

**EMC Consistency Group
for z/OS**
Version 6.1

PRODUCT GUIDE

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As part of its effort to continuously improve and enhance the performance and capabilities of the EMC product line, EMC periodically releases new versions of both the EMC Enginuity Operating Environment and the EMC Consistency Group (ConGroup) software. Therefore, some functions described in this guide may not be supported by all versions of Enginuity or EMC ConGroup currently in use. For the most up-to-date information on product features, see your release notes.

If an EMC ConGroup feature does not function properly or does not function as described in this guide, please contact the EMC Customer Support Center for assistance.

Audience This manual is intended for the host system administrator, system programmer, or operator who will be involved in managing EMC ConGroup.

Organization The following table lists where information is located in this guide:

Chapter 1, <i>ConGroup Overview</i>	Provides an overview of the ConGroup utility.
Chapter 2, <i>Installing and Customizing ConGroup</i>	Describes how to install and customize ConGroup.
Chapter 3, <i>EMCSAFI Security Interface</i>	Describes the EMCSAFI Security Interface and discusses how to enable, disable, and customize the interface.
Chapter 4, <i>Consistency Groups</i>	Describes the consistency groups types and the configuration parameters you define to implement them.

Chapter 5, <i>Starting and Stopping ConGroup</i>	Describes how to start and stop ConGroup.
Chapter 6, <i>Operator Commands</i>	Describes the ConGroup operator commands.
Chapter 7, <i>Data Base Considerations</i>	Provides considerations for using the ConGroup utility with DB2, IMS and multiple DBMSs.
Chapter 8, <i>Resuming Operations after a ConGroup AutoSwap</i>	Describes the steps you must take to resume ConGroup, SRDF, and AutoSwap protected host operations after a ConGroup AutoSwap event.
Appendix A, <i>Messages</i>	Lists the messages reported by the Consistency Group utility, the reason for the message, and the recommended user action.
Appendix B, <i>Problem Diagnosis</i>	Discusses the diagnostic facilities available to ConGroup users.
Appendix C, <i>Enhancements</i>	Provides a comprehensive list of Consistency Group enhancements.
Appendix D, <i>Customer Support</i>	Reviews the EMC process for detecting and resolving software problems, and provides essential questions that you should answer before contacting the EMC Customer Support Center.
<i>Glossary</i>	Describes terms used in this manual.

Related Documentation

Related documents include:

- ◆ *EMC Consistency Group for z/OS Release Notes*, P/N 300-001-070, EMC Corporation
- ◆ *EMC ResourcePak Base for z/OS Product Guide*, P/N 300-999-341, EMC Corporation
- ◆ *EMC Common SWAP Services Message and Code Guide*, P/N 300-001-076, EMC Corporation

If you have obtained a license key for ConGroup AutoSwap, you will find that the following documents are also useful:

- ◆ *EMC AutoSwap Product Guide*, P/N 300-001-351, EMC Corporation
- ◆ *EMC AutoSwap Release Notes*, P/N 300-001-350, EMC Corporation

For additional information about other EMC documentation, contact your EMC sales representative or refer to the EMC Powerlink website at:

<http://powerlink.emc.com>

For reference material about IBM operating systems, refer to:

<http://publib.boulder.ibm.com/>

Conventions Used in This Guide

EMC uses the following conventions for notes, cautions, warnings, and danger notices:

A note presents information that is important, but not hazard-related.

Notes marked **Important**:, **Tip**:, **Background**:, or **Exception**: call attention to any item of information that may be of special importance.



CAUTION

A caution contains information essential to avoid data loss or damage to the system or equipment. The caution may apply to hardware or software.

Typographical Conventions

EMC uses the following type style conventions in this guide:

AVANTGARDE SMALLCAPS	Keystrokes
<i>Italic</i>	• New terms or unique word usage in text • Emphasis in text • Variable values that are displayed only and do not have to be entered • Command line arguments when used in text • Book titles in text • Heading titles used as references in text
<i>Courier</i>	Variables in syntax examples
Courier	• System output • File names • Command line entries
Courier bold	User entry in examples

CAPITALIZATION in syntax statements	The characters capitalized must be typed
[] in syntax statements	An optional element
in syntax statements	Separates alternative parameter values

Terminology

This document uses “mainframe host” to refer to an IBM mainframe host, and uses “z/OS” or “mainframe” to refer to the IBM family of operating systems.

Where to Get Help

For questions about technical support, call your local sales office or service provider.

If you have a valid EMC service contract, contact EMC Customer Service at:

United States: (800) 782-4362 (SVC-4EMC)

Canada: (800) 543-4782 (543-4SVC)

Worldwide: (508) 497-7901

Follow the voice menu prompts to open a service call and select the applicable product support.

Sales and Customer Service Contacts

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Your Comments

Your suggestions will help us continue to improve the accuracy, organization, and overall quality of the user publications. Please send a message to **techpub_comments@emc.com** with your opinions of this guide.

Your technical enhancement suggestions for future Consistency Group development consideration are welcome. To send a suggestion, log on to **<http://powerlink.emc.com>**, follow the path **Support, Contact Support**, and choose **Software Product Enhancement Request** from the Subject menu.

ConGroup Overview

This chapter provides an overview of the EMC Consistency Group utility (ConGroup). Topics include:

- ◆ Introduction 1-2
- ◆ ConGroup Operation..... 1-4
- ◆ ConGroup AutoSwap..... 1-8
- ◆ Security 1-19

Introduction

EMC Consistency Group is a software utility designed to ensure the consistency of the data remotely copied by the Symmetrix® SRDF™ microcode feature in the event of a *rolling disaster*.¹

Dependent Write Logic

Most applications, and in particular data base management systems (DBMS) have a dependent write logic embedded in them that ensures data integrity if a failure occurs in:

- ◆ The host processor
- ◆ The software
- ◆ The storage subsystem

A dependent write is a write that will not be issued by an application until a prior, related write I/O operation has completed.

An example of dependent write is a data base update. When updating a data base, a data base management system (DBMS) takes the following steps:

1. The DBMS writes to the disk containing the transaction log.
2. The DBMS writes the data to the actual data base dataset.
3. The DBMS writes again to the log volume to indicate that the data base update was made.

These three write I/O operations (log, data base, and log again) are related. Each write I/O is not issued until the prior, related write I/O operation has successfully completed.

Data Consistency

In a remote disk copy environment, data consistency cannot be ensured if one of these three write I/O operations was remotely mirrored, but its predecessor was not remotely mirrored. This could occur, for example, in a rolling disaster where a communication loss occurs that affects only a subset of the disk controllers that are performing the remote copy function.

-
1. A rolling disaster is a series of events that lead up to a complete disaster. For example, the loss of a communication link that leads to a site failure.

The ConGroup Utility

The ConGroup utility prevents a rolling disaster from affecting the integrity of the data at a remote site. ConGroup allows you to group storage volumes on different Symmetrix storage subsystems into so-called consistency groups.

ConGroup allows you to create two types of consistency groups:

- ◆ SRDF consistency groups (SRDF_CONGROUP)
- ◆ R1 Read Only consistency groups (R1_RO_CONGROUP)

These consistency group types are mutually exclusive.

SRDF Consistency Groups

SRDF consistency groups can contain only SRDF devices and SRDF devices can only exist in an SRDF consistency group.

SRDF consistency groups provide ConGroup with a method developed by EMC for Symmetrix-only environment to ensure data integrity during a rolling disaster. SRDF consistency groups do this by preventing dependent I/O from being issued by the application.

More Information: SRDF Consistency Groups are described in *SRDF_CONGROUP Consistency Group Architecture* on page 4-2.

R1 Read Only Consistency Groups

R1 Read Only consistency groups are designed for devices containing IMS and DB2 data base management systems. These groups are called R1_RO_CONGROUP. R1 Read Only provides functionality equivalent to the CRITICAL=YES attribute within peer-to-peer remote copy (PPRC). Currently R1 Read Only is performed in a stand-alone fashion.

More Information: R1_RO_CONGROUP consistency groups are described in *R1_RO_CONGROUP Consistency Group Architecture* on page 4-9.

ConGroup Operation

ConGroup operation consists of five steps, as shown in Figure 1-1:

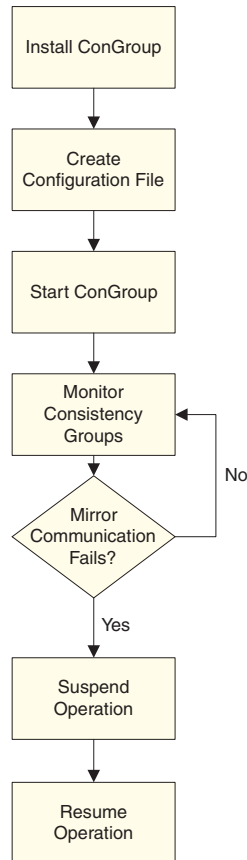


Figure 1-1 ConGroup Operational Steps

ConGroup Modes

ConGroup can operate in two modes:

- ◆ Multi-LPAR
- ◆ Single-LPAR

By default, ConGroup uses the multi-LPAR mode. Multi-LPAR mode implements a new coordination process based on CSC that is designed to allow the ENABLE, REFRESH, and RESUME operator

commands to execute through all ConGroup instances that monitor the same consistency groups and use the same CSC listener ports. If CAX operations are underway (refer to *ConGroup AutoSwap* on page 1-8), the MOVEOWNER and TAKEOVER operator commands are also executed through all ConGroup instances that monitor the same consistency group and use the same CSC listener ports.

Single-LPAR mode is the mode used in previous versions of ConGroup. ConGroup instances do not have cross-LPAR communication. Commands need to be issued on each LPAR.

To set ConGroup in single-LPAR mode, set the MODE=SINGLE global configuration parameter.

More Information: Refer to *Consistency Group Coordination* on page 5-4 for a discussion of modes. Refer to *MODE=SINGLE* on page 4-22 for reference material about the MODE=SINGLE global configuration parameter.

Installing ConGroup

As a first step, you install the ConGroup software. This process is described in Chapter 2 of this guide. You can install ConGroup on one LPAR or on multiple LPARs. If you install ConGroup on multiple LPARs, you can have ConGroups on several LPARs protect the same consistency group or have several sets of ConGroups on different LPARs, each protecting a different consistency group.

Creating the Configuration File

As a second step, you create the ConGroup configuration file. The ConGroup configuration file is a dataset that contains parameter statements that define:

- ◆ Global configuration parameters that apply to general ConGroup operation
- ◆ Consistency-group-specific configuration parameters that define a particular consistency group

Each consistency group is identified by a name of up to eight (8) alphanumeric characters. Each consistency group consists of a list of the devices to monitor.

You define both types of consistency group in the same configuration file. EMC recommends that all ConGroup instances for a the same consistency group definition use the same configuration file by having the CONFIG DD statements point to the same dataset.

Starting ConGroup

As a third step, you can start ConGroup. The most current version of ResourcePak Base (version 5.4 or higher), in SCF SAMPLIB, contains the sample started task procedure to run the ConGroup task. Customize these members for your installation and install them in the appropriate PROCLIB.

Generally, you should start the ConGroup as soon after IPL as possible and keep it running at all times. In fact, EMC recommends that you include the activation of ConGroup in the IPL procedures on all your systems.

You should make sure that ConGroup is running on all LPARS that will issue writes to the same devices.

Monitoring Consistency Groups

As a fourth step, ConGroup automatically monitors the consistency groups you have created for any failure of consistent communication between the volumes and their mirrors. An auto-verification subtask periodically attempts to verify the state of all enabled and active consistency groups to ensure that all groups are still in the expected state.

More Information: The time interval that the auto-verification subtask uses is determined by the value of the `VERIFY_INTERVAL` parameter. Refer to *VERIFY_INTERVAL* on page 4-29.

If all devices are not in the expected state, then what happens depends on the value of the `DISABLE_ON_VERIFY_ERROR` parameter. If `DISABLE_ON_VERIFY_ERROR` is set to YES, then the consistency group is placed in a DISABLED state. If `DISABLE_ON_VERIFY_ERROR` is set to NO, then the consistency group is placed in an UNKNOWN state. (A state of UNKNOWN does not necessarily mean that the group has lost its consistency.)

More Information: Refer to *DISABLE_ON_VERIFY_ERROR* on page 4-20.

Suspending Operation

When ConGroup detects any I/O to a volume that cannot communicate with its remote mirror, the ConGroup instance that owns the consistency group of which the volume is a part executes a ConGroup Trip; that is, it suspends all SRDF transfers for all volumes defined for the consistency group before completing the intercepted

I/O and returning control to the application. (It also raises the IOSLEVEL on the UCB.)

In this way, ConGroup prevents dependent I/O from reaching its remote mirror in the case where a previous I/O only gets as far as the local mirror.

Note that your application will be completely unaware that its writes have stopped being mirrored. Therefore, ConGroup issues a message that a *ConGroup trip* has occurred. You can then proceed with any of several courses of action, knowing that the remote data is not corrupt.

More Information: Refer to *ConGroup Trips* on page 4-2.

Keep in mind also that inconsistency can only happen if more than one link connects local and remote volumes in a consistency group.

The state of the data at the remote site is referred to as *dependent write consistent*. It can be restarted from an operating system and DBMS perspective. This is equivalent to the data state resulting from a CPU power failure.

Resuming Operation

As a fifth step, if a ConGroup trip occurs, you must follow a specific, planned procedure to return your site to normal operation.

More Information: Refer to Chapter 8 for a description of how to return your site to normal operation.

ConGroup AutoSwap

The ConGroup utility optionally can include the ConGroup AutoSwap Extension (CAX).

Important: The ConGroup AutoSwap Extension are a licensed feature of the Symmetrix. To use ConGroup AutoSwap Extension, you must purchase a Licensed Feature Key. For more information on Licensed Feature Keys, refer to the *ResourcePak Base for z/OS Product Guide* or consult your EMC representative.

ConGroup AutoSwap is based on Symmetrix Dynamic Address Switching (S/DAS) and its software components.¹ ConGroup AutoSwap uses the Cross System Communication Component (CSC) of ResourcePak Base for communication. The CSC component provides a way of using the Symmetrix storage subsystem to communicate changes in consistency groups between LPARs.

Building upon the existing foundation of disaster restart technology, ConGroup AutoSwap adds protection for many types of failures that can occur on the “front-end” of SRDF.

The front-end components include:

- ◆ The Symmetrix storage subsystem
- ◆ The primary and secondary channel paths
- ◆ Any directors and/or switches in the channel path

When your site configures independent channel paths to connected Symmetrix storage systems with the secondary (R2) volumes and when SRDF is operating in synchronous mode, you can perform a non-disruptive switch from the primary (source) to secondary (target) volumes.

To accomplish a non-disruptive switch from the primary to the secondary volumes, you extend the defined consistency group so that it is part of a *device swap group*.

Whenever the ConGroup utility starts up or resumes, it validates the device swap group. During operation, the ConGroup utility monitors

1. Messages you may receive from ConGroup AutoSwap may refer to S/DAS.

the consistency group devices. If a failure event occurs, ConGroup determines whether to:

- ◆ Trip the consistency group and preserve a consistent image of the data on the R2 devices
- ◆ Invoke a swap of the ConGroup primary devices in the device swap group to the secondary devices in the device swap group on the secondary Symmetrix storage subsystem
- ◆ Enter a system halt state

The ConGroup utility coordinates these actions with any other LPARs that have access to the ConGroup protected devices.

Important: ConGroup AutoSwap supports only one mirror. Refer to *SYMGROUP* on page 4-41 for information on how to narrow your protected mirror list to one mirror.

Failure Events

Storage configurations can present a large number of potential failure events. Figure 1-2 on page 1-10 identifies 11 possible events:

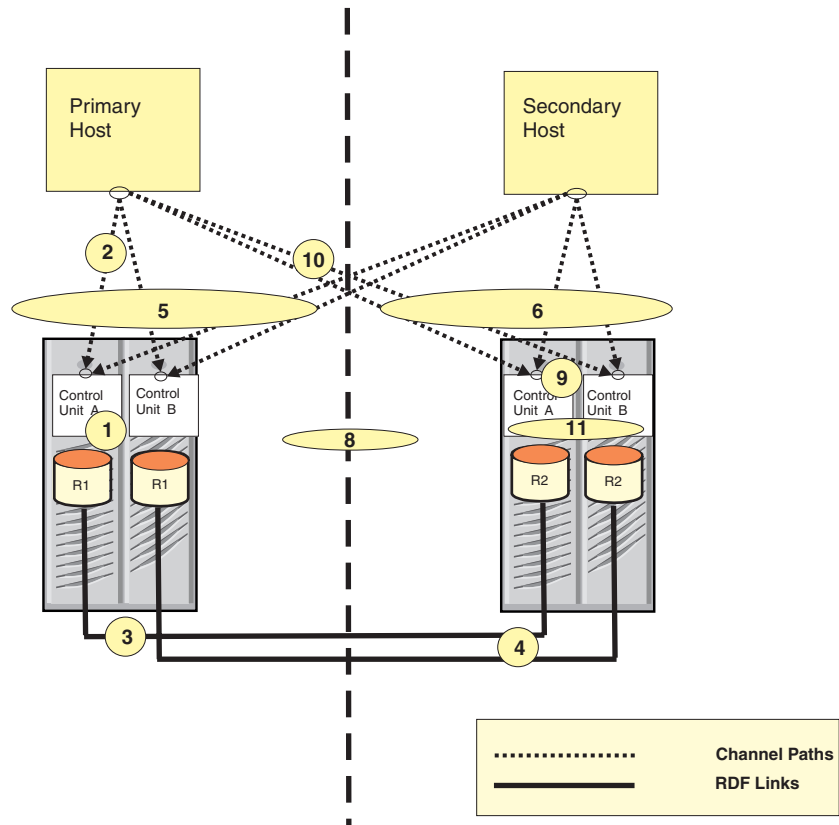


Figure 1-2 Possible Failure Events

These failure types marked in Figure 1-2 include loss of all channel paths, loss of a control unit, loss of one or more devices, loss of the SRDF communication path, and so forth. However since the protection operates on a device group level, only four of the labelled types require attention:

- ◆ SRDF link failure: A failure in moving data from an R1 to its partner R2. (Callouts 3¹ or 4 in Figure 1-2.)
- ◆ Primary channel failure: Inability to communicate with an R1 using the primary channel paths. (Callout 2 in Figure 1-2.)

1. Callouts are the circled numbers in Figure 1-2.

- ◆ Secondary channel failure - Inability to communicate with an R2 using the secondary channel paths. (Callout 10 in Figure 1-2 on page 1-10.)
- ◆ Site communication failure - Loss of inter site connectivity. (Callout 8 in Figure 1-2 on page 1-10.)

Each of these four failure types requires a specific and coordinated reaction from ConGroup. Consider the storage implementation shown in Figure 1-3:

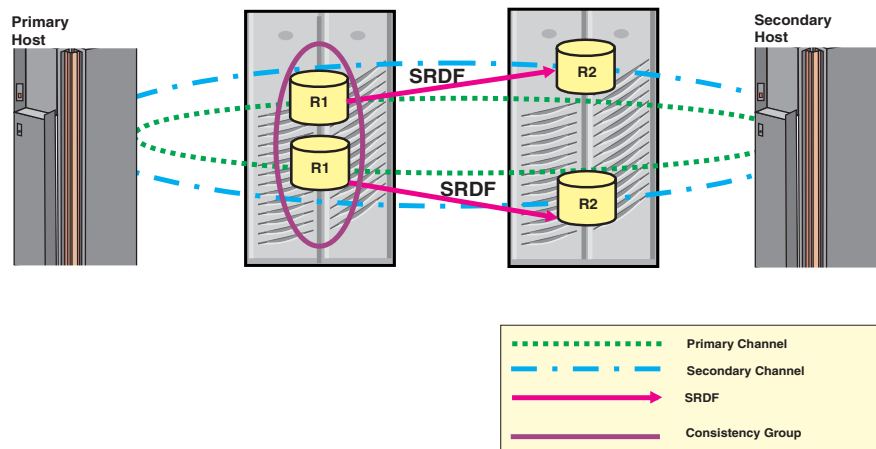


Figure 1-3 Example Storage Implementation

Important: As shown in Figure 1-3, an important configuration requirement is that all the R1 devices of a consistency group be at only one site. In a single site implementation, this requirement means that a Symmetrix storage system contains either R1 devices or R2 devices. You cannot mix R1 and R2 devices of a consistency group in the same control unit.

Now, consider how these four general failure types would affect the storage implementation shown in Figure 1-3.

SRDF Link Failure

Figure 1-4 shows a communications failure in moving data from R1 to R2:

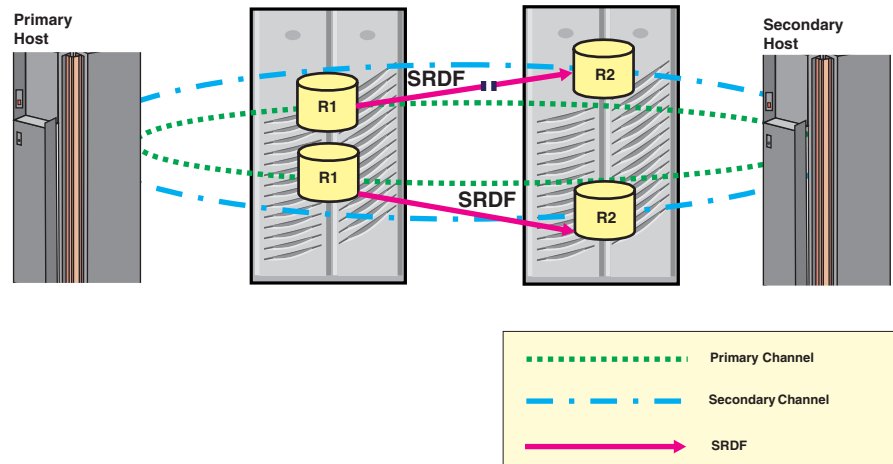


Figure 1-4 Failure in Moving Data from R1 to R2

This is the type of failure against which the ConGroup utility has always provided protection. Because the R2 devices at that point are no longer synchronized images of the R1 devices, the ConGroup AutoSwap Extension is disabled so that no attempt to swap to the secondary devices can occur until the consistency group is resumed, and the R1 and R2 devices are fully synchronized.

Primary Channel Failure

Figure 1-5 shows a communications failure on the primary channel:

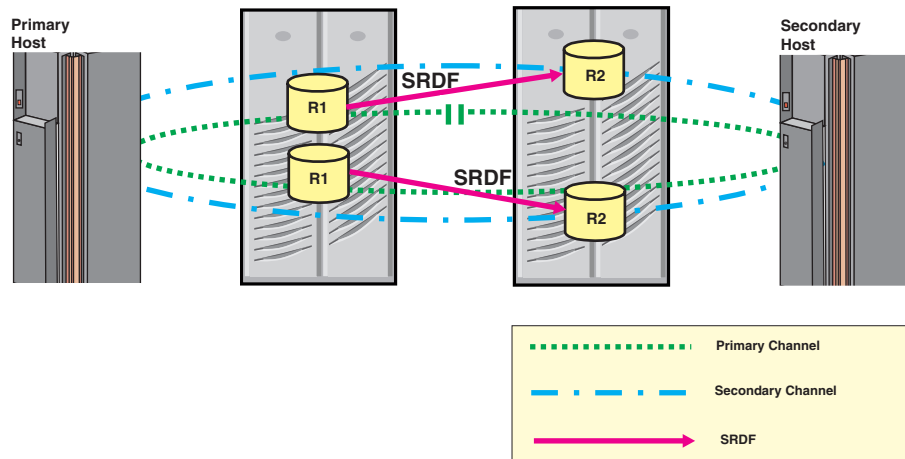


Figure 1-5 Primary Channel Failure

Primary channel interruptions can be due to:

- ◆ Communication problems
- ◆ Control unit problems
- ◆ Channel extender problems
- ◆ Any other problems that prevent a host from accessing the primary R1 devices

In these cases, the ConGroup utility invokes the ConGroup AutoSwap Extension (CAX) to swap all consistency group R1 devices to their partner R2 devices. Consistency Group protection is no longer meaningful since the SRDF data flow remains R1>R2. Monitoring for SRDF events is halted.

Secondary Channel Failure

Figure 1-6 shows a communications failure on the secondary channel:

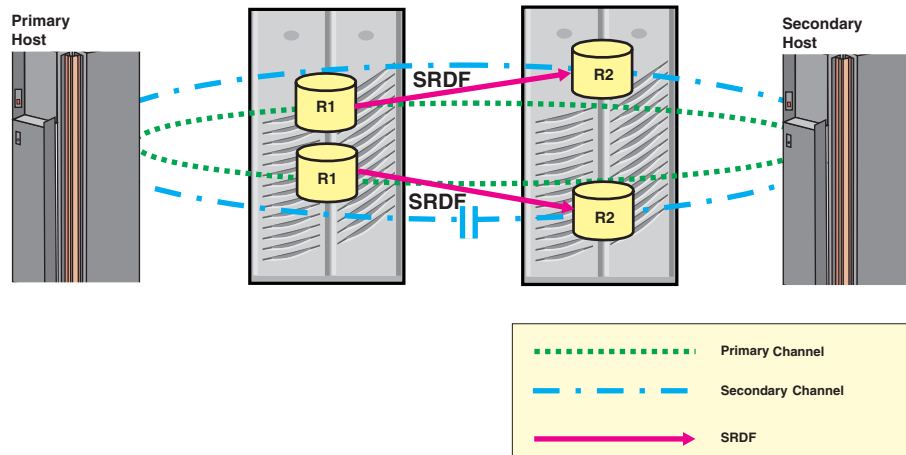


Figure 1-6 Secondary Channel Failure

A secondary channel interruption could also be due to:

- ◆ Communication problem
- ◆ Control unit problems
- ◆ Channel extender problems
- ◆ Any other problems that prevent a host from accessing the secondary R2 devices

CAX periodically validates this secondary channel communication. Loss of the secondary channel path means that swapping to the secondary devices is not possible. In these circumstances, the ConGroup utility suspends CAX swap operations until the situation is corrected. ConGroup protection of SRDF continues.

Site Communication Failure

The fourth failure type, a failure in communication between primary and secondary sites, is the most complicated behaviorally. Neither site can communicate with the other, either through the channels or through SRDF. Neither site knows the operational state of the other site.

If the independent behaviors for SRDF and path failure were permitted, one site would see a channel interruption and swap and one site would see an SRDF failure and may trip. This would result in both sites proceeding to write to what they each believe are the primary volumes, as shown in Figure 1-7 on page 1-16:

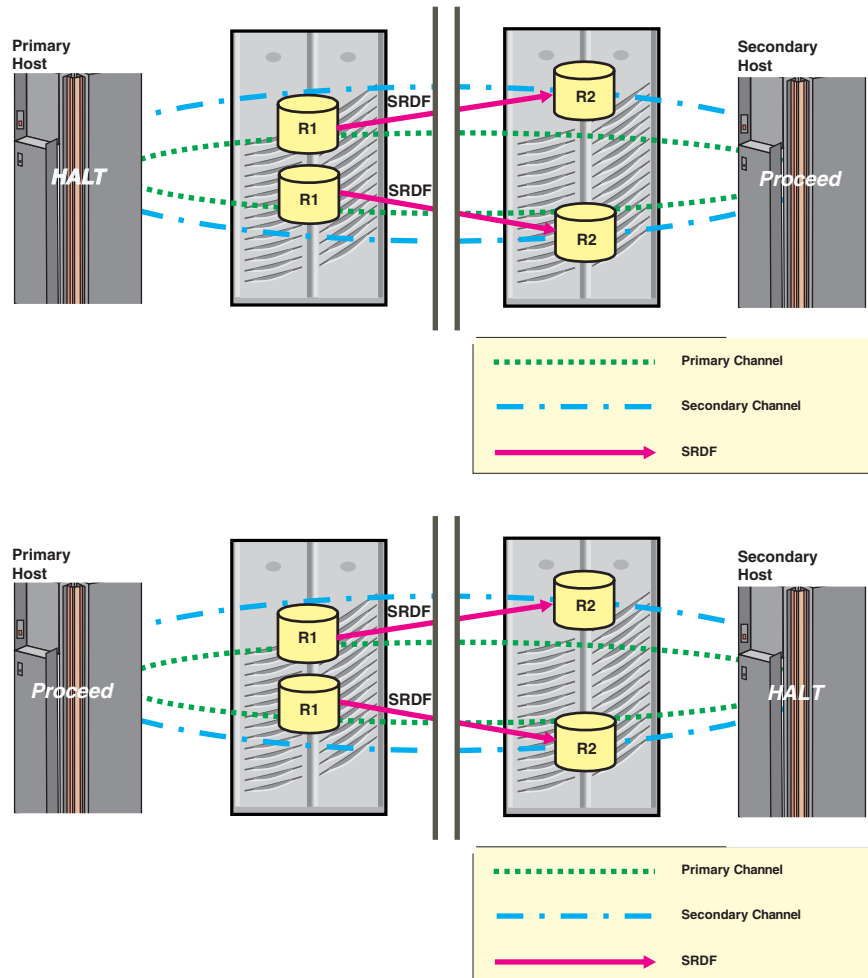


Figure 1-7 Communication Failure between Primary and Secondary Sites

In this case, you cannot programmatically decide what to do. Instead, you must decide at configuration time which site is intended to proceed with the shared workload before enabling ConGroup with the AutoSwap Extension.

More Information: Refer to *GLOBAL* on page 4-21.

By deciding which site should be designated to continue processing, only the hosts at that site attempt a failure response behavior. The other site halts processing immediately.

Using the ConGroup AutoSwap Option

To use ConGroup AutoSwap, you set two of the SRDF_CONGROUPS configuration parameters:

- ◆ CAXOPTS
- ◆ CAX

The CAXOPTS configuration parameter allows you to create an options set. Each options set specifies how ConGroup will enable a set of devices for AutoSwap processing. You identify each options set with a name of from one to eight characters.

The CAX configuration parameter allows you to activate ConGroup AutoSwap on a consistency group by consistency group basis. Each consistency group needing auto swap protection must include one CAX statement.

More Information: Refer to *CAXOPTS* on page 4-14 and *CAX* on page 4-32.

Each consistency group definition that includes CAX needs to have an identified owner. The owner is the LPAR responsible for AutoSwap activity coordination. You specify the owner through the OWNER= subparameter.

More Information: Refer to *GLOBAL* on page 4-21.

Resuming Operation

If a ConGroup AutoSwap event occurs, you must follow a specific, planned procedure to return your site to normal operation.

More Information: Refer to Chapter 8 for a description of how to return your site to normal operation.

Ownership Takeover

All consistency groups defined with the CAX capability must have a single owning LPAR. This is where the single ConGroup instance that is responsible for AutoSwap activity coordination is running.

However, there may be times in which you need to change the ownership to a different LPAR; for example, when you need to perform maintenance on the current owning LPAR or when the owning LPAR goes down.

In earlier versions of ConGroup, if you needed to change the ownership of consistency groups from the current owning LPAR to another LPAR, you had to make that change manually by changing the ownership specification in the configuration file and reinitializing the consistency group in a different LPAR.

Starting with Version 6.1, ConGroup CAX allows the movement of the ownership attribute from one LPAR to another LPAR in the consistency group. ConGroup now supports the MOVEOWNER and TAKEOVER operator commands to accomplish the reassignment of ownership without having to reinitialize all participating ConGroup instances.

In normal operations when both the current owning LPAR and the LPAR you want to make owner are running, you use MOVEOWNER to transfer consistency group ownership.

In a situation where the owner LPAR is not running, you use the TAKEOVER command to transfer ownership to another LPAR that is currently running.

Keep in mind that both the MOVEOWNER and TAKEOVER command use the SMF IDs assigned to the LPARs - as does the OWNER= subparameter of the GLOBAL parameter where the owning LPAR is first specified. Each SMF ID is a unique name of up to four characters.

The new ownership you assign persists as long as any single participating ConGroup is active. If all ConGroup instances are shutdown and then restarted, ownership reverts to the GLOBAL parameter OWNER= subparameter specification in the configuration file.

More Information: Refer to *MOVEOWNER* on page 6-14 and *TAKEOVER* on page 6-23.

Security

ConGroup provides for security by allowing you to validate authorization to access ConGroup resources through the mainframe EMCSAFI interface. As a result, any of the following SAF compliant security products can be used to ensure proper user authorization:

- ◆ RACF
- ◆ CA-ACF2
- ◆ CA-Top Secret

The security product you select must be compatible with RACF release 1.9 or higher.

More Information: EMCSAFI is described in Chapter 3.

This chapter provides the ConGroup utility installation procedure.
Topics include:

- ◆ Overview of Installation2-2
- ◆ Installing from Powerlink Distribution2-8
- ◆ Installing from a 3480 Tape.....2-9
- ◆ Integrating the ConGroup Utility.....2-18

Overview of Installation

The ConGroup installation kit is provided in two forms:

- ◆ An electronic distribution (download)
- ◆ A 3480 tape.

Preinstallation Steps

Before you install the ConGroup utility, take the following steps:

- ❑ Review the hardware and software requirements listed in this section and in the *EMC Consistency Groups for z/OS Release Notes*.
- ❑ Consulting EMC for any product updates or current release notes.
- ❑ Install/upgrade the EMCSCF component of ResourcePak Base.
- ❑ (If applicable) enter the ConGroup AutoSwap License Feature Code (LFC).

Reviewing Hardware and Software Requirements

The ConGroup utility has the Symmetrix hardware and microcode requirements shown in Table 2-1. Before you install ConGroup software, make sure your Symmetrix system meets these requirements:

Table 2-1 Symmetrix System Requirements

Item	Requirements
Hardware	All currently-supported Symmetrix storage subsystems
Enginuity Microcode Release	5x65 and higher
Symmetrix Configuration Parameters	• Prevent auto links recovery after all links failure? YES • Force RAs links off-line after power-up? YES

Important: Contact your EMC Customer Support Engineer to verify that your system meets these requirements.

ConGroup has the mainframe hardware and software requirements listed in Table 2-2. Before you install the ConGroup software, make sure your mainframe system meets these requirements:

Table 2-2 Mainframe Hardware and Software Requirements

Item	Requirements
Hardware	Any system that supports current IBM mainframe operating systems.
Software	- Any currently supported IBM mainframe operating system. - EMC ResourcePak Base 5.4 (and available maintenance ^a) or higher - RACF 1.9 or higher, or an equivalent SAF compliant security product.

a. Refer to the *EMC ConGroup for z/OS Release Notes* for more information.

ResourcePak Base must be running and the Cross System Communications component of ResourcePak Base must be active if you are using ConGroup. ConGroup uses the Cross System Communication component of EMC ResourcePak Base for communications.

Important: VM does not allow volumes defined as unsupported to be attached to SYSTEM, or used to IPL a virtual machine. When running as a guest under VM, the ConGroup utility requires special consideration. You must define the consistency group volumes to VM (SET RDEV) as Type UNSUPported DEVClass DASD DPS Yes RESERVE_RELEASE Yes, and you must attach the consistency group volumes to the guest.

More Information: Refer to the *Consistency Group for z/OS Release Notes* for any additional requirements.

Consulting EMC

You can download the latest maintenance updates and current release or service notes from the EMC FTP site or from the EMC Powerlink website.

Checking the EMC FTP Site

Maintenance updates and current release notes are available on an EMC FTP site:

`ftp.emc.com/pub/MVSoft`

Instructions for locating and downloading specific fixes and documentation are provided in the **ReadMe.txt** text file. The

RlseNote.txt file contains the latest product information to supplement the product guide.

Take the following steps:

1. Log on to a TSO session.

2. Invoke ftp as follows:

```
ftp ftp.emc.com
```

3. Sign on to FTP as follows:

```
signon
```

Sign on as user "ftp". Enter your email address as the password (for example `user@emc.com`).

4. Change directories to `pub/MVSsoft`:

```
cd pub/MVSsoft
```

Important: If you use a browser to access the ftp site, remember to refresh both the directory display and any **ReadMe.txt** files you may have accessed previously to avoid viewing old information from the browser cache.

5. Retrieve the **ReadMe.txt** file you need:

```
get ReadMe.txt 'your.data.set(readme)'
```

The FTP site is case sensitive. Take care to use the correct capitalization for all entries.

Checking the EMC Powerlink Website

Maintenance updates and current service notes (identical to release notes) are also made available on the EMC Powerlink website:

<http://powerlink.emc.com>

Important: Keep in mind that you must register on Powerlink as a valid EMC customer before you can access Powerlink. Make sure as well that your license for this software is registered. If it is not, you will not be able to access the download section of the Powerlink website.

On the page for your product, you will see files for different product versions. For your version, you may see up to three types of files:

- ◆ **ReadMe_vrm_Fixes.txt** contains information about the release.

- ◆ **Service_Notes_prodvrn.pdf** contains information discovered after initial release of the product.¹
- ◆ **prodvrn_fixes.zip** contains the previous two documents as well as a software patch file and instructions on how to apply this maintenance.

Where:

vrn = Is the version, revision level, and modification level of the software you want.

prod = The product name.

Take the following steps to download these files:

1. Log on to <http://powerlink.emc.com>.
2. Choose **Support, Software Downloads, Downloads - Updates and Patches** from the Powerlink home page.

Result: You see the Updates and Patches page with a list of product links. There are two sections in this list: Release Notes and Downloads.

3. Choose the Downloads Section. Click the name of your product from the Downloads Section.

Result: You see a page for the product you selected. On the page is a table of zip files and document files.

4. Take either of the following steps:
 - To download a copy of a document, click either **ReadMe_vrn_Fixes.txt** or **Service_Notes_prodvrn.pdf**.

Important: **Service_Notes_prodvrn.pdf** is an Adobe Acrobat document. To view documents on Powerlink, you must have Adobe Acrobat Reader installed. If you do not have the Adobe Acrobat Reader, you can install it from Powerlink. The Reader is supplied at no charge. Follow the path displayed on Powerlink to download the Adobe Acrobat Reader.

 - To download the zip file, click **prodvrn_fixes.zip**. Download the zip file to your home system, unpack the zip file, and follow the instructions contained in it.

1. Not all product version will have a **Service_Notes_prodvrn.pdf**.

Important: Do not apply any maintenance in this zip file until after you have accepted the product after installation.

5. When you are finished reading or copying, return to previous pages to view other products and services, or choose logout from the menu bar at the top of any page.

Installing/Upgrading EMCSCF

The installation and customization of ConGroup requires that you install the EMCSCF component of ResourcePak Base on your system.

The Symmetrix Control Facility (or SCF) is delivered by ResourcePak Base and is shipped automatically with all EMC mainframe software products.

The latest version of EMCSCF may have already been installed with another EMC product. However, even if you have previously installed EMCSCF, you should check on your EMCSCF version and, if needed, install version 5.4 (and its available maintenance) or higher.

If the latest version of ResourcePak Base not installed before you install Consistency Group, the SMP/E APPLY job fails with a missing PREREQ. If this happens, you must install the latest version of ResourcePak Base before you can rerun the APPLY job.

If you need to install or upgrade EMCSCF, do so before installing ConGroup. Keep the following in mind:

- ◆ EMCSCF is distributed with the EMC ResourcePak Base product. This is included with the ConGroup utility. You can also order EMC ResourcePak Base separately.
- ◆ Refer to the *EMC ResourcePak Base Product Guide* for specific instructions concerning the installation of EMCSCF.
- ◆ Only the most recent EMCSCF will install on your system.

EMCSCF may already be running on the system on which you are installing ConGroup, so it is important that you perform an orderly shutdown of EMCSCF and remove the existing version.

If you are currently running a version of ResourcePak Base prior to version 5.4 (and available maintenance) or higher, you can remove the existing EMCSCF from memory by entering the following commands:

F *server,ini,cstop*

P *server*

If you are currently running ResourcePak Base version 5.4 or higher, you can remove the existing EMCSCF from memory by entering:

F *server,INI,SHUTDOWN*

After you have installed ResourcePak Base and ConGroup, restart the latest version of EMCSCF.

Entering the AutoSwap License Feature Code

As part of your purchase, you may have received a printed license key for ConGroup AutoSwap. This license key has a license feature code (LFC). LFCs are 16-digit numbers that you must insert into the SCFINI initialization parameters table for the feature they unlock to work properly.

More Information: Refer to the *EMC ResourcePak Base for z/OS Product Guide* for a description of the license key installation process.

You can find directions about how to apply the LFCs with the shipping documents from either EMC manufacturing or from the EMC Software Refresh Group (SRG).

Installing from Powerlink Distribution

ConGroup is available through Powerlink distribution. Take the following steps to download and install ConGroup from Powerlink:

1. Log on to <http://powerlink.emc.com>.
2. From the Powerlink home page, choose **Support, Software Downloads, Downloads - Updates and Patches**.

Result: You see the Updates and Patches page with a list of product links. There are two sections in this list: Release Notes and Downloads.

If you are not able to access this location, you may not have registered your software or registered it incorrectly. Follow the prompts to register your software, correct your registration, or contact EMC in the event of a problem.

3. Choose the Downloads Section. Click the name of your product from the Downloads Section.
Result: You see a page for the product you selected.
4. Click the product version you want to download the installation kit (a zip file) and the installation instructions.
5. After you have downloaded the installation kit and instructions, choose logout from the menu bar at the top of any page.
6. Unpack the zip file and follow the instructions within the zip file to install ConGroup.

After you finish installation, go to *Integrating the ConGroup Utility* on page 2-18.

Installing from a 3480 Tape

ConGroup is also distributed on a 3480 tape in SMP/E format. The following sections describe how to install ConGroup from a tape.

ConGroup 3480 Tape Contents

The installation tape contains the files listed in Table 2-3:

Table 2-3 Installation Tape Contents

File	Dataset Name	Contents
1	EMC.SCGPvrm.RIMLIB	Installation materials containing members: • #01ALLOC — creates all needed flat files for installing the product • #02DFZON — IDCAMS define all of the SMP/E zone libraries • #03REPRO — IDCAMS repro the SMPE/E seed into all of the zone libraries • #04DDDEF — creates the DDDEFs for all of the zone libraries • #05RECEV — contains Modification Control Statement (MCS) used to stage SYSMODS to DASD and update the global zone • #06APPLY — installs the product to the target libraries and updates the target zone • #07ACCPT — updates the distribution libraries and zone • #08SMPOP — contains materials used to receive and apply APARS • #90SAFJB — JCL to assemble and link ConGroup modules with EMCSAFD or EMCSAFI • SETUP — REXX to simplify the customization process • CGPJCL — contains REXX to customize the install process • CGPWIN1 — contains panel used in REXX install customization
2	EMC.SCGPvrm.HOLDDATA	Exception SYSMOD data for the ConGroup utility.
3	EMC.SCGPvrm.SMPMCS	MCS SYSMOD data for the installation of the ConGroup utility using the RELFILE technique.
4 . . . nn	EMC.FMID.Fxx Where: FMID = ConGroup FMID xx = The number 1 or greater	SMP/E distribution files. This includes JCLIN Relfiles and Library Relfiles required for all FMIDs on the tape.

The installation tape is standard-labeled and has a VOLSER in the following format:

CGPvrm

Where:

v = version

r = revision level

m = modification level

For example, ConGroup version 6.1.0 would have the VOLSER, CGP610.

Gathering Installation Information

Before beginning the installation, identify, or decide upon, the following items:

EDIT Macro and CLIST Library

You need to determine a name for the edit macro created by the installation dialog. You also need to determine the name of a CLIST library where you can store the edit macro.

Product Dataset Name Prefix

You need to choose the dataset prefix you will use to install ConGroup. Names for the product datasets consist of a final qualifier, such as LINKLIB, and a dataset prefix. For example, if you choose a dataset prefix of *EMC . SCGPvrm*, the LINKLIB dataset will be named *EMC . SCGPvrm . LINKLIB*.

EMC recommends that you use *EMC . fmid* (that is, *EMC . SCGPvrm*) if it agrees with your site standards.

Insure that you have RACF ALTER authority (or the equivalent from another security manager) for the datasets created with this dataset prefix.

Hereafter, datasets created using this dataset prefix are referred to as if they had been created with the suggested value. The actual *fmid* for your installation may be different.

SMP/E Dataset Name Prefix

You need to choose the name prefix for the SMP/E datasets into which you install ConGroup. If you have installed another EMC product using SMP/E, including an earlier version of ConGroup, you should install the current version of ConGroup into the same CSI.

For example, if you already have SMP/E maintained EMC products and the SMPLOG dataset is called "EMC.SMPE.SMPLOG," the SMP/E dataset prefix should be "EMC.SMPE."

If you are installing an EMC SMP/E maintained product for the first time, EMC recommends using "EMC.SMPE."

SMP/E Distribution Libraries Disk Volume

You need to choose the disk volume onto which you will install the distribution libraries (required by SMP/E). This may be the same volume as you use for the product libraries. However, many customer sites prefer to keep SMP/E-related datasets on separate volumes from product libraries. An amount of space similar to that needed for the product libraries is required.

Installation Dataset Prefix

Names for the product datasets consists of a final qualifier, such as LINKLIB and a dataset prefix. For example, if you choose a dataset prefix (high-level qualifier), of EMC.*fmid*, the LINKLIB dataset will be called EMC.*fmid*.LINKLIB.

Target Dataset Disk Volume

You need to determine the disk volume onto which you will install the target (that is, runtime) datasets. The space required is nominal. EMC suggests that you use EMC.*fmid* if it agrees with your site's standards.

Disk Unit Name

Decide upon a disk unit name for the above volumes. For many users, "SYSDA" will suffice. However, use whatever generic or esoteric name your local standards require.

Tape Unit Name

Decide upon a tape unit name. For many users, "CART" will suffice. However, use whatever generic or esoteric name your local standards require.

Installing the ConGroup Utility

First, create and customize the JCL in Figure 2-1 for your installation's standards to unload the first file of the installation tape:

```
//          JOBCARD
//COPY01   EXEC PGM=IEBCOPY,REGION=4M
//INDD1    DD DSN=EMC.SCGPvrm.RIMLIB,DISP=(NEW,PASS),
//          UNIT=(CART,,DEFER),VOL=SER=volser,LABEL=(1,SL)
//OUTDD1   DD DSN=your.dsn,DISP=(NEW,CATLG),
//          UNIT=SYSALLDA,SPACE=(TRK,(50,50,20))
//SYSUT3   DD UNIT=your.esoteric,SPACE=(CYL,10)
//SYSUT4   DD UNIT=your.esoteric,SPACE=(CYL,10)
//SYSPRINT DD SYSOUT=X
//SYSIN    DD *
          COPY OUTDD=OUTDD1,INDD=INDD1
//
```

Figure 2-1 JCL for ConGroup Installation

In Figure 2-1, you must substitute values appropriate to your site for all boldface-italic terms.

Although you may edit the JCL manually if you prefer, EMC strongly recommends that you use the CGPJCL utility to update the JCL.

ConGroup includes a SETUP REXX exec program to expedite the customization process. You can use CGPJCL with or without using SETUP REXX.

Using CGPJCL with REXX

Take the following steps to use CGPJCL with the REXX exec program. Then, continue with *Running the RIMLIB Members* on page 2-15.

1. While in the EDIT or BROWSE member list, use the EX command on the SETUP member. It will call the CGPJCL REXX program and fill in the CLIST dataset name with the PDS you are running from.

Result: The following panel displays. It is the JCL Customization Utility.

```

                                EMC JCL Customization Utility
COMMAND ==> _____
Type EXEC on the command line and press ENTER to proceed, or PF3 to exit.

CLIST library           ==> _____
Edit macro name         ==> CGP
Product dsname prefix  ==> EMC.SCGPvrm
Resource Pak Base
  dsname prefix         ==> EMC.SSCFvrm
SMP/E dsname prefix    ==> EMC.SMPE
SMP/E datasets volser  ==> _____
Install-to disk volser==> _____   Disk unit name ==> SYSDA
Install tape volser   ==> CGPvrm       Tape unit name ==> CART

Enter your job card below ('%MEMBER%' will be replaced by member name):
=> //USERIDXX JOB MSGCLASS=A,CLASS=A,MSGLEVEL=(1,1)

```

Figure 2-2 EMC JCL Customization Utility

2. Enter the following information on the EMC JCL Customization utility panel:
 - Specify the name of the edit macro. This dialog creates the macro. You may choose any name you like.
 - Use the TAB key to jump to the next field.
 - Specify a dataset name prefix (HLQ) in which the ConGroup utility will be installed.
 - Specify the dataset name prefix in which ResourcePak Base was installed. This dataset name prefix is used by some of the install JCL that references the SAMPLIB distributed with ResourcePak Base.
 - Specify a dataset name prefix for the SMP/E datasets that will be created during the install.

Explanation: If you are installing the ConGroup utility into the same SMP/E environment as earlier versions of ResourcePak Base and ConGroup, use the dataset name prefix from the previous version of ResourcePak Base here.

- Specify a DASD VOLSER to be used for the SMP/E datasets.

Explanation: The distribution libraries and the SMP/E datasets will be allocated on this volume.

- Specify a DASD VOLSER to be used for the runtime datasets.
- Specify an esoteric disk name that is appropriate to your site. (SYSDA is the default, but you can type another disk name over it.)

Explanation: If you do not define the Disk Unit Name to a value appropriate to your site, your installation process will have unpredictable results.

- Specify the install tape VOLSER. (CGP~~orm~~ is the default, but you can type another VOLSER over it.)
- Specify an esoteric tape name. (CART is the default, but you can type another esoteric tape name over it.)
- Edit the supplied JOBCARD to conform to your site's requirements. If you need more than one line for a JOBCARD, you need to edit the JOBCARD manually before submitting each job.

3. On the command line, type EXEC and press ENTER.

Result: All of the JCL members in the RIMLIB prefixed with a # are updated with the information you just entered.

4. Go to *Running the RIMLIB Members* on page 2-15.

Using CGPJCL without REXX

Take the following steps to use the CGPJCL utility without using the SETUP REXX. Then, continue with *Running the RIMLIB Members* on page 2-15.

1. Copy the CGPJCL from the RIMLIB that you loaded from the installation tape into a CLIST or EXEC library concatenated to your TSO SYSPROC or SYSEXEC ddnames.
2. Display RIMLIB (this library) in DSLIST (PDF option 3.4).
3. Enter CGPJCL next to RIMLIB on the DSLIST listing panel in the space you might normally type e for edit and press ENTER.

Result: The EMC JCL Customization utility panel (as shown in Figure 2-2 on page 2-13) appears.

4. On the panel displayed, enter:
 - The name of a CLIST library into which an edit macro can be stored (normal TSO prefixing conventions apply).
 - The name of the edit macro. The macro is created by this dialog. (You may choose any name you like).
 - The product dataset name prefix.
 - The SMP/E dataset name prefix.
 - The disk volume and unit name to which the Consistency Group product libraries will be installed.
 - Specify the install tape VOLSER. (CGR ν rm is the default, but you can type another VOLSER over it.)
 - Specify an esoteric tape name. (CART is the default, but you can type another esoteric tape name over it.)
 - Change the job card to conform to your installation's requirements. Note that you may specify %MEMBER% as the jobname to set each jobname equal to the member name (that is, "#01ALLOC", "#02DFZON", etc.).
5. Type EXEC on the command line and press ENTER.

Result: The edit macro is created and saved, then applied to every member of this library that begins with '#'.

Running the RIMLIB Members

1. Run the following RIMLIB members¹ in order:
 - a. #01ALLOC
 - b. #04DDDEF
 - c. #05RECEV
 - d. #06APPLY
2. APF authorize the ConGroup LINKLIB, or move the related load modules to an APF authorized library.
3. Conduct all necessary testing and continue with the remaining steps in this procedure if the results are positive.
4. Submit #07ACCPT.

1. #02DFZON and #03REPRO are only run in ResourcePak Base installation.

5. If you have received ConGroup maintenance cover letters from EMC, have instructions to apply maintenance from EMC support personnel, or found maintenance instructions on the EMC FTP site or Powerlink website, run #08SMPOP. #08SMPOP receives, and applies product maintenance (APARS).

Important: Do not apply ConGroup maintenance until after ConGroup is accepted.

You may not have to apply maintenance at installation time. However, you should keep the #08SMPOP JCL handy for use in the future should the need arise.

6. Do the following:
 - If you plan to run with the security interface active, check with your security administrator to ensure that the proper classes are active and the proper resources are defined. The class and resource names used by the ConGroup Security Interface are described in *Class Names and Resource Names Used* on page 3-3. Refer to the examples in the EMCCCLASS member in SCF SAMPLIB for sample RACF class definitions.
 - If you plan to disable the ConGroup Security Interface, edit member EMCSAFD, removing the MNOTES, and run job #90SAFJB. Be sure to change all occurrences of *SAFMBR* to EMCSAFD.
 - If you plan to customize the security interface, tailor member EMCSAFI in the SAMPLIB, and run job #90SAFJB. Be sure to change all occurrences of *SAFMBR* to EMCSAFI.

More Information: Refer to Chapter 3.

7. Perform installation, customization, and integration:
 - APF authorize the ConGroup LINKLIB, or move the ConGroup load module to an APF authorized library.
 - Refer to your previous ResourcePak Base installation and customization to integrate ConGroup with EMCSCF. This includes concatenating the ConGroup LINKLIB with the SCF LINKLIB.
8. Go to *Integrating the ConGroup Utility* on page 2-18.

Integrating the ConGroup Utility

Perform the following to integrate the ConGroup utility in your environment:

- ◆ Move the EMCCGRP member in the SCF SAMPLIB library to a PROCLIB.
- ◆ Move CGRPCFG0, CGRPCFG1, and CGRPVIVP in the SCF SAMPLIB to a source PDS.
- ◆ Move the load modules to an APF-authorized library.
- ◆ Perform the PROCLIB and APF authorization steps for all LPARs that will be running the ConGroup utility.
- ◆ Refer to your previous ResourcePak Base installation and customization to integrate ConGroup with EMCSCF. This includes concatenating the ConGroup LINKLIB with the SCF LINKLIB.



CAUTION

When consistency groups are enabled, SRDF source (R1) volumes and STD devices specified in consistency group definitions must not be altered, modified, or re-configured by using SRDF Host Component V3.2.3 (or earlier) commands or by EMC Service personnel using the Symmetrix service processor. SRDF Host Component V4.0.0 or later detects consistency group volumes, and verifies that they are not enabled, to prevent changes to them.

Cross Systems Communications

EMC ResourcePak Base must be running and the Cross System Communications (CSC) component of ResourcePak Base must be active if you are using ConGroup. ConGroup uses the Cross System Communication component of EMC ResourcePak Base for communications. To prevent performance problems, EMC recommends that you set specific gatekeepers for CSC.

More Information: Refer to the *EMC ResourcePak Base Product Guide* for more information.

EMCSAFI Security Interface

This chapter describes the EMCSAFI Security Interface and discusses how to enable, disable, and customize the interface. Topics include:

- ◆ Overview 3-2
- ◆ Class Names and Resource Names Used 3-3
- ◆ Disabling the Security Interface 3-4
- ◆ Customizing the Security Interface 3-6
- ◆ The EMCSAFRB Structure 3-9

Overview

The EMCSAFI Security Interface feature uses SAF calls (RACROUTE) to request authorization to use resources. The input to EMCSAFI is the EMCSAFRB request block that describes the authorization.

EMCSAFI requires that RACF version 1.9 or later, or an equivalent SAF-compliant security product, be installed and activated. The security interface is active by default. If you choose not to use it, refer to *Disabling the Security Interface* on page 3-4.

When running with the security interface active, check with your security administrator to ensure that the proper classes are active and the proper resources are defined. The class and resource names used by the ConGroup Security Interface are described in *Class Names and Resource Names Used* on page 3-3.

Class Names and Resource Names Used

Table 3-1 summarizes the resource validation requests for each ConGroup feature and function.

DATASET is the default SAF Class and EMC.VALIDATE.ACCESS is the default SAF Profile. Both may be localized in the global initialization parameters. Refer to member EMCCLASS in the SCF SAMPLIB for sample jobs on how to do this in a RACF environment.

Table 3-1 Resource Validation Requests

Function	Class	Resource	Attr
CANCEL	DATASET	EMC.VALIDATE.ACCESS.CGMANAGE	Update
DISABLE	DATASET	EMC.VALIDATE.ACCESS.CGMANAGE	Update
DISPLAY CGROUP	DATASET	EMC.VALIDATE.ACCESS.CGDISP	Read
DISPLAY CONGROUP	DATASET	EMC.VALIDATE.ACCESS.CGDISP	Read
DISPLAY DEBUG	DATASET	EMC.VALIDATE.ACCESS.CGDISP	Read
ENABLE	DATASET	EMC.VALIDATE.ACCESS.CGMANAGE	Update
MOVEOWNER	DATASET	EMC.VALIDATE.ACCESS.CGREFR	Update
REFRESH	DATASET	EMC.VALIDATE.ACCESS.CGREFR	Update
REMSPLIT	DATASET	EMC.VALIDATE.ACCESS.CGMANAGE	Update
RESUME	DATASET	EMC.VALIDATE.ACCESS.CGMANAGE	Update
STOP	DATASET	EMC.VALIDATE.ACCESS.CGSTOP	Update
TAKEOVER	DATASET	EMC.VALIDATE.ACCESS.CGREFR	Update

The RACF resources and classes used for the QUERY operator command are the same as those used for the DISPLAY operator command.

More Information: Refer to *DISPLAY* on page 6-10 for a description of the DISPLAY operator command and to *QUERY CON* on page 6-15 for a description of the QUERY operator command.

Disabling the Security Interface

The EMCSAFD Routine

Member EMCSAFD in the SCF SAMPLIB contains assembler source code that you can employ to disable the EMCSAFI security interface. Use member #90SAFJB in the ConGroup RIMLIB to assemble and link the modules. Make sure to change all occurrences of literal *SAFMBR* in #90SAFJB to EMCSAFD.

This source replaces CSECT EMCSAFI with a routine that returns a return code of 0 or 4, depending on the content in RNAME_TBL. Entries in RNAME_TBL return four (4). No attempt to call RACF is made and the following message is placed in ESRBMSG:

```
EMC SAF INTERFACE IS DISABLED
```

The ESRBMSG message field is part of the EMCSAFRB structure. Refer to the ESRBMSG area for messages related to the EMCSAFI routine. Refer to Figure 3-2 on page 3-10.

Disabling the EMCSAF Interface

To disable the EMCSAF interface, take the following steps:

1. Change the JCL to conform to your installation standards.
2. Run the job.

Result: Program CGRPMMAIN is relinked.

The sample EMCSAFD (Figure 3-1 on page 3-5) includes MNOTE statements to identify RNAME_TBL table. After reviewing this code, comment the MNOTE statements.

```

**
* IF THE SUPPLIED RESOURCE NAME MATCHES AN ENTRY IN THE RNAME_TBL,
* RETURN WITH RC 4.
**
MNOTE 12, '*-----*'
MNOTE 12, '* Please review the new functionality added with *'
MNOTE 12, '* the RNAME_TBL. A rc 4 will be returned for *'
MNOTE 12, '* each resource name in the table, allowing for *'
MNOTE 12, '* protection of these functions when a full SAF *'
MNOTE 12, '* interface is not desired. *'
MNOTE 12, '* *'
MNOTE 12, '* To run without this enhancement, replace the *'
MNOTE 12, '* first character of the first entry in the table *'
MNOTE 12, '* with a hex FF. *'
MNOTE 12, '* *'
MNOTE 12, '* Before submitting this module for assembly, *'
MNOTE 12, '* delete or comment these MNOTE statements. *'
MNOTE 12, '*-----*'
LA      R2,RNAME_TBL          PRIME POINTER TO RNAME TBL

```

Figure 3-1 Sample EMCSAFD

Customizing the Security Interface

The EMCSAFI Routine

Member EMCSAFI in the SCF SAMPLIB dataset contains assembler source code for the security interface. Use member #90SAFJB in the ConGroup RIMLIB to assemble and link the modules, making sure to change all occurrences of literal *SAFMBR* to EMCSAFI.

The source code included in SAMPLIB is the code linked with CGRPMMAIN. This source is provided to allow you to customize the behavior of the security code to match your installation requirements.

To customize the interface, take the following steps:

1. Change the JCL to conform to your installation standards.
2. Change the source for EMCSAFI to suit your needs.
3. Run the job.

Result: Program CGRPMMAIN is relinked.

Important: Customization of the EMCSAFI routine should only be attempted by experienced system programmers who have extensive knowledge of assembler language and standard linkage conventions, and who understand the RACF RACROUTE interface. Normal precautions must be taken to test changes in an isolated environment, and to protect working production code.

Take care when customizing EMCSAFI to maintain re-entrancy.

On entry to EMCSAFI, R1 points to a full word containing the address of the EMCSAFRFB. The information in this request block is used to build a RACROUTE request.

On return, R15 contains one of the following return codes:

- | | |
|----|---|
| 0 | For ESRBATTR = T: Security subsystem is active
For ESRBATTR ≠ T: Access is allowed |
| 8 | Access is denied |
| 12 | EMCSAFRFB failed validation |
| 16 | RACF is not active |

Return Code Zero If the return code is zero, then field ESRBMSG will contain one of the messages shown in Table 3-2:

Table 3-2 EMCSAFI Routine: Return Code Zero

Message	Description
ACCESS ALLOWED	Access to the requested resource is allowed.
ACCESS ALLOWED - (WARN MODE)	Access to the requested resource would have been denied, however, warn mode is in effect, so access is allowed.
ACCESS ALLOWED - CLASS NOT ACTIVE	The requested class is not defined, and PROTECT ALL is not in effect.
ACCESS ALLOWED - RESOURCE NOT PROTECTED	The requested resource is not defined, and PROTECT ALL is not in effect.
SECURITY SUBSYSTEM IS ACTIVE	The request was to determine if the security subsystem is active and it is.

Return Code Non-Zero If the return code is non-zero, then field ESRBMSG will contain one of the messages shown in Table 3-3:

Table 3-3 EMCSAFI Routine: Return Code Non-Zero

Message	Description
ACCESS DENIED	The security subsystem has denied access to the resource. Contact your security administrator for proper access.
SECURITY SUBSYSTEM IS NOT ACTIVE	The security subsystem is not running. Start the security subsystem or run job #09SAFJB in the RIMLIB using member EMCSAFD in the SAMPLIB to disable the security feature.
EMCSAFRB ERROR - CLASS NOT SPECIFIED	The EMCSAFRB control structure passed to the security interface is in error. The Field ESRBCLAS is not filled in. If you have customized the SAF interface, then review your changes for errors. If you have not customized the SAF interface, contact the EMC Customer Support Center for technical assistance.
EMCSAFRB ERROR - INVALID AUTHORITY LEVEL REQUESTED	The EMCSAFRB control structure passed to the security interface is in error. Field ESRBATTR has an invalid value. If you have customized the SAF interface, then review your changes for errors. If you have not customized the SAF interface, contact the EMC Customer Support Center for technical assistance.

Table 3-3 EMCSAFI Routine: Return Code Non-Zero (continued)

Message	Description
EMCSAFRB ERROR - RESOURCE NAME NOT SPECIFIED	The EMCSAFRB control structure passed to the security interface is in error. Field ESRBRNAM is not filled in. If you have customized the SAF interface, review your changes for errors. If you have not customized the SAF interface, contact the EMC Customer Support Center for technical assistance.
EMCSAFRB ERROR - INVALID DSTYPE VALUE SPECIFIED	The EMCSAFRB control structure passed to the security interface is in error. Field ESRBDSTY has an invalid value. If you have customized the SAF interface, review your changes for errors. If you have not customized the SAF interface, contact the EMC Customer Support Center for technical assistance.
EMCSAFRB ERROR - DSTYPE IS NOT M AND VOLSER NOT SPECIFIED	The EMCSAFRB control structure passed to the security interface is in error. Field ESRBDSTY has an invalid value. The value is not M, and field ESRBVSER is not filled in. If you have customized the SAF interface, review your changes for errors. If you have not customized the SAF interface, contact the EMC Customer Support Center for technical assistance.

The EMCSAFRB Structure

The EMCSAFRB describes the resource access request and is built by the caller and passed to the EMCSAFI routine. The macro is included in the SCF SAMPLIB and is also shown in Figure 3-2 on page 3-10.

When the class name is DATASET (or the class name specified in the initialization of ConGroup) the following are true:

- ◆ ESRBCLAS — Set the class name (QNAME)
- ◆ ESRBNAM — Set to the resource name (RNAME), as documented in Table 3-1 on page 3-3
- ◆ ESRBATTR — U (update) or R (read), as documented in Table 3-1 on page 3-3
- ◆ ESRBUTOK — Security token supplied in the CIB representing the operator command
- ◆ ESRBDSTY — M (model profile)
- ◆ ESRBUID — Set to spaces
- ◆ ESRBGID — Set to spaces

Depending on the action specified, some fields may not be filled in. You can use these fields to customize the security exit.

```

MACRO
.*****
.*
.* EMCSAFRB
.*
.* STRUCTURE PASSED AS INPUT TO THE EMCSAFI SECURITY INTERFACE
.* ROUTINE.
.*
.*-----*
.* CHANGE LOG:
.*
.* 09/09/04 BASE
.* 09/28/04 ADD OPTIONAL PARMS
.*
.******

EMCSAFRB
EMCSAFRB DSECT
*
*****
* AUTHORITY LEVEL
*****
ESRBATTR DS CL1 REQUEST AUTHORITY LEVEL
* T - TEST RACF ACTIVE
* R - READ
* U - UPDATE
* A - ALTER
* C - CONTROL
DS CL3 .. OPEN ..
*****
* REQUESTOR INFORMATION
*****
*
* SET ESRBUID AND ESRBGID TO BLANK UNLESS 3RD PARTY AUTHORIZATION
* CHECKING IS TO BE USED
*
ESRBUID DS CL8 USERID OR BLANK
ESRBGID DS CL8 GROUPID OR BLANK
ESRBACEE DS A | 0 OR ADDR OF ACEE OR 4X'FF'
* | IF ESRBUTOK POINTS TO UTOKEN
*

```

Figure 3-2 EMCSAFRB Macro

```

*****
*                               RESOURCE INFORMATION                               *
*****
ESRBCLAS DS      CL8              RESOURCE CLASS
ESRB RNAM DS      CL44            RESOURCE NAME
ESRBV SER DS      CL6              VOLSER  (IF CLASS=DATASET)
ESRB DSTY DS      CL1              DSTYPE: (IF CLASS=DATASET)
*                               N - NONVSAM
*                               V - VSAM
*                               M - MODEL PROFILE
*                               T - TAPE
DS      CL5              | .. OPEN ..
*****
*                               RETURN CODES                                   *
*****
ESRB R15 DS      F                RETURN CODE FROM RACROUTE
ESRB RRET DS      F                RACF RETURN CODE
ESRB RREA DS      F                RACF REASON CODE
ESRB SRET DS      F                SAF RETURN CODE
ESRB SREA DS      F                SAF REASON CODE
*****
*                               ERROR MESSAGE                                   *
*****
ESRBMSG DS      CL100              AREA FOR MESSAGE RETURN
*****
* REUSE ERROR MESSAGE AREA FOR ADDITIONAL PARAMETERS.  NOTE THAT          *
* THESE PARAMETERS WILL BE OVERLAYED ON RETURN FROM EMCSAFI.              *
*****
ORG      ESRBMSG              |
ESRB P1 DS      XL4              | OPTIONAL PARAMTERS PASSED
ESRB P2 DS      XL4              | . BY APPLICATION
ESRB P3 DS      XL4              | . . .
ESRB P4 DS      XL4              | . . .
ESRBUTOK DS      XL4              | A (USER TOKEN)
ORG      ESRBMSG+L'ESRBMSG      |
EMCSAFRL EQU      *-EMCSAFRB      AREA LENGTH
MEND

```

Figure 3-2 (continued) EMCSAFRB Macro

Tables 3-4 through 3-7 provide descriptions of each field in the EMCSAFRB structure:

Table 3-4 Authority Level

ESRBATTR	1 byte field describing the level of access required. Valid values are: • T — Test if the security subsystem is active A return code of zero indicates that it is active, a non-zero return code indicates that it is not active. • R — requests READ access to the resource • U — requests UPDATE access to the resource • A — requests ALTER access to the resource • C — requests CONTROL access to the resource
----------	--

Table 3-5 Requestor Information

ESRBUID	8 byte field containing the userid of the user requesting access. If ESRBACEE is specified, then this field is ignored.
ESRBGID	8 byte field containing the groupid of the user requesting access. If this field is blank and the ESRBUID field is specified, then the default group for the userid is used. If ESRBUID is blank or ignored, then this field is ignored.
ESRBACEE	8 byte field containing the address of a valid ACEE for the user requesting access. If this field is zero, and ESRBUID is blank, then the ACEE associated with the current address space is used.

Table 3-6 Resource Information

ESRBCLAS	8 byte field containing the class name
ESRBRRNAM	44 byte field containing the resource name
ESRBVSER	Volume serial -- Used only when ESRBCLAS = DATASET and ESRBDSTY is not equal to 'M'
ESRBDSTY	Dataset type when ESRBCLAS = DATASET -- Valid values are: • N — NonVSAM • V — VSAM • M — Model Profile • T — Tape dataset

Table 3-7 Return Codes

ESRBR15	On return, contains the return code from the RACROUTE macro
ESRBRRET	On return, contains the RACF return code
ESRBRREA	On return, contains the RACF reason code
ESRBSRET	On return, contains the SAF return code
ESRBSREA	On return, contains the SAF reason code

More Information: The RACROUTE, RACF, and SAF return codes and reason codes are documented in the IBM publication, *External Security Interface (RACROUTE) Macro Reference for MVS and VM*, or in later releases, *SecureWay Security Server RACROUTE Macro Reference*.

Consistency Groups

This chapter describes SRDF and R1_RO consistency groups. Topics include:

- ◆ SRDF_CONGROUP Consistency Group Architecture.....4-2
- ◆ R1_RO_CONGROUP Consistency Group Architecture4-9
- ◆ Introduction to Configuration Parameters.....4-10
- ◆ Global Configuration Parameters.....4-11
- ◆ Consistency-Group-Specific Configuration Parameters4-31
- ◆ SRDF_CONGROUP Examples4-44
- ◆ R1_RO_CONGROUP Examples4-45

SRDF_CONGROUP Consistency Group Architecture

ConGroup maintains consistency for an SRDF configuration. ConGroup supports the following:

- ◆ All valid SRDF topologies, including concurrent and switched SRDF and static and dynamic COMPAV devices
- ◆ Standard devices with established BCVs

ConGroup monitors data propagation from the primary (R1) devices in a consistency group to their corresponding secondary (R2) devices.

If one or more primary (R1) devices in a consistency group cannot propagate data to their corresponding secondary (R2) devices, ConGroup suspends all the primary (R1) devices in the consistency group. This suspension ensures that:

- ◆ The data flow to the secondary (R2) side is halted.
- ◆ The data on the remote side of the configuration is consistent.

ConGroup Trips

A suspension of I/O activity in the primary R1 devices is called a ConGroup trip. A ConGroup trip creates a restartable environment that enables applications to still use the remote data base.

When the consistency group trips, ConGroup can also split a BCV from a locally channel-attached STD device at the remote site which is defined to the consistency group.

I/O to the local consistency group devices can still occur when the SRDF primary devices in the consistency group have data propagation suspended. When SRDF mirroring is resumed, these updates are sent to the remote side. After synchronization is achieved, ConGroup protection is re-enabled for the consistency group.

ConGroup Instances and SRDF Consistency Groups

Each LPAR can have its own instance of ConGroup and can have one or more SRDF consistency groups. Each SRDF consistency group can contain:

- ◆ SRDF devices
- ◆ SRDF devices and STD Devices ¹

Each SRDF consistency group must contain at least one primary (R1) device.

Resuming SRDF Operation

The resumption of SRDF operation involves planning. In more complex configurations, such as concurrent RDF, special consideration may apply. If the consistency group's targets (R2) are used for processing after a ConGroup suspension, then additional considerations apply.

More Information: Refer to both *EMC Symmetrix Remote Data Facility Product Guide* and *Symmetrix SRDF Host Component Product Guide* for additional information.

The next two figures illustrate this process graphically.

-
1. STD devices are defined in SRDF_CONGROUPS. They are not allowed in R1_RO consistency groups. Refer to *R1_RO_CONGROUP Consistency Group Architecture* on page 4-9 for more information about R1_RO consistency groups.

Figure 4-1 shows a consistency group between the source (R1) devices in Symmetrix A and B those in Symmetrix A' and B':

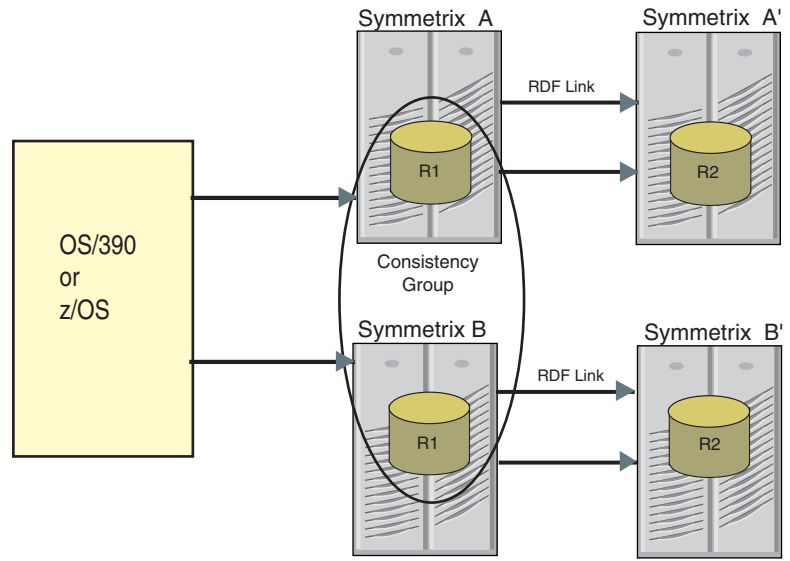


Figure 4-1 SRDF Consistency Group

Figure 4-2 shows a possible failure scenario. Data from a source (R1) device in Symmetrix A has failed to propagate to its corresponding target (R2) device in Symmetrix A', but data base coherency is maintained because ConGroup has suspended all source (R1) devices in the consistency group.

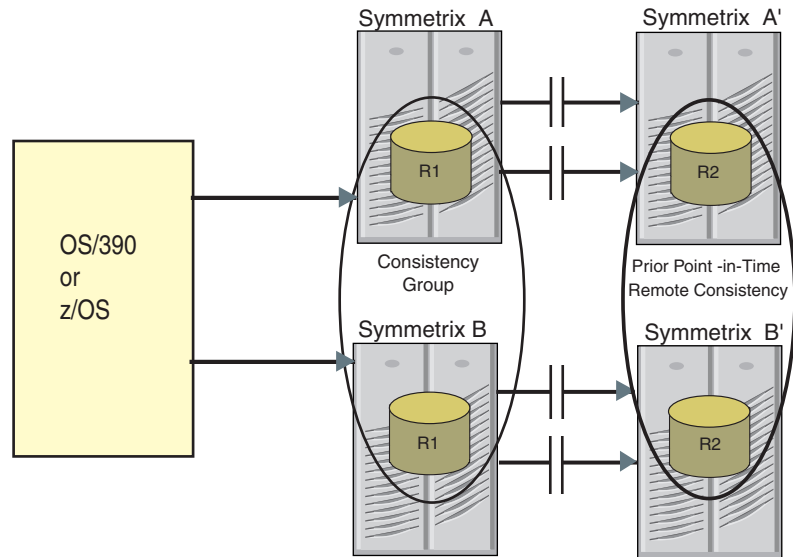


Figure 4-2 Data Propagation Failure

Concurrent RDF

Engenuity 5x67 and later supports remotely mirroring a single primary volume to two secondary volumes concurrently. This feature is called Concurrent RDF and is available in both ESCON and Fibre Channel RDF configurations. ConGroup supports this RDF configuration with the SYMGROUP parameter.

Concurrent RDF requires that each secondary volume operate in the same primary mode, either both synchronous or both semi-synchronous, but allows either (or both) volumes to be placed into adaptive copy mode.

The ConGroup utility needs you to define which of the RDF Groups in the Concurrent RDF configuration are to be protected. You do this by specifying which RDF groups are to be protected.

Figure 4-3 shows a concurrent RDF configuration in which one secondary volume is in synchronous mode and ConGroup protected, while the other is in adaptive copy and not ConGroup protected:

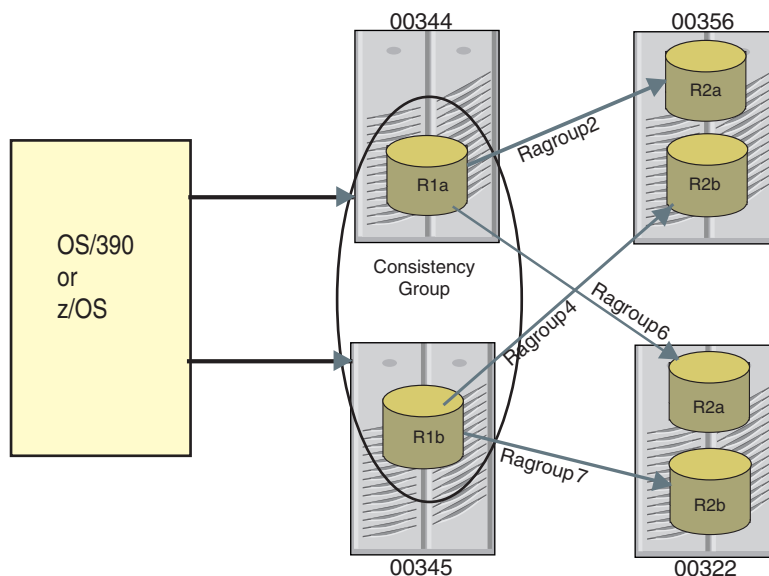


Figure 4-3 Concurrent RDF

Normal operating rules for SRDF also apply to concurrent configurations:

- ◆ When operating in synchronous mode, ending status for an I/O is not presented until the remote Symmetrix acknowledges receipt of the I/O to the primary Symmetrix.
- ◆ If both secondary volumes are operating in synchronous mode, ending status is not presented until both volumes acknowledge receipt of the I/O.
- ◆ If one volume is in synchronous mode and one volume is in adaptive copy mode, ending status is presented to the host when the synchronous volume acknowledges receipt of the I/O.

In Figure 4-3 on page 4-6, RDF Group 2 in Symmetrix 00344 and RDF Group 4 in Symmetrix 00345 are the ragroups in synchronous mode to be protected by the ConGroup utility. RDF Group 6 and RDF Group 7 are ragroups in modes other than semi-synchronous and not monitored by the ConGroup utility.

In this case, the SYMGROUP parameter would specify RDF Groups 2 and 4 are to be protected. If a ConGroup trip occurs, then all devices in the involved Symmetrix unit are suspended.

Consistency Group States

ENABLED

A consistency group can be either ENABLED or DISABLED. ENABLED/DISABLED is the on/off switch for ConGroup protection.

When a consistency group is ENABLED, ConGroup protection is turned on, and that consistency group is eligible to be suspended should the circumstances arise.

An ENABLED consistency group can be in one of the following sub-states:

- ◆ Active

This is the normal state for a consistency group. Data is flowing to the remote devices and the consistency group is eligible to be suspended.

- ◆ Suspend pending

An error has occurred causing the ConGroup task to suspend the consistency group; that is, to stop the data flow to the remote devices. While in this state, I/O to the devices is held until the suspend completes.

- ◆ Suspended

The suspend has completed, data has stopped flowing to the remote devices, and I/O has resumed to the local devices. The remote devices are in a consistent state.

- ◆ Remote split in process

This state implies that the consistency group is suspended. The ConGroup task is in the process of splitting all the remote (R2) devices from their Business Continuation Volume (BCV) devices, if present.

- ◆ Resume in process

The ConGroup task is in the process of resuming the data flow to the remote devices, or has completed the process and is now waiting for all the devices in the consistency group to synchronize with their respective remote devices.

DISABLED

If a consistency group is DISABLED, there is no ConGroup protection active. The consistency group is essentially a defined group of devices with nothing to do.

R1_RO_CONGROUP Consistency Group Architecture

R1_RO_CONGROUP groups are defined through the R1_RO_CONGROUP configuration parameter. R1_RO_CONGROUP groups are a way of protecting a group of devices in the event of a remote device or link failure involving volumes containing IMS or DB2 data base management systems.

When such failures occur, the Symmetrix storage subsystem returns a special sense code. In response to this code, the following takes place:

1. The data base management system (IMS and DB2) writes the data base updates to the data base management system log.
2. The Symmetrix places the source (R1) devices in read-only mode.

This type of operation is different from a group of devices defined with the SRDF_CONGROUP configuration parameter. With R1_RO_CONGROUP, the devices are not suspended; but, rather, the native capabilities of the data base management system allow continued update of the data base through the log file.

Should a subsequent disaster occur at the production site, an emergency restart of the data base management system at the recovery site applies all the updates from the log to the data base on the target (R2) volumes, resulting in zero data loss during the *rolling outage*.

Beyond ENABLING, DISABLING, and maintenance (through the AUTO-REFRESH function) of the R1_RO_CONGROUP, the ConGroup task is not actively involved in providing the source (R1) read only functionality. The role of the ConGroup task is to impart a configuration attribute to a group of Symmetrix devices.

Introduction to Configuration Parameters

The configuration file contains configuration parameters for both SRDF_CONGROUP and R1_RO_CONGROUP congroups. There are two types of configuration parameters:

- ◆ Global configuration parameters that apply to general ConGroup operation
- ◆ Consistency-group-specific configuration parameters that define a particular consistency group ¹

You specify ConGroup configuration parameters as a series of parameter statements in the following format:

keyword = value

Keep the following points in mind:

- ◆ *keyword* must begin in column one
- ◆ An asterisk (*) in column one indicates that the following text is a comment
- ◆ A consistency group is defined first, followed by the devices in the consistency group
- ◆ The parameter statements should be saved as a member of a parameter library which is pointed to by the CONFIG DD statement of the ConGroup started task JCL

The following sections describes the configuration parameters that are applicable to SRDF_CONGROUP and R1_RO_CONGROUP consistency groups.

1. Both R1_RO_CONGROUP consistency groups and SRDF_CONGROUPS for an LPAR are defined in the same configuration file.

Global Configuration Parameters

Global configuration parameters affect all consistency groups used with the current instance of ConGroup. Place global configuration parameters first in the configuration file, followed by the definitions of one or more consistency groups.

More Information: Refer to *Consistency-Group-Specific Configuration Parameters* on page 4-31 for descriptions of those configuration parameters you use to define a particular consistency group.

Not all global configuration parameters apply to both SRDF_CONGROUPE and R1_RO_CONGROUPE consistency groups. Table 4-1 lists the global configuration parameters and the consistency group types to which they apply:

Table 4-1 Global Configuration Parameters by Consistency Group

Configuration Parameter	Applies to SRDF_CONGROUPE?	Applies to R1_RO_CONGROUPE?
AUTO_REFRESH	Yes	Yes
CAXOPTS	Yes	No
COUPLEDSE_ALLOWED	Yes	No
DISABLE_AT_SHUTDOWN	Yes	Yes
DISABLE_ON_VERIFY_ERROR	Yes	Yes
DISPLAY_CONGROUPE_LISTOPT	Yes	Yes
GLOBAL	Yes	Yes
MODE=SENGLE	Yes	Yes
PAGEDEV_ALLOWED	Yes	No
REMSPLIT_INTERVAL	Yes	No
REMSPLIT_OPTION	Yes	No
RESUME_INTERVAL	Yes	No
RESUME_OPTION	Yes	No
SAF_CLASS	Yes	Yes

Table 4-1 Global Configuration Parameters by Consistency Group (continued)

Configuration Parameter	Applies to SRDF_CONGROUPS?	Applies to R1_RO_CONGROUPS?
SAF_PROFILE	Yes	Yes
SEMISYNC_ALLOWED	Yes	Yes
VERIFY_INTERVAL	Yes	Yes

The following sections describe these global configuration parameters.

AUTO_REFRESH

AUTO_REFRESH controls the ConGroup mechanism that detects when a device becomes varied online. The ConGroup task checks to see if that device should belong to a consistency group, and automatically generates a REFRESH command if needed.

More Information: Refer to *REFRESH* on page 6-16.

Applicable Groups

SRDF_CONGROUP consistency groups
R1_RO_CONGROUP consistency groups

Syntax

`AUTO_REFRESH=switch`

Parameter Values

switch can be:

YES

REFRESH commands are automatically generated.

NO

(Default) REFRESH commands are not automatically generated.

Comments

When you define an SRDF_CONGROUP or R1_RO_CONGROUP consistency group, you can include devices in the consistency group by specifying an SMS group or a VOLSER mask. If a device becomes varied online, and that device belongs to a specified SMS group or fits a specified VOLSER mask, the ConGroup task generates a REFRESH command so that the new device will be included into the consistency group.

For example, suppose the definition of a consistency group contains the following statement:

```
DEVICE_LIST=EMC*
```

When the ConGroup task starts, all the devices that are online whose VOLSERs begin with the characters `EMC` are included into the consistency group.

Suppose after startup, a `DISPLAY` command gave these results for an `SRDF_CONGROUP`:

```
CONGROUP=DB2PROD      ENABLED ACTIVE
SUSPEND_FAILURE=WTOR   SUSPEND_TIMEOUT=120
CTLR SER#=000183500647
0101 EMC001 0102 EMC002 0130 EMC003 0104 EMC004
```

If volume `EMC005` is varied online, the ConGroup task recognizes this event, and determines that the volume `EMC005` fits the VOLSER mask `EMC*`. The ConGroup task generates a `REFRESH` command so that `EMC005` will be included as part of consistency group `DB2PROD`.

More Information: Refer to *DEVICE_LIST* on page 4-33.

Auto-Refresh is used when you specify VOLSER masks for either the `DEVICE_LIST` or the `EXCLUDE` parameters, or when you specify SMS groups. If you specify devices by `z/OS` device number (`cuu`), the devices become part of the consistency group, regardless of whether they are online or offline. A `REFRESH` command will not be initiated when devices that you included by `cuu` are varied online or offline.

Offline devices excluded only by VOLSER will not be excluded as the VOLSER does not exist during the time the device is offline. Clipping a device that you defined in the consistency group as part of the consistency group by `cuu` does not initiate a `REFRESH` as the device is already part of the group.

The `REFRESH` command is only issued if the state of the consistency groups allow it to be issued. If the `REFRESH` command cannot be issued immediately, the ConGroup task monitors the consistency groups and issues the `REFRESH` at an appropriate time.

More Information: Refer to *REFRESH* on page 6-16.

Note that AUTO_REFRESH does not issue a REFRESH command if CAX is defined. In such a situation, the following message is returned:

```
CONGROUP - Auto_Refresh is bypassed. Issue manually if desired.
```

More Information: Refer to CAX on page 4-32.

Example

```
AUTO_REFRESH=YES
```

CAXOPTS

The CAXOPTS parameter defines a set of ConGroup AutoSwap options under an options set name. You can then associate that options set for a consistency group through the CAX parameter.

More Information: Refer to CAX on page 4-32.

Applicable Groups

SRDF_CONGROUP consistency groups

Syntax

```
CAXOPTS
options_set=(cax_option[,cax_option[,...]])
```

Parameter Values

options_set

Specifies the name given to a set of CAXOPTS parameter statements to use for this consistency group.

The option set name can be 1 through 8 characters in length.

cax_option

Are the options that make up the option set. If you use multiple *cax_option* parameters, enclose them in parentheses and separate them with commas and no intervening spaces.

CAX Options

You can use the following as CAX options. These are the only options supported by ConGroup and the only ones appropriate for ConGroup usage.

```
AUTOSwapCONDitions=INTERVENTIONREQUIRED|NOPATHS
```

ConGroup AutoSwap action to be taken when the specified condition occurs for a device in the ConGroup. This is a required parameter. There is no default value. Note that you can specify either or both AUTOSWAPCONDITIONS values:

```
AUTOCOND=INTERVENTIONREQUIRED
AUTOCOND=NOPATHS
AUTOCOND=INTERVENTIONREQUIRED NOPATHS
```

CFW=NO | OFFVAL | BYPASS

Controls CFW, cache fast write. The parameter values can be:

NO

If CFW is active on any devices in the consistency group, then validation of the consistency group fails and ConGroup AutoSwap processing is disabled.

OFFVAL

CFW is disabled during ConGroup validation processing. No CFW processing is attempted during a ConGroup AutoSwap swap event. If you subsequently reactivate CFW, for example with IDCAMS, and a ConGroup AutoSwap swap event occurs, jobs using the ability of CFW fail. You must rerun these jobs after the swap.

BYPASS

CFW will be checked during ConGroup validation processing. However, no change in a device's CFW state is performed. If a ConGroup AutoSwap swap event occurs, then jobs using CFW functionality will fail. You must rerun these jobs.

CROSSSYSTEMTIMEOUT=*time_interval*

Specifies the cross-host timeout value. This is the time ConGroup AutoSwap waits for acknowledgement from other ConGroup AutoSwap instances on other hosts. The *time_interval* value may be in the range of 60 seconds through 9999 seconds. The default value is 300.

LOSTOwnerpolicy ONSWAP=[HOLDIO | BACKOUT | OPERATOR | SYSRESET [(*wait_code*)]]

Specifies the action for ConGroup AutoSwap if all communication with the owner or controlling system has been lost. This occurs when SRDF and both primary and secondary channel paths to the consistency group devices.

You can abbreviate LOSTOwnerpolicy as LOP.

HOLDIO

Specifies that the IOSLEVEL is maintained high to halt I/O on the system that has lost connectivity with the owner system.

BACKOUT

Specifies that the swap operation is undone on the system that has lost connectivity with the owner system.

OPERATOR

Specifies that the operator should be asked what LOSTOwnerpolicy to execute. OPERATOR is the default.

SYSRESET [(*wait_code*)]

Specifies that a non-restartable wait state of *wait_code* occur on the system that has lost connectivity with the owner system. Valid values for *wait_code* can range from X'FF0' to X'FFE'. The default *wait_code* is 0FF0.

[NO] BYPASSSYSTEMSCOUNT

Specifies whether or not to bypass the requirement that all other LPARs with an established path group to the device belonging to the ConGroup have EMCSCF and ConGroup running.

During validation processing, number of participating LPARS and path groups is taken. Then, at swap time, the number of participating LPARS and path groups is taken again.

If you specify BypassSystemsCount, the LPAR count at swap time does not have to match the number of path groups for the device established at validation time¹. The swap can continue.

If you specify NoByPassSystemsCount, the LPAR count at swap time must be equal to or greater than the number of path groups for the device established at validation time. If the LPAR count is less than the number of established path groups for the device, the swap cannot proceed.

EMC recommends, where SWAPCONTROL=BYRANGE or BYGROUP is specified, that you use (or default to)

BypassSystemsCount and validate the group before performing swap processing. This is because AutoSwap optimizes the validation processing in this instance.

1. If LPARs and path groups for LPARs cannot be found at validation time, the message GGRS195I (ESWP195I for AutoSwap) is issued.

If you specify `NoBypassSystemsCount`, devices must be individually validated across all hosts to be certain that all hosts with paths to the devices correctly validate the device. In addition, a message is output for each device mismatch with an associated `CGRS19I` message.

More Information: Refer to *EMC SWAP Services Message and Code Guide* for more information about messages you can receive.

`QUIESCETimeout=time_interval|MIH`

Specifies the quiescent time out. The time interval can be between 0 and 300 seconds. A value of 0 is equivalent to specifying `MIH` (Missing Interrupt Handler). If the resolved timeout value is less than 15 seconds, then 15 seconds is used.

Example In this example the `ConGroup AutoSwap` Extension are required. If `ConGroup AutoSwap` is not operating or the consistency group device group fails validation, `ConGroup` will not enable the consistency group.

```
CAX= (CAXOPTS=CASOPT1)
CAXOPTS CAXOPT1= (AUTOCOND=NOPATHS,CFW=OFFVAL,LOSTO ONSWAP=SYSRESET(OFF0) ,BSC)
```

The `CAX` statement declared that `CAXOPT1` specifies the `ConGroup AutoSwap` options for this consistency group.

- ◆ `AUTOCOND=NOPATHS` specifies that if an I/O failure with a “no paths available” condition for any of the devices in the consistency group device group that the failure event actions begin.
- ◆ `CFW=OFFVAL` will turn off the cachefastwrite at the time of group validation. No `CFW` processing will be attempted during the swap event.
- ◆ `LOSTOwnerpolicy ONSWAP=SYSRESET(OFF0)` specifies that if all communication, both channels and `SRDF`, is lost processing continues, if possible, on the primary side and the secondary side enters a non-restartable wait state `OFF0`.
- ◆ `BSC` specifies that failure response actions will occur even if the system count at the time of the event does not match the system count at validation time.

If the failure event is the inability to communicate from the R1 to the R2 a normal ConGroup trip occurs and the ConGroup AutoSwap Extension is disabled.

COUPLEDSD_ALLOWED

COUPLEDSD_ALLOWED allows you to add volumes with couple datasets to a consistency group, or explicitly prevent addition of volumes with couple datasets to the consistency group.

Important: With current maintenance applied, you can now set the COUPLEDSD_ALLOWED global configuration parameter if you are have an AutoSwap consistency group and are using the ConGroup AutoSwap extension.

Applicable Groups SRDF_CONGROUP consistency groups

Syntax COUPLEDSD_ALLOWED=*switch*

Parameter Values *switch* can be:

YES

Allows volumes with couple datasets to be explicitly added to the consistency group. If you include DEVICE_LIST=ALL and also specify COUPLEDSD_ALLOWED=YES, then volumes with couple datasets are NOT added to the consistency group.

NO

(Default) Prohibits volumes with couple datasets to be explicitly added to the consistency group.

Comments There are seven types of couple datasets:

- ◆ SYSPLEX
- ◆ CFRM
- ◆ WLM
- ◆ OMVS
- ◆ ARM
- ◆ SFM
- ◆ LOGR

Volumes with couple datasets *will* have their IOSLevels set high when a consistency group trips. This could cause problems if the wrong couple datasets are added to the consistency group.

If you are using CICS journaling/logging through the System Logger, then you should consider including only the primary LOGR couple dataset in a consistency group. If a LOGR couple dataset is to be included in a consistency group, it is imperative that there are no other couple datasets on the volume with the primary LOGR couple dataset.

COUPLEDSD_ALLOWED allows you to add the primary couple dataset used by the System Logger to the consistency group. No determination as to which couple dataset is added is made so the user should isolate the logger datasets on volume(s) separate from the SYSPLEX couple datasets.

If the primary LOGR couple dataset is to be used as part of a consistency group, then the LOGR structure in the Coupling Facility should be set up for duplexing to staging datasets. After the consistency group has tripped, the contents of the primary LOGR couple dataset, the LOGR staging datasets, and the LOGR logstream datasets will contain the information necessary to restart CICS.

Example COUPLEDSD_ALLOWED=YES

DISABLE_AT_SHUTDOWN

The DISABLE_AT_SHUTDOWN parameter specifies the ConGroup task whether all consistency groups should be disabled for ConGroup protection when the ConGroup task is shutdown.

Applicable Groups SRDF_CONGROUP consistency groups
R1_RO_CONGROUP consistency groups

Syntax DISABLE_AT_SHUTDOWN=*switch*

Parameter Values *switch* can be:

YES

At shutdown, all consistency groups are disabled.

NO

(Default) Consistency groups remain enabled when the ConGroup task shuts down.

Comments DISABLE_AT_SHUTDOWN is particularly important when the ConGroup task is active on multiple z/OS images. Disabling a consistency group turns off ConGroup protection for all the devices

in that consistency group, regardless of which hosts are connected to the devices.

When the ConGroup task is active on multiple z/OS images, disabling a consistency group from one host is not desirable, as it removes ConGroup protection on the other hosts as well.

Example

`DISABLE_AT_SHUTDOWN=YES`

DISABLE_ON_VERIFY_ERROR

The `DISABLE_ON_VERIFY_ERROR` parameter specifies whether ConGroup should disable an `ENABLED/ACTIVE` consistency group if the auto-verify logic finds that the devices in the consistency group are not in the expected state.

The auto-verify logic is disabled for swapped or swapping consistency groups.

Applicable Groups

`SRDF_CONGROUP` consistency groups

`R1_RO_CONGROUP` consistency groups

Syntax

`DISABLE_ON_VERIFY_ERROR=switch`

Parameter Values

switch can be:

YES

(Default) The consistency group will be put into a `DISABLED` state.

If you do not include the `DISABLE_ON_VERIFY_ERROR` parameter, a `DISPLAY ENVIRONMENT` command shows that `DISABLE_ON_VERIFY_ERROR` is set to `YES`.

NO

The consistency group will be put into an unknown state (a `DISPLAY CONGROUP` shows a state of `????`).

`DISABLE_ON_VERIFY_ERROR` is always `NO` for consistency groups that also have an S/DAS group associated with them. If you make an R1 not ready in such cases, Auto-Verify still functions, but does not disable the consistency group. Disabling the consistency group would delete the S/DAS group.

Example `DISABLE_ON_VERIFY_ERROR=NO`

DISPLAY_CONGROUP_LISTOPT

The DISPLAY_CONGROUP_LISTOPT parameter sets the default behavior for the DISPLAY CONGROUP operator command.

Applicable Groups SRDF_CONGROUP consistency groups
 R1_RO_CONGROUP consistency groups

Syntax `DISPLAY_CONGROUP_LISTOPT=switch`

Parameter Values *switch* can be:

LIST

(Default) Information about all the devices in the consistency group are displayed by the DISPLAY CONGROUP processing.

NOLIST

Information about all the devices in a consistency group is suppressed.

Example `DISPLAY_CONGROUP_LISTOPT=NOLIST`

GLOBAL

GLOBAL specifies two subparameters:

- ◆ LISTENCODE=
- ◆ OWNER=

LISTENCODE specifies a code that allows inter-SDAS communication. OWNER specifies the SMF ID of the LPAR that will control the consistency group and the ConGroup AutoSwap functions. If a failure occurs that results in all communication being lost between the primary and secondary sites, the system specified in OWNER proceeds while the other site halts.

You can use the MOVEOWNER or TAKEOVER operator commands to transfer ownership to a different LPAR without the need to reinitialize the ConGroup task manually. Refer to MOVEOWNER on page 6-14 and TAKEOVER on page 6-23.

Applicable Groups SRDF_CONGROUP consistency groups

R1_RO_CONGROUP consistency groups

Syntax GLOBAL= ([LISTENCODE=*nnn*,] OWNER=*SMFid*)

Parameter Values *nnn*

The LISTENCODE that applies to all consistency groups served by this configuration file. If you do not specify a LISTENCODE, ConGroup uses a LISTENCODE of 101. This is satisfactory in general use.

Do not specify a LISTENCODE unless directed by EMC Customer Support.

SMFid

The SMF ID of the owner LPAR. This parameter must be the same in ConGroup parameter files for all instances of ConGroup that use the defined consistency groups.

MODE=SINGLE

The MODE=SINGLE parameters prevents two or more ConGroup 6.1 utilities from communicating with each other. All ConGroup instances that come up will not attempt to talk to ConGroups already running. (This is useful for sites that have many ConGroup 6.0 instances.)

Applicable Groups SRDF_CONGROUP consistency groups
R1_RO_CONGROUP consistency groups

Syntax MODE=SINGLE

PAGEDEV_ALLOWED

The PAGEDEV_ALLOWED parameter specifies whether devices that contain page datasets can be defined as part of a consistency group. This parameter is global in scope and applies to all defined consistency groups.

Important: You cannot set the PAGEDEV_ALLOWED global configuration parameter if you have AutoSwap consistency group, and are using the ConGroup AutoSwap extension.

Applicable Groups SRDF_CONGROUPE consistency groups

Syntax PAGEDEV_ALLOWED=*switch*

Parameter Values *switch* can be:

YES

Devices with page datasets can be defined as part of a consistency group.

NO

(Default) Devices with page datasets cannot be defined as part of a consistency group.

Comments I/O to devices with page datasets cannot be halted during the suspend processing. This means that during the ConGroup trip process, I/O may complete to the remote mirror of a paging volume prior to the SRDF SUSPEND command completing against that volume.

You must ensure that devices containing page datasets do not also contain data which has dependencies with data on other devices in the consistency group. Failure to do so may result in inconsistent data on the remote side.

Example PAGEDEV_ALLOWED=YES

REMSPLIT_INTERVAL

The REMSPLIT_INTERVAL parameter specifies the number of seconds a REMSPLIT process waits before retrying the request after receiving temporary errors. The request will not be retried if any of the following happen:

- ◆ The request succeeds.
- ◆ ConGroup encounters an R2 device without a BCV when you have specified NOESTERR as a REMSPLIT_OPTION.

More Information: Refer to *REMSPLIT_OPTION* in the following section.

- ◆ The request is canceled by the CANCEL operator command.

Applicable Groups SRDF_CONGROUP consistency groups

Syntax REMSPLIT_INTERVAL=seconds

Parameter Values *seconds*

The number of seconds a REMSPLIT process will wait. If you do not specify a value for REMSPLIT_INTERVAL, then REMSPLIT_INTERVAL defaults to 10 seconds.

Comments Message CGRP206I is issued each time the REMSPLIT process retries the remote split.

Example: REMSPLIT_INTERVAL=15

REMSPLIT_OPTION

The REMSPLIT_OPTION parameter, when set to NOESTERR, instructs ConGroup to generate message CGRP314E during remote split processing to notify the operator of all R2 devices without an attached BCV.

Applicable Groups SRDF_CONGROUP consistency groups

Syntax REMSPLIT_OPTION=*switch*

Parameter Values *switch*

When you specify NOESTERR, remote split processing fails when an R2 device is found without an attached BCV. When you do not specify NOESTERR, R2 devices without attached BCVs are ignored and no error message is generated.

Example: REMSPLIT_OPTION=NOESTERR

RESUME_INTERVAL

The RESUME_INTERVAL parameter specifies the number of seconds a RESUME command waits before checking whether all the devices

in the consistency group are synchronized. Message CGRP022I is issued, followed by another message describing the state of the RESUME command. ConGroup continues to retry the request until either of the following occurs:

- ◆ The request succeeds.
- ◆ The request is canceled by the CANCEL operator command.

Applicable Groups SRDF_CONGROUP consistency groups

Syntax RESUME_INTERVAL=*seconds*

Parameter Values *seconds*

The number of seconds a RESUME command will wait. If you do not specify a value for RESUME_INTERVAL, then RESUME_INTERVAL defaults to 10 seconds.

Example: RESUME_INTERVAL=15

RESUME_OPTION

The RESUME_OPTION parameter, when set to NOTRNMSG, suppresses messages about processing verification that are resolved by resume processing. The default generates the transient state message during processing resumption.

In addition, you can specify the RSMALLIT option, which displays the invalid tracks for all devices in the consistency group during each RESUME_INTERVAL.

Applicable Groups SRDF_CONGROUP consistency groups

Syntax RESUME_OPTION=*message treatment*

Parameter Values *message treatment* can be:

NOTRNMSG

Messages about processing verification that are resolved by resume processing are suppressed.

RSMALLIT

Invalid tracks for all devices in the consistency group are displayed during each RESUME_INTERVAL. If you do not specify RSMALLIT, only messages for the first device found with invalid tracks will be issued on each interval.

Example To specify both the NOTRNMSG and the RSMALLIT values:

```
RESUME_OPTION=NOTRNMSG+RSMALLIT
```

or

```
RESUME_OPTION=RSMALLIT+NOTRNMSG
```

SAF_CLASS

The SAF_CLASS parameter defines the QNAME that will be used to perform security checks for the operator commands.

Applicable Groups SRDF_CONGROU consistency groups
R1_RO_CONGROU consistency groups

Syntax SAF_CLASS=*qname*

Parameter Values *qname*

Any valid queue name that is defined to the security subsystem.
The default value for the SAF_CLASS parameter is DATASET.

Example None.

SAF_PROFILE

The SAF_PROFILE parameter defines the base RNAME that will be used to perform security access checks for the operator commands. Before making a security access check, ConGroup appends a command-specific suffix to the value of this parameter.

Applicable Groups SRDF_CONGROU consistency groups
R1_RO_CONGROU consistency groups

Syntax SAF_PROFILE=*resource_name*

Parameter Values *resource_name*

Any valid resource name for the security subsystem. The resource name can be up to 35 characters long.

More Information: Refer to Table 3-1 on page 3-3 for valid values.

The default value for the SAF_PROFILE parameter is EMC.VALIDATE.ACCESS.

Example None.

SEMISYNC_ALLOWED

The SEMISYNC_ALLOWED parameter specifies whether semi-synchronous devices (J1) can be used in a consistency group definition.

Applicable Groups SRDF_CONGROUP consistency groups
R1_RO_CONGROUP consistency groups

Syntax SEMISYNC_ALLOWED=*switch*

Parameter Values *switch* can be:

YES

Devices operating in a semi-synchronous copy state can be defined as part of a consistency group.

Because CAX groups cannot use semi-sync devices, ConGroup ignores any specification of SEMISYNC_ALLOWED=YES when CAX groups are in the ConGroup configuration file. Instead, it uses the “default” value of not allowing semi-sync devices.

If a semi-sync device appears in a CAX group, ConGroup issues message CGRP273E, indicating that SEMISYNC_ALLOWED=NO is in effect.

More Information: Refer to CGRP273E on page A-48.

NO

(Default) Only synchronous devices can be defined as part of a consistency group.

SRDF_CONGROUP: You must use this default if you have any CAX groups defined in your configuration file.

Comments

To use semi-synchronous devices with consistency groups requires special consideration and knowledge of the nature of the applications being protected by SRDF in semi-synchronous mode.

Semi-synchronous mode is designed to improve the performance of SRDF in configurations where the overhead introduced by propagation delay in synchronous mode adversely impacts application performance. Semi-synchronous mode reduces this performance impact by acknowledging the completion of a write I/O to the application by the primary Symmetrix before propagating the data to the secondary Symmetrix. In essence, this eliminates propagation delay.

Propagation delay elimination results in a performance benefit if the inter arrival time of write I/Os to the primary Symmetrix is greater than the service time for the I/O across the SRDF link. If this inter arrival time is less than the link service time, then semi-synchronous mode provides no performance benefit over SRDF's synchronous mode of operation. Therefore, the benefit of semi-synchronous mode is very application and workload dependent.

Semi-synchronous mode limits *out of sync* conditions to, at most, one I/O per logical volume. However, this does allow two logically dependent I/Os to be in flight in the SRDF communications infrastructure at the same time. Such a condition is only likely in applications that do not exhibit deferred write characteristics or are not highly buffered in the CPU. Modern relational data bases, such as DB2, defer dependent writes and are not likely to issue logically dependent I/Os in close time proximity. However older DBMS systems, such as IMS, often do not defer dependent writes and are likely to have dependent I/Os in progress at the same time in SRDF Semi-Sync mode.

Use of semi-synchronous mode in multiple control unit SRDF implementations, (or in a single control unit employing multiple SRDF groups) with applications that do not defer writes is not recommended and may result in inconsistent data at the remote site in the event of an unplanned outage at the primary site.

SRDF_CONGROUP: ConGroup AutoSwap (CAX) groups cannot use semi-synchronous devices. Therefore, ConGroup ignores this parameter if there are CAX groups in the ConGroup configuration file. That is, ConGroup ignores a YES value if there are any CAX groups in the configuration file.

Example

SEMI_SYNC_ALLOWED=YES

VERIFY_INTERVAL

The VERIFY_INTERVAL parameter specifies the time interval (in seconds) before the new auto-verification subtask attempts to verify the state of all ENABLED/ACTIVE consistency groups. This is to ensure that all consistency group devices are still in the expected state.

If all devices are not in the expected state, then what happens depends on the value of the DISABLE_ON_VERIFY_ERROR parameter. If DISABLE_ON_VERIFY_ERROR is set to YES, then the consistency group is placed in a DISABLED state. If DISABLE_ON_VERIFY_ERROR is set to NO, then the consistency group is placed in an UNKNOWN state.

A state of UNKNOWN does not necessarily mean that the group has lost its consistency.

More Information: Refer to *DISABLE_ON_VERIFY_ERROR* on page 4-20.

Applicable Groups

SRDF_CONGROUP consistency groups
R1_RO_CONGROUP consistency groups

Syntax

VERIFY_INTERVAL=*seconds*

Parameter Values

seconds

The time interval in seconds. The maximum value you can specify is 99,999,999 (seconds).

If you do not specify a value for VERIFY_INTERVAL, the ConGroup utility uses a default of 300 seconds. If you enter a value of 0 (zero), the auto-verify logic is disabled.

The auto-verify logic is disabled for swapped or swapping consistency groups.

Example `VERIFY_INTERVAL=250`

Consistency-Group-Specific Configuration Parameters

In the ConGroup configuration file, you place specific configuration parameters after the global configuration statements. You use consistency-group-specific configuration parameters to declare a consistency group and define its characteristics.

Not all consistency-group-specific configuration parameters apply to both SRDF_CONGROUP and R1_RO_CONGROUP consistency groups. Table 4-2 lists the consistency configuration parameters and the consistency group types to which they apply:

Table 4-2 Consistency-Group-Specific Parameters by Consistency Group

Configuration Parameter	Applies to SRDF_CONGROUPS?	Applies to R1_RO_CONGROUPS?
CAX	Yes	No
CONGROUP	Yes	No
DEVICE_LIST	Yes	Yes
DEVICE_LIST_STD	Yes	No
EXCLUDE	Yes	Yes
R1_RO_CONGROUP	No	Yes
SMS_GROUP	Yes	Yes
SRDF_CONGROUP	Yes	No
SUSPEND_FAILURE	Yes	No
SUSPEND_TIMEOUT SUSPEND_RETRY_TIMEOUT	Yes	No
SYMM_DEV#	Yes	Yes
SYMGROUP	Yes	No

CAX

The CAX parameter specifies whether you want to activate the ConGroup AutoSwap Extension for a device swap group and sets the CAX options set you want to use for that group.

The CAX parameter requires the ConGroup AutoSwap Extension feature be available for the ConGroup utility to enable.

More Information: Refer to *ConGroup AutoSwap* on page 1-8 and to *CAXOPTS* on page 4-14 for more information.

Applicable Groups SRDF_CONGROUP consistency groups

Syntax CAX= (CAXOPTS=*options_set*)

Parameter Value *options_set*

The name of an options set created with CAXOPTS. Multiple CAX statements may refer to the same CAXOPTS statement.

More Information: Refer to *CAXOPTS* on page 4-14.

Comments ConGroup AutoSwap Extension is a licensed feature of the Symmetrix.

More Information: For more information on Licensed Feature Codes, refer to the *ResourcePak Base for z/OS Product Guide*.

Example CAX= (CAXOPTS=CASOPT1)

CONGROUP

The CONGROUP parameter defines the name (from 1 to 8 characters) of a consistency group that contains either of the following:

- ◆ SRDF devices
- ◆ SRDF devices and Standard Devices

Applicable Groups SRDF_CONGROUP consistency groups

Syntax CONGROUP=*groupname*

Parameter Values *groupname*
Any string of from 1 to 8 characters.

Example CONGROUP=PATREC

DEVICE_LIST

The DEVICE_LIST parameter defines the devices that belong to the consistency group most recently defined with the CONGROUP or SRDF_CONGROUP, or R1_RO_CONGROUP parameters. For a given CONGROUP, SRDF_CONGROUP, or R1_RO_CONGROUP parameter, there can be one or more DEVICE_LIST parameters.

Applicable Groups SRDF_CONGROUP consistency groups
R1_RO_CONGROUP consistency groups

Syntax DEVICE_LIST=*device*[,*device*,...] | ALL

Parameter Values *device* can be:

- A mainframe device number
- A range of mainframe device numbers
- A mainframe VOLSER

Separate each device by commas. Specify ranges with a hyphen, for example 280-28F. You can mix mainframe device numbers and VOLSERS in the same statement.

When using VOLSERS, ensure that all the devices meant to be defined in a consistency group are online to all LPARs participating in the consistency group. This guarantees that a trip effects all of the devices on every LPAR.

In addition to ranges of device numbers and VOLSERS, you can use ALL to signify all devices. ALL can be useful with the EXCLUDE statement when a large number of devices are part of a consistency group.

DEVICE_LIST=ALL makes sure the devices meet the following criteria before selecting devices:

- The device is not on the exclude list
- The device must be able to communicate with the ConGroup utility

- The device must be in a Symmetrix storage subsystem that meets the requirements shown in Table 2-1 on page 2-2
- The device must be a R1 device
- The device is not a meta device

The ConGroup utility also supports the use of a VOLSER mask for specifying devices to be included in a consistency group.

Comments (SRDF_CONGROUP)

ConGroup monitors the SRDF devices on device list for failures to complete a successful write to their partner R2 device.

A failure to successfully write to a partner R2 device results in all the devices in the consistency group being suspended. This is referred to as a ConGroup trip.

Examples

The following example mixes devices and ranges of devices in the same statements:

```
DEVICE_LIST=200-27F,290,B000-B007
DEVICE_LIST=900,901,90A,DB2001,DB2002
```

The following example, specifies that the ConGroup task will include in the consistency group all the devices defined to the z/OS system:

```
DEVICE_LIST=ALL
```

You may find ALL useful when you use it with the EXCLUDE statement when a large number of devices are part of a consistency group. Refer to *EXCLUDE* on page 4-36.

The following example uses a VOLSER mask to add all the devices whose first three characters begin with IMS, regardless of what follows:

```
DEVICE_LIST=IMS*
```

You can use the mask character (*) after any number of characters, for example:

```
DEVICE_LIST=X*,QW*,EMC*,ABCO*,CDE01*
```

Like the other DEVICE_LIST parameters, you can mix VOLSER wildcards with the other device specifiers, for example:

```
DEVICE_LIST=200,300-310,ABC0*,SYM001,EMC*
```

DEVICE_LIST_STD

The DEVICE_LIST_STD parameter defines the standard devices that belong to the consistency group most recently defined with the CONGROUP or SRDF_CONGROUP parameters. For any given consistency group, there can be one or more DEVICE_LIST_STD parameters.

Applicable Groups SRDF_CONGROUP consistency groups

Syntax `DEVICE_LIST_STD=device[,device,...]`

Parameter Values *device* can consist of:

- ◆ A mainframe device number
- ◆ A range of mainframe device numbers
- ◆ A mainframe VOLSER

Separate values with commas. Specify ranges using a hyphen (for example 280-28F). You can intersperse mainframe device numbers and VOLSERs in the same statement.

The ConGroup utility also supports the use of a VOLSER mask when specifying devices to be included in a consistency group. You can use the mask character (*) after any number of characters.

Comments The standard devices in this parameter list are protected by BCVs rather than R2 devices. The consistency group will only be enabled if the standard devices you specify in this parameter are established with their partner BCV devices.

Devices defined with the DEVICE_LIST_STD parameter are not monitored for the inability to write to their established BCV device. DEVICE_LIST_STD devices cannot cause a ConGroup trip, but they are split when a ConGroup trip occurs.

Examples The following example mixes devices and ranges of devices in the same statements:

```
DEVICE_LIST_STD=200,300-303
DEVICE_LIST_STD=STD001,STD002
```

The following example uses a VOLSER mask to add all the devices whose first three characters begin with EMC, regardless of what follows:

```
DEVICE_LIST_STD=EMC*
```

As you can with the other `DEVICE_LIST_STD` parameters, you can mix VOLSER wildcards with the other device specifiers, for example:

```
DEVICE_LIST_STD=X*,QW*,EMC*,ABCO*,CDE01*
```

or:

```
DEVICE_LIST_STD=200,300-310,ABCO*,SYM001,EMC*
```

EXCLUDE

The `EXCLUDE` parameter allows you to exclude certain devices when defining a consistency group. For a given consistency group, there can be one or more `EXCLUDE` statements.

Excluded devices have precedence over devices included by the `DEVICE_LIST`, `DEVICE_LIST_STD`, and `SMS_GROUP` parameters. That is, an excluded device is always excluded, whereas an included device can be preempted by an `EXCLUDE` statement.

Applicable Groups

`SRDF_CONGROUP` consistency groups

`R1_RO_CONGROUP` consistency groups

Syntax

`EXCLUDE=device[,device,...]`

Parameter Values

device can consist of:

- A mainframe device number
- A range of mainframe device numbers
- A mainframe VOLSERs.

Separate values with commas. Specify ranges using a hyphen (for example 280-28F). You can intersperse mainframe device numbers and VOLSERs in the same statement.

Comments

The `EXCLUDE` parameter does not apply to devices defined with the `SYMM_DEV#` parameter.

Example:

```
EXCLUDE=200-21F
```

R1_RO_CONGROUP

The parameter `R1_RO_CONGROUP` defines the name of the `R1_RO_CONGROUP` consistency group.

Applicable Groups	R1_RO_CONGROUP consistency groups
Syntax	<code>R1_RO_CONGROUP=<i>consistency group</i></code>
Parameter Values	<i>consistency group</i> The name of a consistency group. Each consistency group name can be from 1 to 8 characters in length.
Example:	<code>R1_RO_CONGROUP=SALESDB2</code>

SMS_GROUP

The SMS_GROUP parameter specifies that all the devices belonging to the specified SMS group also belong to the most recently defined consistency group.

Applicable Groups	SRDF_CONGROUP consistency groups R1_RO_CONGROUP consistency groups
Syntax	<code>SMS_GROUP=<i>SMS groupname</i></code>
Parameter Values	<i>SMS groupname</i> Any valid SMS group name. Each SMS group name can be from one (1) to eight (8) characters in length.
Comments (SRDF_CONGROUP)	With SRDF consistency groups, SMS_GROUP and/or DEVICE_LIST are the only parameters that define devices to be monitored for the inability to complete a successful write to their partner R2 devices. This is referred to as a ConGroup trip.
Example:	<code>SMS_GROUP=SMSTEST</code>

SRDF_CONGROUP

The SRDF_CONGROUP parameter defines the name (1 to 8 characters) of an SRDF consistency group. You can define multiple SRDF_CONGROUP statements.

Applicable Groups	SRDF_CONGROUP consistency groups
Syntax	<code>SRDF_CONGROUP=<i>consistency group name</i></code>
Parameter Values	<i>consistency group name</i>

Any valid SRDF_CONGROUP consistency group name.

Comments SRDF and STD devices are the only devices that can be defined to a SRDF_CONGROUP.

Example: SRDF_CONGROUP=SALESDB2

SUSPEND_FAILURE

The SUSPEND_FAILURE parameter specifies what the ConGroup task will do in the event of a failure in the SUSPEND process.

Applicable Groups SRDF_CONGROUP consistency groups

Syntax SUSPEND_FAILURE=*retry option*

Parameter Values *retry option* can be:

FAIL

(Default) If the SUSPEND process fails, the ConGroup task will not retry and will immediately resume I/O to the devices in the consistency group. When a ConGroup SUSPEND fails, the remote devices will be in an inconsistent state.

RETRY

The SUSPEND process continues retrying until a successful completion, or until the timeout value specified in the SUSPEND_TIMEOUT value is exhausted.

WTOR

This value gives you, at run time, the option of retrying or failing the SUSPEND. WTOR is only valid if ConGroup is running SUB=MSTR. This is to avoid the possibility of encountering a deadlock with JES.

The following message is issued:

```
CGRP075W CONGROUP XXXXXXXX RECEIVED AN ERROR WHILE SUSPENDING
CGRP076I REPLY 'R' TO RETRY OR 'C' TO CANCEL
```

Respond to the message as follows:

- Enter **R** to retry the SUSPEND process. See the *RETRY* section above for more details.
- Enter **C** to cancel the SUSPEND process. See the *FAIL* section above for more details.

If the timeout value specified by SUSPEND_TIMEOUT is exceeded, the SUSPEND process is canceled.

Comments When a consistency group is in the process of being suspended, I/O to the devices in the consistency group is halted until the SUSPEND process is complete. This includes the split of BCVs for DEVICE_LIST_STD devices. This is a critical time, and if the error is severe, the SUSPEND process could take minutes to complete.

Example: SUSPEND_FAILURE=RETRY

SUSPEND_TIMEOUT SUSPEND_RETRY_TIMEOUT

The SUSPEND_TIMEOUT parameter specifies the number of seconds the SUSPEND process is allowed to retry. When the time period expires, the SUSPEND process is terminated, I/O to the devices is resumed, and the SUSPEND is deemed unsuccessful. ConGroup issues message CGRP070E followed by message CGRP073E.

Applicable Groups SRDF_CONGROUP consistency groups

Syntax SUSPEND[_RETRY]_TIMEOUT=*seconds*

Parameter Values *seconds*

The number of seconds allowed for a retry. If you do not specify a value, SUSPEND_TIMEOUT defaults to 0, meaning that the SUSPEND process will not timeout; that is, that the suspend operation is never automatically canceled.

Comments You can specify the SUSPEND_TIMEOUT parameter as either SUSPEND_TIMEOUT or SUSPEND_RETRY_TIMEOUT.

Example: SUSPEND_TIMEOUT=60

SYMM_DEV#

The SYMM_DEV# parameter is another way to include devices in a consistency group. The device numbers specified are the internal Symmetrix device numbers.

Do not use SYMM_DEV# for consistency groups that have Autoswap options associated with them. ConGroup Autoswap is based on CUUs, not Symmetrix device numbers, which cannot be used with AutoSwap.

Applicable Groups	SRDF_CONGROU consistency groups R1_RO_CONGROU consistency groups
Syntax	<code>SYMM_DEV#=device[, device, ...], CUU</code>
Parameter Values	<i>device</i> Internal Symmetrix device numbers. As with values you use for the DEVICE_LIST parameter, you can specify the internal Symmetrix device numbers separately or in ranges. The Symmetrix devices specified must all be contained on the same physical controller. <i>CUU</i> Along with the device numbers, this statement must also include a CUU keyword which specifies the z/OS device the discovery I/O will be issued through. The device specified by CUU must reside on the same Symmetrix as the specified Symmetrix device numbers. The device specified by CUU does not need to be in a consistency group, nor is it implicitly included in a consistency group by this statement.
Comments (SRDF_CONGROU)	- With SRDF consistency groups, the SYMM_DEV# parameter is used to define R1 primary SRDF devices to a consistency group. It is a way to allow the consistency group to manage devices that are not defined to the current LPAR. The Symmetrix devices specified by SYMM_DEV# play a limited role in a consistency group compared to devices specified by other keywords. The Symmetrix devices are included in the consistency group and will be suspended if another device in the consistency group trips the ConGroup utility. The Symmetrix devices themselves cannot trip the ConGroup utility as they are not associated with any z/OS devices. - During device discovery, if a device specified is not found, ConGroup writes a entry for the device in a timeout queue. Then, periodically, ConGroup will attempt to rediscover the device. The device will remain on the timeout queue until it is rediscovered.

Example: SYMM_DEV#=100-1FF,200,300,CUU=298

SYMGROUP

The SYMGROUP parameter defines the RDF Groups that must have consistency maintained. The SYMGROUP parameter does not include devices in a consistency group. SYMGROUP specifies the R1 devices to be monitored. If no SYMGROUP parameters are specified for the consistency group, then all RDF groups are required to have consistency maintained.

Important: If you code any SYMGROUP parameters, then you must specify ALL consistent RDF Groups with the SYMGROUP parameters. The SYMGROUP parameter only applies to devices defined through the DEVICE_LIST, SMS_GROUP, and SYMM_DEV# parameters.

Applicable Groups SRDF_CONGROUP consistency groups

Syntax SYMGROUP= (group[, group, . . .])

Comments ♦ The ConGroup utility requires that at least one RDF Group for each device (which is always the case except when concurrent RDF is involved) be defined as requiring consistency to be maintained.

More Information: Refer to *SRDF_CONGROUP Consistency Group Architecture* on page 4-2.

- ♦ Remote devices of RDF Groups that do not require consistency to be maintained may be set to Adaptive Copy mode.
- ♦ A Consistent RDF Group is one where the R2 is in Sync or Semi-Sync mode.
- ♦ The SYMGROUP parameter applies to the most recently defined consistency group. It is not global in scope.
- ♦ If an R1 device has two mirrors, the SYMGROUP configuration parameter allows you to narrow the protected mirror list to one mirror. When you dynamically add an R1 device to a swap group as part of the group enable-define process, you determine that R1 device's R2 partner (and swap destination) by specifying the R1 and a single RDF Group. By default, the RDF Group number ConGroup chooses in the case of two protected mirrors is the numerically lower of the two RDF Group numbers.

If you want an R1 device that has two mirrors to swap to its mirror device that is on the numerically higher of the two RDF Group, enter a SYMGROUP statement that lists the higher RDF group number and does not list the lower RDF Group number. Without this SYMGROUP statement, the swap target will be the R2 in the RDF Group with the lower number.

Parameter Values

group must have one of the following formats:

In the following formats, *RDFGroup*, *RDFGroup-RDFGroup*, and *ALL* can be intermixed.

- ◆ SYMGROUP= (*symmser*#, *RDFGroup* [, *RDFGroup*])

Specifies this parameter for individual devices.

Note : [, *RDFGroup*] may be repeated as required.

- ◆ SYMGROUP= (*symmser*#, *RDFGroup-RDFGroup*)

Specifies this parameter for a range of RDF Groups.

- ◆ SYMGROUP= (*symmser*#, *ALL*)

Specifies this parameter for all RDF Groups.

Where:

symmser

The 12 character Symmetrix serial number of the box that contains the R1 device.

RDFGroup

A 1 or 2 character string representing the hexadecimal RDF Group number.

Examples

Consider the following examples:

- ◆ SYMGROUP= (000184000345, 2, 4, 6)

Specifies that RDF Groups 2, 4, and 6 on controller 000184000345 require consistency to be maintained.

- ◆ SYMGROUP= (000184000345, 02-04)

Specifies that RDF Groups 2, 3, and 4 on controller 000184000345 require consistency to be maintained.

- ◆ SYMGROUP= (000184000345, ALL)

Specifies that all RDF Groups on controller 000184000345 require consistency to be maintained.

Important: In concurrent RDF configurations, only one of the RDF Group device relationships is required to be consistent and running in Sync or Semi-Sync mode. The other RDF Group device relationships may be in Adaptive Copy mode. SYMGROUP provides the mechanism for identifying this RDF Group.

When the ConGroup utility trips, only the devices on the consistent link are suspended.

SRDF_CONGROU Examples

The following examples illustrate how to use the configuration parameters to perform basic ConGroup operations with SRDF_CONGROU consistency groups:

- ◆ Create one consistency group and define a number of devices for that consistency group:

```
SRDF_CONGROU=SALES
DEVICE_LIST=900,C00-C2F,A200-A203
```

- ◆ Create two consistency groups and define the devices using both z/OS device numbers and VOLSERs:

```
CONGROU=DB2TEST
DEVICE_LIST=100-10F,STA001,STA002
DEVICE_LIST=EC0-EC4
DEVICE_LIST=B90-B9F
CONGROU=DB2PROD
DEVICE_LIST=FIN001,FIN002,FIN003
```

- ◆ Create a consistency group that includes an SMS group:

```
SRDF_CONGROU=ENGINEER
DEVICE_LIST=AC0-ACF
SMS_GROUP=SMSENG
```

- ◆ Create a consistency group that has concurrent RDF defined. RDF Group 2 is defined with AC0-RDF and is the RDF Group to be protected. The devices may also be defined to a second (concurrent) RDF Group that could be in SYNC or ADCOPY mode:

```
SRDF_CONGROU=CONCUR
DEVICE_LIST=AC0-ACF
SYMGROUP=(000184000345,2)
```

- ◆ Create a consistency group that has STD and SRDF devices:

```
CONGROU=MIXED
DEVICE_LIST=100-10F,STA001,STA002
DEVICE_LIST_STD=STD000,STD001
```

R1_RO_CONGROUP Examples

The following examples illustrate how to use the configuration parameters to perform basic ConGroup operations with R1_RO_CONGROUP consistency groups:

- ◆ Create one consistency group and define a number of devices for that consistency group:

```
R1_RO_CONGROUP=SALES  
DEVICE_LIST=900,C00-C2F,A200-A203
```

- ◆ Create two consistency groups and define the devices using both z/OS device numbers and VOLSERs:

```
R1_RO_CONGROUP=DB2TEST  
DEVICE_LIST=100-10F,STA001,STA002  
DEVICE_LIST=EC0-EC4  
DEVICE_LIST=B90-B9F  
R1_RO_CONGROUP=DB2PROD  
DEVICE_LIST=FIN001,FIN002,FIN003
```

- ◆ Create a consistency group that includes an SMS group:

```
R1_RO_CONGROUP=ENGINEER  
DEVICE_LIST=AC0-ACF  
SMS_GROUP=SMSENG
```


Starting and Stopping ConGroup

This chapter describes how to start and stop ConGroup. The topics are:

- ◆ ConGroup z/OS Component.....5-2
- ◆ Starting and Stopping a ConGroup Task.....5-3
- ◆ Consistency Group Coordination.....5-4

ConGroup z/OS Component

The z/OS component of the ConGroup utility consists of a started task that contains the ConGroup definitions. The ConGroup started task should be run at the same priority as VTAM or JES.

ConGroup protection is provided for the devices in the configuration file using:

- ◆ DEVICE_LIST
- ◆ DEVICE_LIST_STD
- ◆ SMS_GROUP keywords

in combination with EXCLUDE.

You can find a sample configuration file in the CGRPCFG0 member in the SCF SAMPLIB.

The ConGroup task also has an operator interface allowing the user to display and change the configuration.

More Information: Refer to Chapter 6 for more information about the operator interface.

You can execute only one ConGroup started task on each LPAR; however, each ConGroup started task may manage multiple consistency groups within the LPAR.

In a multiple LPAR, shared DASD environment, a ConGroup task must be active on each LPAR that has connectivity to the volumes included in consistency group definitions. The list of devices you include in a consistency group must be consistent across the LPARs.

You should execute the ConGroup utility SUB=MSTR to avoid any potential deadlock conditions with JES during consistency group suspend operations. SUSPEND_FAILURE=WTOR is only valid if the ConGroup utility is running SUB=MSTR.

Starting and Stopping a ConGroup Task

This section explains how to start and stop a ConGroup task.

Starting a Task

While you can run ConGroup as a batch job, EMC recommends that you run ConGroup as a started task, with `SUB=MSTR`.

The SCF SAMPLIB contains the sample started task procedure to run the ConGroup task. Customize these members for your installation, and install them in the appropriate PROCLIB.

The CONFIG DD statement points to the dataset that contains the ConGroup configuration file. The ConGroup configuration file contains parameter statements that define the devices in both SRDF_CONGROUP and R1_RO_CONGROUP consistency groups. EMC recommends that all ConGroup instances use the same configuration file by having the CONFIG DD statements point to the same dataset.

You can find a sample configuration file in the CGRPCFG0 member in the SCF SAMPLIB.

Important: You can run only one instance of the ConGroup utility for each z/OS image.

Stopping a Task

To stop the ConGroup task, issue the STOP command with the jobname. For example, to stop the consistency group task whose jobname is EMCCGRP, issue either of the following:

```
P EMCCGRP
```

```
F EMCCGRP,STOP
```

Consistency Group Coordination

In previous versions, ConGroup ran in single LPAR mode. In single LPAR mode, there is no information sharing among ConGroup instances that were monitoring the same consistency groups.

Starting with Version 6.1, ConGroup uses a coordination mechanism based on distributed locking, message exchange, and the Cross System Communication (CSC) facility of EMCSCF. This feature allows ConGroup to run in multi LPAR mode.

Multi LPAR mode provides shared information across all ConGroup instances monitoring the same consistency group(s) and using the same CSC listener port¹ about the state of those consistency groups. This allows some ConGroup commands, *ENABLE*, *RESUME*, and *REFRESH*, to be global commands. This means that a *ENABLE*, *RESUME*, or *REFRESH* command issued for a consistency group on one LPAR is automatically issued on each LPAR monitoring that group. You do not have to manually issue the command on each LPAR.

More Information: Refer to *ENABLE* on page 6-13, *REFRESH* on page 6-16, and *RESUME* on page 6-20.

In addition, when you run in multi-LPAR mode and specify the ConGroup AutoSwap extension, you can use the *MOVEOWNER* and *TAKEOVER* commands. (These commands are not available in single LPAR mode or for non-CAX consistency groups.)

More Information: Refer to *MOVEOWNER* on page 6-14 and *TAKEOVER* on page 6-23.

To use multi LPAR mode across systems and/or Sysplexes, the system time must come from the same source. This could be the Sysplex timer or a single CEC system clock.

You can still use single LPAR mode. Set the *MODE=SINGLE* global configuration parameter. Refer to *MODE=SINGLE* on page 4-22.

-
1. You can set various instances to use the same CSC listener port through the *TREADS RECVPORT* coordination parameter. Refer to *TREADS RECVPORT(102)* on page 5-5.

Coordination Parameters

ConGroup multi-LPAR mode coordination introduces a new, optional DD statement: `//CONFIG2 DD. CONFIG2 DD` is used for coordination parameters if you need to change the default.

The following sections describe the coordination parameters.

THREADS CLOCKE(20)

CLOCKE specifies the multiple of the clock tick interval after which unreleased coordination locks are expired. Values between 10 and 50 are valid. This means that, if the clock tick is 5 seconds and you use the default value for THREADS CLOCKE, then the unreleased coordination locks will expire in 5×20 (100) seconds.

For normal operation, you should use the default value (20).

THREADS CLOCKN(1000)

CLOCKN specifies the time, in hundredths of a second, between coordination activities. 1000 is the default.

The number of seconds represented by CLOCKN must be greater than the idle poll value of CSC. The idle poll value is optionally specified in the EMCSCF with the `SCF.CSC.IDLEPOLL` parameter. If the number of seconds represented by CLOCKN is less than the CSC idle poll value, reliable coordination is not possible.

The CLOCKN value constitutes the clock interval duration. ConGroup functions often take multiple clock intervals. Thus, if you specify large clock intervals can unnecessarily lengthen the amount of time these functions take.

For normal operation the default value should be used for both CLOCKN and `SCF.CSC.IDLEPOLL`.

More Information: Refer to the *EMC ResourcePak Base Product Guide* for a discussion of `SCF.CSC.IDLEPOLL`.

THREADS RECVPORT(102)

Values include 102 (the default). The common poll range 240 to 255 are valid. For normal operation the default value should be used.

RECVPORT specifies the CSC listener port to use. CSC Listener ports may not be reusable unless ConGroup does a normal shutdown.

If ConGroup is run as a batch job, this parameter may need to be changed if the batch ConGroup fails. In this case, values between 102 and 255 are valid.

This restriction does not apply if ConGroup is run as a started task.

Important: If multiple ConGroups are going to run all consistency groups using the same CSC listener port, these ConGroups will be aware of each other. If you want separate groups of ConGroup instances, you must assign the different instance groups different CSC listener port numbers.

Coordination Operation

As described in *Consistency Group Coordination* on page 5-4, ConGroup Version 6.1 uses the CSC facility of EMCSCF to identify other active instances of ConGroup. ConGroups using the same CSC port exchange information that is used to coordinate actions and sequence command execution.

As each ConGroup instance starts, it begins exchanging messages with existing members of the group. If the consistency group is using the CAX option, part of the information exchanged is the SMF ID of the owner LPAR. The group of consistency groups will have only one owner LPAR and all ConGroup instances are aware of the current owner as a result of the message exchanges. The remainder of the ConGroup LPARs in the group are referred to as non-owners.

If, at some point, ownership needs to be transferred from one LPAR to another, you can use either the MOVEOWNER or TAKEOVER commands. The MOVEOWNER and TAKEOVER commands use synchronized message passing to coordinate the ConGroup activities on all LPARs in a manner that will result in the passing of the ownership attribute from one LPAR to another.

Use MOVEOWNER if both the existing owner LPAR and the prospective new owner LPAR are running. Use TAKEOVER if the current owner is not running.

Use MOVEOWNER as your first choice. MOVEOWNER lets you verify the identity of the existing owner before you use TAKEOVER.

More Information: Refer to *MOVEOWNER* on page 6-14 and *TAKEOVER* on page 6-23.

Operator Commands

This chapter describes the ConGroup operator commands. Topics include:

◆ Consistency Groups and Commands	6-2
◆ Conventions	6-3
◆ HELP	6-4
◆ CANCEL	6-5
◆ DAS	6-8
◆ DISABLE.....	6-9
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◆ ENABLE	6-13
◆ MOVEOWNER.....	6-14
◆ QUERY CON	6-15
◆ REFRESH.....	6-16
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◆ VERIFY	6-24

Consistency Groups and Commands

The following sections describe the ConGroup operator commands. You cannot use all operator commands on both types of consistency groups. Table 6-1 shows which operator commands can operate with SRDF_CONGROUP consistency groups and with R1_RO_CONGROUP consistency groups:

Table 6-1 Commands and Applicable Consistency Groups

Command	Use with SRDF_CONGROUPS?	Use with R1_RO_CONGROUPS?
HELP	Yes	Yes
CANCEL	Yes	No
DAS	Yes ^a	No
DISABLE	Yes	Yes
DISPLAY	Yes	Yes
ENABLE	Yes	Yes
MOVEOWNER	Yes	No
QUERY CON	Yes	Yes
REFRESH	Yes	Yes
REMSPLIT	Yes	No
RESET	Yes	No
RESUME	Yes	No
SET VERIFY_INTERVAL	Yes	No
TAKEOVER	Yes	No
VERIFY	Yes	Yes

a. Use only with SRDF_CONGROUP consistency groups with AutoSwap enabled through CAX.

Conventions

The commands in this chapter follow these conventions:

- ◆ CAPITALIZATION = must be typed
- ◆ [] = optional entry
- ◆ Italics = parameter
- ◆ | = alternative parameter values

A ConGroup task contains a number of display and control commands that are issued with the MODIFY command in the following format:

```
F EMCCGRP, command [parameter[parameter[...]]]
```

Where:

EMCCGRP

The ConGroup started task

EMCCGRP is used as the ConGroup started task throughout this manual.

command and *parameter*

The ConGroup command followed by its optional parameter or parameters

HELP

The HELP command displays all available ConGroup commands with a short explanation.

Applicable Groups SRDF_CONGROUP consistency groups
R1_RO_CONGROUP consistency groups

Format HELP

Parameter None.

Comments None.

Example None.

CANCEL

The CANCEL command terminates an ongoing ConGroup process that may have been started by a ConGroup command or by external factors.

For example, a REMSPLIT (remote split) process started by a REMSPLIT command or a SUSPEND process started by an external ConGroup trip continues indefinitely until:

- ◆ The process ends normally.
- ◆ The process is terminated by a time limit mechanism (for example, SUSPEND_TIMEOUT).
- ◆ The process is terminated by the CANCEL command.

Valid operands for CANCEL are:

- ◆ SUSPEND
- ◆ RESUME
- ◆ REMSPLIT

These operands may optionally be followed by a consistency group name.



CAUTION

If no consistency group name is specified, all consistency groups will be affected.

Applicable Groups

SRDF_CONGROUP consistency groups

Format

`CANCEL SUSPEND | REMSPLIT | RESUME [congroupname]`

Parameters

SUSPEND

Specifies to cancel one or all SUSPEND processes.

REMSPLIT

Specifies to cancel one or all REMSPLIT processes.

RESUME

Specifies to cancel one or all RESUME processes.

congroupname

Specifies the consistency group name.

Comments

While a consistency group is being suspended, all I/O to all the devices in the consistency group is queued until the SUSPEND process completes. While in this state, the applications using these devices are hung, waiting for the I/O to complete.

If a system problem is delaying the SUSPEND process, you may wish to forego having consistent data and allow the applications using the consistency group devices to continue.

CANCEL and SUSPEND

You can issue CANCEL SUSPEND with a parameter. The parameter specifies the consistency group whose SUSPEND process you want to cancel. If you do not supply a parameter, all active SUSPEND processes are cancelled.

Note that this is a manual intervention to the SUSPEND process. You can automatically cancel a SUSPEND by supplying a SUSPEND_TIMEOUT statement in the configuration for the consistency group.

CANCEL and REMSPLIT

Depending on the number and state of the devices, a REMSPLIT process can take a long time to complete. When the REMSPLIT process receives temporary errors, it enters a retry loop. In each iteration of the loop, the REMSPLIT process takes the following steps:

- ◆ Waits the number of seconds specified in REMSPLIT_INTERVAL.
- ◆ Issues message CGRP206I.
- ◆ Retries the split request.

During this retry loop, you may wish to manually intervene and cancel the process.

You can issue CANCEL REMSPLIT with a parameter. The parameter specifies the consistency group whose REMSPLIT process should be cancelled. If you do not supply a parameter, all active REMSPLIT processes are cancelled.

CANCEL and RESUME

A CANCEL RESUME cancels the resume processing wherever it is detected. This could be:

- ◆ Before any resumes are issued
- ◆ During the resume processing
- ◆ In the wait-for-synchronization process

A CANCEL RESUME command does *not* stop the synchronization between the local and remote devices that have already had their data flow resumed. Any invalid tracks on the local devices continue to synchronize with their respective remote devices.

The CANCEL RESUME command merely terminates the monitoring process that informs you when all the devices in a consistency group are synchronized and that the remote data is consistent. Message CGRP007I is not issued when the devices are synchronized because the RESUME process has not been terminated.

You can issue CANCEL RESUME with a parameter that specifies the consistency group whose RESUME process should be cancelled. If you do not supply a parameter, all active RESUME processes are cancelled.

You should issue a CANCEL REMSPLIT and a CANCEL RESUME if you issue a RESUME SPLIT. If you just issue a CANCEL RESUME, ConGroup will not process the CANCEL RESUME until after SPLIT processing is complete.

Important: You can issue SRDF Host Component commands to suspend RDF or change the mode. After you issue CANCEL, you must issue the DISABLE command to disable ConGroup. Only after ConGroup is disabled can you issue SRDF Host Component commands.

Examples

CANCEL SUSPEND

Cancels the SUSPEND process for all active SUSPEND processes.

CANCEL REMSPLIT DB2PROD

Cancels the REMSPLIT process for the consistency group named DB2PROD.

DAS

The DAS command passes commands to the AutoSwap Extension.

Applicable Groups

SRDF_CONGROUP consistency groups with ConGroup AutoSwap enabled through CAX.

Format

`DAS autoswapcommands`

Parameter

autoswapcommands

Specifies the AutoSwap commands to be executed.

More Information: Refer to the *EMC AutoSwap Product Guide* for descriptions of the valid commands.

Comments

None.

Examples

`DAS DISPLAY OPT`

Displays AutoSwap options in affect.

`DAS SWAP GROUP PATREC`

Execute a SWAP of the devices in PATREC.

DISABLE

The DISABLE command removes the specified consistency group from ConGroup protection.

Applicable Groups SRDF_CONGROUP consistency groups
R1_RO_CONGROUP consistency groups

Format `DISABLE congroupname`

Parameter *congroupname*
Specifies the consistency group name.

Comments

- ◆ If a consistency group is DISABLED, there is no ConGroup protection active, the consistency group is essentially a defined group of devices with nothing to do.
- ◆ The DISABLE command does not change the status of the devices in the consistency group.

More Information: Refer to *Consistency Group States* on page 4-7.

Example `DISABLE SALES`
Removes the consistency group named SALES from ConGroup protection.

DISPLAY

The DISPLAY command displays the information requested onto the operator console.

Applicable Groups

SRDF_CONGROUP consistency groups
R1_RO_CONGROUP consistency groups

Format

DISPLAY
[CONGROUP [*group*] [LIST | NOLIST]] | [ENVIRONMENT]

Parameters

CONGROUP

Displays all the devices and their respective VOLSERs for a given consistency group.

You can abbreviate CONGROUP as CON.

group

Specifies the consistency group name. If you do not specify a consistency group name with DISPLAY, all the consistency groups are displayed.

LIST | NOLIST

Controls the display of detail information. Refer to *DISPLAY_CONGROUP_LISTOPT* on page 4-21 for default settings. You can override the default with DISPLAY.

ENVIRONMENT

Displays configuration information about the consistency group environment rather than a specific consistency group definition. This includes information about AUTO_VERIFY parameters, state of AUTO_REFRESH, the RESUME and REMSPLIT options in effect, the SAF class and resource names, and the default DISPLAY CONGROUP list options.

Comments

None.

Examples

DIS CONGROUP

Displays all consistency groups in the LPAR.

DIS CON DB2PROD

Displays the devices and summary data for a consistency group named DB2PROD in a screen similar to the following:

```

DISPLAY CONGROUP DB2PROD
DISABLE_AT_SHUTDOWN=ON
PAGEDEV_ALLOWED=NO
REMSPLIT_INTERVAL=60
RESUME_INTERVAL=10
SEMISYNC_ALLOWED=YES
CONGROUP=DB2PROD ENABLED ACTIVE
SUSPEND_FAILURE=WTOR      SUSPEND_TIMEOUT=120
CTLR SER#=000183500647
011B SCX01B 011C SCX01C 011D SCX01D 011E SCX01E
011F SCX01F 0120 SCX020 0121 SCX021 0122 SCX022
0123 SCX023 0124 SCX024 0125 SCX025 0126 SCX026

```

DIS CON DB2PROD NOLIST

Displays only the summary data for a consistency group named DB2PROD in a screen similar to the following:

```

DIS CON DB2PROD NOL
DISABLE_AT_SHUTDOWN=ON
PAGEDEV_ALLOWED=NO
REMSPLIT_INTERVAL=60
RESUME_INTERVAL=10
SEMISYNC_ALLOWED=YES
CONGROUP=DB2PROD ENABLED ACTIVE
SUSPEND_FAILURE=WTOR      SUSPEND_TIMEOUT=120

```

The ConGroup task may have difficulty determining the state of a consistency group if the host cannot access the Symmetrix storage subsystem that has devices belonging to the consistency group. For example, there may be no paths to a Symmetrix unit.

If the ConGroup task cannot determine the status of a consistency group, the ConGroup task displays the last known status followed by '????'.

The following examples use DISPLAY ENVIRONMENT to display configuration information about the consistency group environment rather than a specific consistency group definition.

The first example is for single LPAR mode:

```
CGRP282I DIS ENV
*** Begin Display from system UBC4 ***
AUTO_REFRESH=ON
DISABLE_ON_VERIFY_ERROR=YES
DISPLAY_CONGROUP_LISTOPT=NOLIST
RESUME_OPTION=NOTNRMSG
SAF_CLASS=EMC#SYM
SAF_PROFILE=EMC.SRDFXXX.HC.VALIDATE.ACCESS.SECU
VERIFY_INTERVAL=900
ConGroup is executing in SINGLE mode
*** End Display from system UBC04 ***
```

The second is for multi-LPAR mode:

```
CGRP282I DIS ENV
*** Begin Display from system UBC3 ***
AUTO_REFRESH=ON
DISABLE_ON_VERIFY_ERROR=YES
DISPLAY_CONGROUP_LISTOPT=NOLIST
RESUME_OPTION=NOTNRMSG
SAF_CLASS=EMC#SYM
SAF_PROFILE=EMC.SRDFXXX.HC.VALIDATE.ACCESS.SECU
VERIFY_INTERVAL=900
ConGroup LISTENCODE=146
ConGroup is executing in MULTI mode
SDAS OWNERID=X03 , LOCAL SYSTEM IS UBC3
This is not the owning system
SDAS LISTENCODE=101
*** End Display from system UBC3 ***
```

ENABLE

The ENABLE command turns on ConGroup protection for the specified SRDF_CONGROUP or R1_RO_CONGROUP consistency group, including CAX groups. When the ConGroup task starts, the default is to start all consistency groups in an enabled state.

If the ConGroup task encounters a problem and cannot enable the consistency group, it puts the consistency group in a disabled state. When the problem is resolved, you can use the ENABLE command to enable ConGroup protection for the consistency group.

Applicable Groups

SRDF_CONGROUP consistency groups

R1_RO_CONGROUP consistency groups

Format

ENABLE *congroupname* [FORCE]

Parameters

congroupname

Specifies the consistency group name.

FORCE

Reenables the consistency group after a manual swap back of the devices. The FORCE subparameter is intended to be used after a manual swap back so that operators are made aware that they must perform a swap back before enabling.

An ENABLE *congroupname* FORCE fails if all of the devices in *congroupname* have not been swapped back.

Comments

- ◆ Refer to *Consistency Group States* on page 4-7.
- ◆ If you are operating in multi-LPAR mode, ConGroup automatically implements the ENABLE command on all LPARs using the same CSC listener port. If you are operating in single-LPAR mode, you have to manually issue ENABLE on all relevant LPARs.

Example

ENABLE PROD

Starts ConGroup protection for the consistency group named PROD.

MOVEOWNER

The MOVEOWNER command transfers the ownership of a CAX consistency group from the current owner LPAR to another LPAR when both of these LPARs are running. You can issue MOVEOWNER from any LPAR running ConGroup. After you issue MOVEOWNER, but before ConGroup acts upon it, ConGroup validates the existence of the specified LPARS.

You can use the MOVEOWNER command only for CAX consistency group configurations and only if you are using multi-LPAR mode.

More Information: Refer to *GLOBAL* on page 4-21, the discussion of the lost owner policy under *CAXOPTS* on page 4-14, and *ConGroup AutoSwap* on page 1-8.

Applicable Groups SRDF_CONGROUP consistency groups

Format MOVEOWNER, *from_SMFID* [, *to_SMFID*]

Parameters *from_SMFID*

The SMF ID of the LPAR that currently owns the consistency group (up to four characters).

to_SMFID

The SMF ID of the new owner LPAR (up to four characters). If you do not specify *to_SMFID*, ConGroup assigns ownership to the LPAR from which you issued the MOVEOWNER command.

Comments ♦ In normal operations (for example, if you need to transfer ownership because the owner LPAR is going to be IPLed) when both the current and prospective new owner are running, you use MOVEOWNER to transfer consistency group ownership.

In a situation where the current owner LPAR is not running, you use the TAKEOVER command to transfer ownership to another LPAR that is currently running.

More Information: Refer to *TAKEOVER* on page 6-23.

Example None.

QUERY CON

The QUERY CON command is an alias for the DISPLAY command. You can use QUERY CON anywhere you would use the DISPLAY command.

Applicable Groups SRDF_CONGROUP consistency groups
R1_RO_CONGROUP consistency groups

Format QUERY CON *congroupname*

Parameter *congroupname*
Specifies the consistency group name. To display all consistency groups, use the literal CONGROUP.

Comments None.

Example QUERY CON CONGROUP
Displays all the consistency groups.
QUERY CON DB2PROD
Displays all the devices in consistency group named DB2PROD.

REFRESH

The REFRESH command dynamically updates a consistency group configuration without terminating the ConGroup task. After updating the ConGroup configuration file, you issue the REFRESH command to implement the new configuration.

The REFRESH command completes successfully only when:

- ◆ All the consistency groups have no active processes
- ◆ No consistency groups are suspended

If any consistency group is suspended, disabled, or has a SUSPEND, a RESUME, or a REMSPLIT in process, an error message is produced.

The state of the consistency group configuration after the REFRESH completes is dependent on the number and type of errors (if any) encountered during the REFRESH. The REFRESH is processed in two phases:

1. A syntax and verification phase
2. An enabling phase.

Any errors in the syntax and verification phase terminates the REFRESH and the old configuration is still active. Message CGRP201E will be issued signifying this type of error.

After the new configuration has passed verification, the REFRESH command disables all the old consistency groups or CAX groups and attempts to enable the new consistency groups or CAX groups. The new consistency or CAX groups may not be enabled if one or more devices are in an improper state for enablement.

For example, if a device has invalid tracks, the consistency group to which it belongs will not be enabled. Although message CGRP200I will be issued indicating that the new configuration is active, you should take special care to verify that the new consistency groups have been enabled successfully.

To enable the new consistency configuration, even if all the consistency groups are not in an enable-ready state, use the FORCE parameter.

Applicable Groups

SRDF_CONGROUP consistency groups

R1_RO_CONGROUP consistency groups

Format	REFRESH [FORCE]
Parameter	FORCE Enable the new consistency configuration even if all consistency groups are not in a proper state for enablement.
Comments	If you are operating in multi-LPAR mode, ConGroup automatically implements the REFRESH command on all LPARs using the same CSC listener port. If you are operating in single-LPAR mode, you have to manually issue REFRESH on all relevant LPARs.
Example	REFRESH

REMSPLIT

For a specified consistency group, the REMSPLIT command remotely splits all the target (R2) standard Symmetrix devices from their BCV devices (if they are attached to one). REMSPLIT only applies to the BCVs established to the target (R2) devices. It does not apply to BCVs established to standard devices in the consistency group (for example, the standards defined in DEVICE_LIST_STD).

You should issue REMSPLIT just before you issue a RESUME command for a specified consistency group so that you can save a separate copy of the consistent data. This step insures that there will be a consistent copy of data in the event of a failure during the subsequent RESUME process.

Important: Remember that during the RESUME process, data consistency on the remote side is delayed until the RESUME is complete. By creating copies of the data with REMSPLIT, you ensure that there is always a copy of consistent data on which you can rely.

REMSPLIT starts an asynchronous process to split all the BCVs.

For a REMSPLIT operation to be honored, the consistency group must be enabled and suspended. The consistency group cannot have a RESUME or REMSPLIT process already in progress.

A successful completion of the REMSPLIT process is indicated with message CGRP203I. An unsuccessful completion is indicated with either message CGRP204E or CGRP205E.

Applicable Groups SRDF_CONGROUP consistency groups

Format REMSPLIT *congroupname*

Parameter *congroupname*
Specifies the consistency group name.

Comments None.

Example REMSPLIT PROD
Splits the target (R2) devices from their BCV devices for the consistency group named PROD.

RESET

The RESET command updates the state of a consistency group in ConGroup's internal tables. When you issue this command, you allow ConGroup to recognize a change in the state of a consistency group that would ordinarily not be recognized until the next auto-verify cycle executes. ConGroup sets the state of the consistency group based on whether or not the consistency group was enabled for ConGroup protection and suspended/resumed by another LPAR.

The RESET command does not automatically verify all the attributes of each device (for example, synchronous versus adcopy, contains a page dataset, and so on). If you want full verification, use the VERIFY option.

The RESET command re-enables trip processing for a consistency group that has had a suspend timeout failure. After a suspend timeout failure, data at the remote site is not guaranteed to be consistent. Most likely some devices are suspended, while other devices are not. You need to resolve the reason for the suspend timeout failure and that fully resume the consistency group (ENA/ACT) before you issue the RESET command for the consistency group.

Applicable Groups	SRDF_CONGROUP consistency groups
Format	RESET <i>congroupname</i> [VERIFY]
Parameters	<i>congroupname</i> Specifies the consistency group name. VERIFY Specifying VERIFY is equivalent to issuing a RESET command followed by a VERIFY command.
Comments	None.
Example	<pre>RESET SALES</pre> Updates the state information for a consistency group named SALES.

RESUME

When data from one source device in a consistency group cannot reach its corresponding secondary device, the following takes place:

- ◆ All data transmission from the primary devices in the consistency group is suspended
- ◆ The BCVs are split from any STD devices

When you have resolved the SRDF mirroring issues between the primary and secondary devices that caused the suspension, use the RESUME command to start the flow of data from all the primary devices in the consistency group to their secondary devices.

When a consistency group is resumed, the secondary devices are in an inconsistent state until all invalid tracks have been transferred to the secondary devices. The consistency group will not be enabled until the primary and secondary devices are synchronized.

In configurations with concurrent SRDF (two secondaries for one or more of the standard devices protected by ConGroup), you need to give special consideration to choose which of the secondaries you want to use to accomplish the RESUME.

If STD devices are defined as part of the consistency group, then these devices must have BCV devices established and synchronized to them prior to performing the resume. A consistency group cannot be resumed if there is a STD device either without a BCV or with a BCV that is not synchronized.

You can see this process when you enter a RESUME operator command. After an internal RESUME command is issued to each Symmetrix in the consistency group and message CGRP006I is issued, the RESUME process is not completed until message CGRP007I is issued.

In the meantime, you can see the status of the RESUME by message number CGRP022I and a companion message that specifies why the RESUME is not complete. Message CGRP022I is periodically issued until the RESUME is complete.

The SPLIT option of RESUME only operates on the remote secondary (R2) BCVs. The standard devices in the consistency group must use EMC TimeFinder or EMC Host Component to split local BCVs.

Applicable Groups SRDF_CONGROUP consistency groups

Format	<code>RESUME <i>congroupname</i> [SPLIT]</code>
Parameters	<i>congroupname</i> Specifies the consistency group name. SPLIT Specifies that all the remote devices for the consistency group are to be split from their BCV devices (if they are attached to one) before the RESUME process starts. In essence, specifying SPLIT is equivalent to entering the REMSPLIT command followed by a RESUME command. The SPLIT option does not split BCVs established to STD devices. The SPLIT option only applies to BCVs attached to R2 devices.
Comments	If you are operating in multi-LPAR mode, ConGroup automatically implements the RESUME command on all LPARs using the same CSC listener port. If you are operating in single-LPAR mode, you have to manually issue RESUME on all relevant LPARs.
Example	<pre>RES SALES</pre> Resumes the flow of data for a consistency group named SALES.

SET VERIFY_INTERVAL

The SET VERIFY_INTERVAL command specifies the time interval (in seconds) before the new auto-verification subtask attempts to verify the state of all ENABLED/ACTIVE consistency groups. This is to ensure that all consistency group devices are still in the expected state.

Applicable Groups SRDF_CONGROUP consistency groups

Format SET VERIFY_INTERVAL=*interval*

Parameters *interval*

The time interval (in seconds). The maximum value you can specify is 99,999,999 (seconds). If you specify zero (0), you disable the verification interval.

Comments None.

Example SET VERIFY_INTERVAL=600

TAKEOVER

The TAKEOVER command transfers ownership of a CAX consistency group from the current owner LPAR to another LPAR when the current owning LPAR is not running. You can issue TAKEOVER from any LPAR running ConGroup. After you issue TAKEOVER, but before ConGroup acts upon it, ConGroup validates the existence of the specified LPAR.

You can use the TAKEOVER command only for CAX consistency group configurations. TAKEOVER is valid when ConGroup is in multi-LPAR mode. If ConGroup is in single-LPAR mode, TAKEOVER is valid only if the issuing instance is not the owner. If the ConGroup instance is the owner and in single mode, the TAKEOVER is unnecessary and not supported.

More Information: Refer to *GLOBAL* on page 4-21, the discussion of the lost owner policy under *CAXOPTS* on page 4-14, and *ConGroup AutoSwap* on page 1-8.

Applicable Groups SRDF_CONGROUP consistency groups

Format TAKEOVER [, *to_SMFID*]

Parameters *to_SMFID*

The SMF ID of the new owner LPAR (up to four characters). If you do not specify *to_SMFID*, ConGroup assigns ownership to the LPAR from which you issued the TAKEOVER command.

- Comments**
- ◆ In a situation where the current owner LPAR is not running, you use TAKEOVER to transfer ownership to another LPAR that is currently running.
 - ◆ In normal operations (for example, if you need to transfer ownership because the owner LPAR is going to be IPLed) when both the current and prospective new owner are running, you use the MOVEOWNER command to transfer consistency group ownership.

More Information: Refer to *MOVEOWNER* on page 6-14.

Example None.

VERIFY

The VERIFY command goes through all the verification tests normally done when a consistency group is being enabled. For each device experiencing an error, a message is displayed explaining the reason for the error.

Applicable Groups SRDF_CONGROUPE consistency groups
R1_RO_CONGROUPE consistency groups

Format VERIFY *congroupname*

Parameter *congroupname*
Specifies the consistency group name.

Comments None.

Example VERIFY DB2PROD

The following is sample output for this command:

```
CGRP163W R2 DEVICE FOR CUU 0259 IS NOT READY
CGRP163W R2 DEVICE FOR CUU 025A IS NOT READY
CGRP163W R2 DEVICE FOR CUU 025B IS NOT READY
CGRP163W R2 DEVICE FOR CUU 025C IS NOT READY
CGRP159W R2 DEVICE FOR CUU 0298 HAS      1 INVALID TRACKS
CGRP159W R2 DEVICE FOR CUU 0299 HAS     66 INVALID TRACKS
CGRP159W R2 DEVICE FOR CUU 029A HAS      1 INVALID TRACKS
CGRP159W R2 DEVICE FOR CUU 029B HAS     46 INVALID TRACKS
CGRP159W R2 DEVICE FOR CUU 029C HAS    166 INVALID TRACKS
CGRP159W R2 DEVICE FOR CUU 029D HAS    221 INVALID TRACKS
CGRP157E RDF CONFIG FOR CUU 029E IS IN ADAPTIVE COPY MODE
```

Data Base Considerations

This chapter provides considerations for using the ConGroup utility with DB2, IMS and multiple data base management systems. Topics include:

- ◆ Introduction7-2
- ◆ DB2 Considerations7-5
- ◆ IMS Considerations7-7
- ◆ Mixed Data Base Considerations.....7-9
- ◆ R1 READ-ONLY Mode Considerations.....7-11

Introduction

When in RDF remote mirroring in campus mode across two or more control units, a data base management system can have its logs or data on different control units. When failures occur, they do not occur consistently. On one secondary device, a write failure or an RDF link failure can occur while on another secondary device, the data flow continues from the primary devices.

Then, the various elements in a dependent data stream are out of synchronization.

ConGroup and Data Base I/O

The ConGroup utility keeps dependent I/O synchronized when its data is spread across multiple Symmetrix units. Typical data base management, system-generated, dependent I/O consists of:

- ◆ Logs
- ◆ Application data
- ◆ Metadata
- ◆ System data

The dependent I/O occurs only after its predecessor I/O successfully completes. When such I/O spans multiple Symmetrix units, the ConGroup utility's purpose is to *freeze* dependent I/O when predecessor I/O is unsuccessful because of a device or link failure.

Important: In all cases, the devices potentially related by I/O dependency must be defined in the consistency group's device list. Refer to *DEVICE_LIST Definitions* on page 7-3.

Data Base Consistency Group Suspensions

The effect of a consistency group suspension on a data base management system is similar to that of an z/OS power-loss outage. The data base management system does not have an opportunity to properly flush buffers or close logs and data base files. Under such circumstances, a *warm* or *emergency* startup of the data base management system resolves any data inconsistencies caused by the outage, as long as it has the necessary log records to perform backout to a prior point of consistency.

DEVICE_LIST Definitions

As discussed previously, all devices used for related dependent I/O must be defined in one consistency group. If you are a data base administrator, make sure that you include the following types of volumes in the consistency group device list:

- ◆ Volumes where log and system data resides.
- ◆ Volumes where application data resides.

You should group application data with the logs because application data I/O is dependent on the logs. Failure to do so negates the purpose of ConGroup protection.

- ◆ Volumes that contain the system data of any transaction processor, such as CICS, that you use to coordinate synchpoints, commits, or checkpoints -- between either IMS, DB2, or both.

If your site does not use SMS, you, as data base administrator, must also constantly monitor the migration of data base data to ensure that the secondary devices remain within an active consistency group's devicelist.

Expanding to New Devices

When you expand I/O to devices outside an existing active consistency group, you need to:

- ◆ Perform a device list update
- ◆ Issue the ConGroup REFRESH command, for example:

```
F EMCCGRP, REFRESH
```

More Information: Refer to *REFRESH* on page 6-16.

Specifying an SMS group in the group's devicelist, greatly simplifies this task by keeping the contents of the consistency group's devicelist static.

More Information: Refer to *SMS_GROUP* on page 4-37.

Other Configuration Parameters

EMC recommends that you use `SUSPEND_FAILURE=RETRY` or `WTOR` if remote data integrity is to take precedence over local data base availability.

More Information: Refer to *SUSPEND_FAILURE* on page 4-38.

If a `SUSPEND` I/O fails because of an unavailable path after you use `SUSPEND_FAILURE=RETRY`, the ConGroup utility suspends local I/O and retries the `SUSPEND` until the `SUSPEND_TIMEOUT` value is exceeded.

If you want local data base availability to take precedence over remote data integrity, choose `SUSPEND_FAILURE=FAIL`. This parameter allows local I/O to resume immediately upon experiencing a `SUSPEND` I/O failure because of an unavailable Symmetrix link.

Recovery Site Startup

The devicelist configuration ensures that I/O to devices containing log data is never superseded by I/O to devices containing application or system data. Conversely, if a recovery site log has signaled that a unit-of-work (UOW) has completed, while I/O had not reached its remote target data base, the incomplete UOW on the data base would not be detected since the recovery would be driven by end-UOW records present on the log.

ConGroup will ensure that both data and logs remain synchronized so that data base management system startup can resolve such transient data inconsistencies. Data base management system startup will roll back data base updates to a prior checkpoint or commit point. Avoid any type of restart that suppresses this process, such as a *cold start*, if you want consistent data.

DB2 Considerations

The following sections describe considerations you should keep in mind if you use DB2.

DEVICE_LIST Definitions

Volumes in the ConGroup devicelist for a DB2 group must include all volumes where DB2 system data and all other application tablespaces reside. DB2 system data whose devices must be included are:

- ◆ ICF CATALOGS
- ◆ ARCHIVE LOGS
- ◆ BSDS01
- ◆ BSDS02
- ◆ LOGCOPY1.DS01 - LOGCOPY1.DSnn
- ◆ LOGCOPY2.DS01 - LOGCOPY2.DSnn
- ◆ DSNDB01
- ◆ DSNDB04
- ◆ DSNDB06
- ◆ DSNRLST
- ◆ DSNDDF (V4 or lower)
- ◆ DSNRGFDB (if used)

You should include devices containing linear datasets comprising all DB2 application data, vendor applications, and the Query Management Facility (QMF). To make this devicelist comprehensive, include all potentially usable devices found in SYSIBM.SYSVOLUMES that are pointed to by DB2 storgroups during the devicelist definition.

Storgroups can span to such volumes when currently used volumes no longer contain room for tablespaces defined after the devicelist has been defined. Such tablespaces would be unintentionally excluded from the consistency group, if the currently unused devices in SYSIBM.SYSVOLUMES were not included. Of course, an ALTER STOGROUP sgroupname ADD VOLUMES (VOLSER list) should also be reflected in an updated devicelist followed by a REFRESH command.

You may exclude DSNDB07 since it is not required for DB2 recovery site restart. You can exclude DSNDB07 with the EXCLUDE parameter.

More Information: Refer to *EXCLUDE* on page 4-36.

If you exclude DSNDB07, no other DB2 data can share its devices. Sharing those devices may cause this data to be unintentionally unprotected. For the same reason, you must also remove this data base's devices from any SMS storage groups to prevent SMS from moving needed files to devices shared with this data base. You can allocate DSNDB07 at the recovery site just prior to DB2 restart.

DB2 Consistency Group Configuration Example

The following is an example of a configuration file entry for DB2 consistency group:

```
RESUME_INTERVAL=60
SRDF_CONGROUP=DB2PROD
* The following device list ranges represent devices where
* all DB2 system and application data resides.
DEVICE_LIST=2F0-2FB,DB2001,DB201F
SMS_GROUP=DB2GRP
* The following excludes DB2005, DB2007
* for DSNDB07. No other critical data may share these devices.
EXCLUDE=DB2005,DB2007
SUSPEND_FAILURE=RETRY
SUSPEND_TIMEOUT=30
```

Recovery Site Startup

When a consistency group is *tripped* and DB2 startup commences at the recovery site, you need to permit a *warm start* to resolve in-progress, in-commit, in-abort or in-doubt Units-of Recovery (URs) so that they are either committed or rolled-back. This is the only way that ConGroup can guarantee data consistency. The DB2 log contains the data it needs to perform DB2 roll-forward and backward recovery of incomplete Unit-of-Recovery-IDs (URIDs) during the warm start process.

EMC does not recommend that you use a *cold start*, or conditional restart, which suppresses the UR recovery. Use cold starts with *extreme caution*, only after you examine the DB2 active logs to determine if incomplete URIDs do not exist.

Whether or not you use ConGroup protection, avoid long-running update tasks with low commit-to-update ratios. Such tasks cause extended restart times.

IMS Considerations

The following sections describe considerations you should keep in mind if you use IMS.

DEVICE_LIST Definitions

Depending on the IMS configuration, include devices containing only IMS system datasets in the consistency group definition, in addition to those containing application data bases, as follows:

- ◆ DFSOLP00 - DFSOLPnn
- ◆ DFSOLS00 - DFSOLSnn
- ◆ DFSWADS0 - DFSWADSnn
- ◆ RECON1
- ◆ RECON2
- ◆ RECON3
- ◆ MODSTAT
- ◆ MODBLKS
- ◆ MATRIX
- ◆ ACBLIB
- ◆ FORMAT
- ◆ RDS
- ◆ QBLKS
- ◆ SHMSG
- ◆ LGMSG

IMS Consistency Group Configuration Example

The following is an example of a configuration file entry for an IMS consistency group:

```
RESUME_INTERVAL=60
SRDF_CONGROUP=IMSPROD
* The following device list ranges represent devices where
* all IMS system and application data resides.
DEVICE_LIST=2E0-2EB,IMS001,IMS01F
SMS_GROUP=IMSAPPS
SMS_GROUP=IMSWADS
SMS_GROUP=IMSOLDS
* The following excludes IMS005, IMS007.
* No other critical data may share these devices.
EXCLUDE=IMS005,IMS007
SUSPEND_FAILURE=FAIL
```

Recovery Site Startup

When a consistency group is suspended and IMS startup begins at the recovery site, you need to allow IMS to undergo an emergency restart. The emergency restart permits IMS to close the previously active log and backout data bases to a prior checkpoint encountered on the WADS and OLDS.

To permit an emergency restart, issue the command:

/ERE OVERRIDE

Then, wait for message DFS3257I, followed by message DFS994I.

EMC does not recommend an IMS *cold start*. A cold start does not perform all log closes and data base backouts. Use a cold start with *extreme caution* only after:

- ◆ Examining the OLDS by running DFSULTR0 in PSB mode
- ◆ Obtaining a list of active PSBs
- ◆ Performing batch backout against WADs and OLDS

Mixed Data Base Considerations

In the case of hybrid applications which use multiple data base management systems (for example, IMS and DB2) within the same unit of work, use one common consistency group definition.

DEVICE_LIST Definitions

If there is no logical relationship between data in multiple data base management systems, you can use separate consistency group definitions. However, if these separate consistency group definitions contain common devices, they will in effect behave as a single consistency group.¹ This is because the RDF suspension of the intersecting devices caused by one group triggering also causes the other group to trigger.

Hybrid Consistency Group Configuration Example

The following is an example of a configuration file entry for a hybrid consistency group:

```
RESUME_INTERVAL=60
SRDF_CONGROUP=COMMON
* The following device list ranges represent devices where
* all IMS system and application data resides.
DEVICE_LIST=2E0-2EB,IMS001-IMS01F
SMS_GROUP=IMSAPPS
SMS_GROUP=IMSWADS
SMS_GROUP=IMSOLDS
* The following excludes IMS005, IMS007.
* No other critical data may share these devices.
EXCLUDE=IMS005,IMS007
* The following device list ranges represent devices where
* all CICS system data and journals resides.
DEVICE_LIST=2D0-2DB,CIC001-CIC01F
SMS_GROUP=CICJRL
* The following device list ranges represent devices where
* all DB2 system and application data resides.
DEVICE_LIST=2F0-2FB,DB2001,DB201F
SMS_GROUP=DB2GRP
SMS_GROUP=DB2LOGS
* The following excludes a subset of range DB2005,DB2007
* for DSNDB07. No other critical data may share these devices.
EXCLUDE=DB2005,DB2007
SUSPEND_FAILURE=RETRY
SUSPEND_TIMEOUT=45
```

1. Different consistency groups containing common devices are called intersecting consistency groups.

Recovery Site Startup

In addition to data base management system specific restart issues, you should consider the following recovery site operational issues.

- ◆ DB2 restart may produce *indoubt threads* that must be resolved with the DB2 command:

```
-RECOVER INDOUBT connection name ACTION (ABORT)
```

You can identify indoubt threads by issuing the command:

```
-DISPLAY THREAD (*) TYPE (INDOUBT)
```

- ◆ IMS restart may also produce *indoubt threads* that you can identify by issuing either of the following commands:

```
/DIS CCTL ALL INDOUBT
```

or

```
/DIS OASN SUBSYS ALL
```

Following recovery site restart, such scenarios result when both the transaction manager and the data base management system logs have not recorded completion of a two-phased commit on the target (R2) devices at the recovery site. Use of separate data base management system-specific consistency groups are more likely to cause this problem.

R1 READ-ONLY Mode Considerations

R1 READ-ONLY (Figure 7-1) is a zero data-loss disaster recovery (DR) alternative to consistency groups operating in a campus-mode SRDF environment:

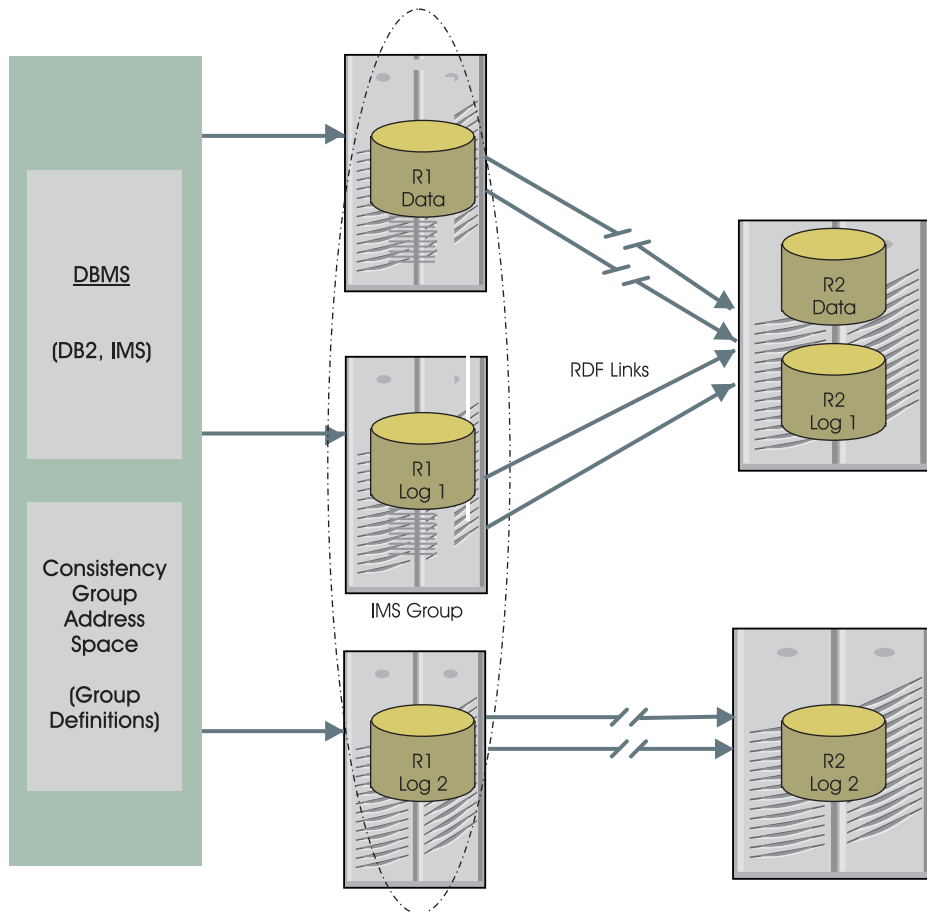


Figure 7-1 R1 READ-ONLY Example

Understanding R1 READ-ONLY Mode

R1 READ-ONLY is usable only by IMS, and DB2. These data base management systems are particularly sophisticated in their response to the inability to write to a data base volume. Data is not lost, because, unlike consistency groups, I/O to R2 mirrors is not suspended when a participating device experiences write errors.

If IMS cannot write to a data base because of a hardware error, IMS allows the write to complete to virtual storage and produces Extended Error Queue Element (EEQE) entries on the log and RECON datasets. IMS can continue to write to virtual storage indefinitely, until virtual storage or RECON dataset space is exhausted.

You can produce a list of data bases in this state by issuing the following IMS command:

```
/DIS DB ALL BKERR
```

DB2 is slightly less robust than IMS in this regard. DB2 simply places the pages that cannot be externalized on the Logical Page List. DB2 allows I/O to these pages until the pages have been flushed to the buffer pool.

After the page is overlaid in the buffer pool, the data is no longer accessible. Applications receive a -904 SQL return code (resource unavailable).

You can find a list of data bases in this state by issuing the DB2 command:

```
-DIS DB (*) SPACENAM (*) RESTRICT
```

Table 7-1 shows how the feature can be configured for various resource failures in the configuration. A **Y** indicates that the read-only sense will be presented if the resource fails. An **N** indicates that it will not:

Table 7-1 Volume Failure Configuration

Volume Type	R1 Failure	R2 Failure	All link failure
Log volumes	Y	Y	Y
Data base volumes	N	N	Y

R1_RO Mode

R1_RO mode directs failed data base dataset update attempts to the data base management system log using special log records. Integrity is guaranteed and availability is not impacted. There can be no data loss because all work is transmitted to the R2 site through the logs. If R1/R2 remote mirroring for logs is interrupted, the data base management system stops on the source side. This is the desired effect.

ConGroup is the preferred solution for multi Symmetrix data integrity in an SRDF configuration. R1_RO mode support is for very specific environments using mainframe data base management systems that respond properly to this type of sense information from the DASD.

Managing and Controlling the R1 READ ONLY Feature

Enabling this function requires that a group of volumes be defined in a manner similar to a consistency group devicelist. Devices are defined by any of the following:

- ◆ VOLSER
- ◆ z/OS device number
- ◆ z/OS device ranges
- ◆ SMS group name

The DEVICE_LIST statements following configuration keyword R1_RO_CONGROUP use this feature. These devices must be kept separate from any devices assigned to any consistency group devicelists and devicelist definition rules outlined in the *DEVICE_LIST Definitions* on page 7-3 for each data base management system should also be considered.

R1_RO_MODE Configuration Example

The following is an example of R1_RO Mode configuration:

```
1_RO_CONGROUP=IMSPROD
EVICE_LIST=IMS001,IMS002,IMS003,2101,3290,FCED,B303-B312
EVICE_LIST=DB2001,DB201E,DB201F,3101,311F,FBED,C303-C312
MS_GROUP=IMSPROD
```

The feature is enabled and disabled using the same z/OS modify commands used in ConGroup. For example:

```
F EMCCGRP ENABLE IMSPROD
```

```
F EMCCGRP DISABLE IMSPROD
```

Resuming Operations after a ConGroup AutoSwap

This chapter describes the steps you must take to resume ConGroup, SRDF, and AutoSwap-protected host operations after a ConGroup AutoSwap event. The topics are:

- ◆ Introduction8-2
- ◆ Defining Complement Device Groups8-3
- ◆ Executing Command Initiated Swaps8-5
- ◆ Resynchronizing SRDF.....8-5
- ◆ Enabling the Consistency Group8-6

Important: This chapter describes procedures that involves other EMC products: EMC AutoSwap and SRDF Host Component. You can find more information about these products in the *EMC AutoSwap Product Guide* and the *Symmetrix SRDF Host Component Product Guide*.

Introduction

The resumption of ConGroup, SRDF, or AutoSwap¹ protected host operations after an AutoSwap event requires careful planning. At your site after the swap, the applications are still running (if the swap was caused by an unplanned outage) and the target (R2) devices have become the new primary devices.

The swap back, returning to the original source (R1) devices, may be accomplished in three steps using ConGroup or AutoSwap:

1. Define a complement device group.
2. Swap the data from the original protected group (now on the R2 devices) to a complement group and return the data from the complement group to the original R1 group.
3. Resynchronize SRDF so that I/O can begin on the restored primary R1 devices.

In addition you must re enable the consistency group.

1. AutoSwap is a license-key activated feature of ResourcePak Base. For more information about AutoSwap, refer to the *EMC AutoSwap Product Guide*.

Defining Complement Device Groups

To use complement groups, you must create a group defined as the complement of the consistency group that was involved in the AutoSwap event that swapped to the secondary R2 devices. You can define complement groups in two ways:

- ◆ With the DAS DEFINE complement operator command issued through the still-running ConGroup.
- ◆ With a complement group definition in the CONFIGCA DD file.

Important: A complement group definition created through COMPLEMENT can only be used if the task that executed the AutoSwap event is still running. Therefore, EMC recommends that you create your own complement definition to be used as an alternative when the ConGroup task is not running. Refer to *Using CONFIGCA* on page 8-4.

Using the COMPLEMENT Parameter

If the ConGroup task that executed the AutoSwap event is still running, the swap back procedure needs to use a device group defined as a complement to the group that was part of the event to the secondary R2 devices.

You create the complement group using the define complement group operator command as follows:

```
DAS DEFINE GROUP complementgroup COMPLEMENT originalgroup [options]
```

Where:

complementgroup

The name for the complement group. This name has the same requirements as that of any consistency group: no more than eight characters.

originalgroup

The name for the original group that was part of the autoswap event. This name also has the same requirements as that of any consistency group: no more than eight characters.

options

The optional parameters defined for the complement group. The options specified in this statement apply to the complement group, not the original group.

The parameters for the original group and its complement do not have to be the same. For example:

```
DAS DEFINE GROUP returngroup COMPLEMENT prodgroup RETAIN SWAPCONTROL=BYDEVICE
```

prodgroup is the monitored group and *returngroup* is its complement.

As a ConGroup AutoSwap group, *prodgroup* is defined with SWAPCONTROL=BYGROUP. In the example above, the *returngroup* is defined with SWAPCONTROL=BYDEVICE.

More Information: Refer to *EMC AutoSwap Product Guide* for a description of the options you can select.

You can define the complement group at any time after you have defined the original consistency group. When defined before a ConGroup AutoSwap event, the complement group is created, but is not populated with devices.

The “swap-back” device definition for the complement group occurs automatically during the ConGroup AutoSwap event, so that the swap back definition defines only the devices that were auto swapped.

Using CONFIGCA

If the task that executed the swap event has been stopped and then restarted, you cannot use a COMPLEMENT definition. Instead, you must have externalized the definition of the complement group (the “swap back” group) in a user-defined file. Then, specify this file in the ConGroup JCL as the CONFIGCA DD statement.

The following example shows such a definition for ConGroup:

```
//EMCCGRP  PROC  PRFX='EMC.CONGROUP',CONFIG=CGRPCFG0,
//          SCFPRFX='EMC.SCF'
// *
//CONGROUP EXEC  PGM=CGRPMAIN,REGION=0M
//STEPLIB  DD   DSN=&PRFX..LINKLIB,DISP=SHR
//          DD   DSN=&SCFPRFX..LINKLIB,DISP=SHR
//CONFIG   DD   DSN=&SCFPRFX..SAMPLIB(&CONFIG.),DISP=SHR
//CONFIGCA DD   DSN=complementgroup,DISP=SHR
```

Executing Command Initiated Swaps

When you have consistency groups defined, you can perform swaps of the complement group (the swap-back group) through ConGroup.

To execute a command initiated manual swap through ConGroup, you use the DAS command, as follows:

```
F EMCCGRP,DAS SWAP returngroup
```

Where:

returngroup

The complement group

Resynchronizing SRDF

The swap back operation using DAS SWAP performs the necessary steps of SRDF resynchronization, so that I/O may begin on the primary R1 devices. This operation is documented as procedure 6 in Chapter 5 of the *SRDF Host Component Product Guide*.

Enabling the Consistency Group

If you are running in multi-mode, (the default) the commands are globally communicated, and don't need to be issued on all LPARS. The exception to this is the DISABLE command. The purpose of the DISABLE is to turn off the consistency group setting on the devices defined in the consistency group. If you are running without a CAX group, a disable on one LPAR disables on all LPARS. However, if you are running with a CAX group, you should issue the DISABLE command (or, a DAS DEL GRP *grpname* command issued) on the owner LPAR to remove the SDAS group.

Following the procedures outlined below, using commands in to enable the consistency group.

In the following procedures:

cgptask

The ConGroup task

cgpgname

The consistency group name

backgrp

The swap back group

Enabling in Single-LPAR Mode

The following instructions explain how to enable a consistency group in single-LPAR mode, where the ConGroups instances are not communicating with one another.

In single-LPAR mode, if you do not issue the following commands in the owner LPAR, it may look like the ConGroup is in an Enabled/Active state, but the S/DAS group may not be ready for a swap event. Both the ConGroup and S/DAS displays should be issued at the end of the procedures to verify that the group(s) are in a desired state.

Delete the S/DAS group from the owner LPAR to do a REFRESH
Issue the following commands:

1. Delete the S/DAS group from the owner LPAR:

```
F cgptask,DAS DEL GRP cgpgname
```

2. Refresh on the non-owner LPAR(s):

```
F cgptask,REFRESH FORCE
```

3. Refresh on the owner LPAR:

```
F cgptask,REFRESH FORCE
```

Verify that the ConGroup is Enabled/ Active, the S/DAS group is defined, and the devices are in an auto-swappable state. Issue the following commands:

```
F cgptask,DIS CON cgpgrpname
```

```
F cgptask,DAS DIS GRP cgpgrpname DET
```

After a ConGroup trip but before starting the resume process, you must delete the S/DAS group. Issue the following commands:

1. Delete the S/DAS group from the owner LPAR:

```
F cgptask,DAS DEL GRP cgpgrpname
```

2. Resume ConGroup on the non-owner LPAR(s):

```
F cgptask,RESUME cgpgrpname
```

3. Resume ConGroup on the owner LPAR:

```
F cgptask,RESUME cgpgrpname
```

Verify that the ConGroup is Enabled/ Active, the S/DAS group is defined, and the devices are in an auto-swappable state.

```
F cgptask,DIS CON cgpgrpname
```

```
F cgptask,DAS DIS GRP cgpgrpname DET
```

Swap back the device UCBs. Issue the following command(s):

1. Create the group to swap back and optionally swap immediately following the group definition, on the owner LPAR:

```
F cgptask,DAS DEF GRP backgrp COMPLEMENT
```

Optionally use the SWAPIMMED option to swap immediately following the group definition.

2. Verify all of the devices have swapped back.

3. After the group has been swapped back delete the original S/DAS group on the owner LPAR:

```
F cgptask,DAS DEL GRP cgpgrpname
```

At this point the non-owner LPAR displays CGRP168E CONGROUP *cgrpgrpname* FAILED TO DISABLE. Refer to CGRP168E on page A-35.

4. Enable the Consistency Group on the non-owner LPAR(s):

```
F cgptask,ENABLE cgpgrpname
```

5. Enable the Consistency Group on the owner LPAR:

```
F cgptask,ENABLE cgpgpname
```

Ensure that step 4 completes successfully. Otherwise the consistency group may appear to be in an acceptable state but the S/DAS group has not been defined.

Enabling in Multi-LPAR Mode

Bring up the consistency group on any LPAR, by issuing the following:

```
/s cgptask
```

This appendix describes and lists the messages reported by the ConGroup utility (or its underlying components), the reason for the message, and the recommended user action. Topics include:

- ◆ Message Destination and FormatA-2
- ◆ Messages: Cause and ActionA-3

Important: You may also receive messages from SWAP services and its underlying S/DAS component. Refer to *CGRSmmnC* on page A-65 for more information about these messages.

Message Destination and Format

During operation, the ConGroup utility can generate informational, warning, or error messages at a number of points. Whenever it does, the ConGroup utility performs the following actions:

- ◆ Displays the message on the operator's console
- ◆ Writes the message to the job log

The ConGroup utility messages are issued in the following format:

CGRPnnnC *message text*

Cause: *Cause Text.*

Action: *Action Text.*

Where:

nnn

Message number

C

Message class, which can be:

I (Informational)

R (Reply)

W (Warning)

E (Error)

message text

Explanatory text describing the message

Cause: *Cause Text.*

An explanation of the cause of the message.

Action: *Action Text.*

The recommended action to take.

Messages: Cause and Action

This section lists each ConGroup message, its cause and recommended operator action.

CGRP000I

CONGROUP *Vv.r.m* INITIALIZING

where:

v

The software version

r

The software release level

m

The software modification level

Cause: This is the initial startup message. It declares the version of ConGroup that is running.

Action: None.

CGRP001E

NO CONGROUPS MATCH THE NAME SPECIFIED

Cause: A command was issued that specified a consistency group name. That name was not found among the consistency groups defined in the configuration file.

Action: Re-enter the command using a defined consistency group name.

CGRP002E

RESUME I/O FOR CONGROUP cccccccc FAILED ON CUU ccuu

Cause: A RESUME command was issued for consistency group cccccccc. The ConGroup task is trying to process the command by issuing an I/O against at least one of the devices in the consistency group. The I/O was attempted on device cuu and failed, so the ConGroup task will attempt the I/O on the next device in the consistency group. Specific details of the error are found in message CGRP003E.

Action: No immediate action is necessary. Look further for either message CGRP005E or CGRP006I.

CGRP003E

R15=ddssnnnn SYSRC=17gc

Cause: This message provides additional information about the error message issued immediately before it.

Where:

dd = device status

ss = subchannel status

nnnn = first two bytes of sense data from I/O

1 = Not all devices errored out

2 = All devices errored out

3 = No RA groups are online

4 = All local mirrors have invalid tracks

5 = All local mirrors are not ready

A typical SYSRC would be 1723, which means that a RESUME was issued for a consistency group, but there are no links online between the source (R1) and target (R2) devices.

Action: None.

CGRP004E

RESUME FAILED FOR CONGROUP ccccccc
CTLR=ssssssssssss

Cause: A RESUME was attempted using all the devices on controller sssssssssss for consistency group ccccccc, and all the attempts failed.

Action: Some action will be necessary depending on the nature of the problem. For more details, see the accompanying message, CGRP003E. The most likely problem is that an RDF link needs to be varied online.

CGRP005E

RESUME PROCESSING FOR CONGROUP ccccccc IS
INCOMPLETE

Cause: Accompanied by other error messages, this message warns that the consistency group ccccccc could not be resumed. The devices in the consistency group remain in suspended state.

Action: None.

- CGRP006I** RESUME STARTED FOR CONGROUP cccccccc
CTLR=ssssssssssss
- Cause:** A RESUME command was issued for consistency group cccccccc and the RESUME was started for controller sssssssssss. Note that RESUME processing continues on other controllers in the consistency group and the RESUME should not be deemed successful until message CGRP007I is issued, i.e. the RESUME was successful on all controllers in consistency group cccccccc.
- Action:** None.
- CGRP007I** RESUME PROCESSING COMPLETED FOR CONGROUP cccccccc
- Cause:** A RESUME command was issued for consistency group cccccccc. The RESUME was successful.
- Action:** None.
- CGRP008E** PARM ERROR - NO PARMS
- Cause:** A command was issued that required one or more parameters. No parameters were entered.
- Action:** Re-enter the command with the proper parameters. Use the HELP command for assistance.
- CGRP009E** PARM ERROR - PARM TOO LONG
- Cause:** A command was issued with a parameter that exceeded 16 characters.
- Action:** Re-enter the command with the proper syntax. Use the HELP command for assistance.
- CGRP010E** INVALID COMMAND
- Cause:** A command was issued which is not a valid consistency group command.
- Action:** Re-enter the correct command with the proper syntax. Use the HELP command for assistance.
- CGRP014E** INVALID DISPLAY COMMAND=>
- Cause:** A DISPLAY command was issued but the subcommand was invalid.
- Action:** Re-enter the DISPLAY command with the proper subcommand.

- CGRP015E** CONGROUP NAME cccccccc NOT FOUND
- Cause:** A command was issued that entered cccccccc as a consistency group name but that consistency group name was not defined in the configuration file.
- Action:** Check to make sure you are using the right consistency group name.
- CGRP016E** FATAL ERROR IN EMC CONGROUP EOS EXIT
- Cause:** An error has occurred in the EMC end-of-sense exit and processing has terminated.
- Action:** Consult the SYSLOG and JOB log for errors. If you cannot use this information to correct the problem, contact the EMC Customer Support Center for technical assistance. Make sure you have all relevant job documentation.
- CGRP017E** LISTENER SUBTASK FOR CONGROUP cccccccc HAS ABENDED
- Cause:** An error has occurred in the listener subtask for consistency group cccccccc.
- Action:** Consult the SYSLOG and JOB log for errors. If you cannot use this information to correct the problem, contact the EMC Customer Support Center for technical assistance. Make sure you have all relevant job documentation..
- CGRP018E** CGRPMAIN HAS DETECTED AN ABEND IN CONGROUP SUBTASK cccccccc
- Cause:** An error has occurred in the ConGroup task for consistency group cccccccc.
- Action:** Consult the SYSLOG and JOB log for errors. If you cannot use this information to correct the problem, contact the EMC Customer Support Center for technical assistance. Make sure you have all relevant job documentation.
- CGRP019E** CONGROUP MAIN TASK HAS ABENDED
- Cause:** An error has occurred in the consistency group main program.
- Action:** Consult the SYSLOG and JOB log for errors. If you cannot use this information to correct the problem, contact the EMC Customer Support Center for technical assistance. Make sure you have all relevant job documentation.

- CGRP021E** CGRPMMAIN HAS DETECTED AN ABEND IN THE cccc SUBTASK
- Cause:** The ConGroup task has detected an abend in one of its subtasks. Where cccc can be COMM for the communication subtask, WTO for the Write-to-operator subtask, or CGCK for the auto-verify subtask. ConGroup attempts to restart the subtask that abended.
- Action:** Consult the SYSLOG and JOB log for errors. If you cannot use this information to correct the problem, contact the EMC Customer Support Center for technical assistance. Make sure you have all relevant job documentation.
- CGRP022I** RESUME IS VERIFYING DEVICES FOR CONGROUP cccccccc
- Cause:** After a RESUME command is issued, the ConGroup task periodically checks the devices in the consistency group to see when the RESUME is complete. The RESUME is not complete until message CGRP007I is issued.
- More Information:** Refer to *RESUME* on page 6-20.
- Action:** None.
- CGRP024E** RESUME SUBTASK FOR CONGROUP cccccccc HAS ABENDED
- Cause:** A RESUME was in process for consistency group cccccccc and the RESUME task abnormally terminated. While not fatal to the ConGroup task, notification of the RESUME process completing will not occur (message CGRP007I).
- Action:** Consult the SYSLOG and JOB log for errors. If you cannot use this information to correct the problem, contact the EMC Customer Support Center for technical assistance. Make sure you have all relevant job documentation.
- CGRP025E** ATTACH FAILED FOR CONGROUP RESUME SUBTASK
- Cause:** A RESUME command failed because the RESUME subtask has abnormally terminated.
- Action:** Consult the SYSLOG and JOB log for errors. If you cannot use this information to correct the problem, contact the EMC Customer Support Center for technical assistance. Make sure you have all relevant job documentation.

- CGRP026I** RESUME IS ALREADY ACTIVE FOR CONGROUP cccccccc
Cause: A RESUME command was issued for consistency group cccccccc while the consistency group was already in RESUME mode.
Action: None.
- CGRP027E** REMOTE SPLIT REQUEST FOR CONGROUP cccccccc DENIED
Cause: A REMSPLIT command was issued but was unable to be processed.
Action: An additional message will be issued explaining the reason. Review the message and take the appropriate action.
- CGRP028E** CONGROUP cccccccc IS ACTIVE
Cause: A REMSPLIT command was issued but was unable to be processed because the consistency group is not in a suspended state.
Action: None.
- CGRP029E** CONGROUP cccccccc IS NOT ENABLED
Cause: A DISABLE, ENABLE, RESET, or REMSPLIT command cannot be issued to a consistency group that is not enabled.
Action: The consistency group must be in the proper state for a DISABLE, ENABLE, RESET, or REMSPLIT.

More Information: Refer to *DISABLE* on page 6-9, *ENABLE* on page 6-13, *RESET* on page 6-19, *REMSPLIT* on page 6-18.
- CGRP030E** CONGROUP cccccccc HAS A RESUME IN PROCESS
Cause: A REMSPLIT, DISABLE, ENABLE, or RESET command cannot be issued to a consistency group that has a RESUME in process.
Action: The consistency group must be in the proper state for a REMSPLIT, DISABLE, ENABLE, or RESET.

More Information: Refer to *REMSPLIT* on page 6-18.
- CGRP031E** CONGROUP cccccccc HAS A REMOTE SPLIT IN PROCESS
Cause: A REMSPLIT command cannot be issued to a consistency group with a remote split already in process.

Action: The consistency group must be in the proper state for a REMSPLIT.

More Information: Refer to *REMSPLIT* on page 6-18.

CGRP032E ATTACH FAILED FOR CONGROUP REMSPLIT SUBTASK

Cause: Internal error.

Action: Consult the SYSLOG and JOB log for errors. If you cannot use this information to correct the problem, contact the EMC Customer Support Center for technical assistance. Make sure you have all relevant job documentation.

CGRP033E REMSPLIT SUBTASK FOR CONGROUP cccccccc HAS ABENDED

Cause: Internal error.

Action: Consult the SYSLOG and JOB log for errors. If you cannot use this information to correct the problem, contact the EMC Customer Support Center for technical assistance. Make sure you have all relevant job documentation.

CGRP034E REMSPLIT PROCESSING FOR CONGROUP cccccccc IS INCOMPLETE

Cause: The REMSPLIT command was not successfully processed for consistency group cccccccc.

Action: See previous messages for details about why the REMSPLIT command failed.

CGRP035E cccccccc ssssssssssss vvvvvv gg ssss bbbb

Cause: This message immediately follows message CGRP037E and offers details about the error.

Where:

cccccccc

Consistency group name

sssssssssssss

Symmetrix serial number

vvvvvvv

VOLSER of the source (R1) device

gg

RA group of the source (R1) device

ssss

Symmetrix device number of the target (R2) standard device

bbbb

Symmetrix device number of the target (R2) BCV device

Action: See message CGRP037E for the reason for the error.

CGRP036E

BCVSPLIT CALL FAILED FOR CUU=ccuu

Cause: A REMSPLIT command was issued and subsequently failed when a remote BCV query request was issued.

Action: See message CGRP037E for the reason for the error.

CGRP037E

R15=rrrrrrrrr EMCRC/EMCRS=ccccssss

Cause: A command issued to a Symmetrix failed.

One of the following reason codes may appear in a CGRP037E message after a CGRP036E message:

ssss

Specifies the reason for the error. The following are possible error codes:

01

The standard device does not exist

02

The standard device is a BCV device

03

The standard device does not have an active BCV mirror

05

The BCV device is not the device which initiated the establish command (pertains to mainframes only)

06

The BCV device is not a BCV device

0A

The flag byte value is invalid

0D

The standard device mirror are not in a ready state and the split would leave the standard device with no available mirrors

10

Poll later for the end of BCV status, as the timeout on the command was reached

This error code is not an error in the true sense, as the split a BCV pair process still continues in the background. Since the timeout was reached, the host needs to later check that the split process was completed.

11

Re-issue the split command at a later time because the standard device is busy

15

The standard device has open concurrent copy sessions

19

The standard device is an SRDF R2 device and the R1 local mirrors are not ready or are WRITE DISABLED

21

The standard and BCV devices do not comprise a BCV pair

22

The system does not have enough resources with which to execute the split process. Try again later.

23

The BCV mirror is not fully synchronized with the standard device mirror(s)

26

SDDF is not enabled, so a differential split cannot be performed

30

Illegal TimeFinder command

31

Code upgrade in progress

34

GST queue full: re-issue command later

35

BCV has File_SMMF

36

The standard device would be left with invalid tracks

37

A reverse split was requested on a device with only one mirror

All other return codes indicate an internal processing error.

Action: For RC=00000018, determine the cause of the error using the reason code and take the appropriate action. For all other return codes, contact the EMC Customer Support Center for technical assistance.

CGRP038E

VERIFY PROCESSING FAILED FOR CONGROUP cccccccc

Cause: The verify processing for consistency group cccccccc failed.

Action: See the previous message for the reason why the verify processing failed.

CGRP039E

VALID OPERANDS FOR CANCEL ARE: SUSPEND, REMSPLIT, RESUME

Cause: A CANCEL command was issued with an unrecognized operand. Valid operands are SUSPEND and REMSPLIT.

Action: Retry the CANCEL command with a valid operand.

CGRP041I

RESUME IS NOT NECESSARY FOR CONGROUP xxxxxxxx

Cause: A RESUME command was issued for a consistency group that does not need a resume.

Action: None.

CGRP042E

RESUME REQUEST FOR CONGROUP xxxxxxxx DENIED

Cause: A RESUME command was issued but was unable to be processed.

Action: An additional message will be issued explaining the reason. Review the message and take the appropriate action.

CGRP043E

REFRESH IS IN PROGRESS

Cause: A command was issued, but can not be processed because a REFRESH is currently being processed.

Action: Wait for the REFRESH processing to complete, then, if appropriate, issue the command again.

CGRP044E

CONGROUP xxxxxxxxx HAS A SUSPEND PENDING

Cause: The command was issued for the consistency group, but can not be processed because the consistency group is about to be suspended.

Action: Wait for the suspend processing to complete. Then, if appropriate, issue the command again.

CGRP045E

REFRESH IS PENDING

Cause: A command was issued, but can not be processed because the REFRESH processing is pending execution.

Action: Wait for the REFRESH processing to complete. Then, if appropriate, issue the command again.

CGRP046W

CONGROUP xxxxxxxxx HAS A RESUME ALREADY IN PROGRESS

Cause: A RESUME command was issued for the consistency group, but can not be processed because the consistency group is currently being resumed.

Action: None.

CGRP047W

CONGROUP xxxxxxxxx HAS A REMOTE SPLIT ALREADY IN PROGRESS

Cause: A REMSPLIT command was issued for the consistency group, but can not be processed because the consistency group is currently processing a remote split.

Action: None.

CGRP048W

CONGROUP xxxxxxxxx HAS A SUSPEND ALREADY IN PROGRESS

Cause: A suspend was issued for the consistency group, but can not be processed because the consistency group is currently being suspended.

Action: None.

CGRP049E

TERMINATING - PROGRAM IS NOT APF AUTHORIZED.

Cause: The ConGroup address space was started, but the load library was not authorized.

Action: APF authorize the ConGroup load library and restart the ConGroup address space.

CGRP050I

SUBTASK FOR CONGROUP cccccccc IS ACTIVE

Cause: The ConGroup task has attached the listener subtask for consistency group cccccccc.

Action: None.

CGRP051I

CGROUP cccccccc POSTED - xxxxxxxxxxxx

Cause: The ConGroup listener subtask has been posted to process a work request. Where xxxxxxxx is the following:

uTRIPPED ON CUU ccuu

A failure to write to the R2 device for CUU ccuu was detected. The consistency group is being suspended.

Action: None.

CGRP052E

SUSPEND I/O FOR CONGROUP cccccccc FAILED ON CUU ccuu

Cause: The ConGroup task attempted to SUSPEND all the devices for consistency group cccccccc by issuing an I/O against at least one of the devices in the consistency group. The I/O was attempted on device ccuu and failed, so the ConGroup task attempts the I/O on the next device in the consistency group. Details of the error follow in message CGRP003E.

Action: No immediate action is necessary. Look for either message CGRP056I or CGRP070E.

CGRP053E

CGRP053E RESET REQUEST FOR CONGROUP xxxxxxxx DENIEDX

Cause: Another action is begin performed against this congroup Reset cannot be performed at this time.

Action: Attempt reset at a later time.

CGRP054E

SUSPEND FAILED FOR CONGROUP cccccccc
CTLR=ssssssssssss

Cause: SUSPEND was attempted using all the devices on controller sssssssssss for consistency group cccccccc, and all the attempts failed.

Because the SUSPEND failed and I/O was resumed to the source (R1) devices, the consistency of data on the target (R2) devices is unreliable.

Action: None.

CGRP055I

SUSPEND SUCCESSFUL FOR CONGROUP cccccccc
CTLR=ssssssssssss

Cause: SUSPEND was issued for consistency group cccccccc and the SUSPEND was successful for controller sssssssssss. Note that SUSPEND processing continues on other controllers in the consistency group and the SUSPEND should not be deemed successful until message CGRP056I is issued, i.e. the SUSPEND was successful on all controllers in consistency group cccccccc.

Action: None.

CGRP056I

SUSPEND PROCESSING SUCCESSFUL FOR CONGROUP cccccccc

Cause: SUSPEND was issued for consistency group cccccccc and the SUSPEND was successful.

Action: None.

CGRP057I

SUBTASK FOR CONGROUP cccccccc SHUTTING DOWN

Cause: A shutdown has been requested and the consistency group listener subtask for consistency group cccccccc has acknowledged the shutdown.

Action: None.

CGRP058E

CONGROUP cccccccc IS BEING VERIFIED

Cause: The request can not be processed at this time because consistency group cccccccc is having its devices verified.

Action: None.

- CGRP059E** VERIFY FOR CONGROUP cccccccc DENIED.
- Cause:** The VERIFY command request can not be processed at this time because another command is being processed by consistency group cccccccc.
- Action:** None.
- CGRP060E** AUTO VERIFY FOR CONGROUP cccccccc FAILED
- Cause:** The auto-verify logic has detected a device in an unexpected state.
- Action:** See the preceding messages for a description of the devices in error.
- CGRP061E** A CONGROUP NAME MUST BE SUPPLIED
- Cause:** An operator command was issued, but no consistency group name was supplied for the command to act upon.
- Action:** Reissue the operator command and specify the name of the consistency group to be processed.
- CGRP062I** CANCEL xxxxxxxx ISSUED TO ALL CONGROUPS
- Cause:** Either a CANCEL RESUME, CANCEL SUSPEND, or CANCEL REMSPLIT operator command was issued without a consistency group name. A CANCEL command was issued to all consistency groups that would have been affected by the command.
- Action:** None.
- CGRP063E** REMSPLIT FOR CONGROUP cccccccc WAS CANCELLED BECAUSE OF A TRIP
- Cause:** During the REMSPLIT processing for consistency group cccccccc, a trip event was detected. The consistency group was suspended and the REMSPLIT processing was aborted.
- Action:** None.
- CGRP064E** RESUME FOR CONGROUP cccccccc WAS CANCELLED BECAUSE OF A TRIP
- Cause:** During the RESUME processing for consistency group cccccccc, a trip event was detected. The consistency group was suspended and the RESUME processing was aborted.
- Action:** None.

- CGRP065W** THERE ARE NO DEVICES TO MONITOR FOR CONGROUP
cccccccc.
- Cause:** Consistency group cccccccc was defined, but no devices were found to monitor for a trip event.
- Action:** The ConGroup application will continue monitoring the devices defined in other consistency groups. Also, if the auto refresh processing is active, the application will watch for devices defined in consistency group cccccccc to become available.
- CGRP066E** CONGROUP cccccccc STATE BEING RESET
- Cause:** The requested operator command cannot be processed at this time because the consistency group is having its internal state reset. This is a normal part of the auto-verify processing.
- Action:** None.
- CGRP067E** 'CGRP067E RESET NOT SUPPORTED FOR CONGROUP
XXXXXXXXX'
- Cause:** Reset was attempted against an R1_RO consistency group.
- Action:** None.
- CGRP068E** PARM ERROR - NO PARMS
- Cause:** Internal error.
- Action:** Consult the SYSLOG and JOB log for errors. If you cannot use this information to correct the problem, contact the EMC Customer Support Center for technical assistance. Make sure you have all relevant job documentation.
- CGRP069E** PARM ERROR - PARM TOO LONG
- Cause:** Internal error.
- Action:** Consult the SYSLOG and JOB log for errors. If you cannot use this information to correct the problem, contact the EMC Customer Support Center for technical assistance. Make sure you have all relevant job documentation.
- CGRP070E** SUSPEND PROCESSING FAILED FOR CONGROUP cccccccc
- Cause:** ConGroup's attempt to suspend consistency group cccccccc failed. See the preceding error messages for more information about the error.

This is a serious error. Because the SUSPEND failed and I/O was resumed to the source (R1) devices, the consistency of data on the target (R2) devices is unreliable.

Action: Consult the SYSLOG and JOB log for errors. If you cannot use this information to correct the problem, contact the EMC Customer Support Center for technical assistance. Make sure you have all relevant job documentation.

CGRP071I SUSPEND IN PROGRESS FOR CONGROUP cccccccc

Cause: A suspend request is being processed for consistency group cccccccc

Action: None.

CGRP073E THE SUSPEND RETRY TIME LIMIT HAS BEEN EXCEEDED

Cause: A suspend process was active for a consistency group, and the time specified in the SUSPEND_RETRY_TIMEOUT parameter was exceeded, thereby failing the suspend process. This message is preceded by message CGRP070E. The group will be prevented from further trips pending operator action. See the following **Action** section.

Action: The remote data is not consistent since the suspend process could not complete normally. The consistency group may only be partially suspended, so a RESUME may need to be done. After a RESUME has been done, a RESET command for the consistency group must be entered to re-enable trip processing for the group.

This enablement is distinct from normal ENABLE status. Normal ENABLE status means that all devices in the group have the microcode-level consistency group feature turned on. The re-enabling for trip processing through the RESET command applies only to previously failed suspends that have timed out.

CGRP074E THE SUSPEND WAS CANCELLED BY THE OPERATOR

Cause: A suspend process was active for a consistency group, and it was manually cancelled by an operator, thereby failing the suspend process. This message is preceded by message CGRP070E.

Action: The remote data is not consistent since the suspend process could not complete normally. The consistency group may only be partially suspended, so a RESUME may need to be done.

CGRP075W

CONGROUP cccccccc RECEIVED AN ERROR WHILE
SUSPENDING

Cause: A suspend process was active for a consistency group, and it encountered an error. The consistency group was configured with SUSPEND_FAILURE=WTOR and this message is the beginning of the WTOR sequence.

Action: Watch for message CGRP076I to follow.

CGRP076I

CONGROUP cccccccc REPLY "R" TO RETRY OR "C" TO
CANCEL

Cause: A suspend process was active for a consistency group, and it encountered an error. The consistency group was configured with SUSPEND_FAILURE=WTOR and an operator must reply to this message. I/O to the devices in the consistency group is halted until a proper response is issued to this WTOR.

Action: See SUSPEND_FAILURE on page 4-39 for further details on the proper responses.

CGRP077E

THE SUSPEND WAS ABORTED BECAUSE A REFRESH IS IN
PROGRESS

Cause: A suspend of a consistency group could not be processed because a REFRESH is in progress.

Action: None. See the associated message for information on which consistency group was being processed.

CGRP078I

SUSPEND OF CONGROUP xxxxxxxx DELAYED BY ANOTHER
COMMAND

Cause: A suspend of the consistency group could not occur immediately because either a RESUME or a REMSPLIT command is being processed for the consistency group.

Action: None. The suspend will be processed when the current command completes processing.

CGRP079E

THE SUSPEND WAS ABORTED BECAUSE A REFRESH IS
PENDING

Cause: A suspend of a consistency group could not be processed because the REFRESH processing is pending execution.

Action: None. See the associated message for information about which consistency group is being processed.

- CGRP080E** ERROR - ACTIVE SERVICE TASK DETECTED.
- Cause:** Internal error.
- Action:** Consult the SYSLOG and JOB log for errors. If you cannot use this information to correct the problem, contact the EMC Customer Support Center for technical assistance. Make sure you have all relevant job documentation.
- CGRP081E** REMSPLIT NOT SUPORTED FOR CONGROUP cccccccc.
- Cause:** A REMSPLIT was requested for a non EMC consistency group.
- Action:** None.
- CGRP082E** RESUME NOT SUPPORTED FOR CONGROUP ccccccccc.
- Cause:** A RESUME was requested for a non EMC consistency group.
- Action:** None.
- CGRP084E** BCVQUERY FAILED FOR RAGROUP=xx, UCB=yyyyyyyyy, RU=uu
- Cause:** The BCV information could not be acquired for the named RA group. The RU=uu field specifies the last two digits of the microcode level running on the target Symmetrix storage subsystem.
- Action:** Contact the EMC Customer Support Center for technical assistance.
- CGRP087E** BCVQUERY FAILED FOR UCB=xxxxxxxx
- Cause:** An error was encountered while attempting to gather BCV information using UCB xxxxxxxx.
- Action:** Consult the SYSLOG and JOB log for errors. If you cannot use this information to correct the problem, contact the EMC Customer Support Center for technical assistance. Make sure you have all relevant job documentation.
- CGRP088I** BCV (xxxx) FOR STD CUU yyyy HAS BEEN ESTABLISHED/SYNCHRONIZED
- Cause:** While processing the DEVICE_LIST_STD configuration parameter, the BCV device xxxx has been found to be established/synchronized to the z/OS cuu yyyy. This message will be issued at initialization for any DEVICE_LIST_STD device that has a BCV currently attached. The message is also issued during REFRESH, VERIFY, and RESUME processing when a new BCV

device is found to be established/synchronized to a device defined by the DEVICE_LIST_STD start up parameter.

Action: None.

CGRP089I

BCV (xxxx) FOR STD CUU (yyyy) IS NOT ESTABLISHED/SYNCHRONIZED

Cause: During VERIFY or RESUME processing the BCV device xxxx was found to no longer be established and synchronized to the z/OS CUU yyyy.

Action: This could indicate that the BCV was split by another application while it was being managed by ConGroup. Determine if this is expected and take the appropriate action.

CGRP090E

VERIFY FOR DEVICES HAS DETECTED ERRORS.

Cause: The device verification processing has detected errors that will prevent a consistency group from being enabled and resumed.

Action: Look at the proceeding messages to find the device in error and take the appropriate action.

CGRP091E

DOMINO LINKS ACTIVE ON CONTROLLER xxxxxxxxxxxx

Cause: While processing the configuration parameters, controller xxxxxxxxxxxx was discovered to have the Domino Links option active. ConGroup does not support Domino Links.

Action: Either remove all the devices on controller xxxxxxxxxxxx from the configuration file or disable the domino links support for the controller.

CGRP092E

DOMINO IS ACTIVE FOR CUU ccuu

Cause: The Domino indicator has been discovered on for CUU ccuu. The ConGroup utility does not support devices that support the Domino feature.

Action: Remove Domino support from the device.

CGRP093E

ENABLE REQUEST FOR CONGROUP cccccccc DENIED

Cause: The ENABLE request for the consistency group could not be processed.

Action: See the proceeding message to determine why the ENABLE request could not be processed.

- CGRP094E** CONGROUP cccccccc IS SUSPENDED
- Cause:** The consistency group cccccccc is currently in a suspended state.
- Action:** This is a descriptive message for the following message. See the following message for a description of what action has failed.
- CGRP095E** DISABLE REQUEST FOR CONGROUP cccccccc DENIED
- Cause:** The request to disable the consistency group cccccccc could not be honored.
- Action:** See the proceeding message for a description of the reason why the request can not be honored.
- CGRP096E** INVALID TRACK INFORMATION NEEDS TO BE EXCHANGED FOR CUU ccuu
- Cause:** CUU ccuu was discovered to required a resynchronization before a resume can be performed.
- Action:** Contact the EMC Customer Support Center for technical assistance.
- CGRP097E** security-failure-rsn
- Cause:** The user is not authorized to issue the operator command. The security-failure-rsn gives details about the security failure.
- Action:** If necessary, have your security administrator correct the security rules and reissue the command.
- CGRP098E** INVALID VALUE FOR VERIFY_INTERVAL => xxx
- Cause:** xxx is not a valid value for the VERIFY_INTERVAL start up parameter.
- Action:** Correct the value specified for the VERIFY_INTERVAL parameter in the configuration file.
- CGRP099E** INVALID VALUE FOR DISABLE_AT_VERIFY_ERROR => xxx
- Cause:** xxx is not a valid value for the DISABLE_AT_VERIFY_ERROR start-up parameter.
- Action:** Correct the value specified for the DISABLE_AT_VERIFY_ERROR parameter in the configuration file.

- CGRP100E** ANOTHER COPY OF CGRPMMAIN IS RUNNING ON THIS LPAR
Cause: A start request was issued for CGRPMMAIN when another copy of CGRPMMAIN was already running on the LPAR. The task ends.
Action: None.
- CGRP101E** ATTACH FAILED FOR CONGROUP xxxx SUBTASK
Cause: A ConGroup task initialization failed. xxxx can be either COMM for the communication task, or CGCK for the auto-verify task.
Action: Contact the EMC Customer Support Center for technical assistance.
- CGRP103E** ATTACH FAILED FOR CONGROUP cccccccc SUBTASK
Cause: A consistency group defined in the configuration file is being initialized and the ConGroup task failed to attach a subtask on its behalf.
Action: Contact the EMC Customer Support Center for technical assistance.
- CGRP104I** EOS EXITS ARE INSTALLED
Cause: ConGroup task initialization has successfully installed the EMC end-of-sense exit.
Action: None.
- CGRP105E** GETMAIN ERROR FOR EOS BLOCK
Cause: Internal error.
Action: Consult the SYSLOG and JOB log for errors. If you cannot use this information to correct the problem, contact the EMC Customer Support Center for technical assistance. Make sure you have all relevant job documentation.
- CGRP106E** SCANUCB FAILED FOR CUU ccuu
Cause: ConGroup task initialization was processing device ccuu and encountered a failure.
Action: Check with your Systems Programmer to make sure that device ccuu is a device defined on z/OS.

CGRP107I CONGROUP Vn.n TERMINATING

Where:

n . n

The version of ConGroup you are running.

Cause: An operator has requested that the ConGroup task be shutdown and shutdown has started.

Action: None.

CGRP108I CGRPMIN POSTING SUBTASKS TO SHUT DOWN

Cause: An operator has requested that the ConGroup task be shutdown and the ConGroup task is informing the consistency group subtasks to shutdown.

Action: None.

CGRP109I CGRPMIN CLEANING UP OLD ENVIRONMENT

Cause: During ConGroup task initialization, startup noticed that there were remnants of an old ConGroup environment remaining from a previous running of the ConGroup task that most likely terminated abnormally.

Action: None.

CGRP110I CONGROUP cccccccc STATE HAS BEEN RESET

Cause: The state of consistency group cccccccc has been reset in ConGroup's internal tables.

Action: None.

CGRP111E 'CGRP111E CONGROUP XXXXXXXX RESET STATE FAILED.
RC=*

Cause: This message can be issued from within DISPLAY CGROUP processing or RESET Congroup processing. In both processing areas, a call is made to a routine (CGRPUTIL) to ascertain the state of the congroup by querying every device in the congroup and aggregating the results to form a composite congroup state. If the call to

CGRPUTIL fails, the return code and reason code is returned and displayed with CGRP111E.

Possible RC and RS values	Result
RC = 0, RS = 0	No error. Message will not be displayed
RC = 12, RS = 3	ERROR. Invalid parameters passed. This is an internal error.
RC = 12, RS = 4	ERROR. A call to get an individual device status failed. This means that the device was swapped and that the UCBLOOK system macro call failed within CGPSWAPC.

Action: Contact the EMC Customer Support Center for technical assistance.

CGRP113E OPEN FOR CONFIG FILE FAILED

Cause: During ConGroup task initialization, an attempt was made to open the CONFIG DD file and the open failed.

Action: Check the JCL to see that the CONFIG DD card is defined and that the dataset is a card-image file.

CGRP114W AUTO_REFRESH IS DISABLED

Cause: This is a warning that the configuration file specified AUTO_REFRESH=OFF.

Action: None.

CGRP115E CUU= WAS NOT SPECIFIED IN SYMM_DEV# STATEMENT

Cause: A SYMM_DEV# did not contain the required CUU= keyword that specifies the gatekeeper z/OS CUU for the given Symmetrix device numbers.

Action: See SYMM_DEV# on page 4-40 and correct the statement in error.

CGRP117E NO CONGROUP HAS BEEN DEFINED YET FOR THESE DEVICES

Cause: While processing the configuration file, devices were defined but there was no previous CONGROUP statement defining the name of the consistency group that the devices belonged to.

Action: Add a CONGROUP= statement before the device definitions to give the group of devices a consistency group name.

CGRP118E INVALID PARAMETER VALUE=> xxxx

Cause: An invalid value was specified when defining a device.

Action: Correct the parameter value in the configuration file.

CGRP119E INVALID SYNTAX => xxxxxxxxx

Cause: While processing the configuration file, the characters xxxxxxxx were encountered and found to be invalid.

Action: Edit the configuration file and correct the problem. Look for missing commas, periods, invalid keywords, and so forth.

CGRP120E xxxx-yyyy IS AN INVALID CUU RANGE

Cause: A device range was defined in the configuration file and the starting CUU, xxxx, is larger numerically than the ending CUU, yyyy.

Action: Correct the device range so that the numbers specify numbers from smallest to largest.

CGRP121E INVALID KEYWORD => xxxxxxxxxxxxxxxxx

Cause: While processing the configuration file, the characters xxxxxxxxxxxxxxxxx were found where a keyword was expected.

Action: Correct the statement so that a valid keyword is specified.

CGRP122E OLD CSA STG AT aaaaaaaa HAS AN INVALID HDR - NOT FREED

Cause: Preceded by message CGRP109I, the ConGroup task found that the CSA storage had invalid header information, so the storage was not freed.

Action: None.

CGRP123E SMS REQUEST FOR SMS GROUP ssssssss FAILED TO OBTAIN VOLSERS

Cause: While processing the configuration file, an SMS_GROUP statement was encountered and the ConGroup task attempted to obtain the VOLSERS of the devices in the SMS group ssssssss. The request failed for the reason specified in the accompanying message CGRP124E.

Action: The most likely reason is that the SMS_GROUP ssssssss is not defined.

CGRP124E R15=rrrrrrrr SMSRC=cccccccc SMSRS=ssssssss

Cause: Preceded by message CGRP123E, this message contains the reason for the error.

Action: None.

CGRP125E CONFIGURATION FILE CONTAINS ERRORS

Cause: The ConGroup task encountered errors while processing the configuration file.

Action: Look for previous messages to determine the nature of the error.

CGRP126E INVALID PARAMETER AT xxxxxxxxxxxxxxxxx

Cause: While processing the configuration file, the ConGroup task encountered a parameter whose length exceeded 16 characters. The first 16 bytes of the parameter are displayed as xxxxxxxxxxxxxxxxx.

Action: Correct the parameter.

CGRP128E zzzz nnnn IS NOT AN R1 DEVICE

Cause: The configuration file specified a device, nnnn, that was not a source (R1) device.

Where:

zzzz

The characters CUU or DEV# depending on whether the device was defined as an z/OS device or as a Symmetrix device number.

nnnn

Specifies either an z/OS CUU number or a Symmetrix device number.

Action: None.

CGRP129E SORTCORE FAILED FOR CONGROUP=cccccccc
CTLR=ssssssssssss

Cause: Internal error. This message is followed by message CGRP130E.

Action: Contact the EMC Customer Support Center for technical assistance.

CGRP130E

RC=rrrrrrrrr

Cause: This message accompanies message CGRP129E. Internal error.

Action: Contact the EMC Customer Support Center for technical assistance.

CGRP131E

THERE MUST BE AT LEAST ONE CONGROUP DEFINED

Cause: The configuration file contained no consistency groups; that is, there were no valid CONGROUP= statements.

Action: Change the configuration file so that it contains at least one CONGROUP= statement.

CGRP132E

GETMAIN FOR CSA STG FAILED

Cause: Not enough common storage (CSA or ECSA) was available.

Action: Contact the EMC Customer Support Center for technical assistance.

CGRP133W

THERE ARE NO DEVICES DEFINED FOR CONGROUP cccccccc

Cause: While processing the configuration file, consistency group cccccccc was defined but there were no devices defined that belong to that consistency group.

A consistency group with no devices defined is skipped and will not be displayed with the DISPLAY command. However, if AUTO_REFRESH is enabled and the consistency group definition contains an SMS group or a VOLSER mask, devices that get varied online and belong to the specified SMS group or match the VOLSER mask are automatically included into the consistency group. After a device is added to the consistency group, the consistency group can then be displayed with the DISPLAY command.

Action: Define at least one device for the consistency group.

CGRP134E

SAI FC01 CALL FAILED FOR CUU=ccuu

Cause: An EMC SAI call was issued to device ccuu and it failed. Details of the error follow in message CGRP271E.

Action: None.

- CGRP136E** INVALID MICROCODE LEVEL FOR CUU=ccuu - MUST BE 5265+
- Cause:** Consistency group services require a controller that is running at a microcode level of 5265+ or higher. Device ccuu is not on a controller with the minimum microcode level.
- Action:** None.
- CGRP137E** SAI CNFG CALL FAILED FOR CUU=ccuu
- Cause:** An EMC SAI call was issued to device ccuu and it failed. The details of the error follow in message CGRP037E.
- Action:** None.
- CGRP139E** SAI SYMDEVICE CALL FAILED FOR CUU=xxxx
- Cause:** An EMC SAI call was issued to device ccuu and it failed. The details of the error follow in message CGRP271E.
- Action:** None.
- CGRP141E** DEVICE REJECTED - CUU xxxx description:
- Cause:** The cuu indicated by xxxx has one of the following problems:
- ◆ DEVICE IS A PAGING DEVICE
- The device cannot be defined to the consistency group because an z/OS paging dataset resides there and the PAGEDEV_ALLOWED parameter is set to NO.
- ◆ DEVICE IS AN UNSUPPORTED PAV DEVICE
- The device can not be defined to the consistency group because it is a PAV device that is not a COMPAV base device.
- ◆ DEVICE IS AN UNSUPPORTED SYMMETRIX MODEL
- The device can not be defined to the consistency group because it does not reside on a SYM4 or higher.
- ◆ DEVICE CONTAINS A COUPLE DATA SET
- The device can not be defined to the consistency group because a couple dataset resides there.
- ◆ DEVICE IS NOT AN EMC DEVICE
- The defined device is not an EMC device.
- ◆ DEVICE IS AN UNSUPPORTED SYMMETRIX MODEL

The defined device is on a SYMM 4 or earlier.

- ◆ DEVICE IS A STRIPED CKD DEVICE

The defined device is an unsupported striped CKD device.

- ◆ DEVICE IS A DYNAMIC RDF DEVICE

The cuu defined with the DEVICE_LIST_STD parameter is a dynamic RDF device.

Action: Correct the device number or remove the device from the consistency group definition.

CGRP142W

CONGROUP cccccccc NOT ENABLED

Cause: Consistency group ccccccc was not enabled for ConGroup protection. Look at the previous messages for more detail as to the reason why it was not enabled.

Action: None.

CGRP143I

ENABLE ALL CONGROUP PROCESSING COMPLETED

Cause: During startup, the ConGroup task attempts to enable all the defined consistency groups. This message indicates that processing to enable all the consistency groups has completed, although it does not mean that all consistency groups were successfully enabled.

Action: Look at previous messages to see if any consistency groups failed to enable.

CGRP144I

DISABLE ALL CONGROUP PROCESSING COMPLETED

Cause: During shutdown, the ConGroup task attempts to disable all the defined consistency groups. This message indicates that processing to disable all the consistency groups has completed, although it does not mean that all consistency groups were successfully disabled.

Action: Look at previous messages to see if any consistency groups failed to disable.

CGRP145E

ENABLE CONGROUP cccccccc FAILED FOR CUU=ccuu

Cause: The ConGroup task was attempting to enable consistency group cccccccc by issuing an I/O against at least one of the devices in the consistency group. The I/O was attempted on device ccuu and failed, so the ConGroup task will attempt the I/O on the next device

in the consistency group. Specific details of the error are found in message CGRP003E.

Action: No immediate action is necessary. Look further for either message CGRP149I or CGRP150E.

CGRP147E

ENABLE CONGROUP cccccccc FAILED FOR
CTLR=ssssssssssss

Cause: The ConGroup task attempted to enable consistency group cccccccc using all the devices on controller ssssssssssss for the consistency group, and all the attempts failed.

Action: Some action will be necessary depending on the nature of the problem. For more details, see the accompanying message, CGRP146E.

CGRP148I

CONGROUP cccccccc IS ENABLED FOR CTLR=ssssssssssss

Cause: The ConGroup task successfully enabled consistency group cccccccc for controller ssssssssssss. Note that enable processing continues on all other controllers in the consistency group and the consistency group should not be considered enabled until message CGRP149I is issued.

Action: None.

CGRP149I

CONGROUP cccccccc SUCCESSFULLY ENABLED

Cause: Consistency group protection has been successfully enabled for consistency group cccccccc.

Action: None.

CGRP150E

CONGROUP cccccccc NOT ENABLED

Cause: Enabling ConGroup protection for consistency group cccccccc encountered errors and the consistency group was not successfully enabled.

Action: Check previous messages for more details as to the reason why the consistency group was not enabled.

CGRP151E

DISABLE CONGROUP cccccccc FAILED FOR CUU=ccuu

Cause: The ConGroup task was attempting to disable consistency group cccccccc by issuing an I/O against at least one of the devices in the consistency group. The I/O was attempted on device ccuu and

failed, so the ConGroup task will attempt the I/O on the next device in the consistency group.

Specific details of the error are found in message CGRP003E.

Action: No immediate action is necessary.

CGRP153E

DISABLE CONGROUP cccccccc FAILED FOR
CTLR=ssssssssssss

Cause: The ConGroup task attempted to disable consistency group cccccccc using all the devices on controller sssssssssss for the consistency group, and all the attempts failed.

Action: Some action will be necessary depending on the nature of the problem. For more details, see the accompanying message, CGRP151E.

CGRP154W

CONGROUP cccccccc IS DISABLED FOR CTLR=ssssssssssss

Cause: The ConGroup task successfully disabled consistency group cccccccc for controller sssssssssss. Note that disable processing continues on all other controllers in the consistency group and the consistency group should not be considered disabled until message CGRP167I is issued, i.e. disable was successful on all controllers in consistency group cccccccc.

Action: None.

CGRP155E

SAI CONFIG_RDF CALL FAILED FOR CUU=ccuu

Cause: An EMC SAI call was issued to device ccuu and it failed.

Action: The details of the error follow in message CGRP037E.

CGRP157E

RDF CONFIG FOR zzzz nnnn IS IN ADAPTIVE COPY MODE

Cause: The RDF configuration for device nnnn shows that the device is in adaptive copy mode. Consistency group protection requires that a device be operating in either synchronous or semi-synchronous mode.

Where:

zzzz

The characters CUU or DEV# depending on whether the device was defined as an z/OS device or as a Symmetrix device number.

nnnn

Specifies either an z/OS CUU number or a Symmetrix device number.

Action: None.

CGRP158E

CUU XXXX IS NOT AN RDF DEVICE

Cause: A non-RDF device was included in the Geoplex configuration file. All devices except for NONSHARE devices must be RDF (R1 or R2) devices.

Action: Change the Geoplex configuration file to reflect the proper configuration.

CGRP159W

R2 DEVICE FOR zzzz nnnn HAS xxxxxx INVALID TRACKS

Cause: Device nnnn and its target (R2) device are not synchronized. To enable consistency group protection for a device, the device and its target (R2) device have to be fully synchronized; that is, the devices can have no invalid tracks.

Where:

zzzz

The characters CUU or DEV# depending on whether the device was defined as an z/OS device or as a Symmetrix device number.

nnnn

Specifies either an z/OS CUU number or a Symmetrix device number.

xxxxxx

Specifies the number of invalid tracks.

Action: None.

CGRP160E

CUU ccuu HAS BEEN SWAPPED

Cause: The UCB for cuu ccuu has been swapped with another UCB.

Action: Refresh the ConGroup environment.

CGRP161E

REQUEST ABORTED - CUU cuu HAS BEEN SWAPPED

Cause: The UCB for CUU ccuu has been swapped with another UCB so the current request could not be processed.

Action: Refresh the ConGroup environment then try the request again.

CGRP162E

R1 DEVICE FOR zzzz nnnn IS NOT READY

Cause: Device nnnn is not ready. To enable consistency group protection for a device, the device and its target (R2) device must be in ready mode.

Where:

zzzz

The characters CUU or DEV# depending on whether the device was defined as an z/OS device or as a Symmetrix device number.

nnnn

Specifies either an z/OS CUU number or a Symmetrix device number.

Action: None.

CGRP163W

R2 DEVICE FOR zzzz nnnn IS TARGET NOT READY

Cause: The target (R2) device for device nnnn is not ready. To enable consistency group protection for a device, the device and its target (R2) device must be in ready mode.

Where:

zzzz

The characters CUU or DEV# depending on whether the device was defined as an z/OS device or as a Symmetrix device number.

nnnn

Specifies either an z/OS CUU number or a Symmetrix device number.

Action: None.

CGRP164E

NO CONGROUPS WERE DEFINED

Cause: No consistency groups were defined in the configuration file.

Action: Correct the configuration file, then either restart the ConGroup address space or reissue the REFRESH command.

- CGRP165W** CUU ccuu NOT USED FOR I/O - rsn
Cause: A necessary I/O could not be issued to CUU ccuu for the reason give in rsn.
Action: None. The I/O is automatically issued to another device on the same controller.
- CGRP166E** SCANUCB FAILED FOR VOLSER vvvvvv
Cause: ConGroup task initialization was processing VOLSER vvvvvv and encountered a failure.
Action: Check with your System Programmer that a device with the specified VOLSER vvvvvv is a device defined on z/OS.
- CGRP167I** CONGROUP cccccccc SUCCESSFULLY DISABLED
Cause: ConGroup protection for consistency group ccccccc has been successfully turned off.
Action: None.
- CGRP168E** CONGROUP cccccccc FAILED TO DISABLE
Cause: The ConGroup task attempted to turn ConGroup protection off for consistency group ccccccc, but there were errors. For more details, check previous messages for messages CGRP151E, CGRP152E, and CGRP153E.
Action: None.
- CGRP169E** TRIGGER_MSGID FOR CONGROUP cccccccc IS INVALID
Cause: The TRIGGER_MSGID specified for consistency group ccccccc is an invalid length. The message ID must be between 1 and 8 characters in length.
Action: None.
- CGRP170I** ALL DEVICES FOR CONGROUP cccccccc HAVE BEEN VERIFIED
Cause: A VERIFY command was issued and the command has completed successfully. All the devices in the consistency group are eligible to be enabled as part of the consistency group.
Action: None.

- CGRP171I** xxxx SUBTASK HAS BEEN SUCCESSFULLY REATTACHED
- Cause:** The name subtask has been successfully reattached following an abnormal termination. xxxx can be either COMM for the communication subtask, WTO for the Write-to-operator subtask, or CGCK for the auto-verify subtask.
- Action:** None.
- CGRP172E** CONGROUP NAME IS TOO LONG => ccccccccccccccccc
- Cause:** The name specified for a consistency group name is more than eight characters in length.
- Action:** Specify a name for the consistency group shorter than eight characters in length.
- CGRP173E** CONGROUP NAME nnnnnnnnn HAS ALREADY BEEN DEFINED
- Cause:** The name specified for a consistency group name has already been defined in a previous ConGroup statement. Each consistency group must have a unique name.
- Action:** Specify a unique name for the consistency group.
- CGRP174E** INVALID VOLSER MASK => cccccccc
- Cause:** This message appears in the following situations:
- ◆ When the only character specified in a VOLSER mask is an asterisk (*). For example:
 DEVICE_LIST=*
 - ◆ When there are too many characters specified in a VOLSER mask. For example:
 DEVICE_LIST=ABC000*
- Action:** Check your parameter syntax, and re-enter the parameter.
- CGRP176E** SORTCORE FAILED - RC=XXXXXX
- Cause:** Internal error.
- Action:** Consult the SYSLOG and JOB log for errors. If you cannot use this information to correct the problem, contact the EMC Customer Support Center for technical assistance. Make sure you have all relevant job documentation.

- CGRP178E** CHKPATCH ERROR ON CUU ccuu - RC=rrrrrrrrr
Cause: Internal error.
Action: Consult the SYSLOG and JOB log for errors. If you cannot use this information to solve the problem, contact the EMC Customer Support Center for technical assistance. Make sure you have the SYSLOG, the JOB log, and any other relevant job documentation.
- CGRP179W** MICROCODE PATCH nnnn IS NOT LOADED ON
CTLR=ssssssssssss
Cause: The ConGroup task, while checking for a valid microcode level, detected missing maintenance.
Action: Proper running of the ConGroup task may require added microcode maintenance. Contact the EMC Customer Support Center for technical assistance.
- CGRP180E** SAF_CLASS PARAMETER IS INVALID
Cause: The value coded for the SAF_CLASS parameter is not valid.
Action: Correct the parameter value in the configuration file.
- CGRP181E** SAF_PROFILE PARAMETER IS INVALID
Cause: The value code on the SAF_PROFILE parameter is not valid.
Action: Correct the parameter value in the configuration file.
- CGRP182E** INVALID SUSPEND_FAILURE PARAMETER =>
Cause: A SUSPEND_FAILURE keyword was specified in the configuration file and was followed by an invalid parameter.
Action: Correct the error and retry the configuration file.
- CGRP183E** VALID SUSPEND_FAILURE PARAMETERS ARE RETRY, FAIL
AND WTOR
Cause: A SUSPEND_FAILURE keyword was specified in the configuration file and was followed by an invalid parameter. This message follows message CGRP182E.
Action: Correct the error and retry the configuration file.

CGRP184E INVALID VALUE FOR SUSPEND_RETRY_TIMEOUT =>

Cause: SUSPEND_RETRY_TIMEOUT was specified in the configuration file and a valid integer was not specified as a parameter.

Action: Correct the error and retry the configuration file.

CGRP185E INVALID VALUE FOR RESUME_INTERVAL =>

Cause: RESUME_INTERVAL was specified in the configuration file and a valid integer was not specified.

Action: Specify a valid integer and retry the configuration file.

CGRP186E CUU uuuu (vvvvvv) IN CONGROUP cccccccc HAS BEEN DEFINED

Cause: A configuration statement added an z/OS device to a consistency group, but the device had already been defined in a previous consistency group. This message is followed by message CGRP188E.

Where:

uuuu

CUU

vvvvvv

VOLSER

cccccccc

Consistency group name

Action: See message CGRP188E for additional information.

CGRP187E DEV# nnnn CONGROUP cccccccc CTLR ssssssssssss HAS BEEN DEFINED

Cause: A configuration statement added a Symmetrix device number to a consistency group, but the device number had already been defined in a previous consistency group. This message is followed by message CGRP189E.

Where:

nnnn

Symmetrix device number

cccccccc

Consistency group name

ssssssssssss

Symmetrix serial number

Action: See message CGRP189E for additional information.

CGRP188E

IN CONGROUP cccccccc AS CUU uuuu (vvvvvv)

Cause: This message follows message CGRP186E, and states where the z/OS device had been previously defined.

Where:

cccccccc

Consistency group name

uuuu

CUU

vvvvvv

VOLSER

Action: Change the configuration file so that the device in error is only included in one consistency group.

CGRP189E

IN CONGROUP cccccccc AS DEV# nnnn USING CUU uuuu

Cause: This message follows message CGRP187E, and states where the Symmetrix device number had been previously defined.

Where:

cccccccc

Consistency group name

nnnn

Symmetrix device number

uuuu

CUU

Action: Change the configuration file so that the device in error is only included in one consistency group.

- CGRP190I** 'CGRP190I DEBUG MODE TURNED ON'
Cause: Debug mode has been turned on.
Action: None
- CGRP191I** 'CGRP191I DEBUG MODE TURNED OFF'
Cause: Debug mode has been turned off.
Action: None.
- CGRP192E** 'CGRP192E INVALID DEBUG VALUE - MUST BE ON, OFF, OR X'
Cause: Specified Debug value is invalid.
Action: Re-enter debug value of ON, OFF or XXXXXXXX,XXXXXXXX.
 Where: XXXXXXXX,XXXXXXXX is a value specified for you by EMC Customer Support.
- CGRP193E** ENFREQ REQUEST FAILED - R15=rrrrrrrr
Cause: Internal error.
Action: Contact the EMC Customer Support Center for technical assistance.
- CGRP194E** INVALID VALUE FOR REMSPLIT_INTERVAL =>
Cause: REMSPLIT_INTERVAL was specified in the configuration file and a valid integer was not specified.
Action: Specify a valid integer and retry the configuration file.
- CGRP195E** COULD NOT IMPLANT SUBSYSTEM CONTROL STRUCTURE.
Cause: Internal Error.
Action: Contact the EMC Customer Support Center for technical assistance.
- CGRP196I** 'CGRP196I DEBUGGING FLAGS IN EFFECT ARE XXXXXXXX
 XXXX
Cause: Debug flags XXXXXXXX XXXXXXXX are in effect.
Action: None.

- CGRP197E** CUU xxxx IS NOT A R1 DEVICE.
- Cause:** When verifying the characteristics of CUU xxxx, it was discovered that the device is no longer marked as an R1 device.
- Action:** The device must be made an R1 device to continue being used in the consistency group.
- CGRP198E** DEVICE_LIST_STD PARAMETER NOT SUPPORTED CURRENT CONGROUP
- Cause:** The DEVICE_LIST_STD parameter was specified for a non-SRDF consistency group.
- Action:** Remove the DEVICE_LIST_STD parameter definition from the non-SRDF consistency group definition.
- CGRP199E** CUU ccuu IS NOT A STD DEVICE
- Cause:** The DEVICE_LIST_STD parameter defined a CCU that is not a STD device.
- Action:** Correct the parameter value in the configuration file.
- CGRP200I** REFRESH COMPLETE - NEW CONFIG IS NOW ACTIVE
- Cause:** A REFRESH command was issued and the configuration file has passed the syntax and verification phase. The new configuration is now active, but errors may be encountered when the new consistency groups are enabled.
- Action:** Check the messages following this message and verify that the consistency groups have been enabled.
- CGRP201E** REFRESH FAILED - OLD CONFIGURATION IS STILL ACTIVE
- Cause:** A REFRESH command was issued and the configuration file has failed the syntax and verification phase. The old configuration is still active while the configuration file contains the new configuration.
- Action:** Check the previous messages for the errors in the configuration file and correct them.
- CGRP202E** REFRESH DENIED - CONGROUPS BEING VERIFIED
- Cause:** The REFRESH command cannot be processed at this time because the current state of the consistency groups is being verified.
- Action:** None.

- CGRP203I** REMSPLIT COMPLETE FOR CONGROUP cccccccc
- Cause:** A REMSPLIT command was issued for consistency group ccccccc and the REMSPLIT process has completed.
- Action:** None.
- CGRP204E** REMSPLIT FOR CONGROUP cccccccc COMPLETED WITH ERRORS
- Cause:** A REMSPLIT command was issued for consistency group ccccccc and the REMSPLIT process has completed with permanent errors.
- Action:** Review the messages issued prior to this message, and take the appropriate action.
- CGRP205E** REMSPLIT FOR CONGROUP xxxxxxxx WAS CANCELLED
- Cause:** A CANCEL REMSPLIT command was issued for consistency group ccccccc and the REMSPLIT process has been terminated.
- Action:** None.
- CGRP206I** REMSPLIT FOR CONGROUP xxxxxxxx CONTINUING
- Cause:** A REMSPLIT command was issued for consistency group ccccccc and the REMSPLIT process has received a temporary error. The process has waited the number of seconds specified in REMSPLIT_INTERVAL and is retrying the remote split request.
- Action:** None.
- CGRP207E** RESUME FOR CONGROUP cccccccc WAS CANCELLED
- Cause:** A RESUME process for consistency group ccccccc was active and an operator issued a CANCEL command to cancel the RESUME process. Although the RESUME process is cancelled, the devices are still resumed and data will continue to flow to the remote devices. Cancelling the RESUME process merely stops the notification of when the process is complete. Message CGRP007I will not be issued.
- Action:** None. The state of the devices can be checked manually by using the VERIFY command.

CGRP210E

CGRP210E INVALID OPTION FOR RESUME COMMAND
=>XXXXXXXX

Cause: A RESUME command was issued that has an invalid option following the consistency group name. The only valid option is SPLIT.

More Information: See *RESUME* on page 6-20.

Action: Retry the command.

CGRP217E

'CGRP217E INVALID VALUE FOR DEBUG=>'

Cause: Invalid debug flags have been entered.

Action: See Action for message CGRP192E.

CGRP218E

RDFEXTR CALL FAILED FOR CUU XXXX

Cause: Internal error.

Action: Consult the SYSLOG and JOB log for errors. If you cannot use this information to correct the problem, contact the EMC Customer Support Center for technical assistance. Make sure you have all relevant job documentation.

CGRP219E

RC=XXXXXXXX RS=XXXXXXXX

Cause: Internal error. Follows message CGRP218E.

Action: Contact the EMC Customer Support Center for technical assistance.

CGRP220E

R1 DEVICE FOR zzzz nnnn IS RDF-WRITE-DISABLED

Cause: The source (R1) device for device nnnn is RDF WRITE DISABLED. In order to enable consistency group protection for a device, the device and its target (R2) device must be in ready mode.

Where:

zzzz

The characters CUU or DEV# depending on whether the device was defined as an z/OS device or as a Symmetrix device number.

nnnn

Specifies either an z/OS CUU number or a Symmetrix device number.

Action: None.

CGRP221W

REFRESH DENIED - CONGROUP cccccccc STATE DISALLOWS REFRESH

Cause: A REFRESH command was issued, but the REFRESH cannot occur because consistency group cccccccc is either suspended or has a RESUME, a REMSPLIT or a SUSPEND in process. A REFRESH cannot occur if there are active processes for any consistency group or if a consistency group is suspended.

Action: Re-enter the command when all processes are completed and no consistency groups are suspended.

CGRP222E

INVALID VALUE FOR AUTO_REFRESH=>

Cause: The configuration specified the AUTO_REFRESH keyword and an invalid parameter was specified. Valid parameters are YES and NO.

Action: See AUTO_REFRESH on page 4-15.

CGRP223E

R2 DEVICE FOR zzzz nnnn HAS R1 INVALID TRKS - RESUME CANCELLED

Cause: A RESUME command was issued for a consistency group that has a remote target (R2) device with source (R1) invalid tracks. The most likely reason for the source (R1) invalid tracks is that the target (R2) device was brought online and data was written to it. This message is issued for each target (R2) device that has source (R1) invalid tracks.

Where:

zzzz

The characters CUU or DEV# depending on whether the device was defined as an z/OS device or as a Symmetrix device number.

nnnn

Specifies either an z/OS CUU number or a Symmetrix device number.

Action: This is a recovery situation. Be careful to avoid data loss and/or data corruption.

More Information: Refer to the *SRDF Host Component Product Guide* for recovery procedures and ALWAYS contact the EMC Customer Support Center for technical assistance.

- CGRP237E** INVALID VALUE FOR START=>
- Cause:** An invalid value was specified for the START keyword. Valid values are WARM and COLD.
- Action:** Enter a valid value for START.
- CGRP244E** INVALID VALUE FOR DISABLE_AT_SHUTDOWN=>
- Cause:** An invalid value was specified for the DISABLE_ST_SHUTDOWN keyword. Valid values are YES and NO.
- Action:** Specify a valid value for DISABLE_SHUTDOWN.
- CGRP247E** ATTACH FAILED FOR CONGROUP WTO SUBTASK
- Cause:** Same as *CGRP101E* on page A-23, except this is the messaging subtask.
- Action:** Refer to *CGRP101E* on page A-23.
- CGRP251E** TDMF IS ACTIVE ON CUU XXXX - CONGROUP HALTED
- Cause:** TDMF (Transparent Data Migration Facility, an Amdahl product) has been found to be active for the given device. To maintain data consistency, ConGroup and TDMF cannot be active simultaneously on the same devices.
- Action:** Remove TDMF from the device and restart ConGroup.
- CGRP252W** REFRESH IS ALREADY IN PROGRESS
- Cause:** The operator issued a REFRESH command when a refresh request was already being processed.
- Action:** None. The REFRESH command just issued is ignored.
- CGRP257E** ATTACH FAILED FOR REFRESH MONITORING SUBTASK
- Cause:** An attempt to attach the refresh monitoring subtask failed.
- Action:** Contact the EMC Customer Support Center for technical assistance.

- CGRP258W** CANCEL RESUME DENIED. RESUME IS NOT IN PROGRESS.
Cause: A CANCEL RESUME command was issued against a consistency group that is not currently processing a resume.
Action: None. The request is ignored.
- CGRP259W** CANCEL REMSPLIT DENIED. REMSPLIT IS NOT IN PROGRESS.
Cause: A CANCEL REMSPLIT was requested against a consistency group that is not currently processing a remote split operation.
Action: None. The REMOTE SPLIT request is ignored.
- CGRP260W** CANCEL SUSPEND DENIED. SUSPEND IS NOT IN PROGRESS.
Cause: A CANCEL SUSPEND operator command was issued for a consistency group, but the consistency group is not currently executing suspend processing.
Action: None.
- CGRP261E** ERROR READING DEVICE STATUS. R15=xxxxxxxx
R0=yyyyyyyyy.
Cause: The Symmetrix device status could not be obtained.
Action: Contact the EMC Customer Support Center for technical assistance.
- CGRP262E** SPLIT OPTION SPECIFIED, BUT CONGROUP IS NOT SUSPENDED
Cause: A RESUME request with the SPLIT option was requested for a consistency group, but the consistency group is not currently in a suspended state.
Action: None. The request is not processed.
- CGRP264E** CANNOT GET REMOTE RDF INFORMATION FOR RAGROUP xx
Cause: An error was encountered while attempting to collect RDF information for the specified RA group.
Action: See message CGRP037E for more information.

- CGRP267E** BCV FOR CUU *yyyy* IS NOT SYNCHRONIZED
- Cause:** While processing the cuu defined with the DEVICE_LIST_STD parameter, a BCV device was found established to the CUU device, but it is not synchronized.
- Action:** If a BCVSPLIT has occurred, then the BCV needs to re-established to the device. If a BCVSPLIT has not occurred, then the synchronization process is most likely still running.
- CGRP268E** THERE IS NO BCV ESTABLISHED AND SYNCHRONIZED TO STD CUU *yyyy*
- Cause:** While processing the cuu defined with the DEVICE_LIST_STD parameter, no BCV device was found to be established to device CUU *yyyy*.
- Action:** In order to enable and resume the consistency group containing this device, a BCV device must be established to the CUU device and synchronized.
- CGRP269E** BCV SPLIT FAILED FOR STD CUU *yyyy*.
- Cause:** The suspend logic was unable to successfully perform a BCVSPLIT for CUU *yyyy*.
- Action:** Contact the EMC Customer Support Center for technical assistance.
- CGRP270E** BCV QUERY FOR DEVICES ON CONTROLLER *xxxxxxxxxxxx* FAILED
- Cause:** During suspend processing, the BCV information for the DEVICE_LIST_STD defined devices on controller *xxxxxxxxxxxx* could not be collected.
- Action:** Contact the EMC Customer Support Center for technical assistance.
- CGRP271E** R15=*xxxxxxxx* EMCRC/EMCRS=*yyyyyyyy* EMCRCX=*zzzzzzzz*
- Cause:** This general message provides additional error information for the proceeding message.
- Action:** None. This information may be needed by the EMC Customer Support Center to aid in problem diagnostics.

- CGRP272E** SEMISYNC_ALLOWED PARAMETER MUST BE YES OR NO
Cause: An invalid value was coded on the SEMISYNC_ALLOWED parameter.
Action: Correct the parameter value in the configuration file.
- CGRP273E** RDF CONFIG FOR CUU ccuu IS IN SEMI-SYNC (J1) MODE
Cause: CUU ccuu is in semi-synchronous mode, but SEMISYNC_ALLOWED=NO is in effect.
 This message may appear if the group is a CAX group regardless of the value of the SEMISYNC_ALLOWED parameter.
Action: Either change the device state to synchronous (J0) mode, change SEMISYNC_ALLOWED=YES, or remove ccuu from the consistency group.
- CGRP274E** GETCPLFL CALL FAILED
 (XXXXXXXX/XXXXXXXX/XXXXXXXX/XXXXXXXX)
Cause: Internal Error.
Action: Contact the EMC Customer Support Center for technical assistance.
- CGRP275E** PAGEDEV_ALLOWED PARAMETER VALUE MUST BE YES OR NO
Cause: The PAGEDEV_ALLOWED start-up parameter was specified with an invalid value.
Action: Correct the value specified for the PAGEDEV_ALLOWED parameter in the configuration file.
- CGRP276W** CUU ccuu HAD AN ACTIVE I/O DURING SUSPEND PROCESSING
Cause: During suspend processing an active I/O was found on CUU ccuu that did not end in the allowed time.
Action: The suspend processing continues.
- CGRP277E** RDF GROUP INFO NOT FOUND FOR CUU xxxx, RAGROUP xx
Cause: The RDF GROUP information could not be found for the device. The RAGROUP value indicates which RAGROUP for which the information could not be found.

Action: Check the status of the RDF Groups. The links must be online when ConGroup is started. If the problem persists, contact the EMC Customer Support Center for technical assistance.

CGRP278E

INSUFFICIENT STORAGE TO ALLOCATE xxxxxxxx

Cause: Insufficient private storage was available for processing.

Action: Increase the region size of the ConGroup address space.

CGRP279E

ALL LOCAL MIRRORS FOR xxxx yyyy ARE NOT READY'

Cause: All local mirrors for CUU ccuu or DEV# xxxx are not ready. DEV# specifies the device was defined with the SYMM_DEV# parameter.

Action: Contact the EMC Customer Support Center for technical assistance.

CGRP280W

'CGRP280W OLD ENVIRONMENT WAS FORCEFULLY DETACHED'

Cause: ConGroup was directed to forcibly overlay the SSCTSUSE field at startup. This should only occur under specific direction of EMC Customer Support by specifying a specific debug flag for that purpose.

Action: None

CGRP281I

BUILD DATE: MM/DD/YY HH:MM

Cause: This is an informational message that documents the product build date. It may be used by EMC Customer Support for diagnostic purposes.

Action: None.

CGRP282I

command

Cause: This is an informational message that documents which commands have been used. The message is used to echo operator commands.

Action: None.

CGRP283E

xxxx SUBTASK ATTACH LIMIT EXCEEDED

Cause: ConGroup detected that the xxxx subtask terminated and attempted a restart, but the task has already been restarted more times than is allowed. xxxx can be either COMM for the

communication task, WTO for the Write-to-Operator Task, or CGCK for the auto-verify task.

Action: Contact the EMC Customer Support Center for technical assistance.

CGRP287E R1 DEVICE FOR xxxx yyyy IS NOT READY

Cause: The R1 device associated with either CUU yyyy or Symmetrix device number yyyy is not ready.

Action: Change the state of the R1 device to Ready.

CGRP288E R2 DEVICE FOR xxxx yyyy is RDF-WRITE-DISABLED

Cause: The R2 device for xxxx (CUU or DEV#) yyyy (CUU or Symmetrix device number) is in a RDF-Write-Disabled state. One possible cause for this is that the R2 device is in a R/W state. A second possible cause is that the R2 device has been made not-ready on the link.

During suspend processing the I/O for the device given by xxxx (CUU or DEV#) yyyy (the z/OS or Symmetrix device number) would not be halted for the given reason.

Action: Change the state of the R2 device to RDF-Write-Enabled.

CGRP290W NO DEVICES TO PROTECT WERE FOUND IN ANY CONGROUP

Cause: After reading the configuration datasets, no R1 devices were found that could trip the consistency group.

Action: None.

CGRP291E INVALID SYMM SERIAL NUMBER => xxxxxxxxxxxx

Cause: While processing the input configuration file, a parameter was found that specified an invalid Symmetrix serial number.

Action: Locate and correct the Symmetrix serial number specified by xxxxxxxxxxxx.

CGRP292E INVALID RA GROUP NUMBER => xx GIVEN FOR SER # xxxxxxxxxxxx

Cause: While processing the input configuration file, an invalid RA group number was specified for the Symmetrix serial number xxxxxxxxxxxx.

Action: Locate and correct the RA group number specified by xxxxxxxxxxxx.

CGRP293E NO REMOTE MIRRORS ON CONSISTENT GROUPS FOR CUU xxxx

Cause: While processing the input configuration file, CUU xxxx was found to have no remote mirrors on a consistent RDF Group defined by the SYMGROUP parameter.

Action: Make sure at least one of the remote mirrors for CUU xxxx has a consistent RDF Group defined by the SYMGROUP= parameter.

CGRP294E INVALID RA GROUP RANGE => xxxxxxxx

Cause: While processing the input configuration file, a parameter was found specifying an invalid RA group range.

Action: Locate and correct the RA group range specified by xxxxxxx.

CGRP301E RELEASE OF THE OPERATING SYSTEM IS NOT SUPPORTED

Cause: The release of operating system currently running is not supported.

Action: Contact the EMC Customer Service Center for technical assistance.

CGRP303E SYMMETRIX CONTROL FACILITY IS NOT AVAILABLE

Cause: The Symmetrix Control Facility must be active on the LPAR for the ConGroup utility to function properly.

Action: Start the Symmetrix Control Facility and retry the operation that failed.

CGRP304E 'CGRP304E COUPLEDEV_ALLOWED PARAMETER MUST BE YES ORX

Cause: A value other than YES or NO was specified.

Action: Resubmit with YES or NO specified.

CGRP305E CUU xxxx IS A PAGING DEVICE

Cause: While verifying the devices in a consistency group, CUU xxxx was discovered to have a paging dataset, but devices with paging datasets have not been allowed.

Action: Either remove the device from the consistency group definition, specify the PAGEDEV_ALLOWED=YES, or move the paging dataset to another device.

CGRP306E

INVALID COMMAND OPTION => xx

Cause: The last operator command was issued with an invalid option.

Action: Reissue the operator command with the correct command option.

CGRP307E

CUU xxxx CONTAINS A COUPLE DATA SET

Cause: While CUU xxxx was being verified, a couple dataset was found to be allocated on the volume.

Action: ConGroup currently does not support volumes containing couple datasets. Either remove the CUU from the consistency group definition or relocate the couple dataset to another volume.

CGRP308E

CGRPUTIL ERROR. FC=xxxx, RC=xxxxxxxx, RSN=xxxxxxxx

Cause: Internal error. Depending on the error condition, this message may be preceded by another message containing additional information about the error.

Action: Contact the EMC Customer Support Center for technical assistance.

CGRP309E

NO CONGROUP NAME WAS SUPPLIED

Cause: A parameter to define a consistency group was encountered in the configuration file, but a name for the consistency group was not supplied.

Action: Correct the configuration file parameter that defines the consistency group.

CGRP310E

CONFIG FILE ERROR FOUND ON LINE xxxx

Cause: An error was detected in line xxxx in the configuration file. This message will be preceded by another message containing additional information about the configuration parameter that is in error.

Action: Correct the configuration file parameter.

- CGRP311E** INVALID VALUE FOR DISPLAY_CONGROUP_LISTOPT => xx
Cause: Value xx is not valid for the DISPLAY_CONGROUP_LISTOPT configuration parameter.
Action: Correct the value specified for the DISPLAY_CONGROUP_LISTOPT parameter in the configuration file.
- CGRP312E** INVALID VALUE FOR RESUME_OPTION => xx
Cause: Value xx is not valid for the RESUME_OPTION configuration parameter.
Action: Correct the value specified for the RESUME_OPTION parameter in the configuration file.
- CGRP313E** INVALID VALUE FOR REMSPLIT_OPTION => xx
Cause: Value xx is not valid for the REMSPLIT_OPTION configuration parameter.
Action: Correct the value specified for the REMSPLIT_OPTION parameter in the configuration file.
- CGRP314E** NO REMOTE BCV FOUND FOR xxxx yyyy
Cause: During REMSPLIT processing no BCV was found to be attached to CUU yyyy or DEV# yyyy.
This message will only be issued if the configuration parameter REMSPLIT_OPTION=NOESTERR is in effect.
Action: The processing will continue, but the overall REMSPLIT process will be incomplete.
- CGRP321E** PARAMETER MUST BE SPECIFIED PRIOR TO ANY CONGROUP DEFINITION
Cause: A configuration parameter that must be specified prior to any consistency group definitions was encountered after a consistency group definition.
Action: See message CGRP310E to determine which configuration line was currently being processed and move this line to a position prior to the first consistency group definition in the configuration file.

CGRP349I xxxxxxxx STATE CHANGE FROM yyyy to zzzz

Cause: The auto-verify logic has detected that the state of consistency group xxxxxxxx has changed from yyyy to zzzz. yyyy and zzzz can have the following values:

- ◆ DISABLED — ConGroup is disabled.
- ◆ ENABLED/ACTIVE — ConGroup is enabled and the data from the primary side is being synchronized to the secondary side.
- ◆ ENABLED/SUSPENDED — ConGroup is enabled, but the data from the primary to the secondary side has been disabled.
- ◆ UNKNOWN — The devices in the consistency group are not in a consistent state (i.e. some may be ENABLED/ACTIVE, with others are ENABLED/SUPENDED, etc.)

Action: A state change may or may not represent an error. See the preceding messages to determine if the state change was considered to be an error by the ConGroup.

CGRP351E PARM MUST BE SPECIFIED BEFORE OTHER PARMS => parm

Cause: The parm parameter must be one of the first parameters defined in the configuration file.

Action: Correct the configuration file.

CGRP352E INTERNAL CALL FAILED. RC=xxxxxxx, RSN=yyyyyyy, ID=zz

Cause: An internal error was encountered.

Action: Contact the EMC Customer Service Center for technical assistance.

CGRP361E 'CGRP361E RE-ARM OF CUU XXXX FAILED'

Cause: Resume failed for an individual R1 that supports concurrent RDF pair or R2s. This re-arm action is taken when the unprotected leg of a concurrent pair trips and CONSISTENT_LINK_TRIP=YES has been specified.

CONSISTENT_LINK_TRIP only applies to Engenuity 5x68 and below. CONSISTENT_LINK_TRIP defaults to NO. NO causes a consistency group to trip if either leg of a concurrent pair trips (this is consistent with older versions of ConGroup that did not have the SYMGROUP parameter).

YES tells ConGroup to examine the mirror that tripped to see if it was intended (by use of the SYMGROUP parameter) to be protected or not. If not, the device is rearmed and the trip is aborted. In Enginuity 5x69 and above, ConGroup actually arms by mirror, so it is impossible for an unprotected mirror to trip and therefore the parameter does not apply.

Action: Determine cause of rearm failure and correct.

CGRP362E 'CGRP362E FAILURE WHILE GETTING DEVICE STATUS FOR CU*

Cause: Device status information could not be obtained for device with trip indication. The trip continues.

Action: None.

CGRP363E 'CGRP363E INVALID VALUE SUPPLIED FOR CONSISTENT_LINK*

Cause: YES or NO was not coded for CONSISTENT_LINK_TRIP.

Action: Specify YES or NO

CGRP364W 'CGRP364W INVALID OPTION FOR DISPLAY ENVIRONMENT COM*

Cause: A superfluous option was specified on an DIS ENV command. It is ignored.

Action: None

CGRP368W SEMISYNC ALLOWED (SEE PRODUCT GUIDE FOR USAGE CONSIDERATIONS)

Cause: SEMISYNC_ALLOWED was specified in the parameter file.

Action: See SEMISYNC_ALLOWED on page 4-28 for usage considerations.

CGRP369E SUSPEND_FAILURE=WTOR IS ONLY VALID WHEN RUNNING SUB=MSTR

Cause: SUSPEND_FAILURE=WTOR was coded in the configuration file, but the ConGroup address space is not running under the Master subsystem.

Action: Either change the value of the SUSPEND_FAILURE parameter or restart the ConGroup address space as a started task using SUB=MSTR.

- CGRP370W** PAGEDEV_ALLOWED (SEE PRODUCT GUIDE FOR USAGE CONSIDERATIONS)
Cause: PAGEDEV_ALLOWED was specified in the parameter file.
Action: See PAGEDEV_ALLOWED on page 4-24 for usage considerations.
- CGRP371W** COUPLEDSD_ALLOWED (SEE PRODUCT GUIDE FOR USAGE CONSIDERATIONS)
Cause: COUPLEDSD_ALLOWED was specified in the parameter file.
Action: See COUPLEDSD_ALLOWED on page 4-20 for usage considerations.
- CGRP372W** NOT RUNNING UNDER MASTER SUBSYSTEM
Cause: The current job is not running under the master subsystem.
Action: Restart the ConGroup address space as a started task using SUB=MSTR.
- CGRP373E** 'CGRP373E Error loading config array'
Cause: Internal error during config processing.
Action: Consult the SYSLOG and JOB log for errors. If you cannot use this information to correct the problem, contact the EMC Customer Support Center for technical assistance. Make sure you have all relevant job documentation.
- CGRP374E** 'CGRP374E Error reading config array'
Cause: Internal error during config processing.
Action: Consult the SYSLOG and JOB log for errors. If you cannot use this information to correct the problem, contact the EMC Customer Support Center for technical assistance. Make sure you have all relevant job documentation.
- CGRP375E** Error in CAX= statement
Cause: Syntax error in CAX statement.
Action: Review statement and correct CAX syntax.

CGRP376E No matching CASOPTS statement found. ConGroup will not start.

Cause: A CAX statement did not have a matching CAXOPTS statement anywhere in the configuration file.

Action: Review statement and correct CAX syntax.

CGRP378I Congroup xxxxxxxx swapping
CGRP378I Congroup xxxxxxxx swap locally complete
CGRP378I Congroup xxxxxxxx swap globally complete

Cause: Progressive state of the swap process. "Swapping" means that S/DAS has begun swapping, but has not yet quiesced all R1 IO on the local system for this congroup. "Swapping locally complete" means that all local IO has been quiesced. "Swap globally complete" means that R1 IO for this congroup has been quiesced on all participating LPARs.

Action: None.

CGRP379E SEMISYNC toleration and SDAS protection are incompatible

Cause: Semisync cannot be specified for an S/DAS protected congroup. Congroup will not start.

Action: None.

CGRP380E CAX feature key missing or not authorized

Cause: The CAX feature key is not authorized or is missing. ConGroup fails to initialize.

Action: Specify a valid CAX authorization key in SCF and restart ConGroup.

CGRP381E Congroup xxxxxxxx includes at least one SRDFA device.

Cause: An SRDFA device was encountered in the consistency group. The enable process fails

Action: Remove all SRDFA devices from the consistency group and enable again.

CGRP382E 'CGRP382E SRDFA IS ACTIVE FOR CUU XXXX'

Cause: SRDFA devices not allowed in a consistency group.

Action: Remove SRDFA devices from the consistency group.

CGRP500E

CONGROUP XXXXXXXX HAS BEEN SWAPPED

Cause: One of the following operator commands was issued (and denied) because the consistency group has been swapped: RESUME, RESET, ENABLE, DISABLE, REMSPLIT, VERIFY.

This message will be followed by a message detailing which command was rejected.

Action: Consult the message that follows CGRP500E.

CGRP504E

CONGROUP XXXXXXXX SWAP STATE INVALID FOR FORCE

Cause: An ENABLE congroup FORCE command was issued against a consistency group that was not swapped.

Action: The FORCE option will only work after a complete swap and a subsequent swap back of all the devices to their original R1s. Do not use FORCE in this situation.

CGRP505E

CONGROUP XXXXXXXX At least one device remains swapped.

Cause: The ENABLE congroup FORCE command was issued against a previously swapped congroup that has not been fully swapped back to its original configuration.

Action: None.

CGRP506E

CUU XXXX is swapped - cannot enable group

Cause: The displayed device remains in a swapped state. It must be swapped back before the ENABLE FORCE will work.

Action: Do not specify FORCE before the swap is complete.

CGRP507I

Queued WTOs delayed by nn.nn seconds due to high UCBLEVEL and non-MSTR execution

Cause: This message appears after a SUSPEND is complete and UCBLEVELs are lowered. Then all queued WTOs (queued during the SUSPEND process) are issued. Because of this, all such messages appear to be issued simultaneously, when in fact they may have been issued throughout the nn.nn delay time period. The time interval in the message is an accurate measure of how long the trip took.

Action: None.

- CGRP508E** Define SDAS Group xxxxxxxx failed: rrrr,ssss
Cause: The CAX group define failed. rrrr,ssss are the return code and reason code from CSC.
Action: None.
- CGRP508I** CG xxxxxxxx has been created by owner.
Cause: A consistency group has been created by the owner.
Action: None.
- CGRP509E** SDAS Define call for xxxxxxxx failed. CSC
R15=rrrr,R0=ssss
Cause: An error occurred executing the CSC signal call to ConGroup AutoSwap Extension.
Action: Contact the EMC Customer Support Center for technical assistance.
- CGRP509I** CG xxxxxxxx has been deleted by owner.
Cause: A consistency group has been deleted by the owner.
Action: None.
- CGRP512I** SDAS Group already exists: xxxxxxxx
Cause: The named group already exists, but an attempt is being made to create the consistency group. This should not occur. Please notify EMC personnel.
Action: Consult the SYSLOG and JOB log for errors. If you cannot use this information to correct the problem, contact the EMC Customer Support Center for technical assistance. Make sure you have all relevant job documentation.
- CGRP513I** Successfully deleted SDAS Group xxxxxxxx
Cause: Whenever a consistency group is disabled, the associated S/DAS group is deleted.
Action: None.
- CGRP514I** Delete SDAS Group xxxxxxxx failed: rrrr,ssss
Cause: The CAX group delete failed. rrrr,ssss are the return code and reason code from CSC.

Action: None.

CGRP515E

SDAS Delete call for xxxxxxxx failed. CSC
R15=rrrr,R0=ssss

Cause: An error occurred executing the CSC signal call to the underlying component S/DAS. rrrr and ssss are the return code and reason code, respectively.

Action: Review the return and reason codes and take the appropriate action.

CGRP516W

SDAS is not available for group delete

Cause: An attempt to delete an CAX group failed. Most likely this occurred because S/DAS terminated after the group was successfully defined.

Action: None.

CGRP517I

Successfully validated SDAS Group xxxxxxxx

Cause: After all the R1 devices in the consistency group have been added, an S/DAS validate request is issued. This message is issued if all devices validate successfully. Successful validation means that all the devices are eligible for swap.

Action: None.

CGRP518E

Validate SDAS Group xxxxxxxx failed: rrrr,ssss

Cause: The validate failed with return code and reason code.

Action: Review the return and reason codes and take the appropriate action.

CGRP520I

Adding Symm ssssssssssss devices to SDAS group
xxxxxxx

Cause: This message indicates the start of the process of adding ranges of devices to controller ssssssssssss to congroup xxxxxxxx.

Action: None.

CGRP521I

Symm devs ssss-eeee on RDF group xx added

Cause: A contiguous range of R1 devices starting with symmdev ssss and ending with symmdev eeee has been added to the group named in message CGRP520I. The matching R2s are automatically determined by S/DAS based on the RDF group number xx.

Action: None.

CGRP522E

SDAS Addrang call for xxxxxxxx failed. CSC
R15=rrrr,R0=ssss

Cause: A call to add a range of devices failed with return and reason codes.

Action: Review the return and reason codes and take the appropriate action.

CGRP523E

Devs ssss-eeee,RDF=xx[,yy] rr,ss

Cause: Symm devices ssss through eeee were not added. The RDF group xx is the one that was passed to the underlying component, S/DAS, on the ADDRANGE call. If yy is shown in the message, it appears for reference only (as the other of two concurrent RDF groups). rr and ss are the CSC return and reason code.

Action: Review the return and reason codes and take the appropriate action.

CGRP524E

CSC Request timeout

Cause: Processing by the underlying component, S/DAS, was delayed beyond the cross system timeout threshold. The owner host did not respond in this period of time.

Action: Examine the S/DAS log on the owner host to determine the reason for the delay failure. If this occurs often then the value for CrossSystemTimeout may need to be increased in the CAXOPTS.

If the reason for the failure cannot be determined, contact the EMC Customer Support Center for technical assistance. Make sure you have the SYSLOG, the JOB log, and any other relevant job documentation.

CGRP525E

CSC has no access to controller

Cause: Congroup is attempting to access the underlying component S/DAS using the EMCSCF Cross System Communication (CFC) component. However, CSC is not active on the controller. This can occur if EMCSCF has been started with an EXCLUDE list of all Symmetrix devices, or the CSC has not been activated. This message can occur when Congroup has been initialized before or during the startup of EMCSCF.

Action: Check to see if EMCSCF and the CSC is active. The CSC can be verified using the EMCSCF command `CSC,DISPLAY,HOSTS` command. If it is active then check to see if there are any additional messages produced by EMCSCF to describe the reason for the failure.

For further information on EMCSCF refer to the EMC ResourcePak Base documentation.

If the failure cannot be determined, contact the EMC Customer Support Center for technical assistance. Make sure you have the SYSLOG, the JOB log, and any other relevant job documentation.

CGRP526E

CSC host not registered

Cause: Congroup is attempting to access S/DAS using the EMCSCF Cross System Communication component. However, the CSC is not active on the current host. This can occur if EMCSCF has been started with an EXCLUDE list of all symmetrix devices, or the CSC has not been activated. This message can occur when Congroup has been initialized before or during the startup of EMCSCF.

Action: Check to see if EMCSCF and the CSC is active. The CSC can be verified using the EMCSCF command `CSC,DISPLAY,HOSTS` command. If it is active then check to see if there are any additional messages produced by EMCSCF to describe the reason for the failure.

More Information: Refer to the *EMC ResourcePak Base Product Guide* for a description of EMCSCF.

If the failure cannot be determined then contact the EMC Customer Support Center for technical assistance.

CGRP527I

CG xxxxxxxx Trip detected after SDAS swap.

Cause: A trip condition was detected after a completed swap. The condition is ignored. This is most likely to occur after a manual swap back, but before the group is re-enabled.

Action: None.

CGRP528I

CG xxxxxxxx Old:cccc,ssss' New:cccc,ssss

Cause: Trace message indicating old and new values for the congroup-S/DAS lock.

Action: Can be turned with DEBUG.

- CGRP529W** CG xxxxxxxx Backing out trip processing
- Cause:** A trip process began after a swap process began but before the swap process completed. The trip process waited until the swap process completed and then backed out. If the swap fails to reach a globally quiesced state, the trip will continue normally.
- Action:** None.
- CGRP530I** CG xxxxxxxx HAS BEEN DISABLED DUE TO SWAP
- Cause:** The consistency group has been auto-swapped. Congroup sets the status of the group to disabled, even though the original R1s (now swapped to the R2s) still have the consistency group-enabled attribute at the device level on the controller.
- Action:** None.
- CGRP531W** CG xxxxxxxx trip waiting pending SDAS action
- Cause:** A trip has begun, but is stalled waiting for the completion or failure of an in-process swap.
- Action:** None.
- CGRP601E** ConGroup is busy, request rejected.
- Cause:** ConGroup is busy performing some other action. The action you requested is excluded until the previous action completes.
- Action:** Try your action at some time after the current action completes.
- CGRP602I** Moveowner/Takeover started
- Cause:** A MOVEOWNER or TAKEOVER command has been issued by a ConGroup instance on another LPAR. This message is generated to inform other participating ConGroup instances.
- Action:** None.
- CGRP604I** ConGroup takeover has begun.
- Cause:** An operator has issued a TAKEOVER command.
- Action:** None.
- CGRP605I** ConGroup moveowner has begun.
- Cause:** An operator has issued a MOVEOWNER command.

Action: None.

CGRP606I Moveowner Takeover has completed. <To match, should have a slash between commands>

Cause: A MOVEROWNER or TAKEOVER command issued by a ConGroup instance has completed. This message is generated to inform other participating ConGroup instances.

Action: None.

CGRP607I Global Refresh started

Cause: A REFRESH command issued by a ConGroup instance has started. This message is generated to inform other participating ConGroup instances.

Action: None.

CGRP608I Global Enable started

Cause: An ENABLE command issued by a ConGroup instance has started. This message is generated to inform other participating ConGroup instances.

Action: None.

CGRP609I Global Enable Complete

Cause: An ENABLE command issued by a ConGroup instance has completed. This message is generated to inform other participating ConGroup instances.

Action: None.

CGRP998E OWNERID missing from CAXOPTS name

Cause: The CAX options set name does not include the owner ID.

Action: Review the syntax and correct the options set specification.

More Information: Refer to *CAXOPTS* on page 4-14.

CGRSnnnC

message text

Where:

CGRS

The four-character prefix for messages generated by SWAP services used by ConGroup AutoSwap.

nnn

Number of the message.

C

Class of the message.

message text

Text of the message.

You can find an explanation of these messages, their causes and any actions you can take in the *EMC Common SWAP Services Message and Code Guide*.

The *EMC Common SWAP Services Messages and Code Guide* lists these messages with the prefix substitute *pref*. Therefore, to find a SWAP services message generated through ConGroup in the *EMC Common SWAP Services Messages and Code Guide*, you look up the message by number and class. For example, to find:

CGRS014E

you look up:

*pref*014E

More Information: Refer to *Message Prefixes* in Chapter 1 of the *EMC Common SWAP Services Message and Code Guide*.

Problem Diagnosis

This appendix discusses the diagnostic facilities available to ConGroup users. The topic is:

- ◆ ConGroup Diagnostic Facilities B-2

ConGroup Diagnostic Facilities

ConGroup uses the following diagnostic facilities available through ConGroup and the operating system:

- ◆ Diagnostic messages,
- ◆ z/OS dump services,
- ◆ z/OS GTF tracing service,
- ◆ z/OS logrec (EREP) data.

Where a condition occurs that prevents continued operation, ConGroup takes the following steps:

- ◆ Suspends processing
- ◆ Generates a symptom record in the logrec dataset

If an ABEND is associated with the error, ConGroup formats VRA data and creates a logrec record.

To facilitate problem diagnosis, please retain the logrec software EREP records for EMC Customer Support. You can format the software records using the following JCL. The example assumes that SYS1.LOGREC is being used.

```
//STEP1    EXEC  PGM=IFCEREP1 , PARM='CARD'
//EREPPPT  DD   SYSOUT=*
//TOURIST  DD   SYSOUT=*
//SERLOG   DD   DSN=SYS1.LOGREC , DISP=SHR
//ACCDEV   DD   DUMMY
//SYSIN    DD   *
PRINT=PS
HIST=N
TYPE=S
ENDPARM
```

More Information: Refer to the IBM publication, *EREP Reference*.

Enhancements

This appendix provides a comprehensive list of Consistency Group enhancements. The topic is:

- ◆ Enhancements by Release C-2

Enhancements by Release

Table C-1 lists Consistency Group enhancements by release:

Table C-1 Consistency Group for z/OS Enhancements

Release	Enhancements
6.1.0	The EMC ConGroup utility adds the MOVEOWNER and TAKEOVER operator commands. Both commands allow you to transfer the default ownership of a consistency group from one LPAR to another without the need to reinitialize the task manually.
	ConGroup uses ,by default, a new multi-LPAR mode. Multi-LPAR mode implements a new coordination process based on CSC that is designed to allow the ENABLE, REFRESH, and RESUME operator commands to execute through all ConGroup instances that monitor the same consistency groups and use the same CSC listener ports. If CAX operations are underway, the MOVEOWNER and TAKEOVER operator commands are also executed through all ConGroup instances that monitor the same consistency group and use the same CSC listener ports. Note that you can also set the MODE=SINGLE global configuration parameter to run ConGroup as you have in the past, in single-LPAR mode without cross-LPAR communication.
6.0.0	EMC ConGroup utility supports Symmetrix storage subsystems that are at microcode revision level 5x69 as well as the prior levels. The ConGroup utility now includes support for the ConGroup AutoSwap Extension. To use ConGroup AutoSwap, you must obtain a license key from EMC. The ConGroup AutoSwap Extension option adds protection for many types of failures that can occur on the front-end of SRDF. The ConGroup AutoSwap Extension option allows you to make non-disruptive switches from the primary to target volumes. As part of ConGroup AutoSwap Extension, ConGroup adds a new configuration parameter, CAX. The CAX configuration parameter specifies: • Whether you want to activate the ConGroup AutoSwap Extension for a device swap group • The name of the CAX options set you want to use for that group Also as part of ConGroup AutoSwap Extension, ConGroup also adds another new configuration parameter, CAXOPTS. The CAXOPTS parameter defines the desired CAX options for an options set name.

Table C-1 Consistency Group for z/OS Enhancements (continued)

Release	Enhancements
5.1.0	Host based PPRC emulation has been removed from ConGroup V5.1.0. This functionality is now provided directly by Symmetrix at Enginuity 5568 and higher. The emulation layer delivered with ConGroup was only provided for GDPS and P/DAS environments and is no longer needed with the availability of native Symmetrix support for PPRC.
	ConGroup now periodically interrogates the state of the consistency group to verify the configuration.
	The DISPLAY CONGROUP operator command has been extended to include both a LIST and a NOLIST option. A new start up parameter, DISPLAY_CONGROUP_LISTOPT, has also been added to allow the user to specify which of these options is a default.
	The DISPLAY CONGROUP operator command has been enhanced to add a RESET parameter. This parameter causes the state of the consistency group to be reset by interrogating the state of all the devices in the consistency group.
	A new startup parameter, REMSPLIT_OPTION=NOESTERR, has been added to generate an error message during REMSPLIT processing if an R2 device is found to have no attached BCV.
	A new start parameter, RESUME_OPTION=NOTRNMSG, has been added to allow the user to suppress the transient error messages that the resume processing will resolve, such as TNR.
5.0.0	Support added for R1 R2 Swap.
	Support added for Dynamic COM-PAV devices in a consistency group.
	Allow Semi-Sync SRDF within a Consistency Group definition.
	Support of EMC Symmetrix Control Facility (EMCSCF).
	Recognition of Sysplex related Couple Datasets. This includes the following Couple Dataset types: Sysplex (XCF), Coupling Facility Resource Manager (CFRM), System Logger (LOGR), Workload Manager (WLM), Automatic Restart Manager (ARM), and Sysplex Failure Manager (SFM).
	Security on commands based on authority granted by SAF compliant security packages.
4.0.0	Support added for Concurrent SRDF configurations. The SYMGROUP parameter defines the RDF group that must have consistency maintained.
	Support added for Switched SRDF configurations.
	Support added for static COMPAV devices in a Consistency Group.
	Support added to split an attached and synchronized BCV from a STD device defined to the consistency group with the DEVICE_LIST_STD parameter when the group cannot propagate data to the target devices. STD devices can only be defined for SRDF ConGroups. STD devices are not supported in either PPRC or R1_R0 ConGroups.

Table C-1 Consistency Group for z/OS Enhancements (continued)

Release	Enhancements
3.3.1	SRDF_CONGROUP replaces the CONGROUP functionality provided in Consistency Group for MVS Version 3.2.1.
	PPRC_CONGROUP and R1_RO_CONGROUP provide new functionality.
	The product guide includes a new topic in Chapter 6, <i>Operator Commands</i> , to assist with implementing ConGroup in a data base environment.
	The ConGroup task startup and ENABLE process now reports all devices (at once) that are in error in a ConGroup definition to speed up error diagnosis.
	A new remote SPLIT command (REMSPLIT) that will SPLIT the BCV devices from the R2 devices that are part of a R1-R2 pair in an SRDF Consistency Group.
	A new VERIFY command that will test a ConGroup definition without enabling it, to assist with defining consistency groups.
	A new REFRESH command to dynamically update an existing CONGROUP without having to stop the ConGroup task.
	A new AUTO_REFRESH feature monitors OS/390 and z/OS VARY ONLINE processing to detect and include new volumes into active consistency groups.
	A new CANCEL command that provides the ability to cancel long running ConGroup RESUME, SUSPEND and REMSPLIT processing without stopping the ConGroup task and impacting other active consistency groups.
	A new NOLIST parameter for the DISPLAY CONGROUP command that suppresses the active volume list when checking the status of a consistency group.
	A new QUERY alias for the DISPLAY command.
	A new RESUME_INTERVAL configuration statement to define the interval between message CGRP022I reporting resume processing status.
	Support for Symmetrix configurations containing <i>floating mirrors</i> .

Customer Support

This appendix reviews the EMC process for detecting and resolving software problems, and provides essential questions that you should answer before contacting the EMC Customer Support Center. Topics include:

- ◆ Overview of Detecting and Resolving Problems D-2
- ◆ Troubleshooting the Problem D-3
- ◆ Before Calling the Customer Support Center D-4
- ◆ Documenting the Problem D-5
- ◆ Reporting a New Problem D-6
- ◆ Sending Problem Documentation D-7

Overview of Detecting and Resolving Problems

EMC software products are supported directly by the EMC Customer Support Center in the United States.

EMC uses the following process to resolve customer problems with its software products (Figure D-1).

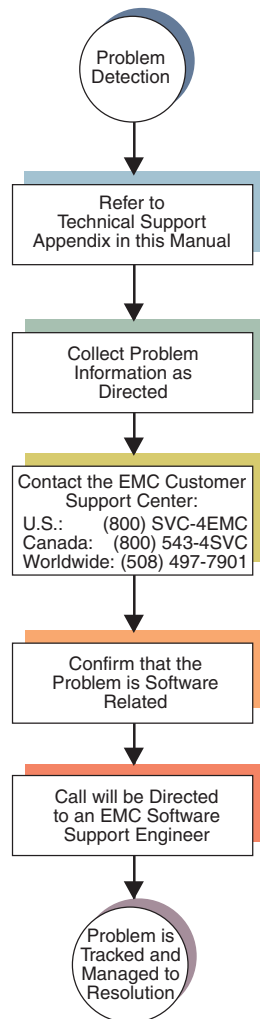


Figure D-1 Problem Detection and Resolution Process

Troubleshooting the Problem

Please perform the relevant diagnostic steps before you contact the EMC Customer Support Center:

1. Read the documentation carefully.
2. Reconstruct the events leading up to the problem and describe them in writing.
3. Run some test cases to reproduce the problem.

If you encounter a problem that requires technical programming or analysis, call the nearest EMC office or contact the EMC Customer Support Center at one of the following numbers:

United States: **(800) 782-4362 (SVC-4EMC)**

Canada: **(800) 543-4782 (543-4SVC)**

Worldwide: **(508) 497-7901**

Important: Please do not request a specific support representative unless one has already been assigned to your particular system problem.

Before Calling the Customer Support Center

Have the following information available before calling the Customer Support Center or your support representative (if one has been assigned to you):

- ☐ Your company name
- ☐ Your name
- ☐ Your phone number
- ☐ For an existing problem, the problem tracking system ID, if one was previously assigned to the problem by a support representative
- ☐ For an MVS problem, the JESLOG, SYSPRINT, all STDOUT DD members of the server job output and similar output for the client, and the relevant portion of the SYSLOG

Documenting the Problem

If the EMC Customer Support Center requests information regarding the problem, please document it completely, making sure to include the following information:

- ☐ Your company name and address
- ☐ Your name
- ☐ Your telephone number
- ☐ The importance of the problem, so that it can be assigned a priority level

To expedite the processing of your support request, you can photocopy this list and include it with the package.

Reporting a New Problem

For a new problem, please provide the following information:

- ☐ Release level of the software that you are running
- ☐ Software installation parameters
- ☐ Host type on which you are running
- ☐ Operating system you are running and its release number
- ☐ Functions of the software that you are running
- ☐ Whether you can reproduce the problem
- ☐ Previous occurrences of the problem
- ☐ Whether the software has ever worked correctly
- ☐ Time period that the software did work properly
- ☐ Conditions under which the software worked properly
- ☐ Changes to your system between the time the software worked properly and the problem began
- ☐ Exact sequence of events that led to the system error
- ☐ Message numbers and complete text of any messages that the system produced
- ☐ Log file dated near the time the error occurred
- ☐ Results from tests that you have run
- ☐ Other related system output
- ☐ Other information that may help solve the problem

Sending Problem Documentation

Use one of the following methods to send documentation of the problem to the EMC Customer Support Center:

- ◆ E-mail
- ◆ FTP
- ◆ U.S. Mail to the following address:

EMC Customer Support Center
171 South Street
Hopkinton, MA 01748-2208

If the problem was assigned a number or a specific support representative, please include that information in the address as well.

This glossary contains terms related to the ConGroup. Many of these terms are used in this manual.

A

adapter

Card that provides the physical interface between the director and disk devices (dual-initiator) or director and SCSI host channels (SCSI adapter).

adaptive copy - disk mode (AD)

An SRDF mode of operation that stores new data for a remotely mirrored pair on the source volume of that pair as invalid tracks until it can be successfully transferred to the target volume. A “skew” parameter associated with this mode indicates the maximum number of tracks that can be out of synchronization between the two volumes at any given time.

This skew parameter value is set at the device level in Symmetrix units at microcode level 5061 and later and can range from 1 to 65,535 (decimal). In Symmetrix units at microcode level 5060, this skew parameter value is set at the controller level and is the same for all remotely mirrored pairs configured for the Adaptive Copy mode. This skew value can range from 1 to 999,999 (decimal).

adaptive copy - write pending mode (AW)

An SRDF mode of operation that stores new data for a remotely mirrored pair in the cache of the local Symmetrix unit until it can be successfully written to both the source and target volumes.

A “skew” parameter associated with this mode determines the maximum number of write pendings that can exist for a remotely mirrored pair. (There is a skew value for each remotely mirrored pair configured for the Adaptive Copy mode in Symmetrix units at microcode level 5061 and later.) This skew parameter is set at the device level and can range from 1 to 65,535 (decimal).

B**backplane**

Card that accommodates the director, cache, and adapter cards.

business continuance volume (BCV)

A standard Symmetrix device with special attributes that allow it to independently support applications and processes, such as backup operations, restore operations, Decision Support operations, and application testing. BCV devices are available through the *EMC TimeFinder* software.

C**cache**

Random access electronic storage used to retain frequently used data from disk for faster access by the channel.

channel director

The component in the Symmetrix subsystem that interfaces between the host channels and data storage. It transfers data between the channel and cache.

command descriptor block (CDB)

The structure used to communicate commands from an initiator to a target. This structure may be 6 bytes, 10 bytes, or 12 bytes in size.

concurrent RDF

The ability for a single primary volume to be remotely mirrored to two secondary volumes concurrently. Concurrent RDF requires that each secondary volume operate in the same primary mode, either both synchronous or both semi-synchronous, but allows either (or both) volumes to be placed into adaptive copy mode.

controller ID

Controller identification number of the director the disks are channeled to for EREP usage. There is only one controller ID for Symmetrix.

count-key-data (CKD) A data recording format employing self-defining record formats in which each record is represented by a count area that identifies the record and specifies its format, an optional key area that may be used to identify the data area contents, and a data area that contains the user data for the record. CKD can also refer to a set of channel commands that are accepted by a device that employs the CKD recording format.

D

DBMS Data base Management System.

delayed fast write There is no room in cache for the data presented by the write operation. Therefore, the write is delayed until there is room in cache.

destage The asynchronous write of new or updated data from cache to disk device.

dependent write A dependent write is a write that will not be issued by an application unless some prior I/O operation has completed.

device A uniquely addressable part of the Symmetrix subsystem that consists of a set of access arms, the associated disk surfaces, and the electronic circuitry required to locate, read, and write data.

device address The hexadecimal value that uniquely defines a physical I/O device on a channel path in an z/OS environment.

device form factor Refers to the physical size and shape of a device. Example: The 36 GB disk device is in a 3.5-inch disk device.

device number The value that logically identifies a disk device in a string.

diagnostics System level tests or firmware designed to inspect, detect, and correct failing components. These tests are comprehensive and self-invoking.

disk director The component in the Symmetrix subsystem that interfaces between cache and the disk devices.

domino attribute	An optional feature for source volumes. When enabled, this feature causes a source volume to become not ready to its host and all I/O activity ceases with that volume if the target volume fails or a link failure occurs. When the fault condition is corrected, the user must manually make the source volume ready. This feature ensures that a remotely mirrored pair is always synchronized.
dual initiator	A Symmetrix feature that automatically creates a backup data path to the disk devices serviced directly by a disk director, if that disk director or the disk management hardware for those devices fails.
dynamic path reconnect (DPR)	A function that allows disconnected I/O operations with Symmetrix to reconnect over any available channel path rather than be limited to the one on which the I/O operation was started. This function is available only on System 370/XA, System 370/ESA, and System 390/ESA systems.
dynamic sparing	A Symmetrix feature that automatically transfers data from a failing disk device to an available spare disk device without affecting data availability. This feature supports all devices in the Symmetrix subsystem.

E

EMIF	ESCON Multiple Image Facility. Allows sharing of ESCON channels among logical partitions (LPAR).
Enginuity	Enginuity is the operating environment for EMCs Symmetrix Enterprise Storage Platforms. Enginuity provides functional services for both its host Symmetrix systems as well as for a large suite of EMC Storage Application software.
EPO	Emergency Power Off.
Error Verification	The process of reading, checking the error correction bits, and writing corrected data back to the source.
ESA	Enterprise System Architecture (mainframe systems only).
ESCON	Enterprise Systems Connection.

F

fast write In Symmetrix, a write operation at cache speed that does not require immediate transfer of data to disk. The data is written directly to cache and is available for later destaging.

FBA Fixed Block Architecture. Disk device data storage format using fixed size data blocks.

FDRSOS Fast Dump Restore Safeguard Open Storage. FDRSOS is a storage management software option that provides high speed, full volume backup and restore of open systems volumes to mainframe tape or disk storage. FDRSOS runs under MVS XA, ESA, and z/OS operating systems with a Symmetrix system.

FICON Fibre CONnectivity. FICON is a new protocol that enables ESCON traffic to move over Fibre Channel connections.

frame Data packet format in an ESCON environment.

G

gigabyte (GB) 10^9 bytes.

H

head and disk assembly (HDA) A field replaceable unit in the Symmetrix subsystem containing the disk and actuator.

home address (HA) The first field on a CKD track that identifies the track and defines its operational status. The home address is written after the index point on each track.

hyper-volume extension The ability to define more than one logical volume on a single physical disk device making use of its full formatted capacity. These logical volumes are user-selectable in size. The minimum volume size is one cylinder and the maximum size depends on the disk device capacity and the emulation mode selected.

I

ICDA	Integrated Cached Disk Array.
identifier (ID)	A sequence of bits or characters that identifies a program, device, controller, or system.
IML	Initial microcode program loading.
index marker	Indicates the physical beginning and end of a track.
index point	The reference point on a disk surface that determines the start of a track.
intersecting consistency groups	Two or more consistency groups that contain common devices.
invalid track	An invalid track occurs when data is written to a disk track, and that data is not yet reflected on the partner device. The track on the partner device is said to be invalid. In the normal case where the source (R1) and target (R2) volumes are in communication and staying in synch, the updated track will be passed to the target device and once it is written there is no longer invalid. If the source and target devices are not in communication for some reason, for instance, if the RDF links are disabled, the invalid tracks will build up over time. The R1 invalid track count can also be built up if the source (R1) volume is not ready to the host while the link is operational and data is being written to the source (R1) volume. Invalid tracks for the source (R1) volume may also be generated during R2 Read/Write testing. These may be cleared using the procedures outlined in SRDF recovery procedures provided in the SRDF Host Component product guide.
invalid tracks attribute	An attribute for target volumes. This attribute, when enabled, informs the host if a target volume did not complete synchronization with its source volume at the time of a second link failure.
I/O device	An addressable input/output unit, such as a disk device.

K

kilobyte (K) 1024 bytes.

L

link path A single ESCON Light Emitting Diode (LED) fiber optic connection between the two Symmetrix units. A minimum of two to a maximum of eight links can exist between the two units.

local volume A Symmetrix logical volume that is not participating in SRDF operations. All CPUs attached to the Symmetrix may access it for read/write operations. It is available for local mirroring or dynamic sparing operations to the Symmetrix unit in which it resides only.

logical volume A user-addressable unit of storage. In the Symmetrix subsystem, the user can define multiple logical volumes on a single physical disk device.

logical volume manager (LVM) Host software responsible for management of the disk subsystems. Interaction with the LVM is done via GUI or via stand-alone commands.

long miss Requested data is not in cache and is not in the process of being fetched.

longitude redundancy code (LRC) Exclusive OR (XOR) of the accumulated bytes in the data record.

LPAR Logical Partition or Logical Partitioning Mode. Mainframe system function that allows different operating systems to run concurrently in separate logical partitions.

M

media The disk surface on which data is stored.

megabyte (MB) 10^6 bytes.

MII Machine Initiated Interrupt.

mirroring The Symmetrix maintains two identical copies of a designated volume on separate disks. Each volume automatically updates during a write operation. If one disk device fails, Symmetrix automatically uses the other disk device.

mirrored pair A logical volume comprised of two physical devices with all data recorded twice, once on each device.

P

partitioned data set (PDS) assist An IBM feature for 3990 Model 6 and 3990 Model 3 with Extended Platform units. PDS Assist improves performance on large, heavily-used partitioned data sets by modifying the directory search process.

physical partition (PP) A physical partition is the smallest unit of disk space that can be allocated in a volume group in an AIX environment. Any disk space allocated is an integral number of physical partitions. By default, a PP is 4 MB in size.

primary track The original track on which data is stored.

promotion The process of moving data from a track on the disk device to cache. See also *stage*.

R

RAID-S A Symmetrix feature that provides parity data protection on the disk device-level using physical parity volumes. A RAID-S group consists of 3 data drives and 1 parity drive. The RAID-S option can be also used with Hyper-Volume Extension to establish distributed parity.

R1 See *source volume (R1)*.

R2 See *target volume (R2)*.

RA1 unit In an SRDF configuration, it is the primary data storage subsystem. It initiates many of the SRDF synchronization activities. An SRDF configuration must have at least one RA1 unit and one RA2 unit. See also *RA2 unit*.

RA2 unit	In an SRDF configuration, this subsystem maintains synchronization with the volumes it is paired with in the RA1 unit. It can serve as an RA1 unit during disaster recovery. An SRDF configuration must have at least one RA1 unit and one RA2 unit. See also <i>RA1 unit</i> .
RAID	Redundant Array of Independent Disks
read hit	Data requested by the read operation is in cache.
read miss	Data requested by the read operation is not in cache.
reconnect	The function that occurs when a target selects an initiator to continue an operation after a disconnect.
reconnection	A reconnection exists from the assertion of the BSY signal in a RESELECTION phase until the next BUS FREE phase occurs. A reconnection can only occur between a target and an initiator.
record zero	The first record after the home address.
remote link director (RLD)	Each Symmetrix system requires a minimum of two up to a maximum of eight RLD directors depending on the Symmetrix model in use. Each RLD manages two ESCON fiber link connections. Each RLD can perform a single I/O at a time to its paired RLD in the remote Symmetrix unit.
reselect	The function that occurs when a target disconnects from an initiator in order to perform a time-consuming function and, then after performing that function, re-establishes the connection.
rolling disaster	A rolling disaster is a series of events that lead up to a complete disaster. For example, the loss of a communication link occurs prior to a site failure.
S	
SAF	Security Access Facility
semi-synchronous mode	An SRDF mode of operation that provides an asynchronous mode of operation. Applications are notified that an I/O (or I/O chain) is complete once the data is in the cache of the RA1 Symmetrix unit. Any new data is then written to cache in the RA2 Symmetrix unit. The RA2 Symmetrix unit acknowledges receipt of the data once it is secure in its cache. If source tracks are pending transfer to a target

	volume, and a second write is attempted to the source, Symmetrix will disconnect (non-immediate retry request), and wait for the pending track to transfer to the RA2 Symmetrix unit.
serial channel	ESCON channel (mainframe hosts).
short miss	Requested data is not in cache, but is in the process of being fetched.
source volume (R1)	A Symmetrix logical volume that is participating in SRDF operations. It resides in the “local” Symmetrix unit. All CPUs attached to the Symmetrix may access a source volume for read/write operations. All writes to this volume are mirrored to a “remote” Symmetrix unit. A source volume is not available for local mirroring operations.
SRDF	Symmetrix Remote Data Facility. SRDF consists of the microcode and hardware required to support Symmetrix remote mirroring.
SSID	Subsystem ID. For 3990 storage control emulations, this value identifies the physical components of a logical DASD subsystem. The SSID must be a unique number in the host system. It should be an even number and start on a zero boundary.
stage	The process of writing data from a disk device to cache. See also <i>promotion, destage</i> .
storage control	The component in the Symmetrix subsystem that connects Symmetrix to the host channels. It performs channel commands and communicates with the disk adapters and cache. See also <i>channel director</i> .
storage control unit (SCU)	The component in the Symmetrix subsystem that connects Symmetrix to the host channels. It performs channel commands and communicates with the disk directors and cache.
string	A series of connected disk devices sharing the same disk director.
striping	The process of segmenting logically sequential data and writing the segments to multiple physical disk devices.
synchronous transmission	A timing protocol that uses a master clock with a clock period and allowable offset that holds the sending and receiving devices in the desired phase relationship.

synchronous mode An SRDF mode of operation that ensures 100% synchronized mirroring between the two Symmetrix units. This is a synchronous mode of operation. Applications are notified that an I/O (or I/O chain) is complete when the RA2 Symmetrix unit acknowledges that the data has been secured in its cache.

T

target volume (R2) A Symmetrix logical volume that is participating in SRDF operations. It resides in the “remote” Symmetrix unit. It is paired with a source volume in the local Symmetrix unit and receives all write data from its mirrored pair. This volume is not accessed by user applications during normal I/O operations. A target volume is not available for local mirroring or dynamic sparing operations.

TimeFinder Batch Utility TimeFinder Batch Utility is a business continuance solution that makes copies of data on standard Symmetrix devices available on special devices called Business Continuance Volumes (BCVs). The BCV devices are made accessible through a separate device address while the original device(s) remain online to their original host(s). The BCV can then be used by any host for backup or any other operation that requires a copy of an existing data volume.

trip The action ConGroup takes when it detects that one or more R1 devices in a consistency group cannot propagate data to their corresponding secondary (R2) devices. During a trip, ConGroup suspends all the primary (R1) devices in the consistency group. This suspension ensures that:

- ◆ The data flow to the secondary (R2) side is halted.
- ◆ The data on the remote side of the configuration is consistent.

U

unit address The hexadecimal value that uniquely defines a physical I/O device on a channel path in a mainframe environment.

A

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