a storage system at the primary site to a storage system at the secondary site. Also called data path.

remote replication
Data replication configuration in which the storage system that contains the original data is at a local site and the storage system that contains the copy of the original data is at a remote site. TrueCopy and Universal Replicator provide remote replication. See also in-system replication.

remote site
See secondary site.

remote volume (R-VOL)
In TrueCopy for Mainframe, a volume at the remote site that contains a copy of the original data on the main volume (M-VOL) at the main site.

resync
resynchronize

R-VOL
See remote volume (R-VOL).

R/W
read/write
S

S#
serial number

S/N
serial number

SAID
system adapter ID

SC
storage control

SCDS
source control dataset

SCI
state change interrupt

scripting
The use of command line scripts, or spreadsheets downloaded by Configuration File Loader, to automate storage management operations.

secondary site
The physical location of the storage system that contains the primary volumes of remote replication pairs at the main or primary site. The storage system at the secondary site is connected to the storage system at the main or primary site via remote copy connections. The secondary site can also be called the “remote site”. See also primary site.

secondary volume
The volume in a copy pair that is the copy. The following Hitachi products use the term “secondary volume”: Storage Navigator, Thin Image, Copy-on-Write Snapshot, ShadowImage, ShadowImage for Mainframe, TrueCopy, Universal Replicator, Universal Replicator for Mainframe, and High Availability Manager.

See also primary volume.

seq.
sequential
**service information message (SIM)**
SIMs are generated by a RAID storage system when it detects an error or service requirement. SIMs are reported to hosts and displayed on Storage Navigator.

**service processor (SVP)**
The computer inside a RAID storage system that hosts the Storage Navigator software and is used by service personnel for configuration and maintenance of the storage system.

**severity level**
Applies to service information messages (SIMs) and Storage Navigator error codes.

**shared volume**
A volume that is being used by more than one replication function. For example, a volume that is the primary volume of a TrueCopy pair and the primary volume of a ShadowImage pair is a shared volume.

**SI**
Hitachi ShadowImage

**SIZ**
Hitachi ShadowImage for Mainframe

**sidefile**
An area of cache memory that is used to store updated data for later integration into the copied data.

**SIM**
service information message

**size**
Generally refers to the storage capacity of a memory module or cache. Not usually used for storage of data on disk or flash drives.

**SM**
shared memory

**SN**
serial number shown in Storage Navigator
**snapshot**
A point-in-time virtual copy of a Copy-on-Write Snapshot primary volume (P-VOL). The snapshot is maintained when the P-VOL is updated by storing pre-updated data (snapshot data) in a data pool.

**SOM**
system option mode

**source volume (S-VOL)**
The volume in a copy pair containing the original data. The term is used only in the earlier version of the Storage Navigator GUI (still in use), for the following Hitachi products: ShadowImage for Mainframe, Dataset Replication, IBM® FlashCopy.

**space**
Generally refers to the data storage capacity of a disk drive or flash drive.

**SS**
snapshot

**SSB**
sense byte

**SSID**
(storage) subsystem identifier. SSIDs are used as an additional way to identify a control unit on mainframe operating systems. Each group of 64 or 256 volumes requires one SSID, therefore there can be one or four SSIDs per CU image. For VSP, one SSID is associated with 256 volumes.

**S-VOL**
See secondary volume or source volume (S-VOL). When used for "secondary volume", "S-VOL" is only seen in the earlier version of the Storage Navigator GUI (still in use).

**SVP**
See service processor (SVP).

**sync**
synchronous

**system option mode (SOM)**
Additional operational parameters for the RAID storage systems that enable the storage system to be tailored to unique customer operating requirements. SOMs are set on the service processor.
T

target volume (T-VOL)
The volume in a mainframe copy pair that is the copy. The term is used only in the earlier version of the Storage Navigator GUI (still in use), for the following Hitachi products: ShadowImage for Mainframe, Dataset Replication, Compatible FlashCopy® V2.
See also source volume (S-VOL).

TB
terabyte

TC
Hitachi TrueCopy

TCz
Hitachi TrueCopy for Mainframe

TDEVN
target device number

TGT
target

total capacity
The aggregate amount of storage space in a data storage system.

TSE
track space efficient. Used in Compatible FlashCopy® V2 operations.

T-VOL
See target volume (T-VOL).

U

update copy
An operation that copies differential data on the primary volume of a copy pair to the secondary volume. Update copy operations are performed in response to write I/Os on the primary volume after the initial copy operation is completed.

UR
Hitachi Universal Replicator
URz
Hitachi Universal Replicator for Mainframe

USP
Hitachi TagmaStore® Universal Storage Platform

USP V
Hitachi Universal Storage Platform V

USP VM
Hitachi Universal Storage Platform VM

UT
Universal Time

V

V
version; variable length and de-blocking (mainframe record format)

VB
variable length and blocking (mainframe record format)

view mode
The mode of operation of Storage Navigator that allows viewing only of the storage system configuration. The two Storage Navigator modes are view mode and modify mode.

virtual device (VDEV)
A group of logical devices (LDEVs) in a RAID group. A VDEV typically consists of some fixed volumes (FVs) and some free space. The number of fixed volumes is determined by the RAID level and device emulation type.

Virtual LVI/LUN volume
A custom-size volume whose size is defined by the user using Virtual LVI/Virtual LUN. Also called a custom volume (CV).

virtual volume (V-VOL)
The secondary volume in a Thin Image or Copy-on-Write Snapshot pair. When in PAIR status, the V-VOL is an up-to-date virtual copy of the primary volume (P-VOL). When in SPLIT status, the V-VOL points to data in the P-VOL and to replaced data in the pool, maintaining the point-in-time copy of the P-VOL at the time of the split operation.
When a V-VOL is used with Dynamic Provisioning, it is called a DP-VOL.

**VLL**
Hitachi Virtual LVI/LUN

**VLVI**
Hitachi Virtual LVI

**VM**
volume migration; volume manager

**VOL, vol**
volume

**VOLID**
volume ID

**volser**
volume serial number

**volume**
A logical device (LDEV), or a set of concatenated LDEVs in the case of LUSE, that has been defined to one or more hosts as a single data storage unit. A mainframe volume is called a logical volume image (LVI), and an open-systems volume is called a logical unit (LU).

**volume pair**
See copy pair.

**V-VOL**
virtual volume

**V-VOL management area**
Contains the pool management block and pool association information for Thin Image and Copy-on-Write Snapshot operations. The V-VOL management area is created automatically when additional shared memory is installed and is required for Thin Image and Copy-on-Write Snapshot operations.
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