

DRAFT
EMC CONFIDENTIAL

Symmetrix
SRDF Host Component for z/OS
Version 5.3.0

PRODUCT GUIDE

P/N 300-000-163
A05

EMC Corporation
Corporate Headquarters:
Hopkinton, MA 01748-9103
1-508-435-1000
www.emc.com

Copyright ©2001 - 2004 EMC Corporation. All rights reserved.

Printed December, 2004

EMC believes the information in this publication is accurate as of its publication date. The information is subject to change without notice.

THE INFORMATION IN THIS PUBLICATION IS PROVIDED "AS IS." EMC CORPORATION MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WITH RESPECT TO THE INFORMATION IN THIS PUBLICATION, AND SPECIFICALLY DISCLAIMS IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Use, copying, and distribution of any EMC software described in this publication requires an applicable software license.

Trademark Information

EMC², EMC, Symmetrix, Celerra, CLARiiON, CLARAlert, Documentum, HighRoad, Legato, Navisphere, PowerPath, ResourcePak, SnapView/IP, SRDF, TimeFinder, VisualSAN, and where information lives are registered trademarks and EMC Automated Networked Storage, EMC ControlCenter, EMC Developers Program, EMC OnCourse, EMC Proven, EMC Snap, Access Logix, AutoAdvice, Automated Resource Manager, AutoSwap, AVALONidm, C-Clip, Celerra Replicator, Centera, CentraStar, CLARevent, Connectrix, CopyCross, CopyPoint, DatabaseXtender, Direct Matrix, Direct Matrix Architecture, EDM, E-Lab, Enginuity, FarPoint, FLARE, GeoSpan, InfoMover, MirrorView, NetWin, OnAlert, OpenScale, Powerlink, PowerVolume, RepliCare, SafeLine, SAN Architect, SAN Copy, SAN Manager, SDMS, SnapSure, SnapView, StorageScope, SupportMate, SymmAPI, SymmEnabler, Symmetrix DMX, Universal Data Tone, and VisualSRM are trademarks of EMC Corporation. All other trademarks used herein are the property of their respective owners.

Preface	xvii
----------------------	------

Chapter 1 Product Overview

Introduction to SRDF Host Component	1-2
Product Features	1-3
Automation.....	1-3
Security.....	1-3
ISPF.....	1-3
Multitasking	1-4
Command Queueing.....	1-4
Commands Queued by Queue Name	1-5
Synchronization Direction.....	1-6
Remote Symmetrix Query and Configuration	1-6
Command Completion Status Checking	1-7
Consistency Group Support.....	1-7
Defined Groups.....	1-7
Host Component Batch Utility	1-8
EMC TimeFinder Option	1-9
SRDF Overview	1-10
SRDF Configurations	1-10
SRDF Director Hardware	1-13
SRDF Distance Implementations.....	1-15
SRDF Operational Modes	1-16
SRDF Asynchronous Mode	1-17
Introduction	1-17
Operational Overview	1-18
The Chunk Method	1-19
Ensuring Data Consistency: Dependent Writes.....	1-19
Ensuring Data Consistency: The Cycle Switch Process	1-22

SRDF / A Multi-Session Mode	1-23
SRDF / A Multi-Session: Operational Overview	1-23
Performing a Consistent Cycle Switch	1-24
What's New in Version 5.3	1-25
Multiple SRDF / A Groups per Symmetrix	1-25
Concurrent SRDF / Synchronous with SRDF / Asynchronous.....	1-25
SRDF / A Tunable Cache	1-25
Dynamic SRDF with SRDF / A	1-26
Switching from SRDF / S to SRDF / A Dynamically	1-26
SRDF / Star	1-26

Chapter 2 Installing and Customizing

Overview of Installation	2-2
Preinstallation Steps	2-2
Checking with EMC	2-3
Installing from Powerlink Distribution	2-7
Installing from a Tape	2-8
ResourcePak Base Kit Contents	2-8
Gathering Installation Information	2-9
Installing SRDF Host Component.....	2-11
Integration	2-16
SRDF Host Component Log File	2-16
Setting Up the ISPF Interface Environment	2-19

Chapter 3 SRDF Initialization Parameters

SRDF Host Component Operations.....	3-2
Running Multiple EMCSCF Copies.....	3-2
Initiation and Termination Commands	3-3
Initiating the SRDF Host Component	3-3
Terminating the SRDF Host Component	3-3
Initialization Parameters.....	3-4
ALLOW_CRPAIR_NOCOPY	3-7
ALIAS	3-7
COMMAND_DETAILS	3-8
COMMAND_PREFIX	3-9
EMCMSGX_ON	3-10
EXCLUDE_CUU	3-10
EXCLUDE_DEVICE_RANGE	3-11
EXCLUDE_SYM	3-12
EXCLUDE_VOL	3-13

FBA_ENABLE	3-14
FILTER_KNOWN	3-15
FILTER_ONLINE	3-15
FILTER_R1	3-16
FILTER_R2	3-16
GROUP_END	3-17
GROUP_NAME	3-17
GROUP_SORT_BY_VOLSER	3-18
GROUP_SORT_BY_MVSCUU	3-18
HCLOG	3-18
INCLUDE_CUU	3-19
INCLUDE_RAG	3-20
INCLUDE_VOL	3-20
INIT_VOLSER	3-22
LOGONLY_FOR_TRACKED_COMMANDS	3-22
MAX_ALIAS	3-23
MAX_COMMANDQ	3-23
MAX_QUERY	3-24
MESSAGE_LABELS	3-24
MESSAGE_PROCESSING	3-25
MSC_ACTIVATE_MS	3-26
MSC_ALLOW_INCONSISTENT	3-26
MSC_CYCLE_TARGET	3-27
MSC_GROUP_END	3-27
MSC_GROUP_NAME	3-28
MSC_INCLUDE_SESSION	3-28
MSC_STAR	3-29
MSC_VALIDATION	3-30
MSC_WEIGHT_FACTOR	3-30
OPERATOR_VERIFY	3-31
REGISTER_COMMAND_PREFIX	3-32
SAF_CLASS	3-33
SAF_PROFILE	3-34
SECURITY_CONFIG	3-36
SECURITY_QUERY	3-36
SHOW_COMMAND_SEQ#	3-37
SINGLE_CONCURRENT	3-38
SMFREC	3-38
SORT_BY_COMMAND	3-39
SORT_BY_MVSCUU	3-40
SORT_BY_VOLSER	3-40
SUBSYSTEM_NAME	3-40
SYNCH_DIRECTION_ALLOWED	3-41

SYNCH_DIRECTION_INIT.....	3-42
USER_VERIFICATION	3-43
USER_VERIFICATION_TIMEOUT.....	3-43
VALIDATE_CRPAIR_NOCOPY_LEVEL	3-44
Group Definitions.....	3-45
Rules for Group Definitions.....	3-45
Example Group Definitions	3-47
Message Exit.....	3-61
Disabling.....	3-61
Enabling.....	3-61
EMCMX03I Messages	3-61

Chapter 4 **SRDF Operations**

Logical Volume Types	4-2
Local Volumes	4-2
Source (R1) Volumes	4-2
Target (R2) Volumes	4-2
I/O Operations	4-3
Logical Volume States	4-4
SRDF Volumes States (SRDF View).....	4-5
Symmetrix Volume States (Host View).....	4-6
Host Accessibility	4-7
SRDF Logical Volume Attributes	4-9
Source (R1) Volume Attributes.....	4-9
Operational Modes.....	4-12
Synchronous Mode.....	4-13
Semi-Synchronous Mode	4-15
Adaptive Copy-Write Pending (AW).....	4-16
Adaptive Copy-Disk Mode (AD).....	4-19
SRDF Asynchronous Mode.....	4-21
Resuming SRDF / A Operation	4-22
SRDF / A Monitor.....	4-23
Ensuring Data Consistency	4-24
Concurrent SRDF.....	4-25
Switched SRDF Configurations.....	4-30
Dynamic SRDF Pairs.....	4-32
Dynamic RDF Groups.....	4-32
Support for Unequal Size R1 and R2	4-34
Microcode Requirements.....	4-34
Supporting SRDF.....	4-34
Using Metadata.....	4-34
ADSRDF Flag	4-34

Target (R2) Volume Read / Write Protection	4-36
--	------

Chapter 5

SRDF Commands

How to Read Syntax Maps	5-2
SRDF Query Commands.....	5-3
#HELP	5-3
#SQ ADC	5-4
#SQ BCV	5-9
#SQ CNFG	5-16
#SQ DSTAT.....	5-24
#SQ GLOBAL.....	5-30
#SQ LINK	5-34
#SQ MIRROR.....	5-41
#SQ MSG	5-50
#SQ RAID	5-55
#SQ RAID5.....	5-59
#SQ RAID10.....	5-63
#SQ RDFGRP	5-67
#SQ SRDFA	5-76
#SQ SRDFA_VOL.....	5-88
#SQ SSID.....	5-91
#SQ STATE	5-94
#SQ VOL.....	5-103
SRDF Configuration Commands	5-114
#STOP	5-114
#SC BCV	5-114
#SC CNFG	5-121
#SC GLOBAL.....	5-123
#SC LINK	5-128
#SC MSG.....	5-129
#SC RDFGRP	5-130
#SC SRDFA.....	5-137
#SC VOL	5-140
#TF.....	5-154
Host Component Examples.....	5-155
#SC VOL Configuration Command	5-155
Multihop List	5-157
Resetting an R1's TNR Status.....	5-158
Personality Swap.....	5-161
Creating a Dynamic RDF Pair	5-164
Creating an RDF Group	5-171
Modifying an RDF Group.....	5-175

Chapter 6 SRDF Procedures

Getting Started	6-2
Resuming SRDF / A Operation	6-2
Recovering Using Operational Host	6-3
Making the Operational Site Available	6-3
When Nonoperational Site Becomes Available	6-4
Testing Recovery Procedures	6-6
Conventions	6-7
Procedure 1: R2 Read / Write Testing	6-9
Presynchronization Procedure R1<R2	6-12
Procedure 2: Synchronization Method Selection	6-14
Procedure 3: R1>R2 Full Volume Resynchronization	6-17
3-R1: Resynchronization from a Host with R1 Access	6-20
3-R2: Resynchronization from a Host with R2 Access	6-23
Procedure 4: R1<R2 Full Volume Resynchronization	6-26
4-R1: Resynchronization from a Host with R1 Access	6-29
4-R2: Resynchronization from a Host with R2 Access	6-32
Procedure 5: R1>R2 Changed Tracks Resynchronization	6-35
5-R1: Resynchronization from a Host with R1 Access	6-37
5-R2: Resynchronization from a Host with R2 Access	6-39
Procedure 6: R1<R2 Changed Tracks Resynchronization	6-41
6-R1: Resynchronization from a Host with R1 Access	6-44
6-R2: Resynchronization from a Host with R2 Access	6-47
SRDF / A Recovery Scenarios	6-50
Temporary Link Loss	6-50
Permanent Link Loss	6-50
Primary Symmetrix Cache “Full” Condition	6-51
Failback from R2	6-51
SRDF / A MSC Recovery Scenario	6-52
SRDF / A MSC is Deactivated or Dropped	6-52
Stand-Alone Recovery for SRDF / A MSC	6-54
Stand-alone Recovery Requirements	6-54
Addressing SRDF / A Sessions	6-54
Possible MSC Group Cases	6-55

Chapter 7 External Interfaces

ISPF Interface	7-2
Product Requirements	7-2
Using Function Keys	7-2
Starting the ISPF Interface Session	7-2
Query Functions Panel	7-8
Configure Functions Panel	7-9

Display Configuration Information Panel.....	7-10
Manage SRDF Configuration Panel	7-11
Command Line Interface Panel	7-31
SRDF / A Monitor Panel	7-32
Batch Interface	7-33
Details	7-33
Example.....	7-35

Appendix A Recovery Procedures

Remote Link Directory and the Host	A-2
SRDF Volume Statuses and the Host	A-3

Appendix B Security

SRDF Host Component Security	B-2
Implementing Security	B-2
Logging On	B-2
Shutting Down	B-2

Appendix C Enhancements

SRDF Host Component Enhancements	C-2
--	-----

Appendix D Customer Support

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

Glossary	g-1
-----------------------	-----

Index	i-1
--------------------	-----

DRAFT
EMC CONFIDENTIAL

Figures

1-1	Concurrent SRDF	1-11
1-2	Unidirectional SRDF Configuration	1-12
1-3	Bidirectional SRDF Configuration	1-13
1-4	SRDF/A Mode Overview	1-18
1-5	Concurrent SRDF Configured for SRDF/Star Support	1-27
2-1	JCL to Unload the SRDF Host Component	2-11
2-2	EMC JCL Customization Utility Panel	2-12
4-1	SRDF Logical Volume State	4-4
4-2	Synchronous Mode	4-14
4-3	Semi-Synchronous Mode	4-16
4-4	SRDF/A Mode Overview	4-23
4-5	Concurrent SRDF Configuration	4-26
4-6	Concurrent SRDF Configuration Example	4-27
4-7	Multihop Configuration Example	4-29
4-8	Switched SRDF Configuration	4-31
5-1	#SQ ADC Command Output for SRDF	5-8
5-2	#SQ BCV Command Output for SRDF	5-12
5-3	#SQ BCV Extended Command Output for SRDF	5-14
5-4	#SQ CNFG Command Output for SRDF	5-20
5-5	#SQ DSTAT Output	5-27
5-6	#SQ GLOBAL Command Output for SRDF	5-31
5-7	#SQ LINK Command Output for SRDF	5-37
5-8	#SQ LINK Extend Command Output for SRDF	5-39
5-9	#SQ MIRROR Command Output for SRDF	5-46
5-10	#SQ MIRROR Command Output for SRDF	5-47
5-11	#SQ MIRROR Command Output for SRDF	5-47
5-12	#SQ MSG Command Output for SRDF	5-53
5-13	#SQ RAID Command Output for SRDF	5-58
5-14	#SQ RAID10 Command Output for SRDF	5-66

5-15	#SQ RDFGRP Command Output for SRDF	5-72
5-16	#SQ RDFGRP Command Output for SRDF	5-73
5-17	#SQ RDFGRP Command Output for SRDF	5-73
5-18	#SQ SRDFA Command Issued to the Primary Side	5-79
5-19	#SQ SRDFA Command Secondary Side	5-83
5-20	#SQ SRDFA_VOL Command Primary Side	5-90
5-21	#SQ SRDFA_VOL Command Secondary Side	5-91
5-22	#SQ SSID Command Output for SRDF	5-92
5-23	#SQ State Command Output for SRDF	5-99
5-24	#SQ VOL Command Output for SRDF	5-110
5-25	#SQ RDFGRP Command Output for SRDF	5-133
5-26	#SQ RDFGRP Command Output for SRDF	5-134
5-27	SRDF Multihop Configuration	5-157
5-28	R1 Device Range After RDF-SUSP Action	5-158
5-29	R2 Device Range Prior to Procedure	5-159
5-30	Status of R1 Devices After the Procedure	5-160
5-31	Status of R2 Devices After the Procedure	5-161
6-1	R2 Read / Write Testing	6-11
6-2	Synchronization Method	6-16
6-3	R1>R2 Full Volume Resynchronization	6-19
6-4	R1>R2 Full Volume Resynchronization from a Host with R1 Access .	6-22
6-5	R1>R2 Full Volume Resynchronization from a Host with R2 Access .	6-25
6-6	R1<R2 Full Volume Resynchronization	6-28
6-7	R1<R2 Full Volume Resynchronization from a Host with R1 Access .	6-31
6-8	R1<R2 Full Volume Resynchronization from a Host with R2 Access .	6-34
6-9	R1>R2 Changed Tracks Resynchronization	6-36
6-10	R1>R2 Changed Tracks Resynchronization from an R1 Host	6-38
6-11	R1>R2 Changed Tracks Resynchronization from an R2 Host	6-40
6-12	R1<R2 Changed Tracks Resynchronization	6-43
6-13	R1<R2 Changed Tracks Resynchronization from an R1 Host	6-46
6-14	R1<R2 Changed Tracks Resynchronization from an R2 Host	6-49
6-15	SRDFSR RPTOUT for Case 1 from Primary Side	6-56
6-16	SRDFSR RPTOUT for Case 1 from Secondary Side	6-57
6-17	FSRDFSR RPTOUT for Case 2 from Primary Side	6-58
6-18	SRDFSR RPTOUT for Case 2 from Secondary Side	6-59
6-19	SRDFSR RPTOUT for Case 3 from Primary Side	6-60
6-20	SRDFSR RPTOUT for Case 3 from Secondary Side	6-61
7-1	Main Product Panel	7-3
7-2	Specify the Session Parameters Panel	7-4
7-3	Symmetrix Function Controls Panel	7-7
7-4	Query Functions Panel	7-8
7-5	Configure Functions Panel	7-9
7-6	Display Configuration Information Panel	7-10

7-7	Manage SRDF Configuration Panel	7-11
7-8	Host Component RA-Group Display Panel	7-15
7-9	SRDFGRP Display Panel	7-16
7-10	SRDFGRP Display Panel	7-17
7-11	Device State Panel Fields	7-26
7-12	Related Help Panel Describing Displayed Fields	7-27
7-13	Command Line Interface Panel	7-31
7-14	SRDF / A Monitor Panel	7-32
D-1	Problem Detection and Resolution Process	D-2

DRAFT
EMC CONFIDENTIAL

DRAFT
EMC CONFIDENTIAL

Tables

2-1	Symmetrix System Requirements	2-2
2-2	Mainframe Hardware and Software Requirements	2-3
2-3	Installation Tape Contents	2-8
3-1	Initialization Parameters	3-4
3-2	SRDF Host Component Commands/Suffixes	3-34
4-1	Source (R1) Volume Accessibility	4-7
4-2	Target (R2) Volume Accessibility	4-8
5-1	Source is Configured for Link-Domino=Yes; Target=No	5-22
5-2	Source is Configured for Link-Domino=Yes; Target=Yes	5-22
5-3	Source Is Configured for Link-Domino=No; Target=Yes	5-22
5-4	EMC9998W Message Format	5-51
5-5	Valid State Values	5-105
5-6	#SC CNFG Command Actions for SRDF	5-123
5-7	#SC RDFGRP Command Actions for SRDF	5-132
5-8	#SC SRDFA Command Actions for SRDF / A Mode	5-138
5-9	#SC VOL Command Actions for SRDF	5-145
5-10	Flag Descriptions	5-152
5-11	#SC VOL Command Restrictions	5-154
6-1	Synchronization Procedure Selections	6-15
A-1	Link Status and Recovery	A-2
A-2	Volume Status and Recovery	A-3
C-1	SRDF Host Component Enhancements	C-2

DRAFT
EMC CONFIDENTIAL

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 SRDF Host Component. Therefore, some functions described in this guide may not be supported by all versions of Enginuity microcode currently in use. For the most up-to-date information on product features, see your product release notes.

If an SRDF Host Component 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 guide is intended for the host system administrator, system programmer, or operator who is involved in managing or operating the Symmetrix storage subsystem.

Organization

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

Chapter 1, <i>Product Overview</i>	Provides an overview of the SRDF Host Component including its features, requirements, and options.
Chapter 2, <i>Installing and Customizing</i>	Provides the installation procedure, a description of the initiation and termination commands and a description of the initialization parameters for the SRDF Host Component.
Chapter 3, <i>SRDF Initialization Parameters</i>	Provides information on initialization and termination commands, and a description of the initialization parameters for the SRDF Host Component.

Chapter 4, <i>SRDF Operations</i>	Provides a description of Symmetrix volume configuration and attributes, modes of operation, and integrated operations for the SRDF Host Component.
Chapter 5, <i>SRDF Commands</i>	Provides a description of the SRDF query and configuration commands.
Chapter 6, <i>SRDF Procedures</i>	Outlines the steps involved in performing data recovery procedures in an SRDF environment.
Chapter 7, <i>External Interfaces</i>	Provides an overview of the SRDF Host Component ISPF and batch interfaces.
Appendix A, <i>Recovery Procedures</i>	Describes the status of individual SRDF volumes and Remote Link Directors, including their impact on the host, probable cause, and the actions required to return to a normal operating status.
Appendix B, <i>Security</i>	Provides a description of the security options available with the SRDF Host Component.
Appendix C, <i>Enhancements</i>	Provides a comprehensive list of SRDF Host Component 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 guide.

Related Documentation

Related documents include:

- ◆ *SRDF Host Component for z/OS Message and Code Guide*, P/N 300-000-260, EMC Corporation
- ◆ *SRDF Host Component for z/OS Release Notes*, P / N 300-000-164, EMC Corporation
- ◆ *EMC ResourcePak Base for z/OS Product Guide*, P / N 300-999-341, EMC Corporation
- ◆ *EMC Symmetrix Remote Data Facility Product Guide*, P / N 300-001-165, EMC Corporation
- ◆ *EMC SWAP Services Message and Code Guide*, P / N 300-001-076, EMC Corporation
- ◆ *EMCSPE Programmer's Reference Manual*, P / N 300-000-657, EMC Corporation
- ◆ *Host Component REXX Interface Programmer's Guide*, P / N 300-002-205, EMC Corporation

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

<http://powerlink.emc.com>

Related Vendor Information

For reference material about the IBM operating systems, refer to:

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

Conventions Used in this Guide

EMC uses the following conventions for notes and cautions.

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

Text marked **Note:**, **Important:**, **Tip:**, **Background:**, or **Exception:** calls 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 or heading titles in text
Courier	• System output • File names • Complete paths • Command line entries
Courier bold	User entry in examples
<i>Courier italic</i>	• Arguments used in examples of command line syntax • Variables in examples • Variables in pathnames

z/OS Syntax Conventions

The syntax conventions used in this guide are:

- ◆ CAPITALIZATION = must be typed
- ◆ [] = optional entry
- ◆ | = alternative parameter value
- ◆ UNDERScoreD = default value or menu selection

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. Unless otherwise indicated, the operating system is z/OS.

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

For a list of EMC sales locations, please access the EMC home page at:

<http://www.emc.com/contact/>

For information on the EMC products and services available to customers and partners, refer to the EMC Powerlink Web site at:

<http://powerlink.emc.com>

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 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.

This chapter provides an overview of the SRDF Host Component including its features, requirements, and options. Topics include:

- ◆ Introduction to SRDF Host Component 1-2
- ◆ Product Features 1-3
- ◆ EMC TimeFinder Option 1-9
- ◆ SRDF Overview 1-10
- ◆ SRDF Asynchronous Mode 1-17
- ◆ SRDF/A Multi-Session Mode 1-23
- ◆ What's New in Version 5.3..... 1-25

Introduction to SRDF Host Component

Symmetrix Remote Data Facility (SRDF®) is a Symmetrix® based business continuance and disaster recovery solution sold under a separate license by EMC. SRDF maintains a real-time copy of data at the logical volume level in multiple Symmetrix systems located in physically separate sites.

The SRDF Host Component is a z/OS subsystem for controlling SRDF processes and monitoring SRDF status, through the use of commands executed from a host.

User interfaces to the SRDF Host Component are provided via both TSO (ISPF) and batch commands. An optional interface is provided for EMC TimeFinder™ commands as well as SRDF commands to centralize commands for both replication products.

SRDF Host Component commands may be issued to both local and remote Symmetrix systems. Commands destined for remote Symmetrix systems are transmitted via local Symmetrix systems to remote Symmetrix systems via their SRDF links.

This manual describes SRDF Host Component support for all SRDF variants, including Synchronous, Asynchronous and SRDF/Star, as well as the TimeFinder option.

Product Features

This section describes the features supported by the SRDF Host Component.

Automation

The SRDF Host Component provides command automation by associating a command, response token, and console ID for all responses to SRDF Host Component commands. This automation allows you to enter commands from and retrieve responses to automation products such as:

- ◆ NETVIEW
- ◆ AutoOPERATOR
- ◆ AF / OPERATOR

Security

The SRDF Host Component provides security by allowing you to validate authorization through the z/OS SAF interface. As a result, you can use any of the following SAF compliant security products to ensure proper user authorization:

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

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

ISPF

The SRDF Host Component provides a TSO ISPF interface. This ISPF interface is implemented as an ISPF dialog. The ISPF interface allows you to enter SRDF Host Component commands and view the command responses from your TSO session.

The ISPF interface allows you to respond to messages that would otherwise be written to the console as Write To Operator with Reply messages (WTORs). These messages are generated as a direct result of commands you enter when the OPERATOR_VERIFY parameter is specified as ALL or CRITICAL. The USER_VERIFICATION and USER_VERIFICATION_TIMEOUT parameters activate this feature.

Multitasking

The SRDF Host Component supports multitasking of SRDF commands to allow reconfiguration, display operations, and recovery testing procedures to be performed on multiple Symmetrix systems at the same time. For each Symmetrix, one SQuery and one SConfig task are supported concurrently.

Many of the SRDF Host Component displays are issued as multiline WTOs. When two or more commands are running concurrently, the output of these commands can appear interspersed in the Host Component job log and in the HCLOG dataset. When this occurs, the displays appears separately in the mainframe SYSLOG.

EMC provides the MESSAGE_LABELS and SHOW_COMMAND_SEQ# initialization parameters to assist with the association of messages to commands entered when running multiple requests simultaneously.

More Information: Refer to *MESSAGE_LABELS* on page 3-24 and *SHOW_COMMAND_SEQ#* on page 3-37 for more information on these parameters.

The SSID_REFRESH action runs under the global task, and may take an extended period of time.

Command Queueing

When you enter Host Component commands, the SRDF Host Component places them on a command queue for parsing. The SRDF Host Component parses commands in the order entered. Then the SRDF Host Component places the commands on a queue for the appropriate Host Component subtask.

The SRDF Host Component has the following subtask queues:

- ◆ One for global commands (commands that are not associated with a specific Symmetrix).
- ◆ Two for each Symmetrix in the configuration:
 - One for SQuery commands
 - One for SConfig commands

The maximum number of commands that can be queued for parsing is controlled by the MAX_COMMANDQ initialization parameter.

The value specified for MAX_COMMANDQ initialization parameter is a decimal integer in the range of 1 through 4096.

Each command queued for parsing occupies 68 bytes plus the length of the command in extended CSA. Commands on the subtask queues occupy extended, private storage.

Commands Queued by Queue Name

To insure that mutually dependent commands are executed one at a time in the order that you enter them, the SRDF Host Component allows you to place most commands on a named, command queue. To do this, append the following text to the end of the command:

`,CQNAME=qname`

Where:

qname

is the name of a command queue. The *qname* can be from 1 through 15 characters.

The SRDF Host Component moves queued commands to the same *qname* to the appropriate subtask queue one at a time. Commands for different Symmetrix controllers as well as global commands can be placed on the same *qname* queue, ensuring sequential execution.

The SRDF Host Component does not release the next command in the *qname* queue until the previous command completes execution. If a queued-by-name command fails, you may elect to:

- ◆ Purge the rest of the commands with the same *qname*
- ◆ Continue executing those commands

By specifying `CQNAME= (qname, P)`, you request that in the event of a command failure, all subsequent commands in the *qname* queue are to be purged.

By specifying `CQNAME= (qname, C)`, you request that even though a command fails, processing continues with the next command in the *qname* queue.

If you do not specify the failcode on the first command for the *qname* queue, the SRDF Host Component uses the default P (purge). On subsequent commands, you can elect to change the failcode. The new failcode takes effect when the command on which you specify it is released to the subtask queue.

Synchronization Direction

To enhance multitasking support, the SRDF Host Component allows you to set synchronization direction at the Symmetrix level. You can set the synchronization direction separately for each Symmetrix storage subsystem to:

- ◆ R1>R2
- ◆ R1<R2
- ◆ NONE
- ◆ GLOBAL

When you start the SRDF Host Component, it sets the `synch_direction` to GLOBAL for each Symmetrix. This action causes the GLOBAL `SYNCH_DIRECTION` setting to be used for each Symmetrix.

The default `SYNCH_DIRECTION` for SRDF Groups that you do not explicitly set by the `#SC RDFGRP` command is either the control units synchronize direction (`#SC CNFG` command), or if absent, the GLOBAL synchronize direction. The two Symmetrix units in an SRDF relationship may have the control unit level set differently.

Related SRDF Groups always have the same synchronization direction.

`SYNCH_DIRECTION` set at the CNFG level does not change the `SYNCH_DIRECTION` set at the RDFGRP level.

Remote Symmetrix Query and Configuration

The SRDF Host Component supports query and configuration operations to remote Symmetrix units across the SRDF link. This provides control of Symmetrix units, which may or may not be accessible directly from any Host Component image.

Remote query and configuration also allows control of recovery testing procedures from a single Host Component image.

More Information: Refer to *Testing Recovery Procedures* on page 6-6.

Remote query and configuration is provided using the `RMT(cuu[,mhlist][,ragroup#])` operand on the `#SQ ADC`, `#SQ VOL`, `#SQ CNFG`, and `#SC VOL` commands. Remote query and configuration is only available on Symmetrix units at Enginuity™ microcode level 5x64 or higher.

Command Completion Status Checking

For all SRDF Host Component commands that change the status of a link or device, the SRDF Host Component checks to see that the device or link successfully changed status.

If the device or link did successfully change status, the command terminates normally. If the device or link did not successfully change status, SRDF Host Component retries the command. If the retries are unsuccessful, the command fails, and an error message is issued.

Consistency Group Support

The SRDF Host Component provides the following support for consistency groups:

- ◆ The SRDF Host Component does not allow you to place a device that is in a consistency group into either of the Adaptive Copy modes.
- ◆ The `#SC VOL, cuu, SUSP-CGRP` command trips a consistency group.
- ◆ The `#SC VOL, cuu, RDF-SUSP` and `#SC VOL, cuu, RDF-RSUM` commands are not allowed for a device in a consistency group.
- ◆ The `#SC VOL, cuu, SUSP-CGRP` command is not allowed for a device that is not in a consistency group.
- ◆ The `#SQ VOL, cuu, CGROUP` and `#SQ MIRROR, cuu, CGROUP` commands display all devices that are in a consistency group for the selected Symmetrix.

Defined Groups

The SRDF Host Component allows you to define groups of Symmetrix devices and /or controllers, and then issue commands against these groups. You represent these defined groups in the initialization parameters. You can use the defined groups in the query commands: `#SQ ADC`, `#SQ CNFG`, `#SQ LINK`, `#SQ MIRROR`, `#SQ STATE`, and `#SQ VOL`, and the configuration commands: `#SC CNFG` and `#SC VOL`.

Important: The SRDF Host Component supports SCF Group syntax implemented through the SCF Group Name Service. Refer to the *EMC ResourcePak Base for z/OS Product Guide* for a description of the Group Name Service.

Host Component Batch Utility

The SRDF Host Component provides the EMCSRDF batch utility to submit Host Component commands. Commands are read in from SYSIN, and the output is displayed on SYSPRINT.

Sample JCL for the batch utility is provided in the SCF SAMPLIB member, EMCSRDF.

DRAFT
EMC CONFIDENTIAL

EMC TimeFinder Option

This option is configured by an EMC Customer Support Engineer at installation or service time.

The SRDF Host Component has an interface to EMC TimeFinder.

EMC TimeFinder is a business continuance solution that allows customers to use special devices that contain a copy of Symmetrix devices from an attached host(s) while the standard Symmetrix devices are online for regular I/O operation from their host(s). Uses for these copies can include:

- ◆ Backup
- ◆ Restore
- ◆ Decision support
- ◆ Applications testing

As EMC TimeFinder evolves, EMC provides advanced capabilities that you can only access through the native TimeFinder interfaces (batch or ISPF). You can use the #TF command to access these EMC TimeFinder features. This #TF command supports single, nonqueued TimeFinder commands using native TimeFinder syntax.

More Information: For syntax and description of EMC TimeFinder function and commands, refer to the *EMC TimeFinder/Mirror for z/OS Product Guide*.

SRDF Overview

The Symmetrix Remote Data Facility (SRDF) feature is a business continuance solution that maintains a mirror image of data at the logical volume level in two to five Symmetrix systems located in physically separate sites.

Symmetrix SRDF offers the following major features and benefits:

- ◆ High data availability
- ◆ High performance
- ◆ Flexible configurations
- ◆ Host and applications software transparency
- ◆ Automatic recovery from a component or link failure
- ◆ Significantly reduced recovery time after a disaster
- ◆ Reduced disaster recovery complexity, planning, testing, and so forth
- ◆ Increased integrity of recovery procedures
- ◆ Reduced backup and recovery costs

The SRDF feature is transparent to the host operating system and host applications. It does not require additional host software for duplicating data on the Symmetrix units at geographically-separate sites. The participating Symmetrix units manage all SRDF functions.

SRDF Configurations

For synchronization and coordination of SRDF activity, individual Symmetrix units have volumes defined as either:

- ◆ Primary (source or R1) volumes
- ◆ Secondary (target or R2) volumes.

These volumes are defined as members of RDFGroups. RDFGroups define the relationships between individual Symmetrix units in an SRDF configuration.

An SRDF configuration has at least one primary (source or R1) volume and one secondary (target or R2) volume. Engenuity 5567 microcode or higher supports the ability for a single primary volume to have a remote relationship or be mirrored to two secondary volumes concurrently, as shown in Figure 1-1 on page 1-11.

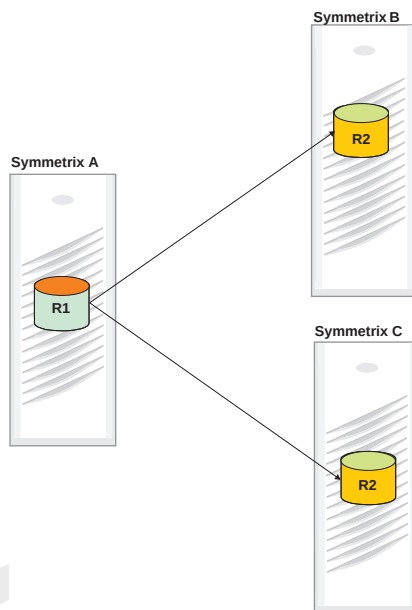


Figure 1-1 Concurrent SRDF

This feature is called Concurrent SRDF and is supported in both ESCON and Fibre Channel SRDF configurations.

SRDF configurations may transfer data:

- ◆ Unidirectionally
- ◆ Bidirectionally

Figure 1-2 shows a unidirectional configuration:

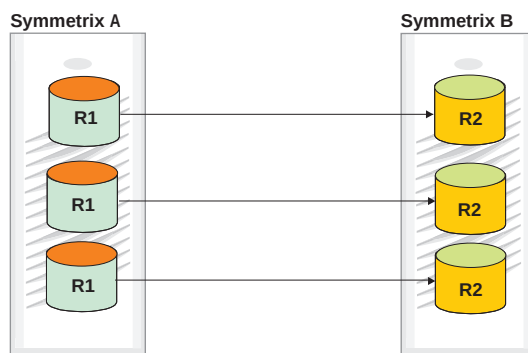


Figure 1-2 Unidirectional SRDF Configuration

In a unidirectional configuration, as shown in Figure 1-2, all primary (source or R1) volumes reside in one Symmetrix unit and all secondary (target or R2) volumes in another Symmetrix unit. Data flows from the primary (source R1) volumes to the secondary (target R2) volumes in the respective Symmetrix units under normal operating conditions.

Figure 1-3 shows a bidirectional configuration:

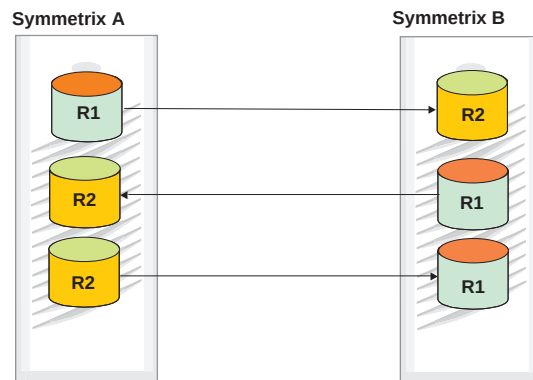


Figure 1-3 Bidirectional SRDF Configuration

In a bidirectional configuration, as shown in Figure 1-3, both primary (source or R1) and secondary (target or R2) volumes reside in each Symmetrix unit. Under normal operating conditions, data flows from the primary (source R1) volumes in the respective Symmetrix units to the corresponding secondary (target R2) volumes in the other Symmetrix units.

SRDF Director Hardware

SRDF director hardware provides the communications transport layer for SRDF data and information exchanges between Symmetrix units.

SRDF director hardware consists of three types of adapters:

- ◆ ESCON Remote Adapters (RAs)
- ◆ Fibre Channel Remote Adapters (RAFs or RFs)
- ◆ Gigabit Ethernet (GigE) Remote Adapters

ESCON Remote Adapters

ESCON remote adapters, known as RAs, are board sets that can provide the link connections, fiber optic protocol support, and communications control between two Symmetrix units within an SRDF configuration.

The RA board set that sends data across an SRDF link is known as an RA-1. An RA-1 functions like an IBM ESCON host channel interface.

The RA board set that receives data sent across an SRDF link is known as an *RA-2*. An *RA-2* functions like an IBM ESCON storage director interface.

An ESCON SRDF link consists of an *RA-1* board set in one Symmetrix unit, an *RA-2* board set in another Symmetrix unit, and a fiber cable connecting them.

An *RA-1* and its corresponding *RA-2* are referred to as an *RA pair*. Beginning with Symmetrix 4.x models, there can be multiple *RA* pairs in an SRDF configuration.

Fibre Channel Remote Adapter

Enginuity microcode Versions 5x66 or higher support SRDF Fibre Channel emulation. The remote adapter for fibre (RAF or RF) is a Fibre Channel board set that is Enginuity-configured as the link between Symmetrix units in an SRDF configuration.

Symmetrix 8000 GigE Remote Adapters

The Symmetrix 8000 GigE remote adapter enables direct native IP connectivity for SRDF deployment. It provides two 1 Gb/s Ethernet ports and connects via SC connectors (1000Base SX). It requires Enginuity code 5568 or higher. The GigE adapter port must be connected to a device with a port type 1000Base SX. Fibre optic cables can be 50 micron or 62.5 micron.

Symmetrix DMX GigE Remote Adapters

The Symmetrix DMX GigE remote adapter enables direct native IP connectivity for SRDF deployment. It provides from one-to-four 1 Gb/s Ethernet ports and connects via LC connectors (1000Base SX). It requires Enginuity code 5670 or higher. It supports SRDF traffic to one or more remote Symmetrix systems that also have GigE remote directors installed. Fibre optic cables can be 50 micron or 62.5 micron.

SRDF Distance Implementations

By maintaining copies of data in different physical locations, SRDF enables you to perform the following operations with minimal impact on normal business processing:

- ◆ Disaster restart
- ◆ Disaster restart testing
- ◆ Recovery from planned outages
- ◆ Remote backup
- ◆ Data center migration
- ◆ Data replication and mobility

SRDF Campus Solution

The SRDF Campus Solution allows Symmetrix units to be located up to 37.5 miles (60 km) apart using fiber-optic links. Synchronous, semi-synchronous, or Adaptive Copy data copying operational modes are available for this solution. This implementation supports both unidirectional and bidirectional SRDF configurations.

SRDF Extended Distance Solution

The SRDF Extended Distance Solution allows the Symmetrix units to be located over 37.5 miles (60 km) apart using a T3 or E3 link. Synchronous, semi-synchronous, or Adaptive Copy data copying modes of operation are available for this solution. To minimize the degradation of performance because of distance and telecommunications delays, EMC recommends using SRDF / Asynchronous mode (SRDF / A) or SRDF / Automated Replication mode (SRDF / AR).

SRDF FarPoint

FarPoint™ is an SRDF feature used with ESCON extended distance solutions (and certain ESCON campus solutions) to optimize the performance of the SRDF links. This feature works by allowing each RA to transmit multiple I/Os, in series, over each SRDF link.

SRDF Operational Modes

When SRDF was introduced to the disaster recovery market in the mid-1990s, it offered three modes of operation:

- ◆ **Synchronous mode** — acknowledges an I/O as complete when it is written to both the local and remote cache of a Symmetrix SRDF pair
- ◆ **Semi-synchronous mode** — allows the members of an SRDF volume pair to be at most one I/O out of synchronization per logical volume as a way to improve performance in certain environments
- ◆ **Adaptive Copy mode** — a data movement solution that sends data to the remote side in random order

The term asynchronous has been specifically excluded from the SRDF lexicon. This practice changed with the introduction of SRDF/A mode in Enginuity level 5670.

Added to this is a newer mode:

- ◆ **Asynchronous mode** — a data movement solution that sends a consistent point-in-time image to the R2 side, which is not too far behind the R1 side, resulting in minimal data loss in the event of a disaster at the primary site.

More Information: Asynchronous mode is discussed in more detail in *SRDF Asynchronous Mode* on page 1-17 and *SRDF/A Multi-Session Mode* on page 1-23.

Asynchronous mode is available with Enginuity level 5x70 or later.

SRDF Asynchronous Mode

The following sections give an introduction to SRDF Asynchronous (SRDF / A) mode¹ and provide an operational overview of this mode.

Introduction

Many SRDF customers use SRDF synchronous mode to protect data on a primary storage system. SRDF synchronous mode creates a consistent copy of data on the secondary storage system (R2). However, SRDF synchronous mode carries a price, both in performance (response time on the R1 side host) and cost (high-capacity links).

For that reason, EMC has developed SRDF / A mode. SRDF / A mode provides a consistent point-in-time image on the R2 side, which:

- ◆ Is not too far behind the R1 side
- ◆ Results in minimal data loss in the event of a disaster at the primary site

What Asynchronous Mode Provides

SRDF / A mode provides:

- ◆ A consistent point-in-time image on the secondary devices at all times
- ◆ Support for all existing SRDF topologies (ESCON, Farpoint, point-to-point and switched fabric Fibre Channel, GigE)
- ◆ No additional external hardware requirements
- ◆ Ability to work at any distance without adding response time to the R1 side host
- ◆ Support for any host (MF, OS) and any data type recognized by Symmetrix (FBA, CKD, AS400 etc.)
- ◆ Low impact on back end (DA) directors
- ◆ High performance (response time equivalent to writing to non-SRDF devices)
- ◆ The ability to read data from the R2 side to the R1 side (e.g. all local mirrors fail on the R1 side), or to read the R2 device from a host at the R2 side

1. Referred to in this document as SRDF / A.

Enginuity Support

To achieve these goals, EMC has made the following elements available with Enginuity:

- ◆ A new mode for SRDF devices: asynchronous mode.
- ◆ A new mode of Virtual Devices (VDEVs), called a Cache Only Virtual Device (COVD, pronounced co-vee-dee). There are two COVDs required in the secondary Symmetrix for each R2 device.

This limits the number of SRDF-A devices per Symmetrix to approximately 2600 in Version 1.

COVDs are required only with Enginuity version 5x70 and earlier. For version 5x71, COVDs are not required.

- ◆ Two data structures for each device on the primary and secondary to track cache slots containing updated data. These are called cycles or Delta sets.
- ◆ A cycle number stored in global memory on the primary side and secondary.

Operational Overview

Figure 1-4 gives an operational overview of SRDF/A mode operation:

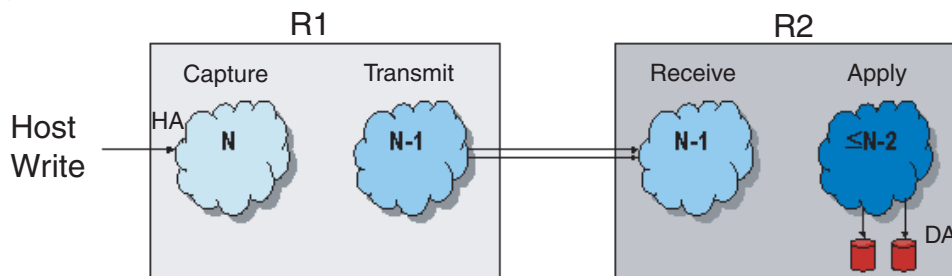


Figure 1-4 SRDF/A Mode Overview

Each representation of N (including N-x) in Figure 1-4 represents a set of cache slot pointers. N is the Capture cycle on the primary (R1) side of the SRDF connection. Consider the following;

- ◆ The R2 device itself always represents a consistent image that is true (for time N-2)

- ◆ The R2 side is working on building a consistent image (for time N-1) by receiving data from the primary side in the Receive cycle
- ◆ The R1 side is sending cycle N-1 to the R2 side by way of the Transmit cycle
- ◆ The R1 side is marking all new writes as belonging to time period N (internal copy writes or host writes) through the Capture cycle

From Figure 1-4 on page 1-18, it should be clear that SRDF/A mode does not actually order the host writes. Instead, SRDF/A mode puts the host writes into cycles or chunks that are transferred one by one.

Only when a complete chunk is fully received on the R2 side can the write be committed. In Figure 1-4 on page 1-18, if the links are lost, partial chunk N-1 can be discarded. This results in a consistent R2. Moreover, regular SRDF operation can be used for failback or failover without a full resynchronization.

The Chunk Method

The chunk method used by SRDF/A mode is different from traditional approaches to ordered writes, but it does not reduce the level of protection. If the R2 lags the R1 by 300 writes, it does not matter if the next 300 writes arrive in order or not. It only matters that either all or none of the 300 writes are applied to the R2. Sending writes in bunches of 300 is the same as sending them in order.

An advantage to sending writes in chunks is that if the host writes to the same track 10 times in a given time period, SRDF/A mode will send the updates only once. This can have a major performance benefit. It results in more efficient link utilization and potentially lower link bandwidth requirements when compared to a traditional ordered write solution which must handle each update write discretely.

The price of this method is that if SRDF links are lost, SRDF/A mode can lose up to twice the size of a cycle (compared to a traditional ordered write solution). However, this is compensated to some extent by the saving in cycle size.

Ensuring Data Consistency: Dependent Writes

Any asynchronous remote replication solution, either host based or storage controller based, must ensure that data at the remote site is always consistent so as to enable restartability **and** maintain data integrity.

To achieve this objective, asynchronous replication solutions must honor the logical dependency between write I/Os that is embedded in the I/O stream by the logic of:

- ◆ An application
- ◆ An operating system
- ◆ A database management system

This ensures dependent write consistency and is the basic principle behind all of EMCs Consistency Technology solutions (Consistency Group, Consistent Split, Consistent SNAP, and now SRDF/A mode).

Understanding this concept is key to understanding how SRDF/A mode is able to provide consistent data at the remote site at all times.

Defining a Dependent Write

The definition of a dependent write is a good place to begin understanding how SRDF/A mode is able to guarantee data consistency. A dependent write is defined as:

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

A real world illustration of this concept is the relationship that a Database Management System (DBMS) creates between the I/O that updates a database file and the I/O that writes to the log of the DBMS. No DBMS ever writes changes to the database itself until after it has first written those updates to its log.

In this case the database write is the dependent write and the log write is the predecessor write. Without this dependent write logic no DBMS could restart with data integrity in the event of a power failure of the CPU on which it was running.

As an example, assume two write I/Os *A* and *B* have a relationship in the application such that I/O *B* will not be issued until I/O *A* has been successfully completed.

Ensuring Dependent Write Consistency

Ensuring dependent write consistency means that no failure in the remote replication infrastructure can create the condition where I/O *B* has been replicated to the remote site, but I/O *A* has not been replicated. Such a missing sequence condition would destroy the integrity of the data at the remote site.

There are several ways to ensure that this does not occur and that consistency of the remote site is preserved. These are:

- ◆ Ordering write I/Os based on timestamps
- ◆ Ordering write I/O based on sequence numbers
- ◆ Honoring dependent writes

SRDF/A mode takes the more elegant approach to preserving dependent write consistency. SRDF/A mode honors the dependent write relationships imbedded in the I/O stream by the application. This makes SRDF/A mode an implicitly enterprise-wide, heterogeneous host solution.

Relationship Between Dependent I/Os

It is important to recognize that the relationship between dependent I/Os is not one of timing, but one of logic. By respecting the logical relationships between I/Os, there is no need for any type of temporal references (timestamps or sequence numbers) to create the consistency.

Clearly, a Symmetrix storage subsystem has no way of knowing which specific I/Os it receives have dependent relationships. The Symmetrix storage subsystem must assume that any I/O *B* that arrives after another I/O *A* has been acknowledged as complete to the host, must in fact be dependent on *A*. Therefore the Symmetrix storage subsystem must ensure that *A* and *B* are either:

- ◆ In the same cycle (or delta set)
- ◆ That *B* is in a cycle that is processed to the remote side after the cycle which contains *A* is processed.

It is really these cycles of I/Os, rather than the I/Os themselves, that are being ordered by SRDF/A mode. The key to preserving the consistency of data within SRDF/A mode is to ensure that dependent write relationships are honored during the cycle switch process, the frequency of which also determines the data lag experienced by remote site (i.e., the amount of data that would be lost in the event of a primary site disaster).

Ensuring Data Consistency: The Cycle Switch Process

SRDF/A mode ensures data consistency through the cycle switch process. In a single Symmetrix SRDF/A implementation, this consistency must be assured across all volumes in the RDF group.

Because SRDF/A mode is ensuring the consistency of the data, there is no need for the Consistency Group product or PowerPath for open systems to be installed for asynchronous mode SRDF devices.

Dependent write consistency is ensured within SRDF/A mode by the host adapter obtaining the active cycle number from a single location in global cache and assigning it to each I/O at the beginning of the I/O and retaining that cycle number even if a cycle switch occurs during the life of that I/O.

This results in the cycle switch process being atomic for dependent write sequences, even though it is not physically an atomic event across a range of volumes. As a result, two I/Os with a dependent relationship between them will either be in the same cycle, or the dependent I/O will be in a subsequent cycle.

Cycle Switch Algorithm

The cycle switch algorithm does not allow a dependent I/O *B* to be placed in cycle *N-1* when its predecessor I/O *A* is placed in the new cycle *N*. This is because the predecessor I/O *A* will retain its assigned cycle number, even if the active cycle number increments during *A*'s execution.

This cycle number retention necessarily results in *B* being assigned to the new cycle *N*. The reason for this is that *B* is only issued by the application after *A*'s execution is completed. If the cycle switched during *A*'s execution, then *B* must be assigned to the new cycle.

The new cycle *N* will then be sent to the remote site only after cycle *N-1* has been successfully transmitted, thus preserving dependent write consistency. In no case will *B* ever be transmitted to the remote side ahead of *A*.

SRDF/A Multi-Session Mode

Enginuity 5x70 and later offers support for SRDF / A in configurations where there are multiple Symmetrix systems on the primary side. Initially this support is available only for z / OS environments and requires an equal number of Symmetrix systems, each containing a single SRDF / A group, on each side of the configuration.

It is possible to provide for consistency of open systems FBA data across multiple Symmetrix storage subsystems if there is a z / OS host present and connected to all Symmetrix systems.

Achieving data consistency across multiple SRDF / A groups simply requires that the cycle switch process described earlier be coordinated among the participating Symmetrix storage subsystems, and that the switch occurs during a very brief time period when no host writes are being serviced by the subsystems.

Achieving this requires a single coordination point to drive the cycle switch process in all participating Symmetrix storage subsystem. This function is provided by a z / OS host running the Symmetrix Control Facility Version 5.4 through an SCF service called SRDF / A Multi-Session Consistency (MSC) that is managed and controlled by the SRDF Host Component.

SRDF/A Multi-Session: Operational Overview

From a single Symmetrix perspective, I / O is processed exactly the same way in SRDF / A multi-session mode as in single session mode.

1. The host writes to cycle N (Capture cycle) on R1 side.
2. SRDF / A transfers cycle N1 (transmit cycle) from R1 to R2.
3. The R2 side receive cycle receives cycle N1 and the apply cycle restores cycle N2.

During this process, the status and location of the cycles are communicated between the R1 and R1 Symmetrix storage subsystems. For example, when the R1 finishes sending cycle N1, it sends a special indication to R2 to let it know that it has a completed the cycle transfer. Similarly, when R2 finishes restoring cycle N2, it sends a special indication to let R1 know that its apply cycle is empty.

At this point in the process (that is, when the transmit cycle on the R1 side is empty and the apply cycle on the R2 side is empty), SRDF / A is ready for a cycle switch. In single session mode, SRDF / A itself would perform a cycle switch once all the conditions are satisfied (the minimum cycle time for multi-session SRDF / A remains 30 seconds).

However, the difference with multi-session mode is that the microcode simply indicates its switch readiness to the host, which is polling for this condition, and the switch command is issued by the host to all Symmetrix storage subsystems once they are in this state.

Performing a Consistent Cycle Switch

Multi-session SRDF / A performs a coordinated cycle switch during very short window of time when there are no host writes being completed. This time period is referred to as an SRDF / A window.

When it discovers that all systems are ready for a switch, the host issues a command to each Symmetrix storage subsystem that performs a cycle switch to open the SRDF / A window. The SRDF / A window is implemented as a bit in the SRDF / A state table in global memory where the cycle number is also stored.

This SRDF / A state is accessed by the host adapter to obtain the cycle number at the start of each write in single session mode. In multi-session mode the host adapter also checks this bit. If the bit is on (an open window), the host adapter performs the following:

- ◆ Disconnects from the channel
- ◆ Begins polling the bit to see if the host has closed the window

While the window is open, any I/Os that start will be disconnected. As a result, no dependent I/Os will even be issued by any host to any devices in the multi-session group.

The SRDF / A window remains open on all Symmetrix storage subsystems until the last Symmetrix unit in the multi-session group acknowledges to the host that the switch and open command has been processed.

As part of this switch and open operation, SRDF / A assigns a Multi-Session Consistency (MSC) cycle tag value to the active cycle. This host tag is carried by the SRDF / A process to the remote side and is used by the host at the recovery site to ensure that only data from the same host cycle is applied to the R2 devices in each Symmetrix in the event of an unplanned outage at the primary site.

What's New in Version 5.3

Multiple SRDF/A Groups per Symmetrix

Enginuity 5x71 expands SRDF/A to allow multiple SRDF/A groups per Symmetrix system. This feature enables you to define a source for one SRDF/A group and a target to another SRDF/A group in the same Symmetrix system.

By doing this, you now have the ability to use SRDF/A with bi-directional operation. Note that there cannot be bi-directional operation within an SRDF/A group, but there can be bi-directional operation between the same systems in an SRDF/A box pair. All source-to-target data flow operations within a group still remain unidirectional.

Concurrent SRDF/Synchronous with SRDF/Asynchronous

This feature provides the ability to replicate a group of devices in Synchronous mode to one target site and in Asynchronous mode to a secondary extended distance site. The same source device can be replicated synchronously using SRDF/S mode down one link and asynchronously using SRDF/A mode down another link.

SRDF/A Tunable Cache

This feature provides a method for limiting the amount of write pending slots (i.e. cache) available to SRDF/A.

SRDF/A cycles can grow until they reach the system write pending limit, at which point you can choose to throttle the host for a given amount of time or to drop SRDF/A immediately. Without this feature, if write pending limits are being exceeded, performance suffers across the entire Symmetrix, not just the SRDF/A application.

Dynamic SRDF with SRDF/A

This feature allows you to add and remove Dynamic SRDF groups that participate in SRDF/A, as well as add and remove devices from SRDF/A groups. You can add a concurrent mirror dynamically to a device that is in an SRDF/A group, subject to the normal restrictions for dynamic concurrent RDF. However, only one mirror per device is allowed to be in an SRDF/A group.

Switching from SRDF/S to SRDF/A Dynamically

This feature allows the capability to switch to and from SRDF/S to SRDF/A while ensuring dependent write consistency at the R2 side throughout the process.

With this capability, if you are currently using SRDF/S, you can switch to SRDF/A mode during high workload periods to minimize performance impacts to applications. You can also switch in reverse from SRDF/A to SRDF/S (for example, to catch up tracks owed) before then reverting to SRDF/A again.

SRDF/Star

SRDF/Star is a solution that operates in a *concurrent* SRDF configuration ($A \rightarrow B$ and $A \rightarrow C$) where one remote mirror operates in SRDF/S mode ($A \rightarrow B$) and the other remote mirror operates in SRDF/A mode ($A \rightarrow C$).

SRDF/Star provides a very rapid re-establishment of cross-site protection in the event of Primary Site (A) failure. Rather than a full re-synchronization between sites B and C, SRDF/Star provides a differential B-C synchronization, dramatically reducing the time it takes to remotely protect the new production site. SRDF/Star also provides a mechanism for you to determine which site (B or C) has the most current data in the event of a rolling disaster that affects site A. In all cases, you maintain the ability to choose which site to use in the event of a failure.

Figure 1-5 shows an SRDF/Star configuration.

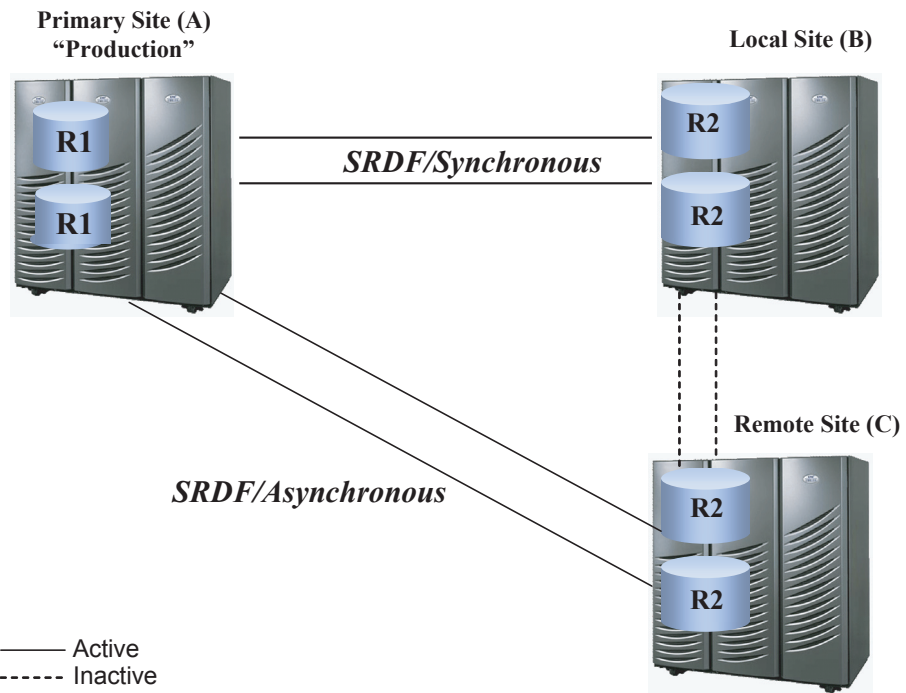


Figure 1-5 Concurrent SRDF Configured for SRDF/Star Support

The concurrent configuration option of SRDF / A offers the ability to restart your environment at long distances with minimal data loss, while simultaneously providing a zero data loss restart capability at a local site. Such a configuration provides protection for both a site disaster and a regional disaster while minimizing performance impact and loss of data.

In a concurrent SRDF / A configuration *without* the SRDF / Star functionality, the loss of the primary 'A' site would normally mean that the long distance replication would stop and data would no longer propagate to the 'C' site. Data at 'C' would continue to age as production was resumed at site 'B'. Resuming SRDF / A between sites B and C would require a full resynchronization to re-enable disaster recovery protection. This is both a time and resource consuming process.

SRDF / Star avoids this full resynchronization by allowing a B→C (or C→B) resynchronization to be done differentially using host software commands and procedures.

In addition, SRDF / Star allows the SRDF personalities of sites A and B to be swapped and the SRDF / A relationship to be transferred to sites B and C during planned outages with no data movement at all.

DRAFT
EMC CONFIDENTIAL

This chapter provides the installation procedure, information on initiation and termination commands, and a description of the initialization parameters for the SRDF Host Component. Topics include:

- ◆ Overview of Installation 2-2
- ◆ Installing from Powerlink Distribution 2-7
- ◆ Installing from a Tape.....2-8
- ◆ Integration.....2-16
- ◆ Setting Up the ISPF Interface Environment 2-19

Overview of Installation

The SRDF Host Component installation kit is provided in two forms:

- ◆ As an electronic download from the EMC Powerlink™ website.
- ◆ As a 3480 installation tape

Preinstallation Steps

Before you begin installing SRDF Host Component, do the following:

- ❑ Review the requirements listed in this section and any that may be in the *SRDF Host Component for z/OS Release Notes*.
- ❑ Check the EMC FTP site or the Powerlink website for any product updates or current release notes.
- ❑ Install / upgrade the EMCSCF component of ResourcePak Base for z/OS.

Reviewing Hardware and Software Requirements

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

Table 2-1 Symmetrix System Requirements

Item	Requirements
Hardware	All currently-supported Symmetrix storage subsystems.
Engenuity Microcode Release	SRDF Host Component supports Symmetrix storage subsystems that are at microcode revision level 5x71 as well as many prior levels. The minimum supported level is 5x64. ^a

a. Use of certain features require higher microcode levels. These are noted where appropriate later in this guide.

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

SRDF Host Component has the mainframe hardware and software requirements listed in Table 2-2 on page 2-3. Before you install the SRDF Host Component software, make sure your mainframe system meets these requirements.

Table 2-2 Mainframe Hardware and Software Requirements

Item	Requirements
Hardware	Any system that supports MVS-based IBM operating systems
Software	- Any MVS-based operating system version currently supported by IBM - EMC ResourcePak Base 5.4 or higher and available maintenance, or a higher version ^a - RACF 1.9 or higher, or an equivalent SAF compliant security product, must be installed and activated

a. EMC ResourcePak Base and its EMC Symmetrix Control Facility (EMCSCF) must be installed and running. Refer to the *SRDF Host Component Release Notes* for more information about PTFs and how to apply them.

Important: VM does not allow volumes defined as unsupported to be attached to SYSTEM, or used to IPL a virtual machine. When running z/OS as a guest under VM, SRDF Host Component requires special consideration. You must define the SRDF Host Component volumes to VM (SET RDEV) as Type UNSUPORTed DEVClass DASD DPS Yes RESERVE_RELEASE Yes, and you must attach the SRDF Host Component volumes to the z/OS guest.

More Information: Refer to the *SRDF Host Component for z/OS Release Notes* for any additional requirements.

Checking with 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/MVSsoft
```

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** or **ReadMeNote.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 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 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_prodvrm.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.

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

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. In the Downloads Section, you see a list of files available for download and their description.

3. Choose your product from the list of files in 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 the documents, click either **ReadMe_vrn_Fixes.txt** or **Service_Notes_prodvrm.pdf**.

Important: **Service_Notes_prodvrm.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.

Important: Do not apply any maintenance in this zip file until you have accepted SRDF Host Component 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 the EMCSCF Component

The installation and customization of the SRDF Host Component requires that the EMCSCF component of ResourcePak Base for z/OS be installed on your system. EMCSCF may have already been installed with another EMC product. Even if you have previously installed EMCSCF, you should check, and if needed, install the latest version.

If ResourcePak Base is not installed before you install SRDF Host Component, the SMP/E APPLY job fails with a missing PREREQ. If this happens, you must install ResourcePak Base before you can rerun the APPLY job.

If you need to install or upgrade EMCSCF, do so before installing the SRDF Host Component while keeping in mind the following:

- ◆ EMCSCF is distributed with the EMC ResourcePak Base for z/OS product. This item is included with the SRDF Host Component and can also be ordered separately.
- ◆ Refer to the *EMC ResourcePak Base for z/OS Product Guide* for specific instructions concerning the installation of EMCSCF.
- ◆ Only the most recent EMCSCF should be installed on your system.
- ◆ EMCSCF may already be running on the system where you are installing the SRDF Host Component, so it is important that you perform an orderly shutdown of EMCSCF. After you have installed and customized the SRDF Host Component, restart the latest version of EMCSCF.

Installing from Powerlink Distribution

SRDF Host Component is available through Powerlink distribution. Take the following steps to download and install SRDF Host Component 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. In the Downloads section, you see a list of files available for download and their description.

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. 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 SRDF Host Component.

After you finish installation, go to *Integration* on page 2-16.

Installing from a Tape

In addition to electronic download, SRDF Host Component is also distributed on a 3480 tape in SMP/E format. The following sections describe how to install SRDF Host Component from a 3480 tape.

Important: This release supersedes all previous releases, and should be installed into the same zone as the EMCSCF component.

ResourcePak Base Kit Contents

The installation 3480 tape contains the files listed in Table 2-3:

Table 2-3 Installation Tape Contents

File	Dataset Name	Contents
1	EMC.SRDFvrm.RIMLIB	Installation materials containing members: • #01ALLOC — creates all needed datasets for installing the product • #02DFZON — IDCAMS define all of the SMP/E zone libraries^a • #03REPRO — IDCAMS repro the SMP/E seed into all zone libraries^a • #04DDDEF — creates the DDDEFs for all of the zone libraries • #05RECEV — contains a Modification Control Statement (MCS) that is used to stage SYSMODS to DASD and updates 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 that are used to receive and apply APARS • #90SAFJB — JCL to assemble and link SRDF Host Component modules with EMCSAFD and EMCSAFI • SETUP — REXX to simplify the customization process • RDFJCL — REXX to customize the install process • RDFWIN1 — panel used in REXX install customization
2	EMC.SRDFvrm.HOLDDATA	Exception SYSMOD data for the SRDF Host Component.
3	EMC.SRDFvrm.SMPMCS	MCS SYSMOD data for the installation of the SRDF Host Component using the RELFILE technique.

Table 2-3 Installation Tape Contents (continued)

File	Dataset Name	Contents
4 nn	EMC.FMID.Fxx Where: FMID SRDF Host Component 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.

a. This job was defined during the EMCSCF install.

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

RDFvrm

Where:

v

The version

r

The revision level

m

Modification number

For example, SRDF Host Component Version 5.3.0 has the VOLSER RDF530.

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 SRDF Host Component. 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.SRDFvrm, the LINKLIB dataset will be named EMC.SRDFvrm.LINKLIB.

EMC recommends that you use `EMC.fmid` (that is, `EMC.SRDFvrm`) 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 SRDF Host Component. If you have installed another EMC product using SMP/E, including an earlier version of SRDF Host Component, you should install the current version of SRDF Host Component 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 SRDF Host Component

Unload the SRDF Host Component, by creating and customizing the JCL in Figure 2-1 to unload the first file on the installation tape.

```
//          JOBCARD
//COPY01   EXEC PGM=IEBCOPY,REGION=4M
//INDD1    DD DSN=EMC.SRDFvrm.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 to Unload the SRDF Host Component

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 RDFJCL utility to update the JCL.

Host Component includes a SETUP REXX exec program to expedite the customization process. You can use RDFJCL with or without using SETUP REXX.

Using RDFJCL with REXX

Take the following steps to use RDFJCL with the REXX exec program. Then, continue with step 6 of this procedure.

1. While in the EDIT or BROWSE member list, use the EX command on the SETUP member. It will call the RDFJCL 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.

```

COMMAND ==> _____

Type EXEC on the command line and press ENTER to proceed, or PF3 to exit.

CLIST library           ==> _____
Edit macro name         ==> RDF
Product dsname prefix   ==> EMC.SRDFvrm
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     ==> RDFvrm      Tape unit name ==> CART

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

```

Figure 2-2 EMC JCL Customization Utility Panel

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 Host Component 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 Host Component into the same SMP/E environment as earlier versions of ResourcePak Base and Host Component, 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. (RDFvrm 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 2-14.

Using RDFJCL Without REXX

Take the following steps to use the RDFJCL utility without using the SETUP REXX. Then, go to *Running the RIMLIB Members* on page 2-14.

1. Copy the RDFJCL 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 RDFJCL 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 2-12) 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 Host Component product libraries will be installed.
 - Specify the install tape VOLSER. (RDFvrm 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

6. Run the following RIMLIB members¹ in order:
 - a. #01ALLOC
 - b. #04DDDEF
 - c. #05RECEV
 - d. #06APPLY
7. Conduct all necessary testing.
8. If the testing results are positive, run #07ACCPT to update the distribution libraries and zone.
9. If you have received maintenance cover letters from EMC, have instructions to apply maintenance from EMC support personnel, or found maintenance instructions on the EMC FTP site, run #08SMPOP. #08SMPOP receives and applies product maintenance (APARS).

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

Important: Do not apply maintenance until after SRDF Host Component is accepted.

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

10. Take one of the following steps:

- 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 SRDF Host Component 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 SRDF Host Component 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.

11. Perform installation, customization, and integration:

- a. APF authorize the SRDF Host Component LINKLIB and the TimeFinder load module.
- b. Refer to your previous ResourcePak Base installation and customization to integrate Host Component with EMCSCF. This includes concatenating the TimeFinder LINKLIB with the SCF LINKLIB.
- c. Conduct all necessary testing.

12. Review and perform all necessary installation customization described in *Integration* on page 2-16.

Integration

To integrate the SRDF Host Component into your environment, perform the following steps:

1. Copy the EMCRDF member in the SCF SAMPLIB library to a PROCLIB.
2. APF authorize the SRDF Host Component LINKLIB, or copy the SRDF Host Component load module to an APF authorized library.
3. Add the subsystem name specified on the SUBSYSTEM_NAME initialization parameter to your IEFSSNxx member.

For z/OS, the SRDF Host Component can dynamically add the subsystem. Dynamically adding the subsystem eliminates the need for an IPL before you use the product. However, EMC is still recommends that you add the subsystem to the IEFSSNxx member so that after an IPL is done, the dynamic installation is not required.

4. Refer to your previous ResourcePak Base installation and customization to integrate the SRDF Host Component with EMCSCF.

This includes concatenating the Host Component LINKLIB with the SCF LINKLIB in the EMCRDF procedure.

5. If you intend to issue EMC TimeFinder commands using the Host Component command interface, you must:
 - a. Install the TimeFinder Product Set for z/OS.
 - b. Concatenate the EMC TimeFinder libraries with Host Component in the EMCRDF procedure.

SRDF Host Component Log File

The SRDF Host Component allows (an) optional log file(s) to log all commands presented to the SRDF Host Component. Commands are logged by writing a copy of the associated EMC MN00E message with the console id and userid appended on the right.

With the additional specification of the HCLOG= initialization statement, you may request that the responses to those commands also be logged. If this feature is desired, add the following DD statement(s) to the startup JCL, EMCRDF:

```
//HCLOG1 DD SYSOUT=class
```

or

```
//HCLOG1 DD DISP=SHR,DSN=desired.log.data.set
```

More Information: Refer to member SRDFALLOG in the SCF SAMPLIB for an example of JCL to allocate the log files.

The SRDF Host Component also displays all initialization statements and any related messages in the log file.

If an alternate log file is desired, add either of the following DD statements to the startup JCL:

```
//HCLOG2 DD SYSOUT=class
```

or

```
//HCLOG2 DD DISP=SHR,DSN=desired.log.data.set
```

These datasets must be fixed-length records with a record length of 121. Using this feature, the SRDF Host Component logs all commands in the following format:

```
mm/dd/yyyy hh.mm.ss message_id : message text
```

Where:

mm/dd/yyyy Month / Day / Year

hh.mm.ss Hour / Minute / Second

message_id EMCxyyz

Where:

xx = message ID

yy = message number

z = message class

I (Informational)

R (Reply)

W (Warning)

E (Error)

message The text of the message
text

The SRDF Host Component writes to DDname HCLOG1 until the #SC GLOBAL, SWAPLOG command is entered, at which time, commands are logged to DDname HCLOG2.

Important: If the log DD statements are not present, command logging is not performed.

When a log is swapped, the previous log file contents are overwritten.

Important: These log files cannot be shared between multiple systems running the SRDF Host Component. When you run the SRDF Host Component on multiple z/OS images concurrently, each SRDF Host Component subsystem must have its own log file.

Setting Up the ISPF Interface Environment

To set up your ISPF interface environment, perform the following steps:

1. Copy the following ISPF interface load modules from the target library to an installation LINKLIST library:

- EMCSRDFR
- EMCSRDFC
- SRDFDASD
- SAISRDF

Important: The EMCSRDFR, EMCSRDFC, SRDFDASD, and SAISRDF modules must reside in an authorized LINKLIST library because they are called through the TSO/E Service Facility Routine IKJESTSR.

2. Remove any prior version of the Host Component ISPF interface (if installed) by performing the following steps:

You should do the following tasks as part of the installation of the new version of the REXX-based ISPF interface.

- a. Delete the following modules from the LINKLIST dataset:

- SRDFDCNS
- SRDFDEAC
- SRDFESTA
- SRDFISPI
- SRDFISSS
- SRDFTMCS

- b. In the IKJTSONn member of PARMLIB, remove the following from the AUTHTSF name list:

- SRDFDCNS
- SRDFTMCS
- SRDFDEAC

For an overview of the SRDF Host Component ISPF interface, refer to Chapter 7, *External Interfaces*.

DRAFT
EMC CONFIDENTIAL

SRDF Initialization Parameters

This chapter provides information on initialization and termination commands, and a description of the initialization parameters for the SRDF Host Component. Topics include:

- ◆ SRDF Host Component Operations 3-2
- ◆ Initiation and Termination Commands 3-3
- ◆ Initialization Parameters 3-4
- ◆ Group Definitions 3-45
- ◆ Message Exit 3-61

SRDF Host Component Operations

The SRDF Host Component requires that EMCSCF be running. If EMCSCF is not running, any issued SRDF Host Component commands receive the following message:

```
nn EMCN86R SCF SUBSYSTEM NOT FOUND - START SCF AND RETRY
```

If you receive this message:

- ◆ Start EMCSCF.
- ◆ Respond “nnRETRY” to reissue the command.

Running Multiple EMCSCF Copies

Multiple instances of EMCSCF can be run as separate subsystems. You may find this desirable when you are testing new versions of EMCSCF or EMCSCF-enabled products.

To run multiple instances of EMCSCF as separate subsystems, add the following DD statement to the EMCSCF test procedure.

```
//SCF$nnnn DD DUMMY
```

Where:

nnnn

Defines this instance of EMCSCF as a unique z/OS subsystem. The DD statement would then be used in any task where you want to use this copy of EMCSCF.

For example:

Test version of EMCSCF

```
//EMCSCF EXEC PGM=SCFMAIN,TIME=1440,REGION=0M
//STEPLIB DD DISP=SHR,DSN=test.load_library
//SCFINI DD DISP=SHR,DSN=init_dataset
//SYSABEND DD SYSOUT=*
//SCF$0100 DD DUMMY
```

Any task needing to use this instance of EMCSCF would add a connection DD statement. If a version of SRDF Host Component needed to use this version of EMCSCF, the JCL for SRDF Host Component would add the DD statement:

```
//HCTEST EXEC PGM=EMCSTC
//SYSOUT DD SYSOUT=A
//SYSIN DD *
//SCF$0100 DD DUMMY
```

Initiation and Termination Commands

This section provides the commands to start and stop the SRDF Host Component.

Initiating the SRDF Host Component

To initiate the SRDF Host Component at a mainframe console, enter the following command:

```
S EMCRDF
```

The EMCRDF started task initializes the SRDF Host Component, and provides server functions to the mainframe subsystem.

All SRDF Host Component I/O is done in the EMCRDF address space for recovery and performance purposes. EMC recommends leaving the subsystem active at all times.

Terminating the SRDF Host Component

To terminate the SRDF Host Component at a mainframe console, enter the following command:

```
P EMCRDF (or #STOP)
```

The “#” character is used as the COMMAND_PREFIX parameter throughout this guide.

Initialization Parameters

The initialization parameters are specified as a series of parameter statements in the following format:

```
<keyword> = <value>
```

- ◆ The keyword must begin in column 1.

An asterisk (*) in column 1 denotes a comment.

- ◆ The first noncomment statement you specify must be SUBSYSTEM_NAME. You can specify all other parameters (except for the SRDF Group parameters) in any order.
- ◆ Save the initialization parameter statements as a member of a parameter library. This parameter library must be pointed to by the RDFPARM DD statement of the EMC RDF procedure.

Table 3-1 summarizes the initialization parameters associated with the SRDF Host Component.

Table 3-1 Initialization Parameters

Parameter	Required/Optional	Default Setting
ALLOW_CRPAIR_NOCOPY	Optional	NO
ALIAS	Optional	N/A
COMMAND_DETAILS	Optional	N/A
COMMAND_PREFIX	Required	N/A
EMCMMSGX_ON	Optional	N/A
EXCLUDE_CUU	Optional	N/A
EXCLUDE_DEVICE_RANGE	Optional	No devices are excluded
EXCLUDE_SYM	Optional	N/A
EXCLUDE_VOL	Optional	N/A
FBA_ENABLE	Optional	NO
FILTER_KNOWN	Optional	N/A
FILTER_ONLINE	Optional	N/A

Table 3-1 Initialization Parameters (continued)

Parameter	Required/Optional	Default Setting
FILTER_R1	Optional	N/A
FILTER_R2	Optional	N/A
GROUP_END	Optional	N/A
GROUP_NAME	Optional	N/A
GROUP_SORT_BY_VOLSER	Optional	N/A
GROUP_SORT_BY_MVSCUU	Optional	N/A
HCLOG	Optional	COMMANDS
INCLUDE_CUU	Optional	N/A
INCLUDE_RAG	Optional	N/A
INCLUDE_VOL	Optional	N/A
INT_VOLSER	Optional	N/A
LOGONLY_FOR_TRACKED_COMMANDS	Optional	N/A
MAX_ALIAS	Optional	200
MAX_COMMANDQ	Optional	500
MAX_QUERY	Optional	512
MESSAGE_LABELS	Optional	NONE
MESSAGE_PROCESSING	Required	N/A
MSC_ACTIVATE_MS	Optional	N/A
MSC_ALLOW_INCONSISTENT	Optional	N/A
MSC_CYCLE_TARGET	Optional	N/A
MSC_GROUP_END	Optional	N/A
MSC_GROUP_NAME	Optional	N/A
MSC_INCLUDE_SESSION	Optional	N/A
MSC_STAR	Optional	N/A
MSC_VALIDATION	Optional	WARN

Table 3-1 Initialization Parameters (continued)

Parameter	Required/Optional	Default Setting
MSC_WEIGHT_FACTOR	Optional	0
OPERATOR_VERIFY	Optional	ALL
REGISTER_COMMAND_PREFIX	Optional	N/A
SAF_CLASS	Optional	DATASET
SAF_PROFILE	Optional	EMC.VALIDATE.ACCESS
SECURITY_CONFIG	Required	N/A
SECURITY_QUERY	Required	N/A
SHOW_COMMAND_SEQ#	Optional	NO
SINGLE_CONCURRENT	Optional	N/A
SMFREC	Optional	SMF option is not active
SORT_BY_COMMAND	Optional	N/A
SORT_BY_MVSCUU	Optional	N/A
SORT_BY_VOLSER	Optional	N/A
SUBSYSTEM_NAME	Required	N/A
SYNCH_DIRECTION_ALLOWED	Optional	R1>R2
SYNCH_DIRECTION_INIT	Optional	NONE
USER_VERIFICATION	Optional	NO
USER_VERIFICATION_TIMEOUT	Optional	(5,0)
VALIDATE_CRPAIR_NOCOPY_LEVEL	Optional	1

ALLOW_CRPAIR_NOCOPY

Description	The ALLOW_CRPAIR_NOCOPY parameter specifies if the NOCOPY flag will be allowed on the #SC VOL CREATEPAIR action.
Format	ALLOW_CRPAIR_NOCOPY=YES <u>NO</u> STAR Where: YES Indicates NOCOPY will be allowed for all devices. <u>NO</u> Indicates NOCOPY will not be allowed for any CREATEPAIR command. STAR Indicates NOCOPY will only be allowed for CREATEPAIR commands to a SRDF/Star group.
Example	ALLOW_CRPAIR_NOCOPY=STAR

ALIAS

Description	The optional ALIAS initialization parameter allows you to assign an alias to an SRDF Host Component command parameter. You can substitute aliases for command parameters within an SRDF Host Component command. The replacement can be any node (parse point) preceding a blank, open parenthesis, close parenthesis, or comma. An alias must be unique, and must not be the same as any SRDF Host Component command. For example, the #SC VOL, VOL command cannot be an alias. You can assign multiple aliases to the same SRDF Host Component command parameter.
Format	ALIAS=srdf-hc <i>command parameter</i> , <i>alias_name</i> Where: <i>command parameter</i> Is the command parameter to which you want to assign a name.

alias_name

Is the alias you want to assign.

Examples

```
ALIAS=GLOBAL,G
ALIAS=SSID_REFRESH,S
```

- ◆ If ALIAS is set to the following:

```
ALIAS='VOL,LCL(9800,02),CREATEPAIR(INVALIDATER2,SYNC,RDY,LCLISR2)',CPR
```

The #SC CPR,02-03,00 command expands to:

```
#SC VOL,LCL(9800,02),CREATEPAIR(INVALIDATER2,SYNC,RDY,LCLISR2),02-03,00
```

- ◆ If ALIAS is set to the following:

```
ALIAS='RMT(3004,00.01.02.03)',MHL
```

The #SQ V,MHL command expands to:

```
#SQ VOL,RMT(3004,00.01.02.03)
```

- ◆ If ALIAS is set to the following:

```
ALIAS='SQ VOL,G(GROUP_ONE)',CMD1
```

The #CMD1 command expands to:

```
#SQ VOL,G(GROUP_ONE)
```

More Information: A sample of ALIAS is provided in the SCF SAMPLIB library member RDFALIAS.

COMMAND_DETAILS

Description

You can use the COMMAND_DETAILS initialization parameter with #SC CNFG, #SC LINK, and #SC RDFGRP commands to get EMCGM40I messages. Use this parameter with the #SC VOL command to get additional messages (EMCGM40I through EMCGM43I). When this parameter is not present, EMCGM40I through EMCGM43I are not issued.

Format

COMMAND_DETAILS

Example

None.

COMMAND_PREFIX

Description The required COMMAND_PREFIX parameter indicates the prefix for all SRDF Host Component commands. This command prefix must be unique to the SRDF Host Component. The COMMAND_PREFIX can be registered with the Sysplex by adding the keyword REGister to the parameter value. For example:

COMMAND_PREFIX=# Prefix not registered with the Sysplex

COMMAND_PREFIX=#HC,REG Prefix registered with the Sysplex

Registering the command prefix prevents ambiguity between similar command prefixes defined for different subsystems. z/OS does not allow you to register a command prefix that is the same as or a subset of an existing registered command prefix, nor does z/OS allow you to register a command prefix for which an existing registered command prefix is a subset. Any attempt to do so results in an error message and an initialization failure.

Format COMMAND_PREFIX=*prefix*

Where:

prefix

Is the one to eight character prefix you want to use.

Comments When you precede the COMMAND_PREFIX parameter by the REGISTER_COMMAND_PREFIX parameter, the value specified is not parsed for the ,REG= *keyword*. Instead, the entire 1-8 character string specified on the COMMAND_PREFIX parameter is used as the prefix.

Consider the following example:

REGISTER_COMMAND_PREFIX=YES
COMMAND_PREFIX=@,REG

In this example, the prefix is set to the 5-character string '@,REG' and the prefix would be registered. On the other hand, if, the REGISTER_COMMAND_PREFIX parameter is not specified, and the same COMMAND_PREFIX parameter is used, the prefix would be set to '@' and the prefix would be registered.

Example COMMAND_PREFIX=#

Important: Be careful when selecting characters for the command prefix, as z/OS interprets some characters differently. For example, the \$ character is intercepted by JES, and V prevents the use of vary or offline commands.

EMCMMSGX_ON

The EMCMMSGX_ON initialization parameter loads and enables the message exit.

More Information: Refer to *Message Exit* on page 3-61.

Format EMCMMSGX_ON

Example EMCMMSGX_ON

EXCLUDE_CUU

Description You can use the EXCLUDE_CUU initialization parameter when defining a Defined Group. EXCLUDE_CUU allows you to exclude a list of included mainframe devices. You can use this statement parameter only after the GROUP_NAME parameter. EXCLUDE_CUU is valid only for MVS_GROUPS.

Formats The formats for this parameter statement are as follows:

- ◆ *EXCLUDE_CUU=aaaa*

Where *aaaa* is a mainframe device number to be excluded from the group definition.

- ◆ *EXCLUDE_CUU=bbbb,cccc,dddd*

Where *bbbb*, *cccc*, and *dddd* are mainframe device numbers to be excluded from the group definition.

- ◆ *EXCLUDE_CUU=eeee-ffff,gggg-hhhh*

Where *eeee-ffff* and *gggg-hhhh* are ranges of mainframe device numbers to be excluded from the group definition. Note that *ffff* > *eeee* and *hhhh* > *gggg*.

More Information: Refer to *Group Definitions* on page 3-45.

EXCLUDE_DEVICE_RANGE

Description The optional EXCLUDE_DEVICE_RANGE parameter statement specifies an mainframe device number, or range of mainframe device numbers to be excluded from use in commands issued to SRDF Host Component. This does not stop SRDF Host Component from acting upon devices listed in this parameter.

Format EXCLUDE_DEVICE_RANGE=*scuu* [-*ecuu*]

Where:

scuu

Specifies the starting mainframe device number.

ecuu

Specifies the ending mainframe device number of a range of devices to be excluded from SRDF Host Component processing.

If *ecuu* is omitted, only the device specified in *scuu* is excluded. The ending device number, if specified, must be greater than or equal to the starting device number. Up to 128 separate EXCLUDE_DEVICE_RANGE statements may be included in the initialization deck, allowing for up to 128 distinct ranges of devices to be excluded.

Example To exclude a whole Symmetrix from SRDF Host Component use, you have EXCLUDE_DEVICE_RANGE parameters for all device ranges in that Symmetrix. For example:

```
EXCLUDE_DEVICE_RANGE=200-3FF
EXCLUDE_DEVICE_RANGE=420
EXCLUDE_DEVICE_RANGE=800-FFF
```

In the previous example, devices 200 through 3FF, 420, and 800 through FFF would be excluded from use as the *cuu* parameter in commands issued to SRDF Host Component.

In the example, device 420 cannot be used in an SRDF Host Component command, but can still be included in the processing of other commands. If you issued a command to device 421 and used ALL in the count field, you actually include device 420 in your command process.

**CAUTION**

EXCLUDE_DEVICE_RANGE does not exclude devices from being processed. The statement specifies which devices are not to be used to issue the actions or query to the Symmetrix.

EXCLUDE_SYM**Description**

You can use the EXCLUDE_SYM initialization parameter when defining a Defined Group. EXCLUDE_SYM allows you to exclude a Symmetrix device or range of Symmetrix devices from an EMC controller. You can only use EXCLUDE_SYM after the GROUP_NAME parameter. EXCLUDE_SYM is valid only for SYM_GROUPS.

Formats

The formats for this parameter statement are as follows:

- ◆ EXCLUDE_SYM=aaaa, (bbbb)

Where aaaa is a mainframe device number in the control unit that the Symmetrix device number bbbb is to be excluded from the group definition.

- ◆ EXCLUDE_SYM=cccc, (dddd-eeee)

Where cccc is an mainframe device number in the control unit that the Symmetrix device number range dddd-eeee is to be excluded from the group definition. Note that eeee > dddd.

Example

None.

EXCLUDE_VOL

Description

You can use the EXCLUDE_VOL initialization parameter when defining a Defined Group. EXCLUDE_VOL allows you to exclude a list of mainframe volumes and/or patterns of volumes. You can only use EXCLUDE_VOL after the GROUP_NAME parameter. EXCLUDE_VOL is valid only for MVS_GROUPS.

EXCLUDE_VOL is a dynamic exclude statement. The mainframe device number of the device to be excluded is obtained at the time the command is issued. The mainframe device number is obtained from the online mainframe volume serial name. The dynamic exclude ability of this statement may produce unexpected results for an R1 and R2 pair with the same volume serial name.

Formats

The formats for this parameter statement are as follows:

- ◆ EXCLUDE_VOL=aaaaaa

Where *aaaaaa* is a mainframe volume serial name to be included in the group definition. Note that *aaaaaa* must be online to be excluded.

- ◆ EXCLUDE_VOL=bbbbbb,cccccc,dddddd

Where *bbbbbb*, *cccccc*, and *dddddd* are mainframe volume serial names to be excluded in the group definition. Note that *bbbbbb*, *cccccc*, and *dddddd* must be online to be excluded.

Comments

When using EXCLUDE_VOL, the SRDF Host Component supports the use of patterns.

For example:

- ◆ EXCLUDE_VOL=e*

Where *e** excludes all online mainframe volume serial names that begin with the character *e*.

- ◆ EXCLUDE_VOL=fghij*

Where *fghij** excludes all online mainframe volume serial names that begin with the characters *fghij*.

The following rules apply when using patterns:

- ◆ At least one significant character must be used (in other words, an* matches every online volume serial starting with a).

- ◆ The only pattern character is * and it can be used for any number of characters.
- ◆ Asterisk (*) is always an ending character.
- ◆ In order for the pattern to match, the device with the Volume Serial name must be online.
- ◆ Using a pattern requires the entire UCB list for the z/OS image to be scanned at the time the command is issued.

More Information: Refer to *Group Definitions* on page 3-45.

Example None.

FBA_ENABLE

Description The optional FBA_ENABLE initialization parameter specifies whether the SRDF Host Component is to allow #SC VOL commands to change the status of FBA devices. You can change this operating mode using the #SC GLOBAL command, and display the operating mode using the #SQ GLOBAL command.

Format FBA_ENABLE=YES | NO

Where:

YES

Specifies that the #SC VOL command is enabled for FBA devices.

NO

Specifies that the #SC VOL command is disabled for FBA devices.

If you do not specify FBA_ENABLE, FBA_ENABLE defaults to NO.

Example FBA_ENABLE=YES

FILTER_KNOWN

Description You can use the FILTER_KNOWN initialization parameter when defining a Defined Group. You can only use FILTER_KNOWN after the GROUP_NAME initialization parameter. FILTER_KNOWN is a initialization parameter that, when used with an MVS_GROUP, includes both online and offline devices *known* to the SRDF Host Component.

A device is *known* to the SRDF Host Component when it has been online or found sometime while the SRDF Host Component has been running.

More Information: Refer to *Group Definitions* on page 3-45.

Format FILTER_KNOWN

Example FILTER_KNOWN

FILTER_ONLINE

Description You can use the FILTER_ONLINE initialization parameter when defining a Defined Group. You can only use FILTER_ONLINE after the GROUP_NAME initialization parameter. FILTER_ONLINE is a parameter that, when used with an MVS_GROUP, includes only *online* devices known to the SRDF Host Component.

More Information: Refer to *Group Definitions* on page 3-45.

Format FILTER_ONLINE

Example FILTER_ONLINE

FILTER_R1

Description

You can use the FILTER_R1 initialization parameter when defining a Defined Group. You can only use FILTER_R1 after the GROUP_NAME parameter. FILTER_R1 is a parameter that, when used, includes only R1 devices in the group, unless you use it with a FILTER_R2 initialization parameter. The included devices (included with INCLUDE statements) are filtered to include only the R1 devices in the group.

If you use both FILTER_R1 and FILTER_R2 in a group definition, both R1 and R2 devices are included in the group. FILTER_R1 is valid for both SYM_GROUPS and MVS_GROUPS.

More Information: Refer to *Group Definitions* on page 3-45.

Format

FILTER_R1

Example

FILTER_R1

FILTER_R2

Description

You can use the FILTER_R2 initialization parameter when defining a Defined Group. You can only use FILTER_R2 after the GROUP_NAME parameter. FILTER_R2 is a parameter that, when used, includes only R2 devices in the group, unless you use it with a FILTER_R1 initialization parameter. The included devices (included through INCLUDE statements) are filtered to include only the R2 devices in the group.

If you use both FILTER_R1 and FILTER_R2 in a group definition, both R1 and R2 devices are included in the group. FILTER_R2 is valid for both SYM_GROUPS and MVS_GROUPS.

More Information: Refer to *Group Definitions* on page 3-45.

Format

FILTER_R2

Example

FILTER_R2

GROUP_END

Description You can use the GROUP_END initialization parameter when defining a Defined Group. You can only use GROUP_END after the GROUP_NAME parameter. GROUP_END is a required parameter to terminate the group definition. GROUP_END is valid for both SYM_GROUPS and MVS_GROUPS.

More Information: Refer to *Group Definitions* on page 3-45.

Format GROUP_END

Example GROUP_END

GROUP_NAME

Description You can use the GROUP_NAME initialization parameter when defining a Defined Group. GROUP_NAME is a required parameter that starts the definition of a group.

The group name you specify can be from 1 through 24 alphanumeric or national characters. A GROUP_NAME must be contiguous and cannot contain blanks in the value. GROUP_NAME is valid for both SYM_GROUPS and MVS_GROUPS.

Both local and remote groups may be defined. Local groups can be defined to operate upon only a single mirror of a concurrent SRDF relationship.

If a Defined Group name is the same as a SMS Group name, the Defined Group is used for that name.

More Information: Refer to *Group Definitions* on page 3-45.

Format GROUP_NAME=*value*

Where

value

Is a name consisting of 1-24 alphanumeric or national (@#)\$ characters.

Example None.

GROUP_SORT_BY_VOLSER

Description You can use the GROUP_SORT_BY_VOLSER initialization parameter in a group definition (must be after a GROUP_NAME initialization parameter statement and before a GROUP_END initialization parameter statement).

If the Global Sort Order is set to COMMAND, the output is sorted in VOLSER sequence. If the Global Sort Order is not set to COMMAND, this parameter is ignored. This parameter only applies to #SQ VOL, #SQ MIRROR, and #SQ STATE commands.

Format GROUP_SORT_BY_VOLSER

Example GROUP_SORT_BY_VOLSER

GROUP_SORT_BY_MVSCUU

Description You can use the GROUP_SORT_BY_MVSCUU initialization parameter in a group definition (must be after a GROUP_NAME initialization parameter statement and before a GROUP_END initialization parameter statement).

If the Global Sort Order is set to COMMAND, the output is sorted in MVSCUU sequence. If the Global Sort Order is not set to COMMAND, this parameter is ignored. This parameter only applies to #SQ VOL, #SQ MIRROR, and #SQ STATE commands.

Format GROUP_SORT_BY_MVSCUU

Example GROUP_SORT_BY_MVSCUU

HCLOG

Description The optional HCLOG initialization parameter specifies whether the SRDF Host Component is to log only commands, or to log commands and command responses to the HCLOGn datasets.

HCLOG is only effective if one or more HCLOGn DD statements are included in the initialization JCL, as described in *SRDF Host Component Log File* on page 2-16.

Format HCLOG=COMMANDS | ALL

Where:

COMMANDS

Only the commands are to be logged.

ALL

Commands and responses be logged.

Example

HCLOG=ALL

INCLUDE_CUU

Description

You can use the INCLUDE_CUU initialization parameter when defining a Defined Group. You can only use INCLUDE_CUU after the GROUP_NAME parameter. INCLUDE_CUU is a parameter you use to include a list of mainframe devices. INCLUDE_CUU is only valid for MVS_GROUPS.

More Information: Refer to *Group Definitions* on page 3-45.

Format

The formats for this parameter statement are as follows:

- ◆ INCLUDE_CUU=aaaa
Where aaaa is an mainframe device number to be included in the group definition.
- ◆ INCLUDE_CUU=bbbb,cccc,ddd
Where bbbb, cccc and dddd are mainframe device numbers to be included in the group definition.
- ◆ INCLUDE_CUU=eeee-ffff,gggg-hhhh
Where eeee-ffff and gggg-hhhh are ranges of mainframe device numbers to be included in the group definition. Note that *ffff>eeee* and *hhhh>gggg*.

Example

None.

INCLUDE_RAG

Description

You can use the INCLUDE_RAG initialization parameter when defining a Defined Group. You can only use INCLUDE_RAG after the GROUP_NAME parameter. INCLUDE_RAG= is a parameter you use to include an entire RA group from a local or remote EMC controller. INCLUDE_RAG= is only valid for SYM_GROUPS.

More Information: Refer to *Group Definitions* on page 3-45.

Format

INCLUDE_RAG=aaaa, (ragroup##)

INCLUDE_RAG=LCL (aaaa, ragroup#)

INCLUDE_RAG=RMT (aaaa, mhlist, ragroup#)

Where:

aaaa

Indicates the mainframe device number of the gatekeeper device in the control unit.

nn

Indicates the RA group to be included into the group definition. In the LCL form, nn is the local RA group to be included into the group definition.

raggroup#

Indicates the remote controller RA group to be included.

Example

None.

INCLUDE_VOL

Description

You can use the INCLUDE_VOL initialization parameter when defining a Defined Group. You can only use INCLUDE_VOL after the GROUP_NAME parameter. INCLUDE_VOL is a parameter that you use to include a list of mainframe volumes and /or patterns of volumes. INCLUDE_VOL is only valid for MVS_GROUPS.

INCLUDE_VOL is a dynamic include statement. The mainframe device number of the device to be included is obtained at the time the command is issued. The mainframe device number is obtained from the online mainframe volume serial name. The dynamic include

ability of this statement may produce unexpected results with an R1 and R2 pair with the same volume serial name.

For example: Assume that both devices in an R1 and R2 pair have a volume serial name of ABCDEF and that the R2 device is online. INCLUDE_VOL=ABCDEF includes the R2 device. If FILTER_R1 is applied, neither the R1 nor the R2 is included. Assume that the R2 device is taken offline and the R1 device is taken online. INCLUDE_VOL=ABCDEF includes the R1 device. The group dynamically changes which device is included, which may not be the expected result.

More Information: Refer to *Group Definitions* on page 3-45.

Format The formats for this parameter statement are as follows:

- ◆ INCLUDE_VOL=aaaaaa

Where aaaaaa is a mainframe volume serial name to be included in the group definition. Note that aaaaaa must be online to be included.

- ◆ INCLUDE_VOL=bbbbbb,cccccc,dddddd

Where bbbbbb, cccccc and dddddd are mainframe volume serial names to be included in the group definition. Note that bbbbbb, cccccc, and dddddd must be online to be included.

Comments The SRDF Host Component supports the use of patterns with INCLUDE_VOL. For example:

- ◆ INCLUDE_VOL=e*

Where e* includes all online z/OS volume serial names that begin with the character e.

- ◆ INCLUDE_VOL=fghij*

Where fghij* includes all online z/OS volume serial names that begin with the characters fghij.

The following rules apply when using patterns:

- ◆ At least one significant character must be used (in other words, an * matches every online volume serial starting with a).
- ◆ The only pattern character is * and it can be used for any number of characters.
- ◆ Asterisk (*) is always an ending character.

- ◆ In order for the pattern to match, the device with the Volume Serial name must be online.
- ◆ Using a pattern requires the entire UCB list for the z/OS image to be scanned at the time the command is issued.

Example None.

INIT_VOLSER

Description The INIT_VOLSER initialization parameter is an initial value for the VOLSER. If a device is not discovered later and filled in from the online UCB, this initial value is used in the displays for the #SQ VOL and #SQ STATE commands.

Note that the opening quote (') is required. The first six characters after the opening quote are used as the value for the device volume serial for any device found offline.

Format INIT_VOLSER='init volser'

Where:

init volser

Specifies the initial value for the VOLSER.

Example INIT_VOLSER='ABCDEF'

LOGONLY_FOR_TRACKED_COMMANDS

Description If you specify LOGONLY_FOR_TRACKED_COMMANDS, then command output for commands entered from the batch and REXX interfaces do not appear in the syslog or system consoles. This output is still returned to the submitter of the command, and will appear in the hclog.

Format LOGONLY_FOR_TRACKED_COMMANDS

Example LOGONLY_FOR_TRACKED_COMMANDS

MAX_ALIAS

Description The optional MAX_ALIAS initialization parameter specifies the maximum number of alias statements that can be included in the parameter file.

Format MAX_ALIAS=*nnnn*

Where:

nnnn

Represents the maximum number of alias statements, a decimal integer in the range of from 200 to 4095. If you do not specify MAX_ALIAS, MAX_ALIAS defaults to 200.

Example MAX_ALIAS=330

MAX_COMMANDQ

Description The optional MAX_COMMANDQ initialization parameter specifies the maximum number of commands that can be queued to the SRDF Host Component main task for parsing.

Each command queued for parsing occupies 80 bytes plus the length of the command in extended private.

Format MAX_COMMANDQ=*nnnn*

Where:

nnnn

Is a value from 1 through 4096. If you omit this parameter, MAX_COMMANDQ defaults to 500.

Example MAX_COMMANDQ=4096

MAX_QUERY

Description The optional MAX_QUERY initialization parameter specifies the maximum number of lines that may be displayed for #SQ VOL, #SQ MIRROR, and #SQ STATE commands.

Format MAX_QUERY=*nnnn*

Where:

nnnn

Is a value from 1 through 8192. If you omit MAX_QUERY, it defaults to 512.

Note: If the Symmetrix being displayed has more than 8192 devices, use command syntax specifying the starting Symmetrix device number. For example:

#SQ VOL, *cuu*, *count*, *startingdev*#

Console buffering should be considered when setting MAX_QUERY.

Example MAX_QUERY=256

MESSAGE_LABELS

Description The optional MESSAGE_LABELS initialization parameter specifies whether the SRDF Host Component is to attach labels to the end of certain SRDF Host Component messages to make it easier to associate responses with commands when multiple commands are running concurrently.

Format MESSAGE_LABELS=NONE | SYMMETRIX_SERIAL | MVS_CUU | COMMAND_SEQ

Where:

NONE

Specifies that labels are not attached to messages.

If you do not specify MESSAGE_LABELS, MESSAGE_LABELS defaults to *NONE*.

SYMMETRIX_SERIAL

Specifies the last five digits of the serial number of the Symmetrix to which the command was directed. This number is appended to the end of command status messages. The label takes the form of “(SER:nnnnn).”

MVS_CUU

Specifies the mainframe device number to which the command was directed. This number is appended to the end of command status messages. If a range of devices was selected, the first device number in the range is used. The label takes the form of “(CUU:xxxx).”

COMMAND_SEQ

Specifies the command sequence number assigned at command entry. This number is appended to the end of command status messages. This parameter can be used with the SHOW_COMMAND_SEQ#=YES initialization statement to make it easier to identify in the log which messages are associated with which commands.

Example MESSAGE_LABELS=SYMMETRIX_SERIAL

MESSAGE_PROCESSING

Description The SRDF Host Component has the ability to intercept and interpret certain Service Information Messages (SIMs). The SIMs may then be saved. The required MESSAGE_PROCESSING initialization parameter indicates whether or not message processing is enabled.

Format MESSAGE_PROCESSING=YES [, *nnn*] | LOG [, *nnn*] | NO

Where:

YES [, *nnn*]

Enables message processing. Optionally, uses *nnn* as the size of the message table. The value of *nnn* can range from 1 through 512. The default size of the message table is 256 entries.

LOG [, *nnn*]

Enables message processing and also sends the EMCQM821 message to the HCLOG dataset (if it is allocated). Optionally, uses *nnn* as the size of the message table. The value of *nnn* can range from 1 through 512. The default size of the message table is 256 entries.

The message log is displayed using the #SQ MSG command.

More Information: For more information about the HCLOG dataset, refer to *HCLOG* on page 3-18.

NO

Disables message processing.

Example

```
MESSAGE_PROCESSING=YES,20
MESSAGE_PROCESSING=LOG,400
```

MSC_ACTIVATE_MS

Description

The MSC_ACTIVATE_MS initialization parameter is optional. MSC_ACTIVATE_MS tells MSC to Activate the MSC GROUP after startup in the SCF address space. You must use MSC_ACTIVATE_MS after the MSC_GROUP_NAME parameter and before the MSC_GROUP_END parameter.

Format

MSC_ACTIVATE_MS

Example

MSC_ACTIVATE_MS

MSC_ALLOW_INCONSISTENT

Description

The MSC_ALLOW_INCONSISTENT parameter is optional. MSC_ALLOW_INCONSISTENT instructs the MSC to allow a SRDF/A session to join MSC, even if the SRDF/A session is inconsistent.

The default is to not allow a SRDF/A session to join MSC until that SRDF/A session is consistent on the secondary side.

You must use the MSC_ALLOW_INCONSISTENT parameter after the MSC_GROUP_NAME parameter and before the MSC_GROUP_END parameter.

Format

MSC_ALLOW_INCONSISTENT

Example

MSC_ALLOW_INCONSISTENT

MSC_CYCLE_TARGET

Description The MSC_CYCLE_TARGET parameter sets the desired length of each cycle in seconds. You can only use MSC_CYCLE_TARGET after the MSC_GROUP_NAME parameter statement and before the MSC_GROUP_END parameter statement.

If you include more than one MSC_CYCLE_TARGET statements in an MSC Group definition, the last one will be the one used.

The higher the value you use, the longer each cycle will be and thus the further behind your secondary side may be. Depending on the Host Throttle value set in the IMPL Bin, if you set MSC_CYCLE_TARGET to too large a value, you can cause either:

- ◆ SRDFA to drop
- ◆ Your host I/O to be slowed down by the Symmetrix storage subsystem

Format MSC_CYCLE_TARGET=*cycle_length*

Example MSC_CYCLE_TARGET=30

MSC_GROUP_END

Description The MSC_GROUP_END parameter terminates the definition of a SRDF/A multi-session group. You can only use the MSC_GROUP_END parameter after the MSC_GROUP_NAME parameter and after at least one MSC_INCLUDE_SESSION parameter.

Format MSC_GROUP_END

Example MSC_GROUP_END

MSC_GROUP_NAME

Description

Use the MSC_GROUP_NAME parameter to define an SRDF/A multi-session definition. MSC_GROUP_NAME is a required key word that starts the definition of the group.

Format

MSC_GROUP_NAME=*groupname*

Where:

groupname

Specifies the name of the group. The *groupname* can be from 1 through 24 alphanumeric or national (@#\$) characters. The *groupname* must be contiguous and cannot contain blanks in the definition.

The name must be unique for each:

- SRDF/A multi-session group
- SRDF Host Component group
- SCFG group
- SMS group

Note: The *groupname* should be unique in the first 8 characters of the possible 24 characters. The first 8 characters are recorded and used for identifying the MSC_GROUP.

Example

MSC_GROUP_NAME=MSCGROUP1

MSC_INCLUDE_SESSION

Description

You can use the INCLUDE_SESSION parameter to include the SRDF/A RDFGRP to the SRDF/A multi-session group.

The MSC_INCLUDE_SESSION statement can only be used after the MSC_GROUP_NAME statement and before the MSC_GROUP_END statement. One INCLUDE_SESSION statement is required for each SRDF/A session to be included in the SRDF/A multi-session group.

Format

MSC_INCLUDE_SESSION=*dddd*, (*nn*) , (*mm*)

Where:

dddd

Specifies the z/OS device number in the Symmetrix where the SRDF/A session exists.

, (*nn*)

Specifies the RDFGRP of the RDFGRP to include in the MSC GROUP.

, (*mm*)

Is an optional parameter that is only used for a SRDF/Star definition. To use this parameter you also need to use the MSC_STAR statement. In a SRDF/Star definition, this is the RDFGRP that goes from the SRDF/A Secondary Symmetrix to the non-SRDF/A Secondary Symmetrix that will be used for failover procedures.

Example 1 (MSC) MSC_INCLUDE_SESSION=A100,(02)

Example 2 (STAR) MSC_INCLUDE_SESSION=A100,(02),(05)

MSC_STAR

Description This parameter is only used when defining a SRDF/Star definition. When you use MSC_STAR, you must also use the optional part of the MSC_INCLUDE_SESSION statement. You must use the MSC_STAR statement after the MSC_GROUP_NAME statement and before the MSC_GROUP_END statement.

Format MSC_STAR=*cgrpname*

Where:

cgrpname

Is the name of the consistency group protecting the non-SRDF/A mirror of the concurrent RDF device.

Example MSC_STAR=STARCGRP

MSC_VALIDATION

Description When running MSC in SRDF / Star mode, the protection level on all of the devices in the Star configuration can be validated. All devices in a Star configuration (i.e., concurrent R1, SRDF / A R2, and the synchronous R2) will be checked to ensure that they are locally protected in some manner. If any device is found that does not meet the protection check, then the action to take is based on this parameter setting.

Format MSC_VALIDATION=WARN | FAIL | NONE

Where:

WARN

Issues a warning message if devices are found that fail the protection check. This is the default setting.

FAIL

Does not allow the Star definition to complete when the protection check is made and any device does not meet the requirements.

NONE

Bypasses the protection check.

MSC_WEIGHT_FACTOR

Description The MSC_WEIGHT_FACTOR parameter is used to weight the redundant MSC servers.

- ◆ Setting MSC_WEIGHT_FACTOR = 0 will cause the server to immediately attempt the MSC cycle switch process once all RDFGRPs in the MSC Group are ready to cycle switch.
- ◆ Setting MSC_WEIGHT_FACTOR to a value greater than 0 instructs the MSC server to wait the value (in seconds) after all RDFGRPs are ready to cycle switch, before attempting to cycle switch.

If you are running a single MSC server, set MSC_WEIGHT_FACTOR = 0. If you are running multiple MSC servers for a single MSC group, you can set one to a primary server ($n=0$) and set the other servers to a secondary server ($n > 0$). The recommended values for secondary MSC servers are $n=2$ or $n=3$.

You must use the MSC_WEIGHT_FACTOR statement after the MSC_GROUP_NAME statement and before the MSC_GROUP_END statement.

Format MSC_WEIGHT_FACTOR=*n*

Where:

n

Is a value of 0, 1, 2, or 3. The default value is 0 (i.e., by omitting the parameter you get MSC_WEIGHT_FACTOR=0).

Example MSC_WEIGHT_FACTOR=0

OPERATOR_VERIFY

Description The optional OPERATOR_VERIFY initialization parameter indicates whether or not operator verification has been enabled.

Format OPERATOR_VERIFY=ALL | CRITICAL | NONE

Where:

ALL

Specifies that operator verification is requested for all command types. If you do not specify OPERATOR_VERIFY, the OPERATOR_VERIFY parameter defaults to ALL.

CRITICAL

Specifies that all requests for operator verification are suppressed except for:

- #SC VOL command action codes: VALIDATE, INVALIDATE, REFRESH, R/W, ITA, and NITA
- #SC RDFGRP command action codes: ADD, MODIFY, and DELETE
- #SC SRDFA command action codes: DROP, PEND_DEACT, PEND_DROP, TOL_ON, and TOL_OFF

NONE

Specifies that no operator verification is requested.

Example OPERATOR_VERIFY=CRITICAL

Important: The ISPF interface does not allow you to respond to Write To Operator with Reply messages (WTORs) that are issued as a direct result of commands you enter when the OPERATOR_VERIFY parameter is ALL or CRITICAL. The SRDF Host Component API interface used by the ISPF panels and REXX requires that you provide another method for responding to these verifications. The recommended approach is to implement SAF security and specifying OPERATOR_VERIFY=NONE. A second TSO ID with console authority is an alternative approach to consider.

See the USER_VERIFICATION and USER_VERIFICATION_TIMEOUT parameters for specific information regarding command verification when using the SRDF Host Component TSOE/REXX interface.

REGISTER_COMMAND_PREFIX

Description

The optional REGISTER_COMMAND_PREFIX initialization parameter specifies whether or not to register the command prefix and the scope of the registration. If you specify REGISTER_COMMAND_PREFIX, you must place it before the COMMAND_PREFIX parameter.

When the REGISTER_COMMAND_PREFIX parameter appears in the initialization deck before the COMMAND_PREFIX parameter, it alters the way the COMMAND_PREFIX parameter is parsed. The full 1 through 8 character string on the COMMAND_PREFIX parameter is used as the command prefix string regardless of the string contents.

If no REGISTER_COMMAND_PREFIX parameter appears in the initialization deck before the command prefix parameter, the command prefix is parsed for the ,REG parameter. In this case, the command prefix can not contain a comma.

When the REGISTER_COMMAND_PREFIX parameter appears in the initialization deck after the COMMAND_PREFIX parameter, it is ignored.

Format

REGISTER_COMMAND_PREFIX=NO | YES | SYSPLEX | SYSTEM

Where:

NO

Indicates the command prefix is not to be registered.

YES

Indicates the command prefix is to be registered
SCOPE=SYSPLEX.

This has the same effect as specifying a value for SYSPLEX.

SYSPLEX

Indicates the command prefix is to be registered
SCOPE=SYSPLEX.

SYSTEM

Indicates the command prefix is to be registered
SCOPE=SYSTEM.

Example

REGISTER_COMMAND_PREFIX=YES
COMMAND_PREFIX=@,REG

In the previous example, the command prefix is set to the string “@,REG.” However, if the user omitted the REGISTER_COMMAND_PREFIX parameter, the command prefix would be set to @ and the prefix would be registered.

SAF_CLASS

Description

The optional SAF_CLASS initialization parameter specifies the SAF class name (from 1 through 8 characters). The SAF class name is used to validate access to the SRDF Host Component commands.

Format

SAF_CLASS=*SAF class name*

Where:

SAF class name

Specifies the SAF class name. If you do not specify SAF_CLASS, the SAF_CLASS parameter defaults to a class name of DATASET.

Important: If this parameter is set to or allowed to default to DATASET, you must define the resource as a generic dataset profile and generic dataset checking must be active.

Example

SAF_CLASS=HC#CLASS

SAF_PROFILE

Description The optional SAF_PROFILE initialization parameter specifies the resource name to be used for SAF validation calls. The resource name can be from 1 through 44 characters.

The resource name is limited to 35 characters in length when using the APPEND_COMMAND=YES subparameter.

Format SAF_PROFILE=EMC.VALIDATE.ACCESS [, APPEND_COMMAND=YES]

Where:

EMC.VALIDATE.ACCESS

Specifies that access must be validated. If this parameter is not specified, SAF_PROFILE defaults to a resource name of EMC.VALIDATE.ACCESS.

APPEND_COMMAND=YES

The optional APPEND_COMMAND=YES subparameter provides more granularity in RACF validations. This option allows you to have a security check related to an SRDF Host Component command that you entered. If this option is chosen, any SRDF Host Component command that you enter is appended to your SAF profile resource name.

Comments Table 3-2 provides a listing of SRDF Host Component commands that are returned along with their corresponding suffixes when you issue a command with the APPEND_COMMAND option specified for the parameter.

Table 3-2 SRDF Host Component Commands/Suffixes

Command	Suffix
SQ[QUERY] ADC	SQADC
SQ[QUERY] BCV	SQBCV
SQ[QUERY] CNFG	SQCNFG
SQ[QUERY] GLOBAL	SQGLOBAL
SQ[QUERY] LINK	SQLINK
SQ[QUERY] MIRROR	SQMIRROR

Table 3-2 SRDF Host Component Commands/Suffixes (continued)

Command	Suffix
SQ[QUERY] MSG	SQMSG
SQ[QUERY] RAID	SQRAID
SQ[QUERY] RAID10	SQRAID10
SQ[QUERY] SRDFA	SQSRDFA
SQ[QUERY] SRDFA_VOL	SQSRDFAV
SQ[QUERY] RDFGRP	SQRDFGRP
SQ[QUERY] SSID	SQSSID
SQ[QUERY] STATE	SQSTATE
SQ[QUERY] VOL	SQVOL
SC[ONFIG] BCV	SCBCV
SC[ONFIG] CNFG	SCCNFG
SC[ONFIG] GLOBAL	SCGLOBAL
SC[ONFIG] LINK	SCLINK
SC[ONFIG] MSG	SCMSG
SC[ONFIG] SRDFA	SCSRDFA
SC[ONFIG] RDFGRP	SCRDFGRP
SC[ONFIG] VOL	SCVOL
STOP	STOP
TF CONFIG	TFCONFIG
TF QUERY	TFQUERY
TF OTHER	TFCONFIG

Example SAF_PROFILE=EMC.VALIDATE.ACCESS,APPEND_COMMAND=YES

Command issued:

```
#SQ VOL, 0F00, ALL
```

Validation is performed for the resource name:

```
EMC.VALIDATE.ACCESS.SQVOL
```

SECURITY_CONFIG

Description The required SECURITY_CONFIG initialization parameter specifies the security associated with the #SC commands.

Format SECURITY_CONFIG=ANY|MASTER|SAF|(SAF,ANY)|(SAF,MASTER)

Where:

ANY

Specifies that commands are accepted from any mainframe console.

MASTER

Specifies that commands are accepted from the master console.

SAF

Specifies the use of the SAF interface to validate #SC commands.

(SAF,ANY)

Specifies the use of the SAF interface to validate #SC commands, unless issued from a mainframe console. #SC commands can be issued from any mainframe console.

(SAF,MASTER)

Specifies the use of the SAF interface to validate #SC commands unless issued from a z/OS console. #SC commands can only be issued from a z/OS master console.

Example SECURITY_CONFIG=MASTER

SECURITY_QUERY

Description The required SECURITY_QUERY initialization parameter specifies the security associated with the #SQ commands.

Format SECURITY_QUERY=ANY|MASTER|SAF|(SAF,ANY)|(SAF,MASTER)

Where:

ANY

Specifies that commands are accepted from any mainframe console.

- MASTER
Specifies that commands are accepted from the master console.
- SAF
Specifies the use of the SAF interface to validate #SQ commands.
(SAF , ANY)
Specifies the use of the SAF interface to validate #SC commands unless issued from an mainframe console. #SQ commands can be issued from any mainframe console.
(SAF , MASTER)
Specifies the use of the SAF interface to validate #SQ commands unless issued from a z / OS console. #SQ commands can only be issued from a z / OS master console.

Example SECURITY_QUERY=ANY

SHOW_COMMAND_SEQ#

Description The SHOW_COMMAND_SEQ# initialization parameter indicates whether you want to display the sequence numbers of entered SRDF Host Component commands on the EMCMN00I message.

Format SHOW_COMMAND_SEQ#=YES | NO

Where:

- YES
Displays sequence numbers of entered SRDF Host Component commands on the EMCMN00I message. The command sequence number appears enclosed in parenthesis before the command text.
- NO
Does not display sequence numbers of entered SRDF Host Component commands on the EMCMN00I message. The default value for the SHOW_COMMAND_SEQ# parameter is NO.

Example SHOW_COMMAND_SEQ#=YES

SINGLE_CONCURRENT

Description

The SINGLE_CONCURRENT initialization parameter causes the following display changes:

- ◆ *#SQ VOL, cuu, RA (ragroup#)*
Only the mirror for *ragroup#* displays in the command for concurrent R1.
- ◆ *#SQ VOL, LCL (cuu, ragroup#)*
Only the mirror for *ragroup#* displays in the command for concurrent R1.
- ◆ *#SQ VOL, RMT (cuu) , RA (ragroup#)*
Only the mirror for *ragroup#* displays in the command for concurrent R1.

SINGLE_CONCURRENT works on #SQ VOL and #SQ STATE commands. If any other format of the command is used, both mirrors of a concurrent R1 appear.

Format

SINGLE_CONCURRENT

Example

SINGLE_CONCURRENT

SMFREC

Description

The optional SMFREC initialization parameter is used to activate the z/OS Systems Management Facilities (SMF) recording by the SRDF Host Component.

An SMF record is written for each SRDF Host Component command issued. The record includes the time of the command, the console id from which the command was issued, the userid that entered the command, and the command text before and after ALIAS substitution.

Important: If this statement is omitted, the SMF option is not active, and no SMF records are written by the SRDF Host Component. The SMF record layout is provided in the SCF SAMPLIB library member SRDFSMFR.

When specifying the SMFREC parameter, select an unassigned SMF record number in the range reserved for users (from 128 through 255).

Format SMFREC=*nnn*

Where:

nnn

Indicates the number of the SMF record to be written, a decimal number from 128 to 255.

Example SMFREC=255

SORT_BY_COMMAND

Description Use the SORT_BY_COMMAND initialization parameter to determine the display sort order. When you use SORT_BY_COMMAND, the display sort order depends on the query command you use:

Command	Displays output according to
#SQ VOL, <i>cuu</i>	MVSCUU
#SQ VOL, LCL (<i>cuu</i>)	SYMDEV
#SQ VOL, RMT (<i>cuu</i>)	SYMDEV
#SQ VOL, V (<i>volser</i>)	VOLSER
#SQ VOL, SSID (<i>ssid</i>)	SYMDEV
#SQ VOL, G (<i>groupname</i>)	Refer to the following descriptions for SORT_BY_VOLSER and SORT_BY_MVSCUU.

Format SORT_BY_COMMAND

Example SORT_BY_COMMAND

SORT_BY_MVSCUU

Description The SORT_BY_MVSCUU initialization parameter changes the sort order of the output for the #SQ VOL, #SQ STATE, and #SQ MIRROR commands from the default sort order (by Symmetrix device number) to MVSCUU as the primary sort order and Symmetrix device as the secondary sort order. Devices that do not have an MVSCUU are at the end of the display in Symmetrix device number order.

Format SORT_BY_MVSCUU

Example SORT_BY_MVSCUU

SORT_BY_VOLSER

Description The SORT_BY_VOLSER initialization parameter changes the sort order of the output for the #SQ VOL, #SQ STATE, and #SQ MIRROR commands from the default sort order (by Symmetrix device number) to VOLSER as the primary sort order and Symmetrix device as the secondary sort order. Devices that do not have a VOLSER are at the end of the display in Symmetrix device number order.

Format SORT_BY_VOLSER

Example SORT_BY_VOLSER

SUBSYSTEM_NAME

Description The required SUBSYSTEM_NAME initialization parameter must be the first noncommented initialization parameter. It indicates the z/OS subsystem name specified in IEFSSNxx for use by the SRDF Host Component.

Format SUBSYSTEM_NAME=*name*

Where:

name

Indicates the name of the subsystem; it can be up to four characters.

Example SUBSYSTEM_NAME=EMC2

SYNCH_DIRECTION_ALLOWED

Description The optional SYNCH_DIRECTION_ALLOWED initialization parameter sets valid values for synchronization direction command processing that can be specified in the SYNCH_DIRECTION_INIT initialization parameter and in the #SC GLOBAL, SYNCH_DIRECTION command.

More Information: Refer to Chapter 6, *SRDF Procedures*.

Format SYNCH_DIRECTION_ALLOWED=R1>R2 | R1<R2 | R1<>R2 | NONE

Where:

R1>R2

Only allows the synch direction to be set to source (R1) -> target (R2) or NONE.

If you do not specify SYNCH_DIRECTION_ALLOWED, SYNCH_DIRECTION_ALLOWED defaults to R1>R2.

R1<R2

Only allows the synch direction to be set to target (R2) -> source (R1) or NONE.

R1<>R2

Allows the synch direction to be set to any valid setting.

NONE

Only allows the synch direction to be set to NONE.

When you specify NONE for SYNCH_DIRECTION_ALLOWED, the #SC VOL command the VALIDATE, INVALIDATE, and REFRESH parameters do not function.

Example SYNCH_DIRECTION_ALLOWED=R1>R2

SYNCH_DIRECTION_INIT

Description The optional SYNCH_DIRECTION_INIT initialization parameter sets the synchronization direction at the time the SRDF Host Component is started.

You can change the SYNCH_DIRECTION in use using the #SC GLOBAL, SYNCH_DIRECTION command.

Important: This parameter must not conflict with SYNCH_DIRECTION_ALLOWED and is therefore subject to all constraints set by SYNCH_DIRECTION_ALLOWED.

Format SYNCH_DIRECTION_INIT=R1>R2 | R1<R2 | NONE

Where:

R1>R2

Specifies that the REFRESH and VALIDATE action codes on the #SC VOL command may only be used on a target (R2) volume and INVALIDATE may only be used on a source (R1) volume.

R1<R2

Specifies that the REFRESH and VALIDATE action codes on the #SC VOL command may only be used on a source (R1) volume and INVALIDATE may only be used on a target (R2) volume.

NONE

Specifies no synchronization direction.

If you do not specify SYNCH_DIRECTION_INIT, SYNCH_DIRECTION_INIT defaults to NONE.

Example SYNCH_DIRECTION_INIT=R1<R2

USER_VERIFICATION

Description The optional USER_VERIFICATION initialization parameter works in conjunction with the OPERATOR_VERIFY parameter to indicate if a user entering SRDF Host Component commands from the REXX Interface will have the ability to respond to messages requesting permission to proceed.

Format USER_VERIFICATION=YES | NO

Where:

YES

If the REXX interface supports this feature, Write To Operator with Reply messages (WTORs) normally issued due to the OPERATOR_VERIFY setting will be bypassed and the TSO/REXX user will be prompted for permission to proceed.

NO

TSO/REXX users will not have the ability to respond to messages requesting permission to proceed.

Examples USER_VERIFICATION=YES
USER_VERIFICATION=NO

USER_VERIFICATION_TIMEOUT

Description The USER_VERIFICATION_TIMEOUT parameter specifies the amount of time that the TSO/REXX user has to reply before a timeout occurs. If a timeout occurs, then processing proceeds as if the user replied CANCEL to the request.

Format USER_VERIFICATION_TIMEOUT=*minutes* | (*minutes,seconds*)

Examples USER_VERIFICATION_TIMEOUT=5
USER_VERIFICATION_TIMEOUT=(2,30)

VALIDATE_CRPAIR_NOCOPY_LEVEL

Description The VALIDATE_CRPAIR_NOCOPY_LEVEL parameter sets the level of validation for CREATEPAIR(NOCOPY) operations.

Format VALIDATE_CRPAIR_NOCOPY_LEVEL=0 | 1 | 3

Where:

0

Does not perform any validation that the volumes are equal.

It is strongly recommended that the value of 0 not be used. If 0 is used and if the volumes are not exactly equal, errors may be generated in the Symmetrix that cause it to "call home".

1

Compares the vtoc and volume serial for both sides.

3

Performs a full volume compare.

Since the value of 3 requires that both entire volumes be read and compared, use of this value may cause the CREATEPAIR command to take a significant amount of time.

Example VALIDATE_CRPAIR_NOCOPY_LEVEL=1

Group Definitions

The SRDF Host Component allows you to define groups of devices and or controllers, and then issue commands against the groups. These Defined Groups are defined in the initialization parameters, and can be used in the query commands: #SQ ADC, #SQ CNFG, #SQ LINK, #SQ MIRROR, #SQ STATE, and #SQ VOL, and the configuration commands: #SC CNFG and #SC VOL.

There are two types of Defined Groups:

- ◆ SYM_GROUPS — definitions are done based on Symmetrix device number.
- ◆ MVS_GROUPS — definitions are done based on the z/OS device number.

Rules for Group Definitions

This section lists the rules for defining Defined Groups.

General

The rules listed in this section apply to both SYM_GROUPS and MVS_GROUPS:

- ◆ You cannot mix SYM_GROUPS and MVS_GROUPS in the same group definition.
- ◆ If a Defined Group has the same name as a SMS Group, the Defined Group is used.
- ◆ All statements must start in column one.
- ◆ An asterisk (*) in column one treats the entire line as a comment.
- ◆ Each group must have GROUP_NAME= and GROUP_END statements.
- ◆ If a group does not use at least one INCLUDE statement, the definition passes syntax checking, but any commands issued using the group fail.
- ◆ Any number of the INCLUDE and EXCLUDE statements can be used in a group definition in any sequence.
- ◆ If a device is both included and excluded in a group definition, the device is excluded.

- ◆ Assume a device is included but not excluded in the group definition. If the same device is excluded by the EXCLUDE_DEVICE_RANGE initialization statement, the device is excluded from the group definition.

Group Specific

The rules listed in this section are divided according to the group to which they apply:

SYM_GROUP Rules

- ◆ If an z/OS device number used on the INCLUDE_RAG or EXCLUDE_SYM statements is invalid or in the EXCLUDE_DEVICE list, the SRDF Host Component issues WTORs giving the operator the opportunity to stop and correct the error or to continue. If the operator continues, the group is not built as requested.
- ◆ INCLUDE_RAG and EXCLUDE_SYM use gatekeeper devices. Gatekeeper devices can be online or offline, as long as a valid path is available to the Symmetrix that is being referenced.
- ◆ SYM_GROUP include by RA Group number and exclude by Symmetrix device number.
- ◆ SYM_GROUPS must use the GROUP_NAME and GROUP_END statements. SYM_GROUPS may use the INCLUDE_RAG, EXCLUDE_SYM, FILTER_R1, and FILTER_R2 statements.
- ◆ SYM_GROUPS cannot use the INCLUDE_CUU, INCLUDE_VOL, EXCLUDE_CUU, EXCLUDE_VOL, FILTER_ONLINE, and, FILTER_KNOWN statements.
- ◆ Both online and offline devices are included in the SYM_GROUP.
- ◆ SYM_GROUPS include only SRDF devices, both R1 and or R2 devices.
- ◆ SYM_GROUPS may use GROUP_SORT_BY_VOLSER and GROUP_SORT_BY_MVSCUU.

MVS_GROUP Rules

- ◆ MVS_GROUP include and exclude by MVS CUU or VOLSER.
- ◆ MVS_GROUPS must use the GROUP_NAME and GROUP_END statements. MVS_GROUPS may use the INCLUDE_CUU, INCLUDE_VOL, EXCLUDE_CUU, EXCLUDE_VOL, FILTER_R1, FILTER_R2, FILTER_ONLINE, and, FILTER_KNOWN statements.

- ◆ MVS_GROUPS cannot use the INCLUDE_RAG and EXCLUDE_SYM statements.
- ◆ By default (or with the use of the FILTER_ONLINE statement) only online devices are included in MVS_GROUPS.
- ◆ Some offline devices can be included into a MVS_GROUP if the FILTER_KNOWN statement is used. FILTER_KNOWN includes devices known to the SRDF Host Component.
- ◆ Any device type (R1, R2, BCV, DR, and, STD devices) can be included in an MVS_GROUP.
- ◆ MVS_GROUP may use GROUP_SORT_BY_MVSCUU and GROUP_SORT_BY_VOLSER.

Example Group Definitions

This section provides example group definitions for MVS_GROUPS and SYM_GROUPS.

In the following examples, question marks (?) indicate that the device was specified in the SCF exclude list.

MVS_GROUP Examples

Example 1

```
GROUP_NAME=ALL
FILTER_KNOWN
INCLUDE_CUU=9820-983F
INCLUDE_CUU=A020-A03F
GROUP_END
```

```
EMCQV00I SRDF-HC DISPLAY FOR (2) #SQ VOL,G(ALL)
```

DV_ADDR	_SYM	TOTAL	SYS	DCB	CNTLUNIT	R1	R2	SY		
SYS CH	DEV RDEV GP	VOLSER	CYLS	STAT	OPN	STATUS	MR	INVTRK	INVTRK	%
9820 20	0020	UGH020	1113	ONPV	0	R/W	ML			
9821 21	0021	UGH021	1113	ONPV	0	R/W	ML			
9822 22	0022	UGH022	1113	ONPV	0	R/W	ML			
9823 23	0023	UGH023	1113	ONPV	0	R/W	ML			
9824 24	0024	UGH024	1113	ONPV	0	R/W	ML			
9825 25	0025	UGH025	1113	ONPV	0	R/W	ML			
9826 26	0026	UGH026	1113	ONPV	0	R/W	ML			
9827 27	0027	UGH027	1113	ONPV	0	R/W	ML			
9828 28	0028 00	UGG028	1113	ONPV	0	R/O	L2	0	0	**
9829 29	0029 00	UGG029	1113	ONPV	0	R/O	L2	0	0	**
982A 2A	002A 00	UGG02A	1113	ONPV	0	R/O	L2	0	0	**
982B 2B	002B 00	UGG02B	1113	ONPV	0	R/O	L2	0	0	**
982C 2C	002C 01	UGG02C	1113	ONPV	0	R/O	B2	0	0	**
982D 2D	002D 01	UGG02D	1113	ONPV	0	R/O	B2	0	0	**
982E 2E	002E 01	UGG02E	1113	ONPV	0	R/O	B2	0	0	**
982F 2F	002F 01	UGG02F	1113	ONPV	0	R/O	B2	0	0	**

SRDF Initialization Parameters

```

9830 30 0030 0030 00 UGH030 1113 ONPV 0 R/W-SY L1 0 0 **
9831 31 0031 0031 00 UGH031 1113 ONPV 0 R/W-SY L1 0 0 **
9832 32 0032 0032 00 UGH032 1113 ONPV 0 R/W-SY L1 0 0 **
9833 33 0033 0033 00 UGH033 1113 ONPV 0 R/W-SY L1 0 0 **
9834 34 0034 0034 01 UGH034 1113 ONPV 0 R/W-SY B1 0 0 **
9835 35 0035 0035 01 UGH035 1113 ONPV 0 R/W-SY B1 0 0 **
9836 36 0036 0036 01 UGH036 1113 ONPV 0 R/W-SY B1 0 0 **
9837 37 0037 0037 01 UGH037 1113 ONPV 0 R/W-SY B1 0 0 **
9838 38 0038 UGH038 1113 ONPV 0 R/W BC
9839 39 0039 UGH039 1113 ONPV 0 R/W BC
983A 3A 003A UGH03A 1113 ONPV 0 R/W BC
983B 3B 003B UGH03B 1113 ONPV 0 R/W BC
983C 3C 003C UGH03C 1113 ONPV 0 R/W BC
983D 3D 003D UGH03D 1113 ONPV 0 R/W BC
983E 3E 003E UGH03E 1113 ONPV 0 R/W BC
983F 3F 003F UGH03F 1113 ONPV 0 R/W BC

```

END OF DISPLAY

EMCQV00I SRDF-HC DISPLAY FOR (2) #SQ VOL,G(ALL)

DV_ADDR	_SYM_	TOTAL	SYS	DCB	CNTLUNIT	R1	R2	SY		
SYS CH	DEV RDEV GP	VOLSER	CYLS	STAT	OPN	STATUS	MR	INVTRK	INVTRK	%
A020	20 0020	UGG020	1113	ONPV	0 R/W	ML				
A021	21 0021	UGG021	1113	ONPV	0 R/W	ML				
A022	22 0022	UGG022	1113	ONPV	0 R/W	ML				
A023	23 0023	UGG023	1113	ONPV	0 R/W	ML				
A024	24 0024	UGG024	1113	ONPV	0 R/W	ML				
A025	25 0025	UGG025	1113	ONPV	0 R/W	ML				
A026	26 0026	UGG026	1113	ONPV	0 R/W	ML				
A027	27 0027	UGG027	1113	ONPV	0 R/W	ML				
A038	38 0038	UGG038	1113	ONPV	0 R/W	BC				
A039	39 0039	UGG039	1113	ONPV	0 R/W	BC				
A03A	3A 003A	UGG03A	1113	ONPV	0 R/W	BC				
A03B	3B 003B	UGG03B	1113	ONPV	0 R/W	BC				
A03C	3C 003C	UGG03C	1113	ONPV	0 R/W	BC				
A03D	3D 003D	UGG03D	1113	ONPV	0 R/W	BC				
A03E	3E 003E	UGG03E	1113	ONPV	0 R/W	BC				
A03F	3F 003F	UGG03F	1113	ONPV	0 R/W	BC				

END OF DISPLAY

Example 2 GROUP_NAME=ALL_R1
 FILTER_R1
 INCLUDE_CUU=9820-983F
 INCLUDE_CUU=A020-A03F
 GROUP_END

```
EMCQV00I SRDF-HC DISPLAY FOR (3) #SQ VOL,G(ALL_R1)
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT| |R1|R2|SY
SYS CH|DEV RDEV GP|VOLSER|CYLS|STAT|OPN|STATUS|MR|INVTRK|INVTRK| %
9830 30 0030 0030 00 UGH030 1113 ONPV 0 R/W-SY L1 0 0 **
9831 31 0031 0031 00 UGH031 1113 ONPV 0 R/W-SY L1 0 0 **
9832 32 0032 0032 00 UGH032 1113 ONPV 0 R/W-SY L1 0 0 **
9833 33 0033 0033 00 UGH033 1113 ONPV 0 R/W-SY L1 0 0 **
9834 34 0034 0034 01 UGH034 1113 ONPV 0 R/W-SY B1 0 0 **
9835 35 0035 0035 01 UGH035 1113 ONPV 0 R/W-SY B1 0 0 **
9836 36 0036 0036 01 UGH036 1113 ONPV 0 R/W-SY B1 0 0 **
9837 37 0037 0037 01 UGH037 1113 ONPV 0 R/W-SY B1 0 0 **
```

Example 3 GROUP_NAME=ALL_R2
 FILTER_R2
 INCLUDE_CUU=9820-983F
 INCLUDE_CUU=A020-A03F
 GROUP_END

```
EMCQV00I SRDF-HC DISPLAY FOR (4) #SQ VOL,G(ALL_R2)
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT| |R1|R2|SY
SYS CH|DEV RDEV GP|VOLSER|CYLS|STAT|OPN|STATUS|MR|INVTRK|INVTRK| %
9828 28 0028 0028 00 UGG028 1113 ONPV 0 R/O L2 0 0 **
9829 29 0029 0029 00 UGG029 1113 ONPV 0 R/O L2 0 0 **
982A 2A 002A 002A 00 UGG02A 1113 ONPV 0 R/O L2 0 0 **
982B 2B 002B 002B 00 UGG02B 1113 ONPV 0 R/O L2 0 0 **
982C 2C 002C 002C 01 UGG02C 1113 ONPV 0 R/O B2 0 0 **
982D 2D 002D 002D 01 UGG02D 1113 ONPV 0 R/O B2 0 0 **
982E 2E 002E 002E 01 UGG02E 1113 ONPV 0 R/O B2 0 0 **
982F 2F 002F 002F 01 UGG02F 1113 ONPV 0 R/O B2 0 0 **
END OF DISPLAY
```

Example 4 GROUP_NAME=ALL_ONLINE_RDF
 FILTER_R1
 FILTER_R2
 FILTER_ONLINE
 INCLUDE_CUU=9820-983F
 INCLUDE_CUU=A020-A03F
 GROUP_END

EMCQV00I SRDF-HC DISPLAY FOR (5) #SQ VOL,G(ALL_ONLINE_RDF)

DV_ADDR	_SYM_		TOTAL	SYS	DCB	CNTLUNIT		R1	R2	SY		
SYS CH	DEV	RDEV	GP	VOLSER	CYLS	STAT	OPN	STATUS	MR	INVTRK	INVTRK	%
9828 28	0028	0028	00	UGG028	1113	ONPV	0	R/O	L2	0	0	**
9829 29	0029	0029	00	UGG029	1113	ONPV	0	R/O	L2	0	0	**
982A 2A	002A	002A	00	UGG02A	1113	ONPV	0	R/O	L2	0	0	**
982B 2B	002B	002B	00	UGG02B	1113	ONPV	0	R/O	L2	0	0	**
982C 2C	002C	002C	01	UGG02C	1113	ONPV	0	R/O	B2	0	0	**
982D 2D	002D	002D	01	UGG02D	1113	ONPV	0	R/O	B2	0	0	**
982E 2E	002E	002E	01	UGG02E	1113	ONPV	0	R/O	B2	0	0	**
982F 2F	002F	002F	01	UGG02F	1113	ONPV	0	R/O	B2	0	0	**
9830 30	0030	0030	00	UGH030	1113	ONPV	0	R/W-SY	L1	0	0	**
9831 31	0031	0031	00	UGH031	1113	ONPV	0	R/W-SY	L1	0	0	**
9832 32	0032	0032	00	UGH032	1113	ONPV	0	R/W-SY	L1	0	0	**
9833 33	0033	0033	00	UGH033	1113	ONPV	0	R/W-SY	L1	0	0	**
9834 34	0034	0034	01	UGH034	1113	ONPV	0	R/W-SY	B1	0	0	**
9835 35	0035	0035	01	UGH035	1113	ONPV	0	R/W-SY	B1	0	0	**
9836 36	0036	0036	01	UGH036	1113	ONPV	0	R/W-SY	B1	0	0	**
9837 37	0037	0037	01	UGH037	1113	ONPV	0	R/W-SY	B1	0	0	**

END OF DISPLAY

Example 5 GROUP_NAME=ALL_ONLINE_WO_UGH
 INCLUDE_CUU=9820-983F,A020-A03F
 EXCLUDE_VOL=UGH*
 GROUP_END

```
EMCQV00I SRDF-HC DISPLAY FOR (6) #SQ VOL,G(ALL_ONLINE_WO_UGH)
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT|MR|R1|R2|SY
SYS CH|DEV RDEV GP|VOLSER|CYLS|STAT|OPN|STATUS|MR|INVTRK|INVTRK| %
9828 28 0028 0028 00 UGG028 1113 ONPV 0 R/O L2 0 0 **
9829 29 0029 0029 00 UGG029 1113 ONPV 0 R/O L2 0 0 **
982A 2A 002A 002A 00 UGG02A 1113 ONPV 0 R/O L2 0 0 **
982B 2B 002B 002B 00 UGG02B 1113 ONPV 0 R/O L2 0 0 **
982C 2C 002C 002C 01 UGG02C 1113 ONPV 0 R/O B2 0 0 **
982D 2D 002D 002D 01 UGG02D 1113 ONPV 0 R/O B2 0 0 **
982E 2E 002E 002E 01 UGG02E 1113 ONPV 0 R/O B2 0 0 **
982F 2F 002F 002F 01 UGG02F 1113 ONPV 0 R/O B2 0 0 **
END OF DISPLAY
EMCQV00I SRDF-HC DISPLAY FOR (6) #SQ VOL,G(ALL_ONLINE_WO_UGH)
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT|MR|R1|R2|SY
SYS CH|DEV RDEV GP|VOLSER|CYLS|STAT|OPN|STATUS|MR|INVTRK|INVTRK| %
A020 20 0020 UGG020 1113 ONPV 0 R/W ML
A021 21 0021 UGG021 1113 ONPV 0 R/W ML
A022 22 0022 UGG022 1113 ONPV 0 R/W ML
A023 23 0023 UGG023 1113 ONPV 0 R/W ML
A024 24 0024 UGG024 1113 ONPV 0 R/W ML
A025 25 0025 UGG025 1113 ONPV 0 R/W ML
A026 26 0026 UGG026 1113 ONPV 0 R/W ML
A027 27 0027 UGG027 1113 ONPV 0 R/W ML
A038 38 0038 UGG038 1113 ONPV 0 R/W BC
A039 39 0039 UGG039 1113 ONPV 0 R/W BC
A03A 3A 003A UGG03A 1113 ONPV 0 R/W BC
A03B 3B 003B UGG03B 1113 ONPV 0 R/W BC
A03C 3C 003C UGG03C 1113 ONPV 0 R/W BC
A03D 3D 003D UGG03D 1113 ONPV 0 R/W BC
A03E 3E 003E UGG03E 1113 ONPV 0 R/W BC
A03F 3F 003F UGG03F 1113 ONPV 0 R/W BC
END OF DISPLAY
```

Example 6 GROUP_NAME=ALL_ONLINE_UGG
 INCLUDE_VOL=UGG*
 GROUP_END

EMCQV00I SRDF-HC DISPLAY FOR (7) #SQ VOL,G(ALL_ONLINE_UGG)

DV_ADDR	_SYM_		TOTAL	SYS	DCB	CNTLUNIT		R1	R2	SY	
SYS CH	DEV	RDEV GP	VOLSER	CYLS	STAT	OPN	STATUS	MR	INVTRK	INVTRK	%
9828 28	0028	0028 00	UGG028	1113	ONPV	0	R/O	L2	0	0	**
9829 29	0029	0029 00	UGG029	1113	ONPV	0	R/O	L2	0	0	**
982A 2A	002A	002A 00	UGG02A	1113	ONPV	0	R/O	L2	0	0	**
982B 2B	002B	002B 00	UGG02B	1113	ONPV	0	R/O	L2	0	0	**
982C 2C	002C	002C 01	UGG02C	1113	ONPV	0	R/O	B2	0	0	**
982D 2D	002D	002D 01	UGG02D	1113	ONPV	0	R/O	B2	0	0	**
982E 2E	002E	002E 01	UGG02E	1113	ONPV	0	R/O	B2	0	0	**
982F 2F	002F	002F 01	UGG02F	1113	ONPV	0	R/O	B2	0	0	**

END OF DISPLAY

EMCQV00I SRDF-HC DISPLAY FOR (7) #SQ VOL,G(ALL_ONLINE_UGG)

DV_ADDR	_SYM_		TOTAL	SYS	DCB	CNTLUNIT		R1	R2	SY	
SYS CH	DEV	RDEV GP	VOLSER	CYLS	STAT	OPN	STATUS	MR	INVTRK	INVTRK	%
A020 20	0020		UGG020	1113	ONPV	0	R/W	ML			
A021 21	0021		UGG021	1113	ONPV	0	R/W	ML			
A022 22	0022		UGG022	1113	ONPV	0	R/W	ML			
A023 23	0023		UGG023	1113	ONPV	0	R/W	ML			
A024 24	0024		UGG024	1113	ONPV	0	R/W	ML			
A025 25	0025		UGG025	1113	ONPV	0	R/W	ML			
A026 26	0026		UGG026	1113	ONPV	0	R/W	ML			
A027 27	0027		UGG027	1113	ONPV	0	R/W	ML			
A038 38	0038		UGG038	1113	ONPV	0	R/W	BC			
A039 39	0039		UGG039	1113	ONPV	0	R/W	BC			
A03A 3A	003A		UGG03A	1113	ONPV	0	R/W	BC			
A03B 3B	003B		UGG03B	1113	ONPV	0	R/W	BC			
A03C 3C	003C		UGG03C	1113	ONPV	0	R/W	BC			
A03D 3D	003D		UGG03D	1113	ONPV	0	R/W	BC			
A03E 3E	003E		UGG03E	1113	ONPV	0	R/W	BC			
A03F 3F	003F		UGG03F	1113	ONPV	0	R/W	BC			

END OF DISPLAY

SYM_GROUP Examples

Example 1 GROUP_NAME=RAGRP00_98BOX
 INCLUDE_RAG=9820, (00)
 GROUP_END

```
EMCQV00I SRDF-HC DISPLAY FOR (1) #SQ VOL,G(RAGRP00_98BOX)
DV_ADDR|_SYM|TOTAL|SYS|DCB|CNTLUNIT| |R1| R2|SY
SYS CH|DEV RDEV GP|VOLSER|CYLS|STAT|OPN|STATUS|MR|INVTRK|INVTRK| %
???? ?? 0008 0008 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 0009 0009 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 000A 000A 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 000B 000B 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 0010 0010 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
???? ?? 0011 0011 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
???? ?? 0012 0012 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
???? ?? 0013 0013 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
9828 28 0028 0028 00 UGG028 1113 ONPV 0 R/O L2 0 0 **
9829 29 0029 0029 00 UGG029 1113 ONPV 0 R/O L2 0 0 **
982A 2A 002A 002A 00 UGG02A 1113 ONPV 0 R/O L2 0 0 **
982B 2B 002B 002B 00 UGG02B 1113 ONPV 0 R/O L2 0 0 **
9830 30 0030 0030 00 UGH030 1113 ONPV 0 R/W-SY L1 0 0 **
9831 31 0031 0031 00 UGH031 1113 ONPV 0 R/W-SY L1 0 0 **
9832 32 0032 0032 00 UGH032 1113 ONPV 0 R/W-SY L1 0 0 **
9833 33 0033 0033 00 UGH033 1113 ONPV 0 R/W-SY L1 0 0 **
???? ?? 0048 0048 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 0049 0049 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 004A 004A 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 004B 004B 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 0050 0050 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
???? ?? 0051 0051 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
???? ?? 0052 0052 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
???? ?? 0053 0053 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
???? ?? 0068 0068 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 0069 0069 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 006A 006A 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 006B 006B 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 0070 0070 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
???? ?? 0071 0071 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
???? ?? 0072 0072 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
???? ?? 0073 0073 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
END OF DISPLAY
```

Example 2 GROUP_NAME=RAGRP00_98BOX_W02A2B
 INCLUDE_RAG=9820,(00)
 EXCLUDE_SYM=9820,(002A-002B)
 GROUP_END

EMCQV00I SRDF-HC DISPLAY FOR (2) #SQ VOL,G(RAGRP00_98BOX_W02A2B)

DV_ADDR	_SYM_		TOTAL	SYS	DCB	CNTLUNIT		R1	R2	SY			
SYS	CH	DEV	RDEV	GP	VOLSER	CYLS	STAT	OPN	STATUS	MR	INVTRK	INVTRK	%
????	??	0008	0008	00	OFFLINE	1113	N/A	0	R/O	L2	0	0	**
????	??	0009	0009	00	OFFLINE	1113	N/A	0	R/O	L2	0	0	**
????	??	000A	000A	00	OFFLINE	1113	N/A	0	R/O	L2	0	0	**
????	??	000B	000B	00	OFFLINE	1113	N/A	0	R/O	L2	0	0	**
????	??	0010	0010	00	OFFLINE	1113	N/A	0	R/W-SY	L1	0	0	**
????	??	0011	0011	00	OFFLINE	1113	N/A	0	R/W-SY	L1	0	0	**
????	??	0012	0012	00	OFFLINE	1113	N/A	0	R/W-SY	L1	0	0	**
????	??	0013	0013	00	OFFLINE	1113	N/A	0	R/W-SY	L1	0	0	**
9828	28	0028	0028	00	UGG028	1113	ONPV	0	R/O	L2	0	0	**
9829	29	0029	0029	00	UGG029	1113	ONPV	0	R/O	L2	0	0	**
9830	30	0030	0030	00	UGH030	1113	ONPV	0	R/W-SY	L1	0	0	**
9831	31	0031	0031	00	UGH031	1113	ONPV	0	R/W-SY	L1	0	0	**
9832	32	0032	0032	00	UGH032	1113	ONPV	0	R/W-SY	L1	0	0	**
9833	33	0033	0033	00	UGH033	1113	ONPV	0	R/W-SY	L1	0	0	**
????	??	0048	0048	00	OFFLINE	1113	N/A	0	R/O	L2	0	0	**
????	??	0049	0049	00	OFFLINE	1113	N/A	0	R/O	L2	0	0	**
????	??	004A	004A	00	OFFLINE	1113	N/A	0	R/O	L2	0	0	**
????	??	004B	004B	00	OFFLINE	1113	N/A	0	R/O	L2	0	0	**
????	??	0050	0050	00	OFFLINE	1113	N/A	0	R/W-SY	L1	0	0	**
????	??	0051	0051	00	OFFLINE	1113	N/A	0	R/W-SY	L1	0	0	**
????	??	0052	0052	00	OFFLINE	1113	N/A	0	R/W-SY	L1	0	0	**
????	??	0053	0053	00	OFFLINE	1113	N/A	0	R/W-SY	L1	0	0	**
????	??	0068	0068	00	OFFLINE	1113	N/A	0	R/O	L2	0	0	**
????	??	0069	0069	00	OFFLINE	1113	N/A	0	R/O	L2	0	0	**
????	??	006A	006A	00	OFFLINE	1113	N/A	0	R/O	L2	0	0	**
????	??	006B	006B	00	OFFLINE	1113	N/A	0	R/O	L2	0	0	**
????	??	0070	0070	00	OFFLINE	1113	N/A	0	R/W-SY	L1	0	0	**
????	??	0071	0071	00	OFFLINE	1113	N/A	0	R/W-SY	L1	0	0	**
????	??	0072	0072	00	OFFLINE	1113	N/A	0	R/W-SY	L1	0	0	**
????	??	0073	0073	00	OFFLINE	1113	N/A	0	R/W-SY	L1	0	0	**

END OF DISPLAY

Example 3 GROUP_NAME=RAGRP00_98BOX_W02A
 INCLUDE_RAG=9820,(00)
 EXCLUDE_SYM=9820,(002A)
 GROUP_END

```
EMCQV00I SRDF-HC DISPLAY FOR (3) #SQ VOL,G(RAGRP00_98BOX_W02A)
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT| |R1|R2|SY
SYS CH|DEV RDEV GP|VOLSER|CYLS|STAT|OPN|STATUS|MR|INVTRK|INVTRK| %
???? ?? 0008 0008 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 0009 0009 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 000A 000A 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 000B 000B 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 0010 0010 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
???? ?? 0011 0011 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
???? ?? 0012 0012 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
???? ?? 0013 0013 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
9828 28 0028 0028 00 UGG028 1113 ONPV 0 R/O L2 0 0 **
9829 29 0029 0029 00 UGG029 1113 ONPV 0 R/O L2 0 0 **
982B 2B 002B 002B 00 UGG02B 1113 ONPV 0 R/O L2 0 0 **
9830 30 0030 0030 00 UGH030 1113 ONPV 0 R/W-SY L1 0 0 **
9831 31 0031 0031 00 UGH031 1113 ONPV 0 R/W-SY L1 0 0 **
9832 32 0032 0032 00 UGH032 1113 ONPV 0 R/W-SY L1 0 0 **
9833 33 0033 0033 00 UGH033 1113 ONPV 0 R/W-SY L1 0 0 **
???? ?? 0048 0048 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 0049 0049 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 004A 004A 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 004B 004B 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
```

Example 4 GROUP_NAME=RAGRP00_98BOX_R1
 FILTER_R1
 INCLUDE_RAG=9820,(00)
 GROUP_END

```
EMCQV00I SRDF-HC DISPLAY FOR (4) #SQ VOL,G(RAGRP00_98BOX_R1)
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT|_R1_|R2|SY
SYS CH|DEV RDEV GP|VOLSER|CYLS|STAT|OPN|STATUS|MR|INVTRK|INVTRK| %
???? ?? 0010 0010 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
???? ?? 0011 0011 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
???? ?? 0012 0012 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
???? ?? 0013 0013 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
9830 30 0030 0030 00 UGH030 1113 ONPV 0 R/W-SY L1 0 0 **
9831 31 0031 0031 00 UGH031 1113 ONPV 0 R/W-SY L1 0 0 **
9832 32 0032 0032 00 UGH032 1113 ONPV 0 R/W-SY L1 0 0 **
9833 33 0033 0033 00 UGH033 1113 ONPV 0 R/W-SY L1 0 0 **
???? ?? 0050 0050 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
???? ?? 0051 0051 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
???? ?? 0052 0052 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
???? ?? 0053 0053 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
???? ?? 0070 0070 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
???? ?? 0071 0071 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
???? ?? 0072 0072 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
???? ?? 0073 0073 00 OFFLINE 1113 N/A 0 R/W-SY L1 0 0 **
END OF DISPLAY
```

Example 5 GROUP_NAME=RAGRP00_98BOX_R2
 FILTER_R2
 INCLUDE_RAG=9820,(00)
 GROUP_END

```
EMCQV00I SRDF-HC DISPLAY FOR (5) #SQ VOL,G(RAGRP00_98BOX_R2)
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT|MR|R1|R2|SY
SYS CH|DEV RDEV GP|VOLSER|CYLS|STAT|OPN|STATUS|MR|INVTRK|INVTRK| %
???? ?? 0008 0008 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 0009 0009 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 000A 000A 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 000B 000B 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
9828 28 0028 0028 00 UGG028 1113 ONPV 0 R/O L2 0 0 **
9829 29 0029 0029 00 UGG029 1113 ONPV 0 R/O L2 0 0 **
982A 2A 002A 002A 00 UGG02A 1113 ONPV 0 R/O L2 0 0 **
982B 2B 002B 002B 00 UGG02B 1113 ONPV 0 R/O L2 0 0 **
???? ?? 0048 0048 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 0049 0049 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 004A 004A 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 004B 004B 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 0068 0068 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 0069 0069 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 006A 006A 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 006B 006B 00 OFFLINE 1113 N/A 0 R/O L2 0 0 **
END OF DISPLAY
```

Example 6 GROUP_NAME=KCH1
 INCLUDE_RAG=LCL(6C00,3F)
 INCLUDE_RAG=LCL(A320,05)
 GROUP_END
 *

EMCQV00I SRDF-HC DISPLAY FOR (1) ¢¢SQ VOL,G(KCH1)

DV_ADDR	_SYM_		TOTAL	SYS	DCB	CNTLUNIT		R1	R2	SY			
SYS	CH	DEV	RDEV	GP	VOLSER	CYLS	STAT	OPN	STATUS	MR	INVTRK	INVTRK	%
6C20	20	0020	0208	3F	OFLINE	1113	OFFL	0	TNR-SY	R1	0	0	**
6C21	21	0021	0209	3F	OFLINE	1113	OFFL	0	TNR-SY	R1	0	0	**
6C22	22	0022	020A	3F	OFLINE	1113	OFFL	0	TNR-SY	R1	0	0	**
6C23	23	0023	020B	3F	OFLINE	1113	OFFL	0	TNR-SY	R1	0	0	**
6C30	30	0030	0030	3F	U6A030	1113	ONPV	0	R/W-SY	R1	0	0	**
6C31	31	0031	0031	3F	U6A031	1113	ONPV	0	R/W-SY	R1	0	0	**
6C32	32	0032	0032	3F	U6A032	1113	ONPV	0	R/W-SY	R1	0	0	**
6C33	33	0033	0033	3F	U6A033	1113	ONPV	0	R/W-SY	R1	0	0	**
6C34	34	0034	0034	3F	U6A034	1113	ONPV	0	R/W-SY	R1	0	0	**
6C35	35	0035	0035	3F	U6A035	1113	ONPV	0	R/W-SY	R1	0	0	**

END OF DISPLAY

EMCQV00I SRDF-HC DISPLAY FOR (1) ¢¢SQ VOL,G(KCH1)

DV_ADDR	_SYM_		TOTAL	SYS	DCB	CNTLUNIT		R1	R2	SY			
SYS	CH	DEV	RDEV	GP	VOLSER	CYLS	STAT	OPN	STATUS	MR	INVTRK	INVTRK	%
A030	30	0030	0030	05	OFLINE	1113	OFFL	0	N/R	R2	0	0	**
A031	31	0031	0031	05	OFLINE	1113	OFFL	0	N/R	R2	0	0	**
A032	32	0032	0032	05	OFLINE	1113	OFFL	0	N/R	R2	0	0	**
A033	33	0033	0033	05	OFLINE	1113	OFFL	0	N/R	R2	0	0	**
A034	34	0034	0034	05	OFLINE	1113	OFFL	0	N/R	R2	0	0	**
A035	35	0035	0035	05	OFLINE	1113	OFFL	0	N/R	R2	0	0	**
A2C8	C8	0208	0020	05	OFLINE	3339	OFFL	0	R/O	R2	0	0	**
A2C9	C9	0209	0021	05	OFLINE	3339	OFFL	0	R/O	R2	0	0	**
A2CA	CA	020A	0022	05	OFLINE	3339	OFFL	0	R/O	R2	0	0	**
A2CB	CB	020B	0023	05	OFLINE	3339	OFFL	0	R/O	R2	0	0	**

END OF DISPLAY

SYM-000382

Example 7 GROUP_NAME=KCH2
 INCLUDE_RAG=RMT (6C00,3F,05)
 INCLUDE_RAG=RMT (A320,05,3F)
 GROUP_END

```
EMCQV00I SRDF-HC DISPLAY FOR (2) ¢¢SQ VOL,G(KCH2)
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT|MR|R1|R2|SY
SYS CH|DEV RDEV GP|VOLSER|CYLS|STAT|OPN|STATUS|INVTRK|INVTRK|%
```

A030	30	0030	0030	05	OFLINE	1113	OFFL	0	N/R	R2	0	0	**
A031	31	0031	0031	05	OFLINE	1113	OFFL	0	N/R	R2	0	0	**
A032	32	0032	0032	05	OFLINE	1113	OFFL	0	N/R	R2	0	0	**
A033	33	0033	0033	05	OFLINE	1113	OFFL	0	N/R	R2	0	0	**
A034	34	0034	0034	05	OFLINE	1113	OFFL	0	N/R	R2	0	0	**
A035	35	0035	0035	05	OFLINE	1113	OFFL	0	N/R	R2	0	0	**
A2C8	C8	0208	0020	05	OFLINE	3339	OFFL	0	R/O	R2	0	0	**
A2C9	C9	0209	0021	05	OFLINE	3339	OFFL	0	R/O	R2	0	0	**
A2CA	CA	020A	0022	05	OFLINE	3339	OFFL	0	R/O	R2	0	0	**
A2CB	CB	020B	0023	05	OFLINE	3339	OFFL	0	R/O	R2	0	0	**

END OF DISPLAY

```
EMCQV00I SRDF-HC DISPLAY FOR (2) ¢¢SQ VOL,G(KCH2)
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT|MR|R1|R2|SY
SYS CH|DEV RDEV GP|VOLSER|CYLS|STAT|OPN|STATUS|INVTRK|INVTRK|%
```

6C20	20	0020	0208	3F	OFLINE	1113	OFFL	0	TNR-SY	R1	0	0	**
6C21	21	0021	0209	3F	OFLINE	1113	OFFL	0	TNR-SY	R1	0	0	**
6C22	22	0022	020A	3F	OFLINE	1113	OFFL	0	TNR-SY	R1	0	0	**
6C23	23	0023	020B	3F	OFLINE	1113	OFFL	0	TNR-SY	R1	0	0	**
6C30	30	0030	0030	3F	U6A030	1113	ONPV	0	R/W-SY	R1	0	0	**
6C31	31	0031	0031	3F	U6A031	1113	ONPV	0	R/W-SY	R1	0	0	**
6C32	32	0032	0032	3F	U6A032	1113	ONPV	0	R/W-SY	R1	0	0	**
6C33	33	0033	0033	3F	U6A033	1113	ONPV	0	R/W-SY	R1	0	0	**
6C34	34	0034	0034	3F	U6A034	1113	ONPV	0	R/W-SY	R1	0	0	**
6C35	35	0035	0035	3F	U6A035	1113	ONPV	0	R/W-SY	R1	0	0	**

END OF DISPLAY

SYM-000383

Example 8 GROUP_NAME=KCH3
 INCLUDE_RAG=RMT (6C00,3F,05)
 GROUP_END

```
EMCQV00I SRDF-HC DISPLAY FOR (3) $$$SQ VOL,G(KCH3)
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT|MR|R1|R2|SY
SYS CH|DEV RDEV GP|VOLSER|CYLS|STAT|OPN|STATUS|MR|INVTRK|INVTRK|%
```

A030	30	0030	0030	05	OFLINE	1113	OFFL	0	N/R	R2	0	0	**
A031	31	0031	0031	05	OFLINE	1113	OFFL	0	N/R	R2	0	0	**
A032	32	0032	0032	05	OFLINE	1113	OFFL	0	N/R	R2	0	0	**
A033	33	0033	0033	05	OFLINE	1113	OFFL	0	N/R	R2	0	0	**
A034	34	0034	0034	05	OFLINE	1113	OFFL	0	N/R	R2	0	0	**
A035	35	0035	0035	05	OFLINE	1113	OFFL	0	N/R	R2	0	0	**
A2C8	C8	0208	0020	05	OFLINE	3339	OFFL	0	R/O	R2	0	0	**
A2C9	C9	0209	0021	05	OFLINE	3339	OFFL	0	R/O	R2	0	0	**
A2CA	CA	020A	0022	05	OFLINE	3339	OFFL	0	R/O	R2	0	0	**
A2CB	CB	020B	0023	05	OFLINE	3339	OFFL	0	R/O	R2	0	0	**

END OF DISPLAY

SYM-000384

Example 9 GROUP_NAME=KCH4
 INCLUDE_RAG=RMT (A000,05,3F)
 GROUP_END

```
EMCQV00I SRDF-HC DISPLAY FOR (4) $$$SQ VOL,G(KCH4)
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT|MR|R1|R2|SY
SYS CH|DEV RDEV GP|VOLSER|CYLS|STAT|OPN|STATUS|MR|INVTRK|INVTRK|%
```

6C20	20	0020	0208	3F	OFLINE	1113	OFFL	0	TNR-SY	R1	0	0	**
6C21	21	0021	0209	3F	OFLINE	1113	OFFL	0	TNR-SY	R1	0	0	**
6C22	22	0022	020A	3F	OFLINE	1113	OFFL	0	TNR-SY	R1	0	0	**
6C23	23	0023	020B	3F	OFLINE	1113	OFFL	0	TNR-SY	R1	0	0	**
6C30	30	0030	0030	3F	U6A030	1113	ONPV	0	R/W-SY	R1	0	0	**
6C31	31	0031	0031	3F	U6A031	1113	ONPV	0	R/W-SY	R1	0	0	**
6C32	32	0032	0032	3F	U6A032	1113	ONPV	0	R/W-SY	R1	0	0	**
6C33	33	0033	0033	3F	U6A033	1113	ONPV	0	R/W-SY	R1	0	0	**
6C34	34	0034	0034	3F	U6A034	1113	ONPV	0	R/W-SY	R1	0	0	**
6C35	35	0035	0035	3F	U6A035	1113	ONPV	0	R/W-SY	R1	0	0	**

END OF DISPLAY

SYM-000385

Message Exit

The SRDF Host Component user message exit is named EMCMSGX. If this load module is omitted from the linklib, the message exit is disabled. If the module is in the linklib, the exit is enabled during SRDF Host Component initiation.

Disabling

To disable the exit, enter the following command:

```
#SC GLOBAL,MSGX,OFF
```

Enabling

To reenable the exit, enter the following command:

```
#SC GLOBAL,MSGX,ON
```

The source for EMCMSGX is in SCF.SAMPLIB. The sample exit contains a table of message ids that are to be processed. If the message currently being processed is in the table, an ESTAE environment is established, and the processing routine is invoked.

If the ESTAE routine gets control, the exit is disabled.

EMCMX03I Messages

The sample exit generates one of the following forms of message EMCMX03I:

- ◆ EMCMX03I USER MSG EXIT FOR *msgid*
- ◆ EMCMX03I USER MSG EXIT FOR *msgid*, MVS DEVICE NUMBER IS *cuu*
- ◆ EMCMX03I USER MSG EXIT FOR *msgid*, MVS DEVICE NUMBERS FOLLOW:
cuu1-cuu2

Refer to the following examples:

Example 1:

```

EMCMN00I SRDF-HC : (1) //SQ VOL,A000,4
EMCQV00I SRDF-HC DISPLAY FOR (1) //SQ VOL,A000,4
DV_ADDR|_SYM_|_TOTAL|SYS|DCB|CNTLUNIT|_R1_|R2|SY
SYS CH|DEV RDEV GP|VOLSER|CYLS|STAT|OPN|STATUS|MR|INVTRK|INVTRK| %
A000 00 0000 0000 00 UWC000 1113 OFFL 0 R/W-SY L1 0 0 **
EMCMX03I USER MSG EXIT FOR EMCQV00I, MVS DEVICE NUMBER IS A000
A001 01 0001 0001 00 UWC001 1113 OFFL 0 R/W-SY L1 0 0 **
EMCMX03I USER MSG EXIT FOR EMCQV00I, MVS DEVICE NUMBER IS A001
A002 02 0002 0002 00 UWC002 1113 OFFL 0 R/W-SY L1 0 0 **
EMCMX03I USER MSG EXIT FOR EMCQV00I, MVS DEVICE NUMBER IS A002
A003 03 0003 0003 00 UWC003 1113 OFFL 0 R/W-SY L1 0 0 **
EMCMX03I USER MSG EXIT FOR EMCQV00I, MVS DEVICE NUMBER IS A003
END OF DISPLAY

```

Example 2:

```

EMCMN00I SRDF-HC : (4) //SC VOL,9801-9803,REFRESH
EMCCVE4E DEVICE 0001 PARTNER R1 IS NOT IN TNR STATUS (CMD:4)
EMCMX03I USER MSG EXIT FOR EMCCVE4E, MVS DEVICE NUMBER IS 9801 (CMD:4)
EMCCVE4E DEVICE 0002 PARTNER R1 IS NOT IN TNR STATUS (CMD:4)
EMCMX03I USER MSG EXIT FOR EMCCVE4E, MVS DEVICE NUMBER IS 9802 (CMD:4)
EMCCVE4E DEVICE 0003 PARTNER R1 IS NOT IN TNR STATUS (CMD:4)
EMCMX03I USER MSG EXIT FOR EMCCVE4E, MVS DEVICE NUMBER IS 9803 (CMD:4)
EMCCV25I NO ELIGIBLE DEVICES FOUND, COMMAND ABORTED (CMD:4)
EMCMN00I SRDF-HC : (5) //SC VOL,A000-A003,RDF-SUSP
EMCGM40E COMMAND HAS FINISHED FOR BOX 000184600045 (CMD:5)
EMCGM41I REQUESTED DEVICES
0000-0003
EMCMX03I USER MSG EXIT FOR EMCGM41I, MVS DEVICE NUMBERS FOLLOW:
A000-A003
EMCGM42I ELIGIBLE DEVICES
0000-0003
EMCMX03I USER MSG EXIT FOR EMCGM42I, MVS DEVICE NUMBERS FOLLOW:
A000-A003
EMCGM43I COMPLETED DEVICES
0000-0003
EMCMX03I USER MSG EXIT FOR EMCGM43I, MVS DEVICE NUMBERS FOLLOW:
A000-A003
EMCGM07I COMMAND COMPLETED (CMD:5)

```

This chapter provides a description of Symmetrix volume configuration and attributes, SRDF modes of operation, and integrated operations for the SRDF Host Component. Topics include:

- ◆ Logical Volume Types.....4-2
- ◆ Logical Volume States.....4-4
- ◆ SRDF Logical Volume Attributes.....4-9
- ◆ Operational Modes 4-12
- ◆ Support for Unequal Size R1 and R2.....4-34
- ◆ Target (R2) Volume Read / Write Protection 4-36

Logical Volume Types

Within each Symmetrix unit, three logical volume types may be defined:

- ◆ Local volumes
- ◆ Source (R1) volumes
- ◆ Target (R2) volumes

Local Volumes

Local volumes are logical volumes unique to that Symmetrix unit. That is, local volumes are only accessible to hosts attached to that Symmetrix unit. These logical volumes can be:

- ◆ Unmirrored / unspared volumes
- ◆ Internally mirrored to other local volumes in that unit
- ◆ Protected by dynamic sparing
- ◆ Exist as dynamic spares

Source (R1) Volumes

Source (R1) volumes are logical volumes that reside on a Symmetrix unit. The data on those source (R1) volumes is mirrored to target (R2) volumes on another Symmetrix unit.

Should the source (R1) volume fail, Symmetrix transparently accesses the data on its corresponding target (R2) volume. When the failing source (R1) volume is replaced, the remotely mirrored volume is resynchronized automatically as a background operation using the data in the target (R2) volume.

Target (R2) Volumes

Target (R2) volumes are a copy of the source (R1) volume in another Symmetrix unit. A target (R2) volume typically has a default configuration mode of *read only* to any host with access to the Symmetrix unit in which it resides.

Under normal operation, writes to the target (R2) volume occur by using the link paths. However, should the source (R1) volume fail, Symmetrix transparently accesses the data on the corresponding target (R2) volume through the link paths. New writes accumulate as invalid tracks in the Symmetrix unit containing the source (R1) volume.

During disaster recovery or any other use of SRDF in which the Symmetrix unit containing the source (R1) volume is unavailable for read / write access, the target (R2) volume can be made available for read / write operations with a host attached to the Symmetrix unit containing the target (R2) volume.

I/O Operations

The Symmetrix units in an SRDF configuration can simultaneously perform I/O operations with source (R1), target (R2), and local volumes. That is, the host systems connected to Symmetrix channel interfaces have read / write access to the local and source (R1) volumes in their respective Symmetrix units. A host system may also access target (R2) volumes on the Symmetrix unit that are in *read only* mode.

The SRDF Host Component obtains the status of remotely mirrored volumes and moves control between the Symmetrix units during failover operations and concurrent operations.

Logical Volume States

This section describes the three device states that an SRDF logical volume (source (R1) or target (R2)) reflects to the host connected to the Symmetrix unit on which the volumes are located.

Understanding how the three device states of an SRDF logical volume are achieved is fundamental to grasping the concepts of SRDF operation. Make sure you fully comprehend this section before attempting any SRDF operations.

The device states can be:

- ◆ Not Ready (NR)
- ◆ Write Protected (RO)
- ◆ Write Enabled (RW)

These device states are determined by a combination of two substates: the device SRDF substate and the device channel interface substate, as shown in Figure 4-1.

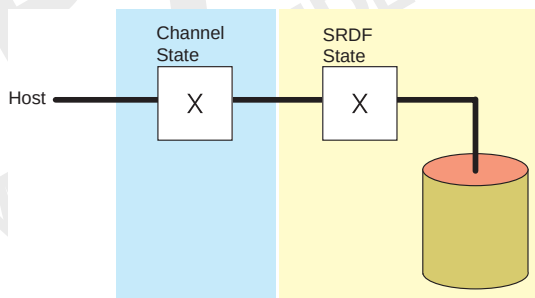


Figure 4-1 SRDF Logical Volume State

In general, you can look at the two substates as two layers:

- ◆ An internal layer (SRDF view) - the SRDF state
- ◆ An external layer (host view) - the device channel interface state

These two layers are configured by different sets of internal Symmetrix parameters. The state ultimately seen by the host is determined by the combination of the two device states.

Table 4-1 on page 4-7 and Table 4-2 on page 4-8 summarize the device state seen by the host as determined by the individual sub-states. For example, only when a device is write enabled for both the channel state and the SRDF state can the host be able to write to the device.

The following sections describes these two substates and how the various device substate combinations determine the actual overall device state reflected to the host.

SRDF Volumes States (SRDF View)

This section lists the substates a source (R1) or target (R2) volume can have for SRDF operations.

Source (R1) Volume States

A source (R1) volume can have the following states listed for SRDF operations:

- ◆ Read / Write (RW)
In this state, the source (R1) volume is available for read / write operations. This is the default source (R1) volume state.
- ◆ Not Ready (NR)
If the source (R1) volume fails, the host continues to recognize that volume as available for read / write operations as all reads and / or writes continue uninterrupted with the target (R2) volume in that remotely mirrored pair.

Target (R2) Volume States

A target (R2) volume can have one of the three states listed for SRDF operations:

- ◆ Not Ready (NR)
In this state, the target (R2) volume responds “intervention required / unit not ready” to the host for all read and write operations to that volume. The target (R2) volume is unable to perform any SRDF operations when in this state.
- ◆ Read Only (RO)
In this state, the target (R2) volume is available for read-only operations. This is the default target (R2) volume state.

- ◆ Read / Write (RW)

In this state, the target (R2) volume is available for read / write operations.

Read / Write (RW) use of target (R2) volumes is intended for host read / write use in disaster recovery as well as disaster recovery testing. Target (R2) volumes should not be used for extended periods of read / write activity. Use local volumes, or request your EMC Customer Engineer to schedule a reconfiguration of R1 / R2 volume pairs to local volumes, to avoid extended read / write use of target (R2) volumes.

Symmetrix Volume States (Host View)

This section lists the states a source (R1) or target (R2) volume can have for host operations. This represents the channel interface states.

Source (R1) Volume States

A source (R1) volume can have one of the three following states. This state is seen by the host connected to the Symmetrix unit in which that volume resides:

- ◆ Write Enabled (RW)

In this state, the source (R1) volume is online to the host and available for read / write operations. This is the default source (R1) volume state.

- ◆ Write Disabled (RO)

In this state, the source (R1) volume responds *device write protected* to the host for all write operations to that volume.

- ◆ RDF Not Ready (RNR)

In this state, the source (R1) volume responds *intervention required/unit not ready* to the host for all host accesses to that volume.

Target (R2) Volume States

A target (R2) volume can have one of the three following states. This state is seen by the host connected to the Symmetrix unit in which that volume resides:

- ◆ Write Enabled (RW)

In this state, the target (R2) volume is available for read / write operations.

Since the default SRDF substate is read only (RO), the overall default target (R2) volume device state is read only (RO).

◆ Write Disabled (RO)

In this state, the target (R2) volume is not available for write operations to that volume from any host that can access that volume. This is the default target (R2) volume state.

◆ Not Ready (NR)

In this state, the target (R2) volume responds *intervention required/unit not ready* to the host for all host accesses to that volume.

Host Accessibility

The tables in this section describes the accessibility state of the source (R1) and target (R2) volumes to the host connected to the Symmetrix containing the source (R1) volumes.

The accessibility of the host to a particular Symmetrix volume depends on its state from both the host and SRDF view.

Table 4-1 lists the accessibility for a source (R1) volume.

Table 4-2 on page 4-8 lists the accessibility for a target (R2) volume.

Table 4-1 Source (R1) Volume Accessibility

Channel Interface State	SRDF View State	Accessibility
Write Enabled (RW)	Read/Write (RW)	Read/Write (RW)
Write Enabled (RW)	Not Ready (NR)	Depends on target (R2) volume availability
Write Disabled (RO)	Read/Write (RW)	Read Only (RO)
Write Disabled (RO)	Not Ready (NR)	Depends on target (R2) volume availability
Not Ready (NR)	Read/Write (RW)	Unavailable
Not Ready (NR)	Not Ready (NR)	Unavailable
RDF Not Ready (RNR)	RDF Not Ready (RNR)	Unavailable

Table 4-2 Target (R2) Volume Accessibility

Channel Interface State	SRDF View State	Accessibility
Write Enabled (RW)	Not Ready (NR)	Unavailable
Write Enabled (RW)	Read Only (RO)	Read Only (RO)
Write Enabled (RW)	Read/Write (RW)	Read/Write (RW)
Write Disabled (RO)	Not Ready (NR)	Unavailable
Write Disabled (RO)	Read Only (RO)	Read Only (RO)
Write Disabled (RO)	Read/Write (RW)	Read Only (RO)
Not Ready (NR)	Not Ready (NR)	Unavailable
Not Ready (NR)	Read Only (RO)	Unavailable
Not Ready (NR)	Read/Write (RW)	Unavailable
RDF Not Ready (RNR)	RDF Not Ready (RNR)	Unavailable

SRDF Logical Volume Attributes

This section describes attributes that can be assigned to each SRDF logical volume. A source (R1) or target (R2) volume can have one or more attributes assigned to it.

Source (R1) Volume Attributes

This section describes attributes that can be assigned to the source (R1) volumes in a Symmetrix unit. These attributes are set at the logical volume level.

SYNC This attribute sets the remotely mirrored pair to the *synchronous* state. In this state, the Symmetrix unit informs the host with access to that volume that an I/O sequence has successfully completed only after the Symmetrix unit containing the target (R2) volume acknowledges that it has received and checked the data.

In an open systems environment, the Symmetrix unit containing the source (R1) volume handles each I/O command separately and informs the host of successful completion when the Symmetrix unit containing the target (R2) volume checks and acknowledges receipt of the data.

This state ensures full synchronization between the source (R1) and target (R2) volumes prior to the start of an I/O sequence.

SEMI-SYNC This attribute sets the remotely mirrored pair to the *semi-synchronous* state. The semi-synchronous state is typically used in Extended Distance configurations to minimize the impact on performance. The semi-synchronous state is also used in situations where the Symmetrix unit containing the source (R1) volume needs high performance but can tolerate a one I/O gap in data synchronization.

In the semi-synchronous state, the Symmetrix unit containing the source (R1) volume informs the host of successful completion of the I/O operation when it receives the data. The RLD transfers each write to the target (R2) volume as the link path becomes available. The Symmetrix unit containing the target (R2) volume checks and acknowledges receipt of each write.

If a new write is started for a source (R1) volume before the previous write has completed to the target (R2) volume, the Symmetrix unit containing the source (R1) volume temporarily disconnects from the

host until the previous write operation is completed and acknowledged from the other Symmetrix unit and then reconnects to the host and continues processing.

Adaptive Copy - Write Pending (AW)

The adaptive copy -- write pending attribute, when set, affects the synchronized state of the remotely mirrored pair. When this attribute is enabled, Symmetrix acknowledges all writes to the source (R1) volume as if it was a local volume. The new data accumulates in cache until it is successfully written to the source (R1) volume and the RLD has transferred the write to the target (R2) volume.

The adaptive copy -- write pending attribute also has a user-configurable skew (write pending) threshold, that when exceeded, causes the remotely mirrored pair to operate in the predetermined SRDF state (synchronous or semi-synchronous) when this mode is in effect. As soon as the number of write pendings drops below this value, the remotely mirrored pair reverts back to the Adaptive Copy-Write Pending (AW) state. The skew value is configured at the volume level and may be set to a value between 1 and 65,535.

Adaptive Copy - Disk (AD)

The adaptive copy -- disk attribute, when set, affects the synchronized state of the remotely mirrored pair. When this attribute is enabled, Symmetrix acknowledges all writes to source (R1) volumes as if they were local volumes. New data accumulates as invalid tracks on the source (R1) volume for subsequent transfer to the target (R2) volume. The RLD transfers each write to the target (R2) volume whenever a link path becomes available.

The adaptive copy -- disk attribute also has a user-configurable skew (maximum number of invalid tracks threshold), that when exceeded, causes the remotely mirrored volume to operate in the predetermined SRDF state (synchronous or semi-synchronous) when this mode is in effect. As soon as the number of invalid tracks drops for a volume below this value, the remotely mirrored pair reverts back to the Adaptive Copy-Disk mode.

SRDF/A

The SRDF / A attribute, when set, indicates that the source (R1) volume is a member of an SRDF / A session. New writes for devices in an SRDF / A session are collected and pushed to R2 devices in cycles. The active cycle (N) on the R1 side collects new writes. The inactive cycle on the R1 side pushes data that had been collected in the previous active cycle (N-1) to the R2 side. On the R2 side, an inactive cycle is receiving data from its partner R1 inactive cycle (N-1) and placing it in cache.

There is also an active cycle at the remote site that is marking data in cache write pending to the R2 that has been received in its entirety. This is cycle N-2 data. The asynchronous mode preserves dependent write consistency by honoring the dependent write relationships imbedded in the I/O stream by the application. The design makes it an implicitly enterprise-wide, heterogeneous, host solution.

DOMINO Attribute

The DOMINO attribute, when set along with the SYNC attribute, ensures that the data on the source (R1) and target (R2) volumes are fully synchronized. When the DOMINO attribute is enabled, Symmetrix forces the other SRDF (source (R1) or target (R2)) volume to *not ready* and respond *intervention required/unit not ready* to the host whenever it detects one volume in a remotely mirrored pair is unavailable or a link failure has occurred.

After the problem has been corrected, the *not ready* volume must be made SRDF ready again to the host using the #SC VOL command with the SRDF action code. If the failed volume or link is still not available when the SRDF volume is made ready, the volume remains *not ready*.

Under normal operating conditions (DOMINO attribute not enabled), a remotely mirrored volume continues processing I/Os with its host even when an SRDF volume or link failure occurs. New data written to the source (R1) or target (R2) volume while its pair is unavailable or link paths are out of service are marked for later transfer.

When a link path is reestablished or the volume becomes available, resynchronization begins between the source (R1) and target (R2) volumes. Each source (R1) volume notifies the host when synchronization completes on that volume.

Operational Modes

All SRDF operations are managed at a logical volume level. Five operational modes are possible on SRDF logical volumes:

- ◆ Synchronous mode
- ◆ Semi-synchronous mode
- ◆ Adaptive Copy - Write Pending mode
- ◆ Adaptive Copy - Disk mode
- ◆ SRDF Asynchronous mode

These operational modes only affect those Symmetrix volumes that are remotely mirrored. I/O operations with local volumes occur as if they are in a non-SRDF environment as no updates are required to volumes at a different physical location. There is a preferred mode of operation for each SRDF solution. These operational modes are selectable based on the performance, distance, and speed of recovery requirements.

These SRDF modes of operation are set at the source (R1) volume during Symmetrix configuration. All source (R1) volumes are configured for either the synchronous or semi-synchronous mode. These two modes are considered to be *predetermined* SRDF modes.

In addition, the source (R1) volumes (all, individual, or a range) may also be configured for the Adaptive Copy-Write Pending or Adaptive Copy-Disk mode. Each Adaptive Copy volume also has a “skew” parameter associated with it. In the Adaptive Copy-Write Pending mode, this skew parameter is the maximum write pending threshold. In the Adaptive Copy-Disk mode, this skew parameter is the maximum invalid tracks threshold. This skew value may be set to the same value for all Adaptive Copy volumes or be a different value for each Adaptive Copy volume.

The Adaptive Copy mode and its skew value may be enabled (or disabled) for individual remotely mirrored pairs or all remotely mirrored pairs using SRDF commands.

An IML of a Symmetrix unit retains all SRDF parameter values set during its configuration or changed using the Symmetrix service processor commands with the exception of the Adaptive Copy mode (either mode) and the skew parameter value for that mode. These parameters revert to the values set during configuration upon a Symmetrix IML.

Synchronous Mode

The synchronous mode is used primarily in SRDF Campus Solutions. In this operational mode, Symmetrix maintains a real-time mirror image of the data on remotely mirrored volumes on a volume level. Data on the source (R1) and target (R2) volumes are always fully synchronized at the completion of an I/O sequence.

In normal operation, this mode has an impact on write performance to source (R1) volumes. This performance impact is due to overhead associated with remote data transfer, fiber latency, and acknowledgment of the synchronous operation.

The Symmetrix unit containing the source (R1) volume informs the host that an I/O sequence has successfully completed only after the Symmetrix unit containing the target (R2) volume acknowledges that it has received and checked the data.

In an open systems environment, the Symmetrix unit containing the source (R1) volume handles each I/O command separately and informs the host of successful completion when the Symmetrix unit containing the target (R2) volume acknowledges and checks receipt of the data.

That is, the Symmetrix unit containing the source (R1) volume disconnects from the channel and informs the host of successful completion of the I/O operation only after the SRDF feature determines that the data resides in cache in both Symmetrix units. If a problem occurs with data synchronization, the Symmetrix unit containing the source (R1) volume sends a Unit Check with the appropriate sense bytes to the host. This causes the host to retry the I/O operation. These actions maintain data integrity and ensure that two copies of the data exist real-time in both systems before the I/O completes.

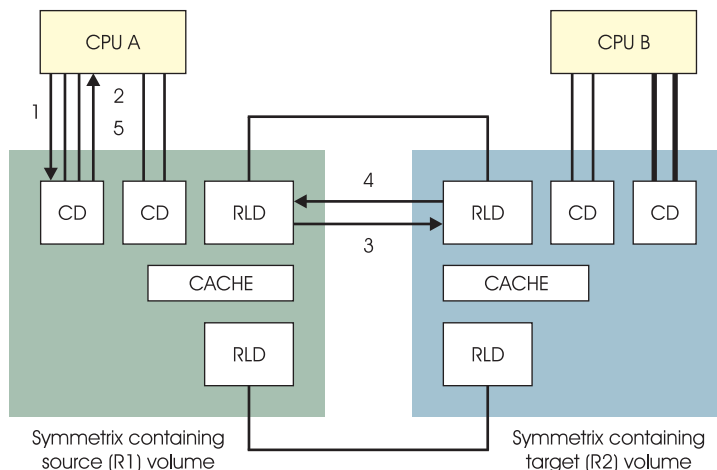


Figure 4-2 Synchronous Mode

When the Symmetrix unit containing the source (R1) volume has valid data in cache destined for a target (R2) volume, the Remote Link Director (RLD) transfers data to the cache in the Symmetrix unit housing the target (R2) volume by using its link path. This data transfer occurs while the Symmetrix unit containing the source (R1) volume continues to process I/O commands. If the Symmetrix unit containing the source (R1) volume does not receive acknowledgment of a successful transfer from the other Symmetrix unit within its timeout period or another failure occurs that prevents the data transfer, the Symmetrix unit containing the source (R1) volume sends a Unit Check with the appropriate sense bytes to the host.

Semi-Synchronous Mode

The semi-synchronous mode is used primarily in SRDF Extended Distance Solutions. In this operational mode, the Symmetrix unit containing the source (R1) volume maintains a semi-synchronous mirror image of its data in the Symmetrix unit containing the target (R2) volume on a volume level. Data on remotely mirrored volumes are always synchronized between the source (R1) and the target (R2) prior to initiating the next write operation to these volumes.

This mode of operation is designed for situations where high performance is needed at the Symmetrix unit containing the source (R1) volume and can tolerate a gap of up to one I/O (worst case) in data synchronization.

The Symmetrix unit containing the source (R1) volume informs the host of successful completion after each write operation. When the Symmetrix unit containing the source (R1) volume has valid data in cache destined for a target (R2) volume, the RLD transfers data to the cache in the Symmetrix unit containing the target (R2) volume via an available link path. This data transfer occurs while the Symmetrix unit containing the source (R1) volume continues to perform additional commands. If the host issues a new write operation for a source (R1) volume with a write pending status, the Symmetrix unit containing the source (R1) volume disconnects from the host channel. The Symmetrix unit containing the source (R1) volume then starts another I/O operation on another channel. When the write pending status is cleared (write completed and acknowledged and checked from the target (R2) volume), the Symmetrix unit containing the source (R1) volume reconnects to the channel and continues processing the write operation on the channel from which it disconnected. This operational mode keeps the data in the Symmetrix unit containing the target (R2) volume at most one I/O behind the data in the Symmetrix unit containing the source (R1) volume while minimizing the impact on local application performance. Figure 4-3 on page 4-16 illustrates this sequence of operations.

Although write operations can be held up due to synchronization between source (R1) and target (R2) volumes, read operations continue uninterrupted.

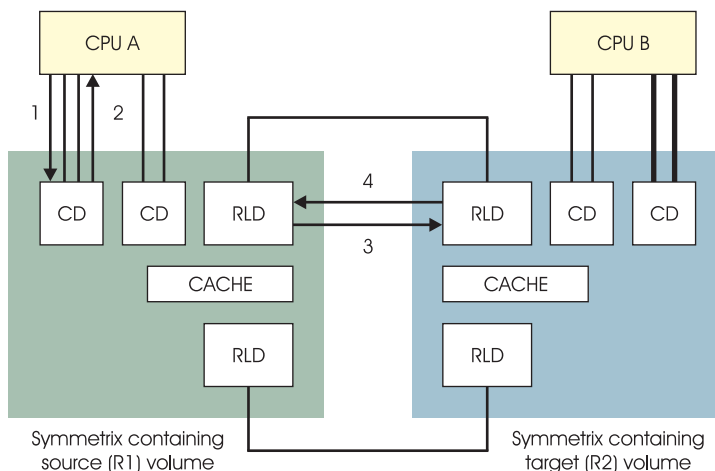


Figure 4-3 Semi-Synchronous Mode

If the Symmetrix unit containing the source (R1) volume does not get acknowledgment of a successful transfer from the Symmetrix unit containing the target (R2) volume within its timeout period or another failure occurs that prevents the data transfer, the Symmetrix unit containing the source (R1) volume marks that data as nonvalid for the target (R2) volume. Symmetrix copies that data to the target (R2) volume as a background operation to reestablish synchronization of the remotely mirrored pair.

Adaptive Copy-Write Pending (AW)

EMC offers an additional level of SRDF operation, the Adaptive Copy-Write Pending mode. The Adaptive Copy-Write Pending mode transfers data from the source (R1) volume to the target (R2) volume and does not wait for receipt acknowledgment or synchronization to occur. This mode is ideal for situations when a large amount of data must be transferred to remote devices and performance must not be

compromised at the local site; or, for situations where it is not necessary for remotely mirrored volumes to be synchronized at all times. This operational mode keeps the data in the Symmetrix unit containing the target (R2) volume as current to the data in the Symmetrix unit containing the source (R1) volume as possible.

This mode is designed to have little or no impact on performance between the host and the Symmetrix unit containing the source (R1) volume and offers protection against loss of data in the unlikely event that a source (R1) or target (R2) volume fails or all link paths are lost.

In this mode, the Symmetrix unit containing the source (R1) volume informs the host of successful completion after each write. When the Symmetrix unit containing the source (R1) volume has valid data in cache for a remotely mirrored pair, it destages that data to the source (R1) volume and the RLD transfers data to the cache in the Symmetrix unit containing the target (R2) volume via its link path. This data transfer occurs while the Symmetrix unit containing the source (R1) volume continues to process I/O commands. All writes for remotely mirrored pairs accumulate in the cache of the Symmetrix unit containing the source (R1) volume as write pendings until the data can be successfully written to both volumes.

Should a problem arise with data transfer to the Symmetrix unit containing the target (R2) volume or the Symmetrix unit is unable to write the data to the source (R1) volume, the Symmetrix unit containing the source (R1) volume retains that data in its cache until the problem can be corrected and the data is successfully written to both the source (R1) and target (R2) volumes.

The Adaptive Copy-Write Pending mode has a user-configurable skew parameter (maximum allowable write pendings) for each source (R1) volume configured for this mode. This parameter value, when exceeded, causes Symmetrix to switch to the predetermined SRDF mode (synchronous or semi-synchronous) for that remotely mirrored pair. When the number of write pending operations for a target (R2) volume drops below the skew value, Symmetrix switches back to the Adaptive Copy-Write Pending mode for that remotely mirrored pair. The skew value may range from 1 to 65,535. The default value for this parameter for each remotely mirrored pair is 65,535 (maximum value).

This mode can be enabled / disabled for one remotely mirrored pair, all remotely mirrored pairs, or a range of remotely mirrored pairs during Symmetrix configuration or using SRDF commands. When this mode is disabled, the remotely mirrored pairs operate in the

predetermined SRDF state (synchronous or semi-synchronous, whatever was configured for that pair).

Examples

The Adaptive Copy-Write Pending mode is designed to:

- ◆ Transfer large amounts of data with minimal impact on performance
- ◆ Allow remotely mirrored volumes to drift out of synchronization for higher performance, but stay within a predetermined number of write pendings

with protection against data loss.

The following examples describe these two methods of use.

Example 1

This mode of operation is convenient in situations where the write activity caused by heavy batch loads or data reorganization can severely impact performance due to the Symmetrix units maintaining a full synchronous state. In these cases, set the Skew parameter to its default value (65,535). Enable the Adaptive Copy mode for all remotely mirrored pairs. Data transfers begin between the SRDF units.

Example 2

In many systems, it is not necessary that all volumes be fully synchronized. In this example, SRDF volumes requiring synchronization are configured for synchronous or semi-synchronous operation. Those SRDF volumes that do not require full synchronization are configured for the Adaptive Copy-Write Pending mode (AW) and a low skew value (that is, 100). When data transfers begin, an AW remotely mirrored pair operates in the Adaptive Copy-Write Pending mode until bursts of high write activity cause the number of write pending operations to exceed 100. Symmetrix then forces the AW remotely mirrored pair to the predetermined SRDF mode. When the number of write pending operations for the target (R2) volume drops below the skew value, that AW remotely mirrored pair returns to the Adaptive Copy-Write Pending mode. Any new writes for these pairs accumulate in cache as write pendings. Synchronization occurs when the pair switches to the predetermined SRDF mode.

Disabling Adaptive Copy

When the Symmetrix unit containing the source (R1) volume(s) receives a command to disable the Adaptive Copy-Write Pending mode, it does not go to the predetermined SRDF mode immediately. The remotely mirrored pairs with write pendings (skew ≠ 0) continue to work in the Adaptive Copy mode until all writes have been transferred to the respective target (R2) volumes. These remotely

mirrored pairs then switch to the predetermined SRDF mode (synchronous or semi-synchronous).

Error Conditions

Should a source (R1) volume fail, Symmetrix temporarily suspends the Adaptive Copy state (if enabled), destages all write pendings for the target (R2) volume at the highest priority, and continues I/O operations with the target (R2) volume. When the source (R1) volume is replaced, Symmetrix resynchronizes the remotely mirrored pair and reenables Adaptive Copy-Write Pending mode. No data is lost as the Symmetrix unit containing the source (R1) volume retains the data in its cache until it can destage the data to the source (R1) volume.

Should a target (R2) volume fail, Symmetrix marks all pending writes and any new data as invalid tracks in the Symmetrix unit containing the source (R1) volume until the target (R2) volume can be replaced. When the defective device is replaced, Symmetrix resynchronizes the remotely mirrored pair and reenables the Adaptive Copy-Write Pending mode.

Should the link paths fail between the Symmetrix units, all data for the target (R2) volume(s) accumulates as invalid tracks in the cache of the Symmetrix unit containing the source (R1) volume(s).

Adaptive Copy-Disk Mode (AD)

EMC offers a second type of Adaptive Copy operation, the Adaptive Copy-Disk mode. The Adaptive Copy-Disk mode transfers data from the source (R1) volume to the target (R2) volume and does not wait for receipt acknowledgment and synchronization to occur. This mode is ideal for situations when a large amount of data must be transferred to remote devices and performance must not be compromised. This mode is intended to be a temporary SRDF operating state and has little impact on performance between the host and the Symmetrix unit containing the source (R1) volume. This operational mode keeps the data in the Symmetrix unit containing the target (R2) volume as current to the data in the Symmetrix unit containing the source (R1) volume as possible.

This mode of operation is designed for situations requiring the transfer of large amounts of data without loss of performance. Because Symmetrix cannot fully guard against data loss should a failure occur, EMC recommends using this mode temporarily to transfer the bulk of your data to target (R2) volumes and then switch

to a full SRDF mode (synchronous or semi-synchronous) or Adaptive Copy-Write Pending mode (if you can tolerate some lack of synchronization between the remotely mirrored pairs) to ensure full data protection.

In this mode, the Symmetrix unit containing the source (R1) volume acknowledges all writes to source (R1) volumes as if they were local volumes. Symmetrix accumulates the new data on the source (R1) volume marking it as invalid tracks for the target (R2) volume. Synchronization of the source (R1) and target (R2) volumes is reported to the Symmetrix unit containing the source (R1) volume only.

This mode can be enabled / disabled for one remotely mirrored volume pair, all remotely mirrored volumes, or a range of remotely mirrored volumes using commands entered at the Symmetrix service processor at the Symmetrix unit containing the source (R1) volume. When this mode is disabled, the Symmetrix units operate in the predetermined SRDF state (synchronous or semi-synchronous, whatever was configured during Symmetrix installation).

More Information: This mode can also be enabled / disabled by entering SRDF Host Component commands. For more details, refer to *Adaptive Copy-Write Pending (AW)* on page 4-16.

This mode of operation has a user-configurable skew parameter (maximum invalid tracks), that, when its value is exceeded for a remotely mirrored pair, causes Symmetrix to switch to the predetermined SRDF mode. (That is, all write operations between the remotely mirrored volumes are fully synchronized.) When the number of invalid tracks for a target (R2) volume goes below the specified value, Symmetrix switches back to the Adaptive Copy-Disk mode for that volume pair. The skew value may range from 1 to 65,535. The default value for this parameter for each remotely mirrored pair is 65,535. The default value for this parameter is the maximum skew value at that microcode level.

Example

The Adaptive Copy-Disk mode is designed to migrate large amounts of data from one Symmetrix unit to another. The following example describes the migration mode of use.

This mode of operation is convenient in situations where it is necessary to either migrate a data center from one location to another or create a mirror image of the data in a separate location without a disruption in operation. The write activity caused by the movement

of large amounts of data can severely impact performance, particularly if Symmetrix is configured for either the synchronous or semi-synchronous mode.

In this example, the large data transfer is only a temporary condition. In this case, set the Skew parameter to its default value (65,535 or 999,999 depending on your microcode revision level). Enable the Adaptive Copy mode for all remotely mirrored pairs. Data transfers begin between the SRDF units.

When the data migration or data copy operation has completed (or is near completion), switch to the synchronous, semi-synchronous, or Adaptive Copy-Write Pending SRDF mode, depending on the degree of synchronization needed between the remotely mirrored pairs.

Error Conditions

Should a source (R1) volume fail, all data not already written to the target (R2) volume is lost. When the source (R1) volume is replaced, Symmetrix resynchronizes the remotely mirrored pair and reenables the Adaptive Copy-Disk mode.

Should a target (R2) volume fail, Symmetrix marks all pending writes and any new data as invalid tracks in the Symmetrix unit containing the source (R1) volume until the target (R2) volume can be replaced. When the defective device is replaced, Symmetrix resynchronizes the remotely mirrored pair and reenables the Adaptive Copy-Disk mode.

Should the link paths fail between the Symmetrix units, all data for the target (R2) volume(s) accumulates as invalid tracks on the source (R1) volume.

SRDF Asynchronous Mode

Many SRDF customers use synchronous mode to protect data on a primary storage system. Synchronous mode creates a consistent copy of data on the secondary storage system (R2) but carries a price, both in performance (response time on the R1 side host) and cost (high-capacity links).

The main premise of SRDF/A mode is to provide a consistent point-in-time image on the R2 side, which is not too far behind the R1 side, resulting in minimal data loss in the event of a disaster at the primary site. For customers that choose this lower level of protection, SRDF/A mode provides:

- ◆ A consistent point-in-time image on the secondary devices at all times.

- ◆ Support for all existing SRDF topologies (ESCON, FarPoint, point-to-point, and switched fabric Fibre Channel, GigE).
- ◆ No additional external hardware requirements.
- ◆ Ability to work at any distance without adding response time to the R1 side host.
- ◆ Support for any host (MF, OS) and any data type recognized by Symmetrix (FBA, CKD, AS400, and so forth).
- ◆ Low impact on back end (DA) directors.
- ◆ High performance (response time equivalent to writing to non-SRDF devices).
- ◆ Ability to read data from the R2 side to the R1 side (for example, all mirrors fail on the R1 side), or to read the R2 device from a host at the R2 side while SRDF / A is inactive.

In order to achieve these goals, the following new elements are made available with the Enginuity microcode:

- ◆ A new mode for SRDF devices, asynchronous mode.
- ◆ A new mode of Virtual Devices (VDEVs) called a Cache Only Virtual Device (COVD, pronounced co-vee-dee). There are two COVDs required in the secondary Symmetrix for each R2 device.

This condition limits the number of SRDF / A devices per Symmetrix to approximately 2600 in Version 1.

COVDs are required only with Enginuity version 5x70 and earlier. For version 5x71, COVDs are not required.

- ◆ Two data structures (linked lists) for each device on the primary and secondary to track cache slots containing updated data.
- ◆ A “cycle number” (in other words, a virtual timer) in global memory on the primary side and secondary side.

Resuming SRDF/A Operation

Resuming SRDF / A involves planning. If you are going to use the SRDF / A target R2 disks for processing after an SRDF / A suspension caused by a DROP or PEND_DROP, you should follow the same procedures for resuming SRDF that are documented in Chapter 6, *SRDF Procedures*.

SRDF/A Monitor

An optional feature provided with EMCSCF is a monitor that periodically checks the state of SRDF / A sessions. Both periodic and event SMF records may be produced, and optionally, calling a user exit on events is provided.

More Information: Refer to the *ResourcePak Base for z/OS Product Guide* for more details on the monitor function.

Refer to Figure 4-4 and the following description for an operational overview.

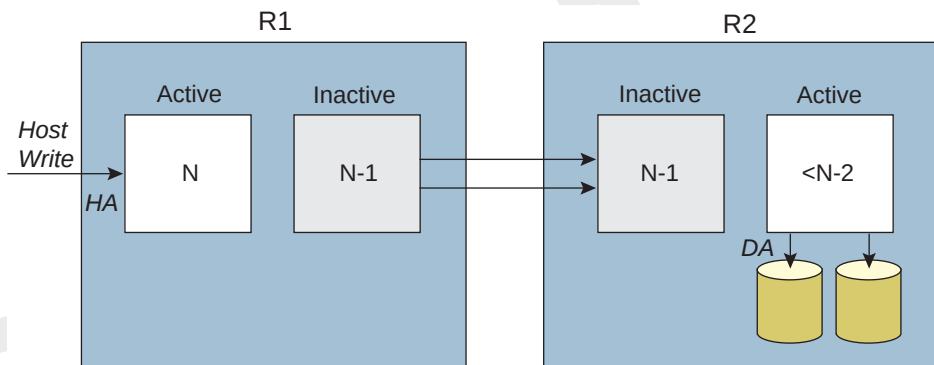


Figure 4-4 SRDF/A Mode Overview

Each representation of N (including N-“x”) represents a set of cache slot pointers. The N is the active cycle number on the primary (R1) side of the SRDF connection. You should consider the following:

- ◆ The R2 device always represents a consistent image that is true (for time N-2)
- ◆ The R2 side is working on building a consistent image (for time N-1) by receiving data from the primary side
- ◆ The R1 side is sending cycle N-1 to the R2 side
- ◆ The R1 side is marking all new writes as belonging to time period N (internal copy writes or host writes)

In referring to Figure 4-4, it is clear that SRDF / A mode does not actually order host writes. Instead, it puts the host writes into cycles or “chunks” that are transferred one-by-one. Only when a complete chunk is fully received on the R2 side can it be committed. In Figure 4-4, if the links are lost, partial chunk N-1 can be discarded,

resulting in a consistent R2. Moreover, regular SRDF operation can be used for failback or failover without a full resynchronization.

This “chunk” method is different from traditional approaches to ordered writes (such as XRC), but it does not reduce the level of protection. If the R2 side lags the R1 side by 300 writes, it does not matter if the next 300 writes arrive in order or not. It only matters that either all or none of the 300 writes are applied to the secondary. Thus, sending writes in bunches of 300 is the same as sending the writes in order. An advantage to sending writes in chunks is that if the host writes to the same track 10 times in a given time period, SRDF/A mode sends the updates only once. This feature can have a major performance benefit as it results in more efficient link utilization and potentially lower link bandwidth requirements when compared to a traditional, ordered, write solution that must handle each update discretely. The potential cost is that if SRDF links are lost, SRDF/A can lose up to twice the size of a cycle (compared to a traditional ordered write solution). However, this potential problem is compensated somewhat by the saving in cycle size.

Ensuring Data Consistency — The Dependent Write Principle

Any asynchronous, remote, application solution, whether it is host or storage controller based, must ensure that data at the remote site is always consistent to enable restartability and maintain data integrity.

To achieve this objective, asynchronous replication solutions must recognize the logical dependency between write I/Os that are embedded in the I/O stream by the logic of an application, the operating system, or the database management system. This design ensures “dependent write consistency”, which is the basic principle behind all EMC Consistency Technology solutions (Consistency Group, Consistent Split, Consistent SNAP, and SRDF/A mode).

You must understand this concept to comprehend how SRDF/A mode is able to provide consistent data at the remote site at all times.

Dependent Writes

A dependent write ensures that SRDF/A mode is able to guarantee data consistency. A dependent write is a write I/O that is not issued by an application until some prior write I/O has completed.

Example

Assume two write I/Os, A and B, have a relationship in the application such that I/O B is not issued until I/O A has been completed successfully. Ensuring dependent write consistency means that no failure in the remote replication infrastructure can create the

condition where I/O *B* has been replicated to the remote site, but I/O *A* has not been replicated. Such a missing sequence condition would destroy the integrity of the data at the remote site. There are several methods to ensure that this condition does not occur, and that consistency is preserved at the remote site:

- ◆ Ordering write I/Os based on timestamps
- ◆ Ordering write I/Os based on sequence numbers
- ◆ Honoring dependent writes

SRDF/A mode preserves dependent write consistency by honoring the dependent write relationships imbedded in the I/O stream by the application. This design makes it an implicitly enterprise wide, heterogeneous host solution.

You must recognize that the relationship between I/Os is not one of *timing*, but one of *logic*. By respecting the logical relationships between I/Os, there is no need for any type of references such as timestamps or sequence numbers to create consistency. The Symmetrix does not understand which specific I/Os it receives that have dependent relationships. Therefore, the Symmetrix assumes that any I/O *B*, arriving after another I/O *A*, has been acknowledged as complete to the host, must be dependent on I/O *A*. Symmetrix must ensure that *A* and *B* are either in the same cycle (or chunk) or that *B* is in a cycle that is processed to the remote side after the cycle is processed that contains I/O *A*.

It is these cycles of I/Os, rather than the I/Os themselves, that are being ordered by SRDF/A mode. The key to preserving the data consistency within SRDF/A mode is to ensure that dependent write relationships are honored during the cycle switch process. The frequency of this process also determines the data lag experienced by a remote site (in other words, the amount of data that would be lost in the event of a primary site disaster).

Concurrent SRDF

Enginuity 5567 and later supports the ability for a single primary volume to be remotely mirrored to two secondary volumes concurrently. This feature is called Concurrent SRDF and is supported in both ESCON and Fibre Channel SRDF configurations.

Concurrent SRDF 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.

Figure 4-5 shows a concurrent SRDF configuration in which one secondary volume is in synchronous mode, while the other is in adaptive copy. Any combination of synchronous/semi-synchronous and adaptive copy is allowed with the exception of one volume operating in synchronous mode and the other operating in semi-synchronous mode.

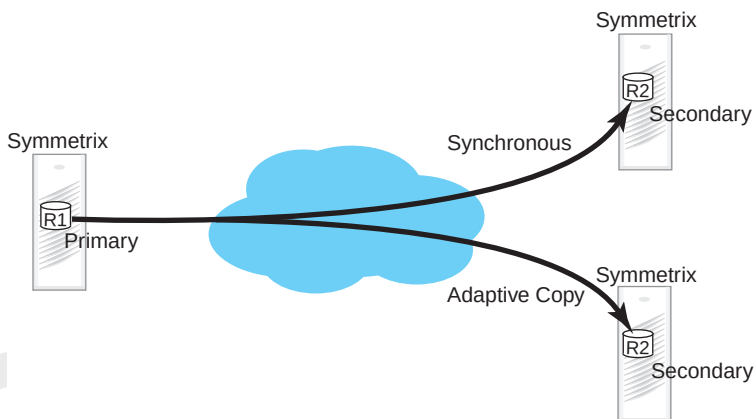


Figure 4-5 Concurrent SRDF Configuration

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 is in synchronous mode and one is in adaptive copy mode, ending status is presented to the host when the synchronous volume acknowledges receipt of the I/O.

Concurrent SRDF Configurations with Host Component Commands

The introduction of Engenuity microcode level 5567, with its support of concurrent SRDF, required the addition of one new Host Component parameter (LCL) and the extension of a current parameter (RMT). This section provides a brief explanation and basic examples of how these parameters are used in a concurrent SRDF configuration.

The following steps are involved in configuring SRDF protection:

Currently, these steps are only performed by EMC personnel.

1. RDF Groups are defined.
2. Devices are assigned to SRDF Groups.
3. RDF Groups are pointed to the remote Symmetrix and SRDF Groups.

Consider the example shown in Figure 4-6.

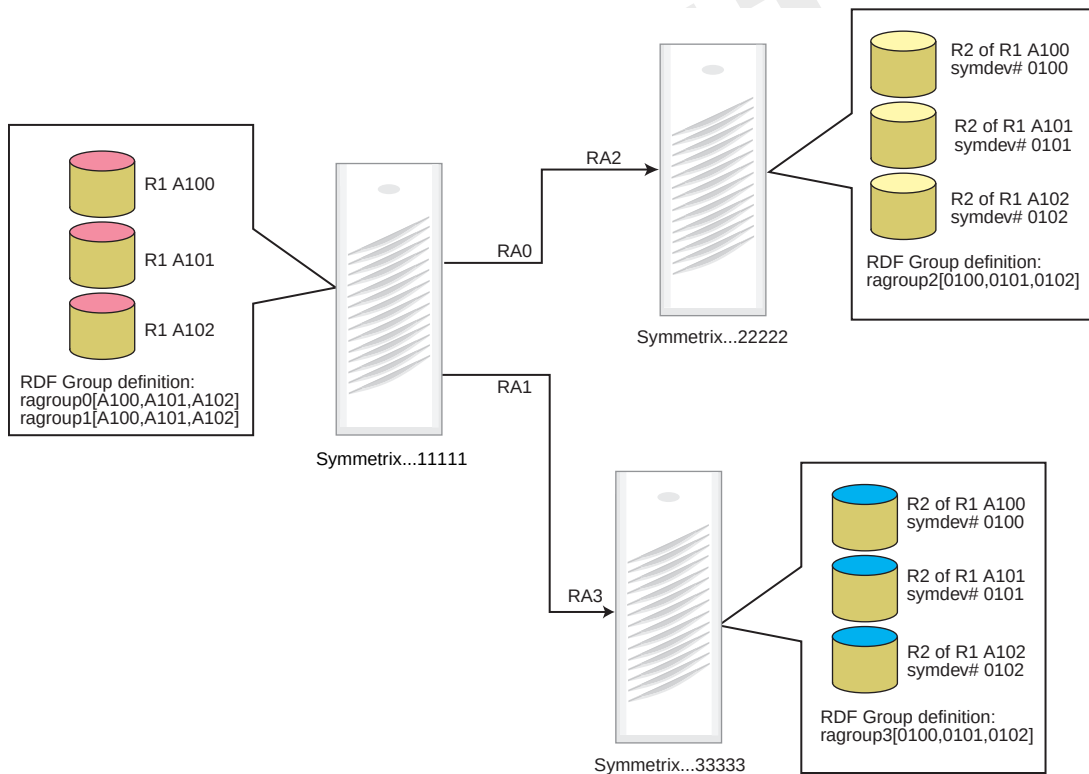


Figure 4-6 Concurrent SRDF Configuration Example

This example consists of the following:

- ◆ RDF Group *ragroup0* in Symmetrix 11111 points to SRDF Group *ragroup02* in Symmetrix 22222.

- ◆ RDF Group *ragroup1* in Symmetrix 11111 points to SRDF Group *ragroup03* in Symmetrix 33333.
- ◆ RDF Group *ragroup0* contains source (R1) devices A100-A102, *ragroup02* contains target (R2) devices 0100-0101, and *ragroup03* contains target (R2) devices 0100-102.

If Host Component commands are issued against the source (R1) (such as setting the SRDF adaptive copy mode with one of the target (R2) devices), the LCL parameter is used to specify the target (R2). For example:

```
#SC VOL,LCL(A100,1),ADCOPY
```

Where the first value in the LCL parameter specifies which z/OS device to issue the I/O against and the second value specifies the SRDF Group. In this case, the SRDF Group *ragroup1* points to *ragroup03* and sets a adaptive copy mode between A100 and *symdev# 0100* in Symmetrix 33333.

If Host Component Commands are issued against the target (R2) (such as making the device not ready to the host (NRDY)), the RMT parameter is used to specify the target (R2) device. For example:

```
#SC VOL,RMT(A101,0,2),NRDY,0101
```

Where the first value in the RMT parameter specifies which z/OS device to issue the I/O against, the second value specifies the SRDF Group, and the third value is the SRDF group of the target device. In this case the SRDF Group *ragroup0* points to Symmetrix 22222. The *symdev# 0101* is a member of *ragroup2* in Symmetrix 22222 and is the device made not ready to the host.

In a multihop configuration, the RMT parameter is extended to specify the path to the target Symmetrix.

Consider the example shown in Figure 4-7.

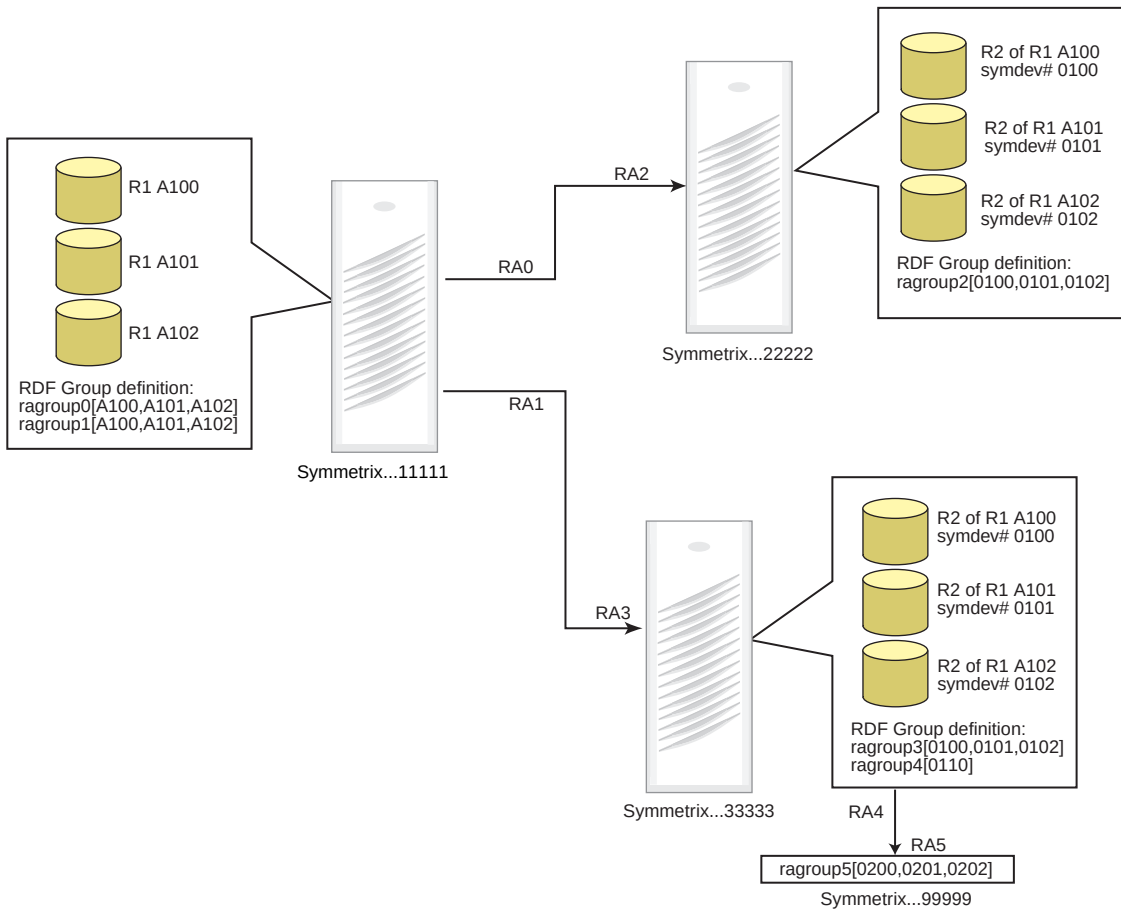


Figure 4-7 Multihop Configuration Example

This example consists of the following:

- ◆ The target (R2) devices for mainframe devices A100-A102 exist in Symmetrix 22222 in *ragroup2*.
- ◆ The concurrent target (R2) devices exist in Symmetrix 33333.
- ◆ Symmetrix 99999 is one hop away with the communication path passing through Symmetrix 33333.
- ◆ RDF Group *ragroup4* points to Symmetrix 99999.

The RMT *mhlist* value specifies the SRDF Groups used to reach the target (R2) devices. For example:

```
#SC VOL,RMT(A100,1.4,5),RDY,0201
```

Where the second RMT parameter value specifies the multihop list. The target (R2) devices are found by using *ragroup1* in Symmetrix 11111 to reach Symmetrix 33333, then *ragroup4* to reach Symmetrix 99999. The third value specifies that the target (R2) *symdev# 0201* in *ragroup5* be set ready to the host (RDY).

Switched SRDF Configurations

The support for switched SRDF configuration using Fibre Channel SRDF requires zoning of SRDF on the fabric.

EMC recommends having a World Wide Name (WWN) zone for each SRDF configuration. The zone should only include the WWN of Fibre Adaptor (RF) ports used.

For example, in Figure 4-8, Symmetrix 11111 is configured with concurrent SRDF relationships to target (R2) devices in Symmetrix 22222 and 33333. FAPort01, FAPort02, and FAPort03 are used to connect the Symmetrix through the Switch.

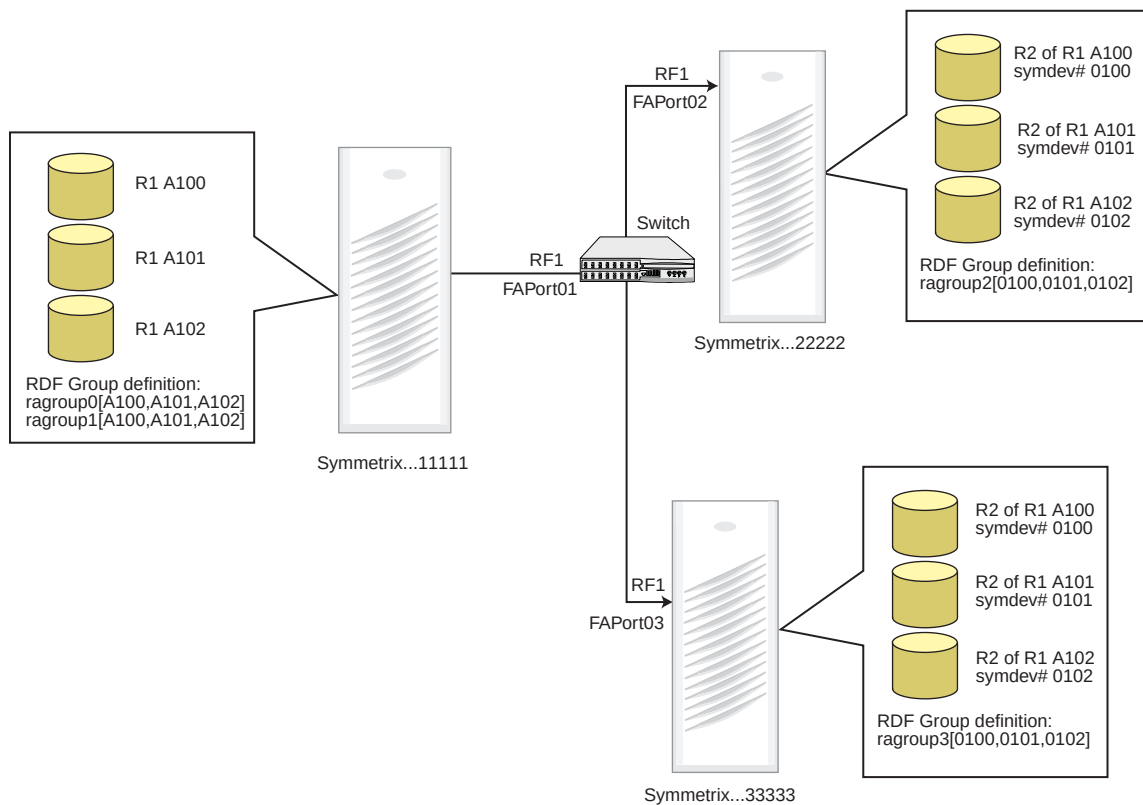


Figure 4-8 Switched SRDF Configuration

In this case, the SRDF zone should include WWN of FAPort1, FAPort2 and FAPort3.

More Information: For a complete discussion of fabric zones and switch configuration, refer to the *EMC ESN Manager Product Guide* and its related documentation.

Dynamic SRDF Pairs

Enginuity microcode level 5568 supports the SRDF capability to dynamically change SRDF device pairings, thus providing more options and flexibility in user applications. Devices configured with the SRDF Dynamic attribute can be operated on with #SC VOL command actions:

- ◆ SWAP
- ◆ CREATEPAIR
- ◆ DELETEPAIR

Possible configurations are governed by Symmetrix SRDF connectivity and SRDFGroup relationship definitions.

SWAP exchanges the personalities of existing R1 (primary) and partner R2 (secondary) relationships. CREATEPAIR establishes a new SRDF relationship between devices with the Dynamic SRDF attribute. Both SWAP and CREATEPAIR allow flag settings to determine the states of the R1 and R2 after the operation is complete. DELETEPAIR removes the relationship between existing R1 and R2 partners.

Devices in PPRC relationships (those established using CESTPAIR) cannot be controlled by the SRDF Host Component. Conversely, devices in a Dynamic SRDF relationship cannot be controlled by PPRC commands.

More Information: Refer to Enginuity reference materials for more details about native PPRC support in Enginuity 5568.

Dynamic RDF Groups

Beginning with Enginuity level 5669, support is added for Dynamic SRDF Groups. This Enginuity feature allows you to add RDF groups dynamically, and to modify and delete dynamic groups.

Once a dynamic group is defined, devices may be added or removed using dynamic SRDF CREATEPAIR or DELETEPAIR. Definitions for dynamic groups are persistent across IMLs.

Defining and Adding Groups

A group is defined with a group number (x'00' - x'3F') and a list of directors for each side of the SRDF relationship. In addition, flags may be set at group creation time to enable the "Links Domino" and "Prevent Auto Links Recovery" attributes. When dynamic groups are added, they can be assigned a 10-character alphanumeric label. Static groups can also be assigned labels as part of the Symmetrix configuration activity.

Restrictions

The following restrictions apply:

- ◆ Only GigE directors and switched fibre RAs are supported.
- ◆ Point-to-point fibre RA configurations are not supported.
- ◆ PPRC is not supported.
- ◆ ESCON RAs are not supported.
- ◆ Dynamic operations to static groups are not supported.
- ◆ Labels must be unique on both sides of the group SRDF relationship.
- ◆ Group must be empty and all pairs deleted before it can be deleted.
- ◆ At least one physical link must be present before a group can be added.
- ◆ Modify group actions can only add or remove directors.
- ◆ Modify cannot be used to change flag settings or labels.
- ◆ Modify cannot delete all directors from the group on one side while leaving one or more directors on the other side.
- ◆ A label name of RDFDVGROUP is not allowed for dynamic groups. RDFDVGROUP is the default label assigned to static groups if a label is not explicitly specified.
- ◆ Only one dynamic group operation is allowed at a time.
- ◆ Dynamic group operations are not allowed while IML.
- ◆ Each RF director can have a maximum of 32 connections. For example:

Source Box	Target Box
4 RDF directors	4 RF directors

In this case, each group added generates four connections on each director because each source director makes a connection to each of the target directors:

- 1 group = 4 connections
- 2 groups = 8 connections
- 3 groups = 12 connections
- 4 groups = 16 connections

This can be adjusted by setting each group to use only two of the directors, allowing fewer connections per group.

Support for Unequal Size R1 and R2

SRDF Host Component provides support for Unequal Size R1 and R2. This Symmetrix feature supports the establishment of an SRDF pair where the R1 device is smaller (fewer cylinders) than the R2 device. The devices must still be of the same emulation type, however. Resynchronization procedures are supported for sync-direction of R1>R2. Synch-direction R1<R2 is not supported.

Microcode Requirements

The Symmetrix with the R1 volume must be at Engenuity microcode level 5568 or higher. The Symmetrix with the R2 volume needs to be at microcode level 5669 or higher.

Supporting SRDF

Static and dynamic SRDF support is provided as well as concurrent SRDF support. For dynamic SRDF, CREATEPAIR and DELETEPAIR are supported. However, SWAP and the KEEPR2 option of CREATEPAIR are not supported.

Using Metadata

Since the metadata (VTOC, VTOC index, VVDS, and so forth) is copied along with the rest of the data when the devices are resynchronized, the R2 volume still appears as though it has the same number of cylinders as the R1 volume. The additional cylinders at the end of the R2 volume can be accessible by running the ICKDSF utility REFORMAT statement with the REFVTOC option after a DELETEPAIR or with the R2 volume in R/W mode. The free space information is updated at the next new dataset allocation on the volume.

If you want to continue to use the R2 volume as a mirror of the R1 volume, you need to run resynchronization procedures with sync-direction set to R1>R2 to recover the metadata.

ADSRDF Flag

A new flag for CREATEPAIR, ADSRDF (Allow Different Size SRDF) is available. To create a dynamic SRDF pair with different size devices, enter the following command:

```
#SC VOL,LCL(2830,31),CREATEPAIR(ADSRDF),30,40
```

If a CREATEPAIR is requested without the ADSRDF flag and pairs with different size R1 and R2 volumes are included, the CREATEPAIR fails. This safeguard prevents a CREATEPAIR to the wrong volumes erroneously. The ADSRDF specification does not prevent the creation of same-size pairs, however. One or more (or all) of the pairs could be same size volumes and no error would be generated.

DRAFT
EMC CONFIDENTIAL

Target (R2) Volume Read/Write Protection

The target (R2) volume read / write protection Engenuity feature prevents the source (R1) volume from sending writes to the target (R2) volume over the links while the target (R2) volume is write enabled.

This situation can occur if the Symmetrix unit containing the source (R1) volume is brought online before the application (running on the host attached to the Symmetrix unit containing the target (R2) volume) is halted, the target (R2) volume made read only, and optionally not ready.

Any new data, written to the source (R1) volumes while the target (R2) volumes are write enabled, accumulate as invalid tracks at the source (R1) volumes, owed to the target (R2) volumes. When the target (R2) volumes are brought to a read-only state, SRDF resync procedures must be used to determine resync direction and initiate data resynchronization between the remotely mirrored pairs.

This chapter provides a description of the SRDF Host Component query and configuration commands. Topics include:

- ◆ How to Read Syntax Maps 5-2
- ◆ SRDF Query Commands..... 5-3
- ◆ SRDF Configuration Commands..... 5-114
- ◆ Host Component Examples..... 5-155

How to Read Syntax Maps

The following apply to all Host Component syntax maps:

- ◆ Read the maps left to right and top to bottom.
- ◆ Command syntax maps start with ►► and end with ►◄|.
- ◆ Lines of syntax that continue to the next line end with ►○, where the circle contains a connecting reference number. A continuation line starts with ○►, where the circle contains a matching reference number.
- ◆ Required keyword and symbols are shown in upper case.
- ◆ Information supplied by the user is shown in lower case italics.
- ◆ Options for positional parameters are shown as stacked boxes.
- ◆ If the map line passes through a stack of parameters, one must be selected.
- ◆ If the map line connects one keyword with another and passes over a stack of parameters, the parameters are optional.

SRDF Query Commands

The SRDF Host Component commands presented in this section allow you to view various aspects of SRDF status.

The command examples in this chapter use a variety of command prefix characters, for example, the “#” and “@” characters. When executing the SRDF commands, substitute the `COMMAND_PREFIX` you specify for your system.

In the command examples in this chapter, question marks (?) in device fields indicate that the device was specified in the SCF exclude list.

#HELP

The #HELP command displays all available SRDF Host Component commands.

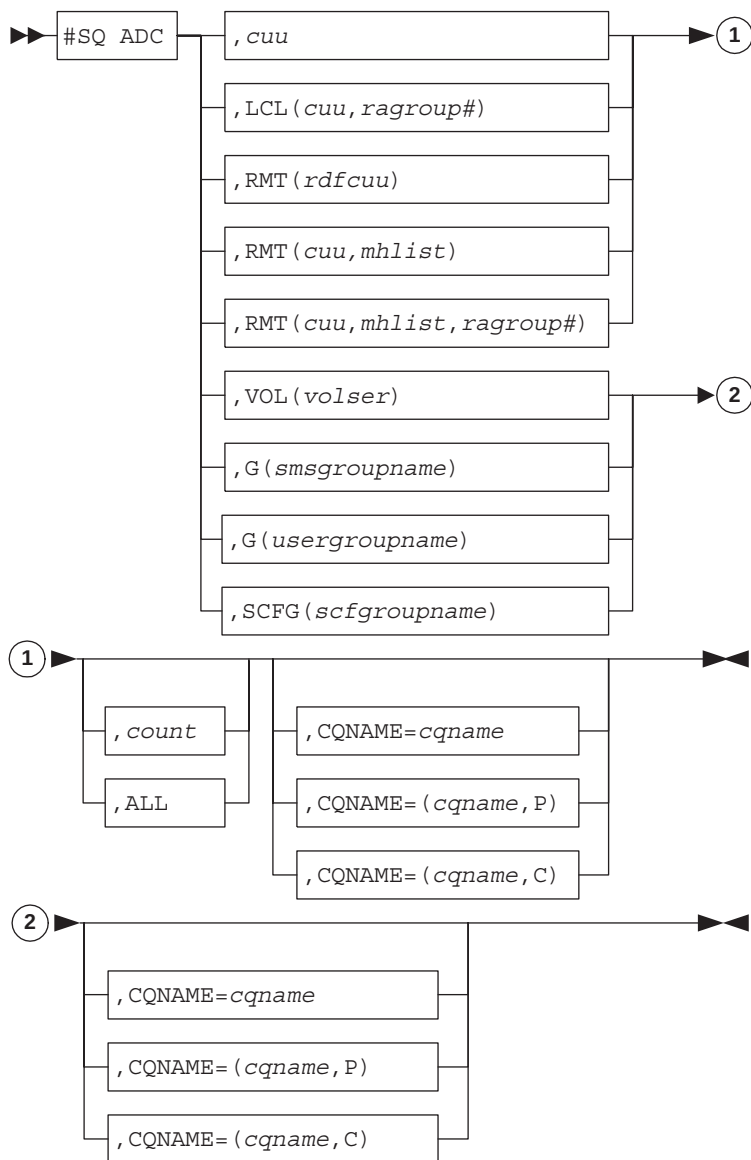
Syntax #HELP

Parameters None.

#SQ ADC

The #SQ ADC command displays the adaptive copy skew values and adaptive copy rate for the specified device(s).

Syntax



Parameters *count*

Specifies the number of devices to display adaptive copy information. You can set this value from one to the value specified in the MAX_QUERY initialization parameter, or ALL. If you do not specify this parameter, *count* defaults to one. This parameter cannot be used with the *G (smsgroupname)*, *G (usergroupname)*, or *SCFG (scfgroupname)* parameters.

cqname

Specifies the name of a command queue into which this command should be placed.

cuu

Specifies the z/OS device number.

G (smsgroupname)

Specifies the SMS groupname of the devices to display. This parameter specifies that the mirror configurations of devices in the specified SMS group name be displayed. Only online devices are selected for display.

Note that SMS groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group.

G (usergroupname)

Specifies the Defined Group name of the devices to display. This parameter specifies that the mirror configurations of devices in the specified Defined Group name be displayed.

Note that Defined Groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group.

If a Defined Group has the same name as an SMS Group, the Defined Group is used.

LCL

Specifies that the operation affects local directors in an SRDF configuration.

mhlist

Specifies the *ragroup#* used to identify the remote Symmetrix unit.

For multihop remote configurations, the *mhlist#* can be a single *ragroup#* or a list of up to eight hops, delineated by periods.

For example, an *mhlist* of 0.1.2 is for three hops. The command hops from the source box on an RA for *ragroup#* 0 to first hop box, through the first hop box on an RA for *ragroup#* 1 to second hop box, through second hop box on an RA for *ragroup#* 2 to third hop box.

P | C

P (purge) specifies that in the event of a command failure, all subsequent commands in the *qname* queue are to be purged.

C (continue) specifies that even though a command failed, processing is to continue with the next command in the *qname* queue. If you do not specify the failcode on the first command for the *qname* queue, the default is P.

ragroup#

Specifies the *ragroup#* through which you want to perform an operation. This must be a 1- or 2-digit (hex) value representing the *ragroup#*.

For concurrent SRDF configurations, *ragroup#* identifies the R2 device for which the operation is to be performed.

In the LCL (*cuu* [, *ragroup#*]) format of the command, *ragroup#* identifies the R2 partner device.

In the RMT (*cuu* [, *mhlist*] [, *ragroup#*] format of the command:

- The *ragroup#* can default in most cases, because the *ragroup#* defaults to the partner *ragroup#* of the last hop of the *mhlist*.
- The *ragroup#* can be either a character "*" or the *ragroup#* of the mirror to operate upon. The character "*" means perform the action on both R2s of a concurrent R1 device. The character "*" is only valid as the third value of the RMT parameter.

rdfcuu

Specifies the z/OS device number of a source R1 device.

RMT

Specifies that the operation affects remote directors in an SRDF configuration.

SCFG (scfgroupname)

Specifies the SCF Group name of the devices to display. This parameter specifies that the mirror configurations of devices in the specified SCF group name be displayed.

Note that SCF groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group. SCF Groups are defined using the Group Name Services feature of EMCSCF.

VOL (volser)

Requests a specific VOLSER or a pattern that includes multiple online VOLSERS. To specify a pattern, you must specify at least one unique alphanumeric value followed by an asterisk (*). The * character means include all values that match starting in this position.

For example, the #SQ VOL, VOL (UG*) command generates a list of all online VOLSERS that have the first two characters of UG.

Comments

Only the source (R1) volumes in the Adaptive Copy mode (Disk or Write Pending) are displayed.

Example #SQ ADC,2150,8 command displays the output shown in Figure 5-1:

```
@SQ ADC,2150,8
EMCMN00I SRDF-HC : (124) @SQ ADC,2150,8
EMCGM81I SRDF-HC DISPLAY FOR (124) @SQ ADC,2150,8 698
DV_ADDR|      SYM      |ADC|  ADC_CUR  |  ADC_MAX
SYS  CH|_DV_  _RD_  GP|MODE|      SKEW      |      SKEW
2150 50 0050 0050 00  AD      1227      65535
2151 51 0051 0051 00  AD      1227      65535
2152 52 0052 0052 00  AW          0      25000
2153 53 0053 0053 00  AD      1332      65535
2154 54 0054 0054 00  AD      1237      65535
2155 55 0055 0055 00  AW          0      65535
2156 56 0056 0056 00  AW          0      65535
2157 57 0057 0057 00  AD      1247      65535
END OF DISPLAY
```

Figure 5-1 #SQ ADC Command Output for SRDF

The fields in this example have the following meaning:

- ◆ DV_ADDR SYS
z/OS device number.
- ◆ DV_ADDR CH
First device address (hex) on the channel as specified in the IOCP gen.
- ◆ SYM_DV
Symmetrix device number in hex.
- ◆ SYM_RD
Remotely mirrored device number in hex.
- ◆ SYM_GP
RDF group #.
- ◆ ADC MODE
Adaptive Copy mode in effect. Valid values are *Adaptive Copy - Write Pending mode (AW)* or *Adaptive Copy - Disk mode (AD)*.

◆ ADC_CUR SKEW

Current skew value - for Adaptive Copy - Write Pending mode. It is the number of write pendings for the target (R2) volume. For the Adaptive Copy - Disk mode, it is the number of tracks marked as out-of-synchronization between the source (R1) and the target (R2) volumes.

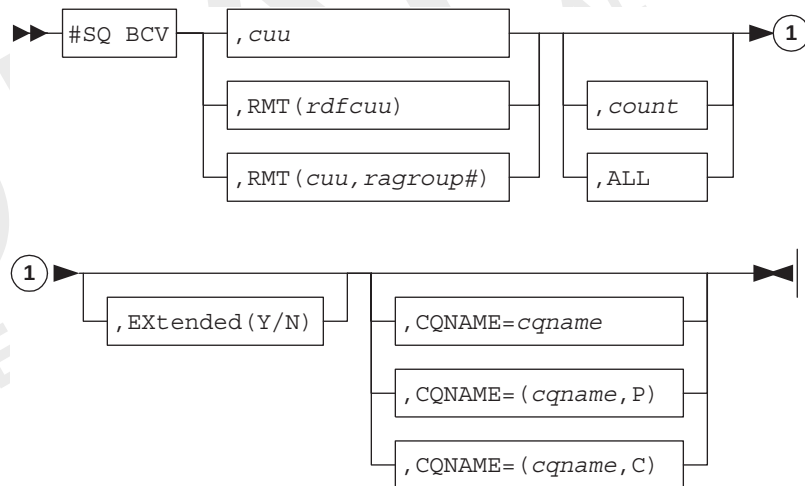
◆ ADC_MAX SKEW

Adaptive Copy maximum skew value for device(s). Range is from 1 to 65,535 (decimal).

#SQ BCV

The #SQ BCV command displays all the Business Continuance Volumes (BCVs) on the specified Symmetrix unit and their current status.

Syntax



Parameters *count* | ALL

Specifies the number of BCV devices to display. You can set this value from one to the value specified in the MAX_QUERY initialization parameter, or ALL. If you omit this parameter, all BCVs starting at the specified *cuu* are displayed.

cqname

Specifies the name of a command queue into which this command should be placed.

cuu

Specifies the z/OS device number.

EXtended (Y)

EXtended (Y) requests the extended format Query to show multi-BVC status, which shows the incremental relationship status of all BCVs for each standard device and the time elapsed since each BCV was established with its last standard device. The multi-BCV feature and Extended Query are available only at Engenuity microcode level 5x66 or higher.

P | C

P (purge) specifies that in the event of a command failure, all subsequent commands in the *qname* queue are to be purged. C (continue) specifies that even though a command failed, processing is to continue with the next command in the *qname* queue. If you do not specify the failcode on the first command for the *qname* queue, the default is P.

ragroup#

Specifies the *ragroup#* through which you want to perform an operation. This must be a 1- or 2-digit (hex) value representing the *ragroup#*.

For concurrent SRDF configurations, *ragroup#* identifies the R2 device for which the operation is to be performed.

In the LCL(*cuu* [, *ragroup#*]) format of the command, *ragroup#* is used to identify the R2 partner device.

In the RMT(*cuu* [, *mhlist*] [, *ragroup#*] format of the command:

- The *ragroup#* can default in most cases, because the *ragroup#* defaults to the partner *ragroup#* of the last hop of the *mhlist*.

- The *ragroup#* can be either the “*” character or the *ragroup#* of the mirror to operate upon. The “*” character means perform the action on both R2s of a concurrent R1 device. The “*” character is only valid as the third value of the RMT parameter.

rdfcuu

Specifies the z/OS device number of a source R1 device.

RMT

Specifies that the operation affects remote directors in an SRDF configuration.

Comments

The z/OS *cuu* for the BCV appears if the *cuu* to Symmetrix address relationship can be determined; otherwise, “----” appears for the z/OS *cuu*.

You must have the TimeFinder feature installed on your Symmetrix unit to take advantage of this command. For information on EMC TimeFinder, contact your EMC representative.

The TimeFinder / Mirror Product Set for z/OS displays some additional information for which the Host Component does not have room in the multi-line WTO format. To display the additional information, use the TimeFinder batch utility to QUERY the devices.

Example #SQ BCV,2390,16 command displays the output shown in Figure 5-2:

```
EMCVQ00I SRDF-HC DISPLAY FOR (3) #SQ BCV,2390,16
BCVM046I          *** EMC TIMEFINDER vrm ***

BCVM039I (0000) PROCESS INPUT STATEMENT
BCVM004I QUERY STATUS ON DEVICE 2390, MICRO-CODE LEVEL 5X66 TYPE SYM5
...BCV...  ...STD...
ACTION LAST
CUU  SYM#  CUU  SYM#  ITRK-BCV  ITRK-STD  STATUS  USED  BCV  EMUL  #CYLS
23B0 03B0  2390 0390           0           0  AVAIL          03B0 3390  1113
23B1 03B1  2391 0391           0           0  AVAIL          03B1 3390  1113
23B2 03B2  2392 0392           0           0  AVAIL          03B2 3390  1113
23B3 03B3  2393 0393           0           0  AVAIL          03B3 3390  1113
23B4 03B4  2394 0394           0           0  AVAIL          03B4 3390  1113
23B5 03B5  2395 0395           0           0  AVAIL          03B5 3390  1113
23B6 03B6  2396 0396           0           0  AVAIL          03B6 3390  1113
23B7 03B7  2397 0397           0           0  AVAIL          03B7 3390  1113
23B8 03B8  2398 0398           0           0  AVAIL          03B8 3390  1113
23B9 03B9  2399 0399           0           0  AVAIL          03B9 3390  1113
23BA 03BA  239A 039A           0           0  AVAIL          03BA 3390  1113
23BB 03BB  239B 039B           0           0  AVAIL          03BB 3390  1113
23BC 03BC  239C 039C           0           0  AVAIL          03BC 3390  1113
23BD 03BD  239D 039D           0           0  AVAIL          03BD 3390  1113
23BE 03BE  239E 039E           0           0  AVAIL          03BE 3390  1113
23BF 03BF  239F 039F           0           0  AVAIL          03BF 3390  1113

BCVM047I ALL CONTROL STATEMENTS PROCESSED, HIGHEST RC 0
END OF DISPLAY
```

Figure 5-2 #SQ BCV Command Output for SRDF

The fields in this example have the following meaning:

- ◆ BCV CUU
Specifies the z/OS device number if it is available.
- ◆ BCV SYN#
Specifies the Symmetrix device number of the BCV if it can be determined.
- ◆ STD CUU
Specifies the z/OS device number for the standard device.

◆ STD SYM#

Specifies the Symmetrix device number for the standard device from which to make the copy.

◆ ITRK-BCV

Specifies the number of tracks to be refreshed on the BCV device after an ESTABLISH or RE-ESTABLISH command has been issued.

◆ ITRK-STD

Specifies the number of tracks to be refreshed on the standard device after a RESTORE command has been issued.

◆ STATUS

Specifies the status of the BCV. Valid values are:

AVAIL	BCV is available.
AVAILB	BCV is available, last action did not complete.
INUSE	BCV is attached to a primary device.
INUSX	BCV is attached and the copy process is in progress.
SPLIT	The BCV is processing a SPLIT action.

More Information: Refer to the *BCVM0031* message in the *TimeFinder/Mirror for z/OS Product Guide* for more details on this field.

◆ ACTION USED

Specifies the state of the BCV. Valid values are:

EST	BCV is attached to a standard device and data is being copied from the standard device.
RSTR	BCV is attached to a standard device and data is being copied from the BCV.

This field is only displayed at Engenuity microcode level 5264 or higher.

◆ LAST BCV

Specifies the Symmetrix device number of the last BCV device attached to the standard device.

◆ EMUL

Specifies the emulation type. Valid values are:

3380	3380 device emulation.
3390	3390 device emulation.
FBA	Fixed Block Architecture.

◆ #CYLS

Specifies the number of cylinders on the BCV device.

Example #SQ BCV,2390,16,EX(Y) command displays the output shown in Figure 5-3:

```
EMCVQ00I SRDF-HC DISPLAY FOR (4) #SQ BCV,2390,16,EX(Y)
BCVM046I      *** EMC TIMEFINDER vrm ***

BCVM039I (0000) PROCESS INPUT STATEMENT
BCVM004I QUERY STATUS ON DEVICE 2390, MICRO-CODE LEVEL 5X66 TYPE SYM5
BCVM073I .SYMDV#.. LAST    TIME-FROM    BCV    BCV    STD    PAIR    LA
BCVM073I STD  BCV  BCV    ...SPLIT....  CNFG  STATE  STATE  STATE  AC
BCVM073I 0390 03B0 03B0 005.18:33:12  R1    SYNC  AVAIL  AVAIL
BCVM073I 0391 03B1 03B1 005.18:33:12  R1    SYNC  AVAIL  AVAIL
BCVM073I 0392 03B2 03B2 005.18:33:12  R1    SYNC  AVAIL  AVAIL
BCVM073I 0393 03B3 03B3 005.18:33:11  R1    SYNC  AVAIL  AVAIL
BCVM073I 0394 03B4 03B4 005.18:33:11  R1    SYNC  AVAIL  AVAIL
BCVM073I 0395 03B5 03B5 005.18:33:11  R1    SYNC  AVAIL  AVAIL
BCVM073I 0396 03B6 03B6 005.18:33:10  R1    SYNC  AVAIL  AVAIL
BCVM073I 0397 03B7 03B7 005.18:33:10  R1    SYNC  AVAIL  AVAIL
BCVM073I 0398 03B8 03B8 005.18:33:10  R1    SYNC  AVAIL  AVAIL
BCVM073I 0399 03B9 03B9 005.18:33:09  R1    SYNC  AVAIL  AVAIL
BCVM073I 039A 03BA 03BA 020.21:54:57  R1    SYNC  AVAIL  AVAIL
BCVM073I 039B 03BB 03BB 020.21:54:56  R1    SYNC  AVAIL  AVAIL
BCVM073I 039C 03BC 03BC 020.21:54:56  R1    SYNC  AVAIL  AVAIL
BCVM073I 039D 03BD 03BD 020.21:54:55  R1    SYNC  AVAIL  AVAIL
BCVM073I 039E 03BE 03BE 020.21:54:54  R1    SYNC  AVAIL  AVAIL
BCVM073I 039F 03BF 03BF 020.21:54:54  R1    SYNC  AVAIL  AVAIL

BCVM047I ALL CONTROL STATEMENTS PROCESSED, HIGHEST RC 0
END OF DISPLAY
```

Figure 5-3 #SQ BCV Extended Command Output for SRDF

The fields in Figure 5-3 on page 5-14 have the following meaning:

- ◆ SYMDV# STD
Specifies the internal EMC device number for the standard device.
- ◆ SYMDV# BCV
Specifies the internal EMC device number of the BCV.
- ◆ LAST BCV
Specifies the most recent of multi-BCV for the standard device.
- ◆ TIME-FROM SPLIT
Shows the time in `ddd.hh:mm:ss` since this BCV was SPLIT from the standard device.
- ◆ BCV CNFG
Specifies the configuration of the BCV. Valid values are:

R1	BCV is an R1 device.
R2	BCV is an R2 device.
MIRR	BCV is mirrored. There is more than one physical copy of the data.
NONE	BCV is not mirrored. There is only one physical copy of data.
- ◆ BCV STATE
Specifies the status of the BCV. Valid values are:

ATTACH	BCV is attached to this standard to this standard device.
SYNC	BCV is synchronized with this standard device.
CPYTMM	BCV is synchronizing to the moving mirror (it is being refreshed from its mirror after a reverse split).
CPYFMM	BCV is synchronizing from the moving mirror (it is synchronizing to its mirror after a normal split).
- ◆ STD STATE
Specifies the status of the standard device. Valid values are:

AVAIL	Standard device is available for an establish.
NAvail	Standard device is not available.

◆ PAIR STATE

Specifies the status of this BCV-standard pair. Valid values are:

AVAIL	BCV is available.
AVAILB	BCV is available, last action synchronization did not complete (SPLIT with force used).
INUSE	BCV is attached to a standard device.
INUSX	BCV is attached and the copy process is in progress.
SPLITB	Background SPLIT is in progress, SPLIT with INSTANT(Y) (must complete before another operation can be done with this BCV or standard).
SPLITO	Traditional SPLIT is in progress, SPLIT with INSTANT(N) or default.

◆ LA AC

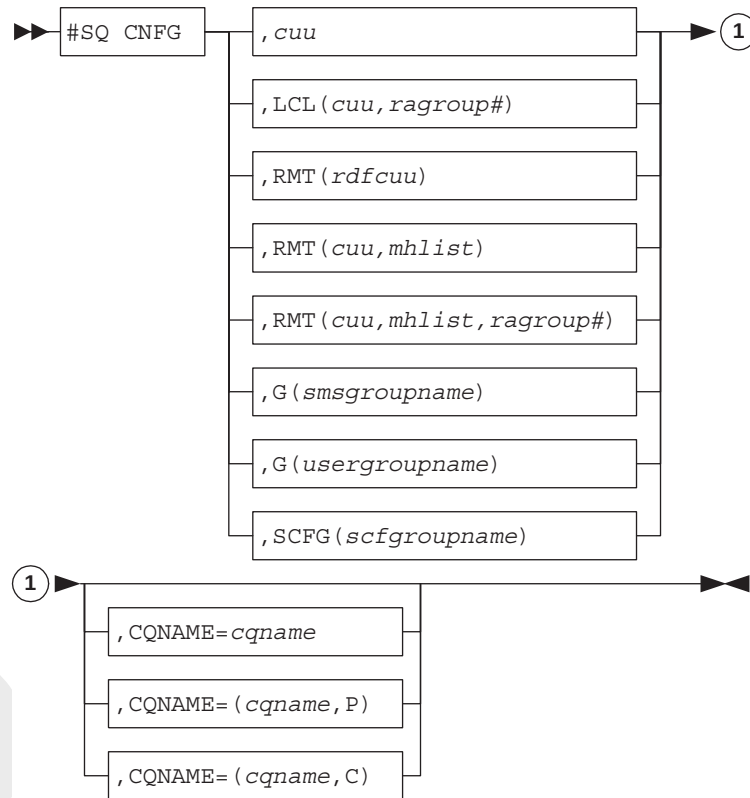
Specifies the action used to pair this BCV and standard device. Valid values are:

EST	ESTABLISH or RE-ESTABLISH action used.
RSTR	RESTORE action used.

#SQ CNFG

The #SQ CNFG command displays the status of the Symmetrix unit. It lists the following:

- ◆ The serial number of the Symmetrix unit
- ◆ The amount of installed cache memory
- ◆ The controller emulation type
- ◆ The Symmetrix model number
- ◆ The microcode level, the SSIDs
- ◆ The LINK DOMINO status
- ◆ The local Symmetrix SYNCH DIRECTION
- ◆ The link type
- ◆ The director type and layout

Syntax**Parameters***cqname*

Specifies the name of a command queue into which this command should be placed.

cuu

Specifies the z/OS device number.

G(smsgroupname)

Specifies the SMS groupname of the devices to display. This parameter specifies that the configurations of devices in the specified SMS group name be displayed. Only online devices are selected for display.

Note that SMS groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group.

G (usergroupname)

Specifies the Defined Group name of the devices to display. This parameter specifies that the configurations of devices in the specified Defined Group name be displayed.

Note that Defined Groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group.

If a Defined Group has the same name as an SMS Group, the Defined Group are used.

LCL

Specifies that the operation affects local directors in an SRDF configuration.

mhlist

Specifies the *ragroup#* used to identify the remote Symmetrix unit.

For multihop remote configurations, the *mhlist#* can be a single *ragroup#* or a list of up to eight hops, delineated by periods.

For example, an *mhlist* of 0.1.2 is for three hops. The command hops from the source box on an RA for *ragroup#* 0 to first hop box, through the first hop box on an RA for *ragroup#* 1 to second hop box, through second hop box on an RA for *ragroup#* 2 to third hop box.

P | C

P (purge) specifies that in the event of a command failure, all subsequent commands in the *qname* queue are to be purged.

C (continue) specifies that even though a command failed, processing is to continue with the next command in the *qname* queue. If you do not specify the failcode on the first command for the *qname* queue, the default is P.

ragroup#

Specifies the *ragroup#* through which you want to perform an operation. This must be a 1- or 2-digit (hex) value representing the *ragroup#*.

For concurrent SRDF configurations, *ragroup#* identifies the R2 device for which the operation is to be performed.

In the LCL(*cuu* [, *ragroup#*]) format of the command, *ragroup#* is used to identify the R2 partner device.

In the RMT(*cuu* [, *mhlist*] [, *ragroup#*] format of the command:

- The *ragroup#* can default in most cases, because the *ragroup#* defaults to the partner *ragroup#* of the last hop of the *mhlist*.
- The *ragroup#* can be either the "*" character or the *ragroup#* of the mirror to operate upon. The "*" character means to perform the action on both R2s of a concurrent R1 device. The "*" character is only valid as the third value of the RMT parameter.

rdfcuu

Specifies the z/OS device number of a source R1 device.

RMT

Specifies that the operation affects remote directors in an SRDF configuration.

SCFG(*scfgroupname*)

Specifies the SCF Group name of the devices to display. This parameter specifies that the mirror configurations of devices in the specified SCF group name be displayed.

Note that SCF groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group. SCF Groups are defined using the Group Name Services feature of EMCSCF.

Comments

Issue #SQ CNFG to determine the location of the Remote Link Directors in your Symmetrix unit for the SRDF operations.

To correctly display the configuration information after a Symmetrix microcode upgrade, you must shut down and restart the SRDF Host Component.

Example #SQ CNFG,3018 command displays the output shown in Figure 5-4:

```
EMCGM11I SRDF-HC DISPLAY FOR (1) @SQ CNFG,3018
SERIAL NUMBER: 000184501175 MEM:20,480 MB TYPE:2105 MODEL: DMX1000P
MICROCODE LEVEL: 5670-56 CONCURRENT-RDF
CONCURRENT DRDF: YES
SWITCHED-RDF DYNAMIC-RDF NO-AUTO-LINKS RDFGRP LINKS-OFF-ON-POWERUP
LINKS-DOMINO: RDFGRP SYNCH_DIRECTION: GLOBAL LINK: LOCAL
SSID(S): 3000 3001 3002 3003 3004 014E
D01: DF D02: __ D03: SF D04: EF D05: __ D06: __ D07: __ D08: __
D09: __ D10: __ D11: __ D12: __ D13: EA D14: SF D15: __ D16: DF
D17: DF D18: __ D19: SF D20: EF D21: __ D22: __ D23: __ D24: __
D25: __ D26: __ D27: __ D28: __ D29: EA D30: SF D31: __ D32: DF
D33: DF D34: __ D35: SF D36: EF D37: __ D38: __ D39: __ D40: __
D41: __ D42: __ D43: __ D44: __ D45: EA D46: SF D47: __ D48: DF
D49: DF D50: __ D51: RF D52: EF D53: __ D54: __ D55: __ D56: __
D57: __ D58: __ D59: __ D60: __ D61: EA D62: RF D63: __ D64: DF
END OF DISPLAY
```

Figure 5-4 #SQ CNFG Command Output for SRDF

The fields in this example have the following meaning:

- ◆ SERIAL NUMBER
Symmetrix serial number.
- ◆ MEM MB
Cache size in megabytes.
- ◆ TYPE
Controller emulation type.
- ◆ MODEL
The Symmetrix model number.
- ◆ MICROCODE LEVEL
Microcode level of the Symmetrix unit.
- ◆ CONCURRENT-RDF
Displays if this feature is enabled on the Symmetrix unit.

◆ CONCURRENT DRDF

Indicates YES if the Concurrent Dynamic RDF feature is enabled, otherwise indicates NO. This feature allows you to create Concurrent RDF pairs using the SC VOL CREATEPAIR action code. This allows you to dynamically create an R1 with 2 R2s.

◆ SWITCHED-RDF

Displays if this feature is enabled on the Symmetrix unit.

◆ DYNAMIC-RDF

Displays if this feature is enabled on the Symmetrix unit.

◆ NO-AUTO-LINK-RECOVERY

Displays if this feature is enabled on the Symmetrix unit.

◆ NO-AUTO-LINK RDFGRP

Displays if this feature is set by RDFGRP.

◆ LINKS-OFF-ON-POWERUP

Displays if this feature is enabled on the Symmetrix unit.

◆ SSID(S)

SSID(s) (in hex).

◆ LINKS DOMINO

Indicates YES if the LINKS-DOMINO mode is in effect, NO if the LINKS-DOMINO mode is not in effect, or RDFGRP if the feature is in effect by RDF group. LINKS-DOMINO Mode is a mode of operation in which all R1 devices go SRDF-NOT READY if all links are dropped.

The differences between logically (by Host Component command) and physically (for example, disconnecting link cables) dropping the links with LINKS-DOMINO enabled are illustrated in Table 5-1 through Table 5-3 on page 5-22:

This field is only displayed if the Symmetrix unit is configured with SRDF.

Table 5-1 Source is Configured for Link-Domino=Yes; Target=No

	Source R1	Target R1
Links logically dropped on Source	RDF-NRDY ^a & LNR	LNR
Links logically dropped on Target	RDF-NRDY & LNR	LNR
Links physically dropped on Source	RDF-NRDY & LNR	LNR
Links physically dropped on Target	RDF-NRDY & LNR	LNR

a. The RDF-NRDY display in this situation occurs on Enginuity microcode 5265 or higher.

Table 5-2 Source is Configured for Link-Domino=Yes; Target=Yes

	Source R1	Target R1
Links logically dropped on Source	RDF-NRDY ^a & LNR	RDF-NRDY & LNR
Links logically dropped on Target	RDF-NRDY & LNR	RDF-NRDY ^a & LNR
Links physically dropped on Source	RDF-NRDY & LNR	RDF-NRDY & LNR
Links physically dropped on Target	RDF-NRDY & LNR	RDF-NRDY & LNR

a. The RDF-NRDY display in this situation occurs on Enginuity microcode 5265 or higher.

Table 5-3 Source Is Configured for Link-Domino=No; Target=Yes

	Source R1	Target R1
Links logically dropped on Source	LNR	RDF-NRDY & LNR
Links logically dropped on Target	LNR	RDF-NRDY ^a & LNR
Links physically dropped on Source	LNR	RDF-NRDY & LNR
Links physically dropped on Target	LNR	RDF-NRDY & LNR

a. The RDF-NRDY display in this situation occurs on Enginuity microcode 5265 or higher.

◆ SYNCH_DIRECTION

Symmetrix level synchronization. Valid values are $R1 > R2$, $R1 < R2$, *NONE*, or *GLOBAL*.

This field is only displayed if the Symmetrix is configured with SRDF.

◆ LINK

Symmetrix implementation:

LOCAL	SRDF campus solution
EXTENDED	SRDF extended distance solution

This field is only displayed if the Symmetrix unit is configured with SRDF.

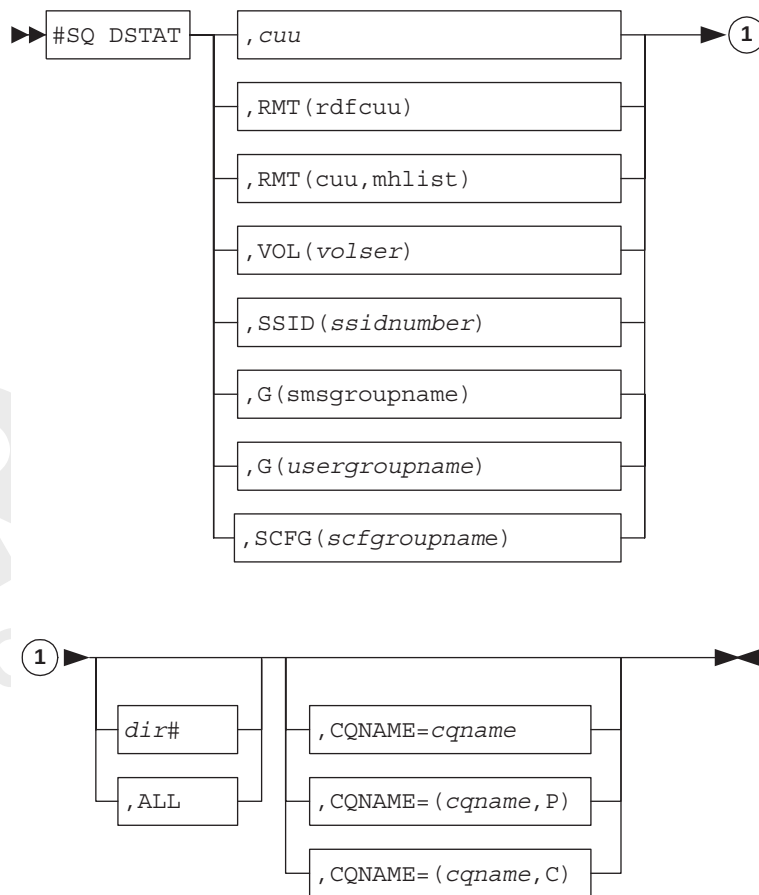
◆ D01 - D64

Symmetrix Director types. Valid values are:

DA	Disk Director
CA	Parallel Channel Director
EA	Serial Channel Director
FA	Fibre Channel Director
SA	Fast-Wide SCSI Channel Director
R1	Remote Link Director (source)
R2	Remote Link Director (target)
RF	Remote Link Director (fibre)
EF	FICON
SF	Fibre SA
DF	Fibre DA
RE	GIGE

#SQ DSTAT

The #SQ DSTAT command displays director statistics. Statistics include # writes, # of I/Os, # of I/Os per port, and throughput in kilobytes per port.

Syntax:

Parameters: *cqname*

Specifies the name of a command queue into which this command should be placed.

cuu

Specifies the z/OS device number.

G (smsgroupname)

Specifies the SMS groupname of the devices to display. This parameter specifies that the link information of devices in the specified SMS group name be displayed. Only online devices are selected for display.

Note that SMS groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group.

G (usergroupname)

Specifies the Defined Group name of the devices to display. This parameter specifies that the link information of devices in the specified Defined Group name be displayed.

Note that Defined Groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group.

If a Defined Group has the same name as an SMS Group, the Defined Group is used.

mhlist

Specifies the ragroup# used to identify the remote Symmetrix storage subsystem. For multihop remote configurations, the mhlist# can be a single ragroup# or a list of up to eight hops, delineated by periods.

For example, an mhlist of 0.1.2 is for three hops. The command hops from the source box on an RA for ragroup# 0 to first hop box, through the first hop box on an RA for ragroup# 1 to second hop box, through second hop box on an RA for ragroup# 2 to third hop box. The action is performed on the third hop box using the ragroup# specified in RMT(cuu[mhlist][,ragroup#]).

P | C

P (purge) specifies that in the event of a command failure, all subsequent commands in the qname queue are to be purged.

C (continue) specifies that even though a command failed, processing is to continue with the next command in the qname queue. If you do not specify the failcode on the first command for the qname queue, the default is P (purge).

rdfcuu

Specifies the z/OS device number of a source R1 device.

RMT

Specifies that the operation affects remote directors in an SRDF configuration.

SSID(*ssidnumber*)

Indicates the SSID and the *ssidnumber* that identifies the devices to be used for the command.

VOL(*volser*)

Requests a specific VOLSER or a pattern that includes multiple online VOLSERS. To specify a pattern, you must specify at least one unique alphanumeric value followed by an asterisk (*). The * character means to include all values that match starting in this position.

SCFG(*scfgroupname*)

Specifies the SCF Group name of the devices to display. This parameter specifies that the mirror configurations of devices in the specified SCF group name be displayed.

Note that SCF groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group. SCF Groups are defined using the Group Name Services feature of EMCSCF.

Example: #SQ DSTAT,6C00,ALL command displays the output¹ shown in Figure 5-5:

1. All values are displayed as an unsigned integers in the range of 0 - 4,294,967,295 (left justified).


```

EMCMN00I SRDF-HC : (4) #SQ DSTAT,6C00,ALL
EMCQT00I SRDF-HC DISPLAY FOR (4) @SQ DSTAT,6C00,ALL
DIR TYP  STATS
-----
 33 RE    WRT: 2,000      IOS: 2,000      IO0: 1,500
          IO1: 500       TP0: 400        TP1: 350
          HIT: 250       REQ: 250        MIS: 0
          SWP: 0         DWP: 0

 3E RE    WRT: 14,001     IOS: 14,001     IO0: 7,001
          IO1: 7,000     TP0: 850        TP1: 848
          HIT: 100       REQ: 800        MIS: 0
          SWP: 0         DWP: 0

END OF DISPLAY

```

Figure 5-5 #SQ DSTAT Output

The fields in Figure 5-5 have the following meanings:

◆ DIR

The director number in hexadecimal.

◆ TYP

The type of director.

The mainframe host director types are:

- CA - Parallel channel host adapter
- EA - ESCON channel host adapter
- EF - FICON channel host adapter

The open systems host director types are:

- SA - SCSI host adapter
- FA - Fibre SA host adapter
- F2 - Four-port fibre SA host adapter
- SE - GIGE SA host adapter

The disk director types are:

- DA - Disk director
- DF - Disk fiber director

The RDF director types are:

- R1 - ESCON RDF director (RA1 mode)
- R2 - ESCON RDF director (RA2 mode)

- RE - GIGE RDF director
- RF - FIBER RDF director

◆ **STATS**

Statistics for each host director.

Mainframe

The format for mainframe host director statistics is as follows:

```
02 EF      WRT: 1,098,822      TIO: 508,071      HIT: 9,333
           REQ: 9,334,466      MIS: 436              SWP: 0
           DWP: 9,814
```

The fields for the mainframe host director statistics are:

- WRT: Number of writes
- TIO: Total I/Os
- HIT: Hits
- REQ: Requests
- MIS: Read misses
- SWP: System write pending events
- DWP: Device write pending events

Open Systems

The format for open systems host director statistics is as follows:

```
21 F2      WRT: 0              TIO: 0              IO0: 0
           IO1: 0              TP0: 0              TP1: 0
           HIT: 0              REQ: 0              MIS: 0
           SWP: 0              DWP: 0
```

The fields for the open systems host director statistics are:

- WRT: Number of writes
- TIO: Total I/Os
- IO0: I/Os port 0
- IO1: I/Os port 1
- TP0: Throughput port 0
- TP1: Throughput port 1
- HIT: Hits
- REQ: Requests
- MIS: Read misses
- SWP: System write pending events
- DWP: Device write pending events

Disk Director

The format for the disk director statistics is as follows:

```
01 DF      TIO: 60,324      REQ: 21,685      REA: 1,804
           WRT: 19,881      PFT: 1,362      PTN: 18
           PTU: 1,029      SMS: 524      LMS: 95
           RES: 330        PMM: 0        PCR: 0
           FTT: 27,907
```

The fields for the disk director statistics are:

- TIO: Total I/Os
- REQ: Requests
- REA: Reads
- WRT: Writes
- PFT: Prefetch tracks
- PTN: Prefetch tracks not used
- PTU: Prefetch tracks used
- SMS: Short misses
- LMS: Long misses
- RES: Prefetch restarts
- PMM: Prefetch mismatches
- PCR: Perma cache requests
- FTT: Fall through time

RDF Director

The format for the RDF director statistics is as follows:

```
31 RF      TIO: 18,696,228  LUC: 0          LU1: 0
           LU2: 0          RCV: 35         SNT: 24
```

The fields for the RDF director statistics are:

- TIO: Total I/Os
- LUC: Link utilization counter
- LU1: T1 link utilization counter
- LU2: T2 link utilization counter
- RCV: Bytes received - suffixed by one of the following:
 - KB - Value is expressed in kilobytes
 - MB - Value is expressed in megabytes

GB - Value is expressed in gigabytes

TB - Value is expressed in terabytes

PB - Value is expressed in petabytes

- SNT: Bytes sent - suffixed by one of the following:

KB - Value is expressed in kilobytes

MB - Value is expressed in megabytes

GB - Value is expressed in gigabytes

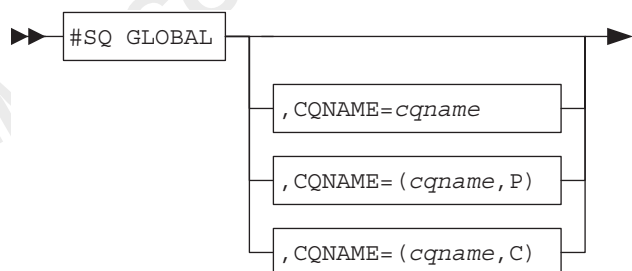
TB - Value is expressed in terabytes

PB - Value is expressed in petabytes

#SQ GLOBAL

The #SQ GLOBAL command displays the settings for the various global parameters, including the current SRDF Host Component version, the current and allowed synch directions, the status of message processing, the size of the message table, the setting for the OPERATOR_VERIFY initialization parameter, the DDname of the current log file, and whether or not status changes are allowed to FBA devices.

Syntax



Parameters

cqname

Specifies the name of a command queue into which this command should be placed.

P | C

P (purge) specifies that in the event of a command failure, all subsequent commands in the qname queue are to be purged.
C (continue) specifies that even though a command failed,

processing is to continue with the next command in the qname queue. If you do not specify the failcode on the first command for the qname queue, the default is P.

Comments None.

Example #SQ GLOBAL command displays the output shown in Figure 5-6:

```
EMCQG00I SRDF-HC DISPLAY FOR (7) @@SQ GLOBAL
VERSION:          v.r.m      SYNCH_DIR_CURR: R1>R2      MSG_PROC:   YES,512
OPER_VERIFY:     NONE      SYNCH_DIR_ALWD: R1<>R2      LOG_DDNAME: HCLOG1
CONFIG_FBA:      ENABLED   MAX_QUERY:      4000      MAX_CMDQ:   4095
DISPLAY_SORT_ORDER: SYMDEV  MESSAGE_EXIT: INACTIVE
HC-PTF:          0000      SCF-VERSION:   v.r.m      SCF-PTF:    0000
CRPAIR_NCPY:     STAR      CRPAIR_NCPY_VL: 2
```

Figure 5-6 #SQ GLOBAL Command Output for SRDF

The fields in this example have the following meaning:

- ◆ **VERSION**
The SRDF Host Component version.
- ◆ **SYNCH_DIR_CURR**
The current synchronization direction as set by the SYNCH_DIRECTION_INIT initialization parameter or the last #SC GLOBAL, SYNC_DIRECTION command.
- ◆ **MSG_PROC**
The status of message processing, as set by the MESSAGE_PROCESSING initialization parameter. When YES, the value *nnn* represents the number of messages that can be held in the message table. When LOG, the value *nnn* represents the number of messages that can be held in the message table. All messages are also written to HCLOGn, if it exists.
- ◆ **OPER_VERIFY**
The setting for Operator Verification, as set by the OPERATOR_VERIFY initialization parameter.
- ◆ **SYNCH_DIR_ALWD**
The allowable synchronization directions, as set by the SYNCH_DIRECTION_ALLOWED initialization parameter that can be specified in the #SC GLOBAL, SYNC_DIRECTION command.

◆ LOG_DDNAME

Lists the DDname of the current log file if defined by //HCLOGx DD statements in the execution JCL. A value is N/A indicates that command logging is not being performed. Affected by the #SC GLOBAL, SWAPLOG command.

◆ DISPLAY_SORT_ORDER

The sort order that the #SQ VOL, #SQ STATE, and #SQ MIRROR commands use to display device information. The default sort order is SYMDEV, but can be MVSCUU or VOLSER.

◆ CONFIG_FBA

A value of ENABLED indicates that #SC VOL commands are allowed for FBA devices. A value of DISABLED indicates that FBA devices are bypassed for #SC VOL commands. Can be changed with the #SC GLOBAL command specifying FBA_ENABLE or FBA_DISABLE.

◆ MAX_QUERY

The maximum number of lines displayed by #SQ(quiry) commands, as set by the MAX_QUERY initialization parameter.

◆ MAX_CMDQ

The maximum number of commands that can be queued, as set by the MAX_COMMANDQ initialization parameter.

◆ MESSAGE_EXIT

The valid states are:

ACTIVE The message processing exit is active.

INACTIVE The message processing exit is not active. Issue a #SC GLOBAL, MSGX, ON command to activate it.

Note that this state can be caused either by a #SC GLOBAL, MSGX, OFF command, or by the message exit ESTAE routine getting control, due to an abend in the user exit.

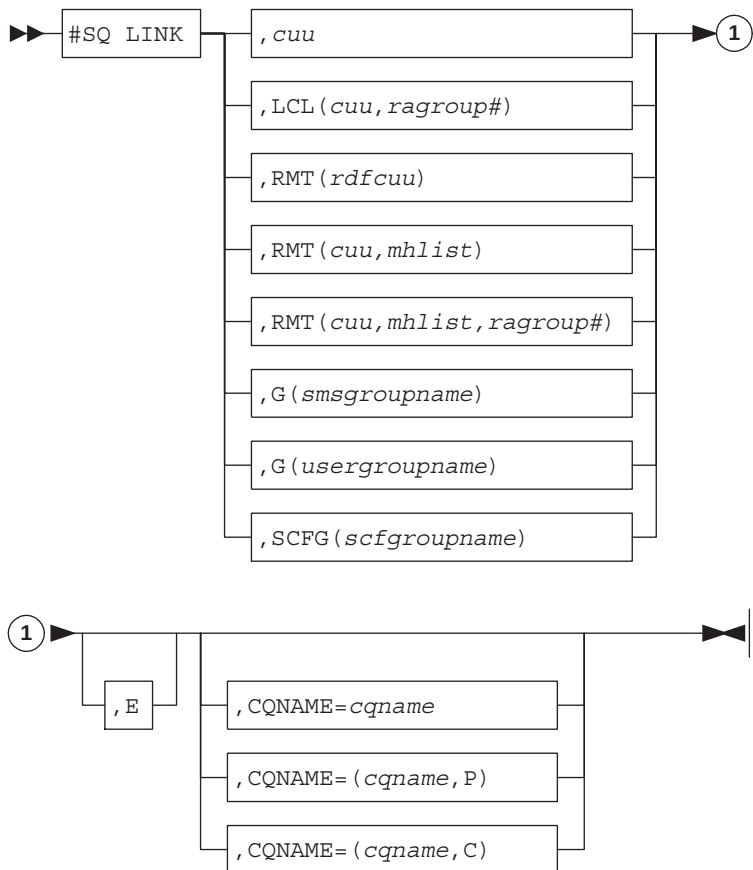
DISABLED The message processing exit is disabled. EMCMSGX was not found in the standard search libraries during the Host Component started task initiation. An #SC GLOBAL, MSGX, ON command fails.

- ◆ HC-PTF
Displays the highest PTF applied to SRDF Host Component.
- ◆ SCF-VERSION
Displays the SCF (ResourcePak Base) version.
- ◆ SCF-PTF
Displays the highest PTF applied to SCF (ResourcePak Base).
- ◆ CRPAIR_NCPY
Displays the selected value from the
ALLOW_CRPAIR_NOCOPY= initialization statement. Valid
values are YES, NO, or STAR.
- ◆ CRPAIR_NCPY_VL
Displays the selected value from the
VALIDATE_CRPAIR_NOCOPY_LEVEL= initialization
statement. This will be a numeric value from 0 to 3.

#SQ LINK

The #SQ LINK command displays the port connection and online/offline status of individual Remote Link Directors. It also displays the average I/Os per second during a short interval, and the total I/Os since the last Symmetrix IML.

Syntax



Parameters

cqname

Specifies the name of a command queue into which this command should be placed.

cuu

Specifies the z/OS device number.

E

Requests extended format display.

G (smsgroupname)

Specifies the SMS groupname of the devices to display. This parameter specifies that the link information of devices in the specified SMS group name be displayed. Only online devices are selected for display.

Note that SMS groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group.

G (usergroupname)

Specifies the Defined Group name of the devices to display. This parameter specifies that the link information of devices in the specified Defined Group name be displayed.

Note that Defined Groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group.

If a Defined Group has the same name as an SMS Group, the Defined Group is used.

LCL

Specifies that the operation affects local directors in an SRDF configuration.

mhlist

Specifies the *ragroup#* used to identify the remote Symmetrix unit.

For multihop remote configurations, the *mhlist#* can be a single *ragroup#* or a list of up to eight hops, delineated by periods.

For example, an *mhlist* of 0.1.2 is for three hops. The command hops from the source box on an RA for *ragroup#* 0 to first hop box, through the first hop box on an RA for *ragroup#* 1 to second hop box, through second hop box on an RA for *ragroup#* 2 to third hop box. The action is performed on the third hop box using the *ragroup#* specified in `RMT(cuu[mhlist] [,ragroup#])`.

P|C

P (purge) specifies that in the event of a command failure, all subsequent commands in the qname queue are to be purged. C (continue) specifies that even though a command failed, processing is to continue with the next command in the qname queue. If the failcode is not specified on the first command for the qname queue, the default is P.

ragroup#

Specifies the *ragroup#* through which you want to perform an operation. This must be a 1- or 2-digit (hex) value representing the *ragroup#*.

For concurrent SRDF configurations, *ragroup#* identifies the R2 device for which the operation is to be performed.

In the LCL(*cuu* [, *ragroup#*]) format of the command, *ragroup#* is used to identify the R2 partner device.

In the RMT(*cuu* [, *mhlist*] [, *ragroup#*]) format of the command:

- The *ragroup#* can default in most cases, because the *ragroup#* defaults to the partner *ragroup#* of the last hop of the *mhlist*.
- The *ragroup#* can be either the "*" character or the *ragroup#* of the mirror to operate upon. The "*" character means to perform the action on both R2s of a concurrent R1 device. The "*" character is only valid as the third value of the RMT parameter.

rdfcuu

Specifies the z/OS device number of a source R1 device.

RMT

Specifies that the operation affects remote directors in an SRDF configuration.

SCFG(*scfgroupname*)

Specifies the SCF Group name of the devices to display. This parameter specifies that the mirror configurations of devices in the specified SCF group name be displayed.

Note that SCF groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group. SCF Groups are defined using the Group Name Services feature of EMCSCF.

Comments EMC recommends that you use the extended display option with this command.

Example `#SQ LINK,3018` command displays the output shown in Figure 5-7:

```

RESPONSE=Z01
EMCQL00I SRDF-HC DISPLAY FOR (6) ++SQ LINK,3018
CUU_ DIR RA P CONN _STATUS_ MM:SS I/O-RATE DDD:HH:MM:SS _TOTAL-I/O_
3018 03 RF 1 Y ONLINE 05:39 8 042:02:36:59 29,641,341
3018 04 RF 1 Y ONLINE 05:39 7 042:02:37:00 29,632,957
3018 13 RF 1 Y ONLINE 05:38 7 042:02:36:59 29,631,802
3018 14 RF 1 Y ONLINE 05:39 7 042:02:37:00 29,635,667
3018 1C MA 1 Y ONLINE 05:26 0 042:02:36:59 1,249,148
3018 1D SL 1 Y ONLINE 05:23 0 042:02:36:59 300,181
3018 2C MA 1 Y ONLINE 05:26 0 042:02:36:59 18,447,425
3018 2D SL 1 Y ONLINE 05:23 0 042:02:36:59 299,600
3018 3C MA 1 Y ONLINE 05:26 0 042:02:36:59 11,594,150
3018 3D SL 1 Y ONLINE 05:23 0 042:02:36:59 27,963,901
END OF DISPLAY

```

Figure 5-7 #SQ LINK Command Output for SRDF

The fields in this example have the following meaning:

- ◆ CUU
z/OS device number.
- ◆ DIR
Director number of the Remote Link Director in hex.
- ◆ RA
Remote Link Director type. Valid values are:
 MA Source Remote Link Director
 SL Target Remote Link Director
 RF Fibre Remote Link Director
- ◆ P
Number of ports on the Remote Link Director.
- ◆ CONN
Port connection status (Y = link path established; N = no link path established).

More Information: Refer to *Recovery Procedures* on page A-1 for more details on the CONN field.

◆ STATUS

Link status. Valid values are ONLINE or OFFLINE.

◆ MM:SS

Short interval duration during which the average number of start I/O commands are calculated. This timer resets approximately every 10 minutes, or when a Symmetrix IML occurs or utility reset command is issued.

◆ I/O-RATE

Average I/Os per second over the short time interval.

◆ DDD:HH:MM:SS

Time since last Symmetrix IML or last utility reset command issued from the service processor.

◆ TOTAL_I/O

Total Start I/O commands since last Symmetrix IML or last utility reset command.

Example #SQ LINK,9800,E command displays the output shown in Figure 5-8:

Unavailable information is displayed as asterisks.

Directors 0E and 13 are offline and have never been online while EMC RDF has been running.

```
EMCQL01I SRDF-HC EXTENDED DISPLAY FOR (15) #SQ LINK,9800,E
DR GP _OTHER__S/N_ OD OG RCS | %S M:SS RATE| %L DD:HH:MM:SS  TOTAL-I/O
03 SW 000184600045 .. .. FYY | .. 4:37 2 | .. 07:00:08:16 2,402,782
0E ** ***** ** ** FNN | .. 4:37 0 | .. 07:00:08:15 1
10 00 000184600045 10 00 SY Y | 00 8:34 0 | 00 07:00:08:36 4,720,468
13 ** ***** ** ** FNN | .. 4:37 0 | .. 07:00:08:16 1
1E SW 000184600045 .. .. FYY | .. 4:37 1 | .. 07:00:08:14 2,395,112
20 01 000184600045 20 01 MYY | 00 8:34 0 | 00 07:00:08:31 212,775
30 02 000184600045 30 02 SY Y | 00 8:34 0 | 00 07:00:08:36 1,939,605
40 03 000184600045 40 03 MYY | 00 8:34 0 | 00 07:00:08:31 30,519
END OF DISPLAY
```

Information that may be out of date is denoted with a asterisk beside the serial number.

Director 30 was taken offline and information may be out of date.
Note the asterisk after the serial number.

```
EMCQL01I SRDF-HC EXTENDED DISPLAY FOR (17) #SQ LINK,9800,E
DR GP _OTHER__S/N_ OD OG RCS | %S M:SS RATE| %L DD:HH:MM:SS  TOTAL-I/O
03 SW 000184600045 .. .. FYY | .. 4:18 2 | .. 07:00:12:13 2,403,282
0E ** ***** ** ** FNN | .. 4:18 0 | .. 07:00:12:12 1
10 00 000184600045 10 00 SY Y | 00 8:15 0 | 00 07:00:12:33 4,720,481
13 ** ***** ** ** FNN | .. 4:18 0 | .. 07:00:12:13 1
1E SW 000184600045 .. .. FYY | .. 8:34 2 | .. 07:00:12:11 2,395,627
20 01 000184600045 20 01 MYY | 00 8:15 0 | 00 07:00:12:28 212,787
30 02 000184600045*** ** SNN | 00 8:15 0 | 00 07:00:12:33 1,939,616
40 03 000184600045 40 03 MYY | 00 8:15 0 | 00 07:00:12:28 30,528
END OF DISPLAY
```

Figure 5-8 #SQ LINK Extend Command Output for SRDF

The fields in this example have the following meaning:

◆ DR

Director number of the Remote Link Director in hex.

- ◆ GP
RLD group of the Remote Link Director. For switched SRDF configurations, SW displays as the group. For concurrent SRDF, the SRDF Group number is displayed.
- ◆ Other S/N
Serial number of partner Symmetrix unit. The serial number may show as *'s if you configured the directory for Switched RDF. This could indicate that there is more than one remote serial number.
- ◆ OD
Director number of the Remote Link Director on the partner Symmetrix unit. For switched SRDF configurations “..” displays as the other director.
- ◆ OG
RLD group of the Remote Link Director on the partner Symmetrix unit. For switched SRDF configurations, “..” displays as the other group. For concurrent SRDF, the SRDF Group number of the target device is displayed.
- ◆ RCS
Where:
 - R = Remote Link Director type. Valid values are:

M	Source Remote Link Director
S	Target Remote Link Director
F	Fibre Remote Link Director
E	GIGE
 - C = Port connection status. Valid values are:

Y	link path established
N	no link path established
 - S = Link status. Valid values are:

Y	link is online
N	link is not online
- ◆ %S
Percent busy over short interval.

This field displays “..” for Fibre RAs.

- ◆ M:SS
Short interval duration during which the average number of start I/O commands are calculated. This timer resets approximately every 10 minutes, or when a Symmetrix IML occurs or utility reset command is issued.
- ◆ RATE
Average I/Os per second over the short time interval.
- ◆ %L
Percent busy over long interval.

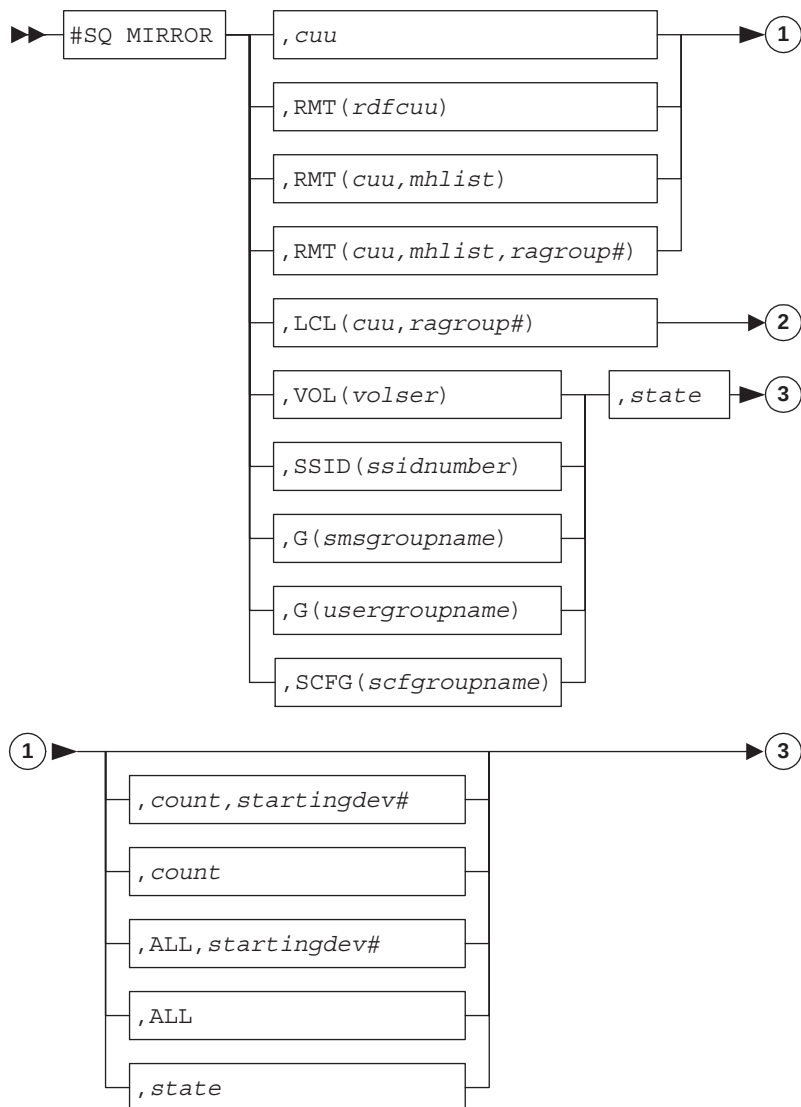
This field displays “..” for Fibre RAs.

- ◆ DD:HH:MM:SS
Time since last Symmetrix IML or last utility reset command issued from the service processor.
- ◆ TOTAL-I/O
Total Start I/O commands since last Symmetrix IML or last utility reset command.

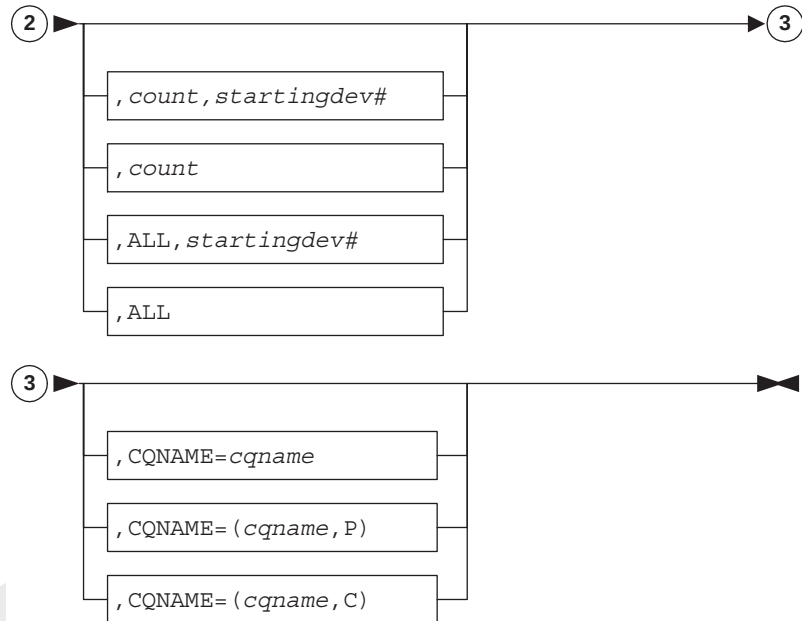
#SQ MIRROR

The #SQ MIRROR command displays the relationship of the logical devices to the physical devices, the invalid track count for each associated physical device, and the “NOT READY” and “WRITE DISABLED” status of each associated physical device.

Syntax



The #SQ MIRROR command syntax continues on the next page.



Parameters

count / *ALL* / *STATE*

Specifies the number of devices to display. You can set this value from one to the value specified in the MAX_QUERY initialization parameter, ALL, or STATE. If you omit this parameter, the value defaults to one. The *count* and ALL parameters cannot be used with the G (*smsgroupname*), G (*usergroupname*), or VOL (*volser*) parameters.

Note: The maximum value for MAX_QUERY is 8192. If the Symmetrix being displayed has more than 8192 devices, use command syntax specifying the starting Symmetrix device number. For example:

```
#SQ MIRROR, cuu, count, startingdev#
```

Console buffering should be considered when setting MAX_QUERY.

More Information: For a description of valid STATE values, refer to Table 5-5 on page 5-105.

cqname

Specifies the name of a command queue into which this command should be placed.

cuu

Specifies the z/OS device number.

G (msggroupname)

Specifies the SMS groupname of the devices to display. This parameter specifies that the mirror configurations of devices in the specified SMS group name be displayed. Only online devices are selected for display.

Note that SMS groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group.

G (usergroupname)

Specifies the Defined Group name of the devices to display. This parameter specifies that the mirror configurations of devices in the specified Defined Group name be displayed.

Note that Defined Groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group.

If a Defined Group has the same name as an SMS Group, the Defined Group is used.

LCL

Specifies that the operation affects local directors in an SRDF configuration.

mhlist

Specifies the *ragroup#* used to identify the remote Symmetrix unit. For multihop remote configurations, the *mhlist#* can be a single *ragroup#* or a list of up to eight hops, delineated by periods.

For example, an *mhlist* of 0.1.2 is for three hops. The command hops from the source box on an RA for *ragroup#* 0 to first hop box, through the first hop box on an RA for *ragroup#* 1 to second hop box, through second hop box on an RA for *ragroup#* 2 to third hop box.

P | C

P (purge) specifies that in the event of a command failure, all subsequent commands in the qname queue are to be purged. C (continue) specifies that even though a command failed, processing is to continue with the next command in the qname queue. If you do not specify the failcode on the first command for the qname queue, the default is P.

ragroup#

Specifies the *ragroup#* through which you want to perform an operation. This must be a 1- or 2-digit (hex) value representing the *ragroup#*.

For concurrent SRDF configurations, *ragroup#* identifies the R2 device for which the operation is to be performed.

In the LCL(*cuu* [, *ragroup#*]) format of the command, *ragroup#* is used to identify the R2 partner device.

In the RMT(*cuu* [, *mhlist*] [, *ragroup#*]) format of the command:

- The *ragroup#* can default in most cases, because the *ragroup#* defaults to the partner *ragroup#* of the last hop of the *mhlist*.
- The *ragroup#* can be either the "*" character or the *ragroup#* of the mirror to operate upon. The "*" character means to perform the action on both R2s of a concurrent R1 device. The "*" character is only valid as the third value of the RMT parameter.

rdfcuu

Specifies the z/OS device number of a source R1 device.

RMT

Specifies that the operation affects remote directors in an SRDF configuration.

SCFG(*scfgroupname*)

Specifies the SCF Group name of the devices to display. This parameter specifies that the mirror configurations of devices in the specified SCF group name be displayed.

Note that SCF groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group. SCF Groups are defined using the Group Name Services feature of EMCSCF.

`SSID(ssidnumber)`

The SSID and the *ssidnumber* that identifies the devices to be used for the command.

`startingdev#`

Specifies the Symmetrix device number at which to start the display. This parameter is optional. This parameter cannot be used with the *G(smsgroupname)* or *G(usergroupname)* parameters.

`VOL(volser)`

Requests a specific VOLSER or a pattern that includes multiple online VOLSERS. To specify a pattern, you must specify at least one unique alphanumeric value followed by an asterisk (*). The * character means to include all values that match starting in this position.

For example, the `#SQ VOL,VOL(UG*)` command generates a list of all online VOLSERS that have the first two characters of UG.

Examples

Example 1 **#SQ MIRROR,B66C,5** command displays the output shown in Figure 5-9:

```
EMCMN00I SRDF-HC : (225) #SQ MIRROR,B66C,5
EMCQV15I SRDF-HC DISPLAY FOR (225) #SQ MIRROR,B66C,5 767
    ---MIRROR 1--- ---MIRROR 2--- ---MIRROR 3--- ---MIRROR 4---
HOST SYMM|          NW|          NW|          NW|          NW
CUU  DEV|DA-IF ITRKS RD|DA-IF ITRKS RD|DA-IF ITRKS RD|DA-IF ITRKS RD
B66C 022C 10-C3      0 .. 11-D2      0 .. *T06*      0 .. *T07*      0 ..
B66D 022D 0F-C3      0 .. 12-D2      0 .. *T06*      0 .. *T07*      0 ..
B66E 022E 02-C3      0 .. 1F-D2      0 .. *T06*      0 .. *T07*      0 ..
B66F 022F 01-C3      0 .. 20-D2      0 .. *T06*      0 .. *T07*      0 ..
???? 0230 20-D2      0 .. 01-C3      0 .. *T06*      0 .. *T07*      0 ..
END OF DISPLAY
```

Figure 5-9 #SQ MIRROR Command Output for SRDF

Example 2 **#SQ MIRROR,B8AC,5** command displays the output shown in Figure 5-10:

```
EMCMN00I SRDF-HC : (228) #SQ MIRROR,B8AC,5,22C
EMCQV15I SRDF-HC DISPLAY FOR (228) #SQ MIRROR,B8AC,5,22C 829
---MIRROR 1--- ---MIRROR 2--- ---MIRROR 3--- ---MIRROR 4---
HOST SYMM| NW| NW| NW| NW|
CUU DEV|DA-IF ITRKS RD|DA-IF ITRKS RD|DA-IF ITRKS RD|DA-IF ITRKS RD
???? 022C 10-C3 0 .. 11-D2 0 .. *S09* 0 .. . . .
???? 022D 0F-C3 0 .. 12-D2 0 .. *S09* 0 .. . . .
???? 022E 02-C3 0 .. 1F-D2 0 .. *S09* 0 .. . . .
???? 022F 01-C3 0 .. 20-D2 0 .. *S09* 0 .. . . .
???? 0230 20-D2 0 .. 01-C3 0 .. *S09* 0 XX . . .
END OF DISPLAY

END OF DISPLAY
```

Figure 5-10 #SQ MIRROR Command Output for SRDF

Example 3 **#SQ MIRROR,9820,4** command displays the output shown in Figure 5-11:

```
EMCMN00I SRDF-HC : (95) #SQ MIRROR,9820,4
EMCQV15I SRDF-HC DISPLAY FOR (95) #SQ MIRROR,9820,4
--- MIRROR 1--- ---MIRROR 2--- ---MIRROR 3--- ---MIRROR 4---
HOST SYMM| NW| NW| NW| NW|
CUU DEV|DA-IF ITRKS RD|DA-IF ITRKS RD|DA-IF ITRKS RD|DA-IF ITRKS RD
9820 0020 01-C2 0 .. 12-C2 0 .. . . . . . . . . . .
      0040 12-C2 0 .. 01-C2 0 .. . . . . . . . . . .
      0060 02-D0 0 .. 11-D0 0 .. . . . . . . . . . .
      0080 11-D0 0 .. 02-D0 0 .. . . . . . . . . . .
9821 0021 11-C0 0 .. 02-C0 0 .. . . . . . . . . . .
      0041 11-C3 0 .. 02-C3 0 .. . . . . . . . . . .
      0061 01-D3 0 .. 12-D3 0 .. . . . . . . . . . .
      0081 01-D2 0 .. 12-D2 0 .. . . . . . . . . . .
9822 0022 12-D0 0 .. 01-D0 0 .. . . . . . . . . . .
      0042 11-D1 0 .. 02-D1 0 .. . . . . . . . . . .
      0062 01-D0 0 .. 12-D0 0 .. . . . . . . . . . .
      0082 12-C2 0 .. 01-C2 0 .. . . . . . . . . . .
9823 0023 02-D0 0 .. 11-D0 0 .. . . . . . . . . . .
      0043 12-D1 0 .. 01-D1 0 .. . . . . . . . . . .
      0063 12-D0 0 .. 01-D0 0 .. . . . . . . . . . .
      0083 02-C0 0 .. 11-C0 0 .. . . . . . . . . . .
END OF DISPLAY
```

Figure 5-11 #SQ MIRROR Command Output for SRDF

For RAID10 devices, the participating Symmetrix devices that make up the logical volume are listed individually, as shown in Figure 5-11.

The fields in these examples have the following meaning:

- ◆ Host CUU

Specifies the z/OS device number.

- ◆ Symm Dev

Symmetrix device number in hex.

- ◆ Mirror 1 - Mirror 4

Each of these columns describes a mirror. These columns are further subdivided as follows:

- DA-IF

Identifies the physical address (disk adapter and SCSI interface), or for SRDF devices, this field could display *Snn* or *Tnn* where *nn* is the *ragroup#* indicating that the mirror position represents the SRDF partner device on the remote Symmetrix unit. *Snn* is displayed when the local device is a target (R2) and the remote partner is a source (R1) device. *Tnn* is displayed when the local device is a source (R1) and the remote partner is a target (R2) device. *Bsyndv#* is displayed for devices with attached BCVs, where *syndv#* is the Symmetrix device number.

If the device is a BCV device actively being used as a BCV, the mirror that is being used as a BCV contains *Snnnn* where *nnnn* is the Symmetrix device number of the STD device.

If the device is a STD device that has a BCV attached, the mirror of the BCV is marked as *Bnnnn* where *nnnn* is the Symmetrix device number of the BCV.

This support is only available at Enginuity microcode level 5x66 or higher.

- ITRKS

Indicates the invalid track count for the mirror.

- N
R

An X appears in this column if the mirror is not ready.

- W
D

An X appears in this column if the mirror is write disabled (read only).

Example 4 Below is a display for #SQ MIRROR for a RAID5 device. Note that all members of a RAID5 devices are attributed to the same mirror position. Note also that invalid track information is displayed for the whole device, not for each member.

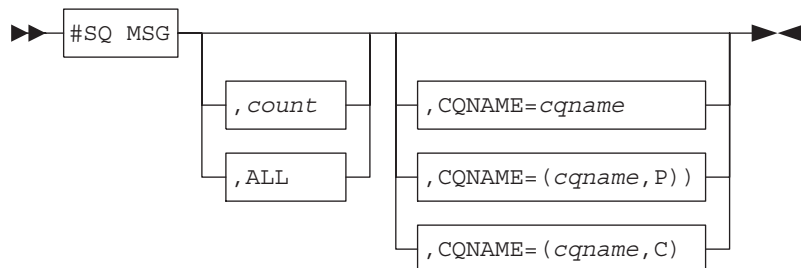
```
EMCQV15I SRDF-HC DISPLAY FOR (6) //SQ MIRROR,6F60,10
---MIRROR 1--- ---MIRROR 2--- ---MIRROR 3--- ---MIRROR 4---
HOST SYMM|      NW|      NW|      NW|      NW
CUU  DEV|DA-IF ITRKS RD|DA-IF ITRKS RD|DA-IF ITRKS RD|DA-IF ITRKS RD
6F60 0060 01-C0      0 .. .....
```

HOST	SYMM	CUU	DEV	DA-IF	ITRKS	RD	DA-IF	ITRKS	RD	DA-IF	ITRKS	RD	DA-IF	ITRKS	RD
6F60	0060		01-C0		0	..	..	..	..	..	..	..	..	..	..
			04-D8			..	..	..	..	..	..	..	..	..	..
			1A-C2			..	..	..	..	..	..	..	..	..	..
			20-C0			..	..	..	..	..	..	..	..	..	..
			22-C0			..	..	..	..	..	..	..	..	..	..
			28-C0			..	..	..	..	..	..	..	..	..	..
			30-C2			..	..	..	..	..	..	..	..	..	..
			31-C0			..	..	..	..	..	..	..	..	..	..

#SQ MSG

The #SQ MSG command displays any SRDF error or informational messages presented to the host console if the message processing startup option was selected. These messages can be generated by any Symmetrix unit in the SRDF configuration.

Syntax



Parameters

count

Specifies the number of messages to display. You can set this value from one to the size of the message log (as specified in the MESSAGE_PROCESSING initialization parameter), or ALL (which specifies all the messages). If you do not specify this parameter, *count* defaults to one. The maximum *count* value is 100.

cqname

Specifies the name of a command queue into which this command should be placed.

P | C

P (purge) specifies that in the event of a command failure, all subsequent commands in the qname queue are to be purged. C (continue) specifies that even though a command failed, processing is to continue with the next command in the qname queue. If you do not specify the failcode on the first command for the qname queue, the default is P.

Comments

This command, when issued with the ALL parameter, displays all messages currently held in the message log. The newest messages appear at the top of the display and the oldest messages at the bottom of the display.

SIM messages (Service Information Messages) are produced by Symmetrix units to report events. The SIM message is sent in response to the first I/O following the occurrence of the event. The device to which this I/O is issued is recorded as the REPORTING device. When z/OS receives a SIM message, an IEA480E message is generated.

The SIM message contains a description of the abnormal condition in the REFCODE. This is a hex code identifying the event, and to which device(s) the event occurred. The SRDF Host Component detects the event and issue an EMC9998W message in an attempt to more clearly interpret the SIM message.

The format for SIM IEA480E message is as follows:

```
IEA480E rptdv#,SCU,SERVICE ALERT,MT=ctltype,SER=ctlser,REFCODE=xxxx-yyy-zzzz
```

Where:

<i>rptdv#</i>	Specifies the reporting device number
<i>ctltype</i>	Specifies the controller type (for example, 3990-3)
<i>ctlser</i>	Specifies the controller serial number
<i>xxxx</i>	Specifies the exception code
<i>yyy</i>	Specifies additional information about the event
<i>zzzz</i>	Specifies additional information about the event

More Information: Refer to the *MVS/ESA System Messages* manual for your release of z/OS for further details on the IEA480E message.

The format of the EMC9998W message varies slightly depending on the exception code. Table 5-4 describes the exception codes intercepted by the SRDF Host Component and the corresponding format of the EMC998W message.

Table 5-4 EMC9998W Message Format

Exception Code	Meaning	Message Format
1460	DYNAMIC SPARING INVOKED	1
147D	REMOTE LINK DIRECTOR PROBLEM/FAILURE	2
147E	RDF ADAPTER LINK OPERATIONAL	1

Table 5-4 EMC9998W Message Format (continued)

Exception Code	Meaning	Message Format
146D	ALL LINKS OFFLINE	1
146E	ALL SRDF LINKS OPERATIONAL	1
E454 ^a	VOL SET TO ADAPTIVE COPY MODE	3
E461	TARGET VOLUME RESYNC W/SOURCE	3
E462	SOURCE VOLUME RESYNC W/TARGET	3
E465	RESYNC PROCESS HAS BEGUN	3
E473	R1/L1/ML VOL IN NOT READY STATE	4
E474	R1 VOL SRDF WRITE-DISABLED	4
E475	R2 VOL IN NOT READY STATE	4
E4F9 ^b	R1 CONGROUP TASK INACT	4

a. E454 exception code is issued when a long running channel program using suspend and resume logic is detected on an SRDF source (R1) volume, which is set to synchronous mode. Normally, this indicates that the volume contains an active page dataset. Symmetrix automatically changes this volume to the adaptive copy mode of operation.

b. A Service Alert with E4F9 REFCODE was detected. This occurs when the ConGroup task (for product EMC Consistency Group for z/OS) is terminated without first disabling active consistency groups and a situation occurs that would have otherwise triggered the consistency group. The data at the target may no longer be in a "consistent" state.

Where:

◆ MSG FORMAT 1

EMC9998W SSID *ssss* message, RPTD BY *rrrr*

◆ MSG FORMAT 2

EMC9998W SSID *ssss* RLD *ll* message, RPTD BY *rrrr*

◆ MSG FORMAT 3

EMC9998W SSID *ssss* DEV *ddd* message, RPTD BY *rrrr*

◆ MSG FORMAT 4

EMC9998W SSID *ssss* DEV *ddd* (count) message, RPTD BY *rrrr*

Where:

<i>ssss</i>	Specifies the reporting SSID
<i>ll</i>	Specifies the Remote Link Director number
<i>ddd</i>	Specifies the Symmetrix device number of the error device
<i>count</i>	Specifies the number of devices with the status note that the device numbers may not be contiguous
<i>message</i>	Message text
<i>rrrr</i>	Specifies the reporting cuu

Depending on the MESSAGE_PROCESSING initialization parameter, the SIM message may be saved by the SRDF Host Component for later display using the #SQ MSG command.

Example #SQ MSG,ALL command displays the output shown in Figure 5-12:

```
EMCQM81I SRDF-HC DISPLAY FOR (7) #SQ MSG,ALL
  DATE      TIME      CUU_ DV_ CT_ SSID      MESSAGE      NNNN RCUU
11/02/2001 13:28:28 N/A 00 N/A 3402 RDF ADAPTER LNK PROBLEM 0006 B85F
11/02/2001 13:28:28 N/A 00 N/A 3402 RDF ADAPTER LNK PROBLEM 0005 B85F
11/02/2001 13:28:21 N/A 00 N/A 3001 RDF ADAPTER LNK PROBLEM 0004 316B
11/02/2001 13:28:15 N/A 00 N/A 3000 RDF ADAPTER LNK PROBLEM 0003 3004
11/02/2001 13:28:15 N/A 00 N/A 3000 RDF ADAPTER LNK PROBLEM 0002 3004
11/02/2001 13:28:14 N/A 00 N/A 3001 RDF ADAPTER LNK PROBLEM 0001 316B
END OF DISPLAY
```

Figure 5-12 #SQ MSG Command Output for SRDF

The fields in this example have the following meaning:

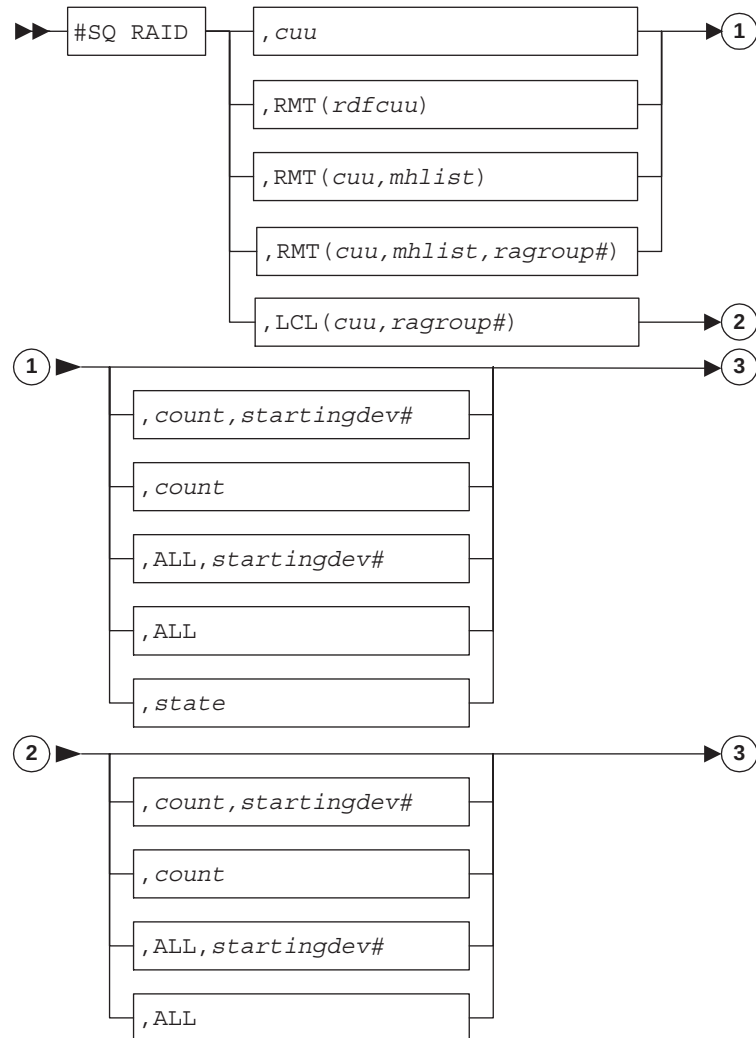
- ◆ DATE
Date of event.
- ◆ TIME
Time of event.
- ◆ CUU
z/OS device number.
- ◆ DV
Symmetrix device number or Remote Link Director number.

- ◆ CT
Number of devices affected (in decimal).
- ◆ SSID
Subsystem ID of the reporting device.
- ◆ MESSAGE
Symmetrix message. Valid messages are:
 - DYNAMIC SPARING INVOKED
 - TARG VOLUME RESYNC W/SOURCE
 - SOURCE VOLUME RESYNC W/TARGET
 - R1 CONGROUP TASK INACT
 - R1/M1/ML VOL NOT READY STATE
 - R1 VOL SRDF WRITE-DISABLED
 - R2 VOLUME IN NOT RDY STATE
 - RDF ADAPTER LINK PROBLEM
 - RESYNC PROCESS HAS BEGUN
 - RDF ADAPTER LINK OPERATIONAL
- ◆ nnnn
A unique number assigned to all associated events. The nnnn on the EMCQM81I, EMCQM82I in HCLOG, and EMC9998W messages provides a tie between single event messages.
- ◆ RCUU
Reporting device address.

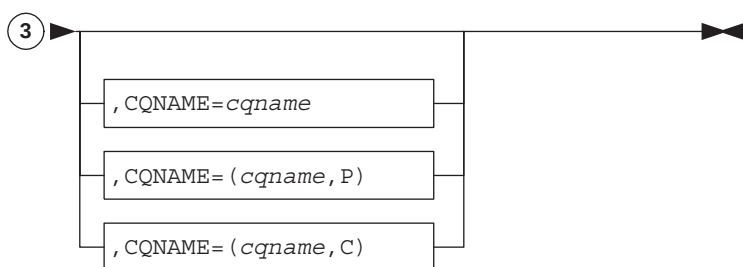
#SQ RAID

The #SQ RAID command displays the Symmetrix RAID configuration. The z/OS device number is displayed as well as the Symmetrix device number and the physical device numbers. The parity device also appears.

Syntax



The #SQ RAID command syntax continues on the next page.

**Parameters***cqname*

Specifies the name of a command queue into which this command should be placed.

cuu

Specifies the z/OS device number.

LCL

Specifies that the operation affects local directors in an SRDF configuration.

mhlist

Specifies the *ragroup#* used to identify the remote Symmetrix unit.

For multihop remote configurations, the *mhlist#* can be a single *ragroup#* or a list of up to eight hops, delineated by periods.

For example, an *mhlist* of 0.1.2 is for three hops. The command hops from the source box on an RA for *ragroup#* 0 to first hop box, through the first hop box on an RA for *ragroup#* 1 to second hop box, through second hop box on an RA for *ragroup#* 2 to third hop box.

P | C

P (purge) specifies that in the event of a command failure, all subsequent commands in the *qname* queue are to be purged.

C (continue) specifies that even though a command failed, processing is to continue with the next command in the *qname* queue. If you do not specify the failcode on the first command for the *qname* queue, the default is P.

ragroup#

Specifies the *ragroup#* through which you want to perform an operation. This must be a 1- or 2-digit (hex) value representing the *ragroup#*.

For concurrent SRDF configurations, *ragroup#* identifies the R2 device for which the operation is to be performed.

In the LCL(*cuu* [, *ragroup#*]) format of the command, *ragroup#* is used to identify the R2 partner device.

In the RMT(*cuu* [, *mhlist*] [, *ragroup#*] format of the command:

- The *ragroup#* can default in most cases, because the *ragroup#* defaults to the partner *ragroup#* of the last hop of the *mhlist*.
- The *ragroup#* can be either the "*" character or the *ragroup#* of the mirror to operate upon. The "*" character means to perform the action on both R2s of a concurrent R1 device. The "*" character is only valid as the third value of the RMT parameter.

rdfcuu

Specifies the z/OS device number of a source R1 device.

RMT

Specifies that the operation affects remote directors in an SRDF configuration.

startingdev#

Specifies the Symmetrix device number at which to start the display. This parameter is optional.

count

Specifies the number of devices to display (starting from *startingdev#* or from the beginning of the configuration).

ALL

Specifies all devices or all devices starting from *startingdev#*.

Example #SQ RAID,2150,16 command displays the output shown in Figure 5-13:

```

EMCQV17I SRDF-HC DISPLAY FOR (6) #SQ RAID,2150,16
RAID
GROUP| CUU_  DEV_  DA-IF | CUU_  DEV_  DA-IF | CUU_  DEV_  DA-IF | PTY
800F| 2114 0014 12-C0 | 21C1 00C1 1F-D3 | 21F6 00F6 13-D3 | 1E-D3
8010| 2115 0015 13-C0 | 21CC 00CC 0E-D3 | 21F4 00F4 0F-D3 | 12-D3
8011| 2116 0016 1E-C0 | 21C9 00C9 1F-C0 | 21F1 00F1 02-D3 | 03-D3
8019| 2117 0017 1F-C1 | 21CA 00CA 02-D2 | 21EF 00EF 1E-C1 | 03-D2
8012| 2118 0018 02-D0 | 21C8 00C8 1E-C3 | 21FC 00FC 03-D0 | 1F-C3
801A| 2119 0019 03-D1 | 2128 0028 02-D1 | 21D7 00D7 1E-C2 | 1F-C2
8013| 211A 001A 0E-D0 | 21CD 00CD 0F-D0 | 21F9 00F9 12-C3 | 13-C3
801B| 211B 001B 0F-D1 | 21D5 00D5 12-C2 | 21F3 00F3 0E-D1 | 13-C2
8014| 211C 001C 12-D0 | 2122 0022 0E-C3 | 21CF 00CF 13-D0 | 0F-C3
801C| 211D 001D 13-D1 | 2132 0032 0E-C2 | 21CE 00CE 12-D1 | 0F-C2
8016| 211E 001E 1E-D2 | 2121 0021 03-C1 | 21D2 00D2 02-C1 | 1F-D2
801E| 211F 001F 1F-D3 | 21E1 00E1 12-C0 | 21F7 00F7 1E-D3 | 13-D3
801D| 2120 0020 02-C2 | 2131 0031 03-C2 | 21D0 00D0 1E-D1 | 1F-D1
8017| 2123 0023 0F-C1 | 212C 002C 12-D2 | 21D4 00D4 0E-C1 | 13-D2
8018| 2124 0024 12-C1 | 212A 002A 0E-D2 | 21D6 00D6 13-C1 | 0F-D2
801F| 2125 0025 13-C0 | 213C 003C 12-D3 | 21DB 00DB 0E-D3 | 0F-D3
END OF DISPLAY

```

Figure 5-13 #SQ RAID Command Output for SRDF

The fields in this example have the following meaning:

- ◆ RAID GROUP

Raid Group Number.

- ◆ CUU

z/OS device number.

This field displays “????” for devices specified in the SCF exclude list.

- ◆ DEV

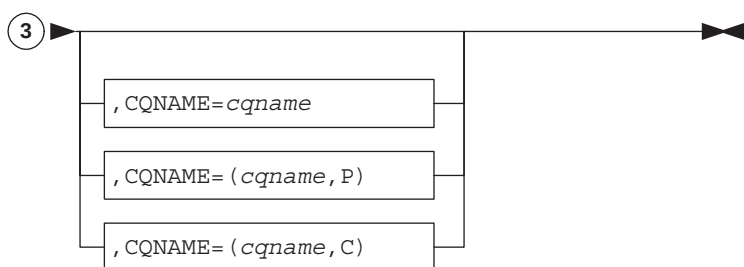
Symmetrix device number in hex.

- ◆ DA-IF

Identifies the physical address (disk adapter and SCSI interface).

- ◆ PTY DA-IF

Identifies the physical address (disk adapter and SCSI interface) of the RAID parity device.

**Parameters***cqname*

Specifies the name of a command queue into which this command should be placed.

cuu

Specifies the z/OS device number.

LCL

Specifies that the operation affects local directors in an SRDF configuration.

mhlist

Specifies the *ragroup#* used to identify the remote Symmetrix unit.

For multihop remote configurations, the *mhlist#* can be a single *ragroup#* or a list of up to eight hops, delineated by periods.

For example, an *mhlist* of 0.1.2 is for three hops. The command hops from the source box on an RA for *ragroup#* 0 to first hop box, through the first hop box on an RA for *ragroup#* 1 to second hop box, through second hop box on an RA for *ragroup#* 2 to third hop box.

P | C

P (purge) specifies that in the event of a command failure, all subsequent commands in the *qname* queue are to be purged.

C (continue) specifies that even though a command failed, processing is to continue with the next command in the *qname* queue. If you do not specify the failcode on the first command for the *qname* queue, the default is P.

ragroup#

Specifies the *ragroup#* through which you want to perform an operation. This must be a 1- or 2-digit (hex) value representing the *ragroup#*.

For concurrent SRDF configurations, *ragroup#* identifies the R2 device for which the operation is to be performed.

In the `LCL(cuu [, ragroup#])` format of the command, *ragroup#* is used to identify the R2 partner device.

In the `RMT(cuu [, mhlist] [, ragroup#])` format of the command:

- The *ragroup#* can default in most cases, because the *ragroup#* defaults to the partner *ragroup#* of the last hop of the *mhlist*.
- The *ragroup#* can be either the "*" character or the *ragroup#* of the mirror to operate upon. The "*" character means to perform the action on both R2s of a concurrent R1 device. The "*" character is only valid as the third value of the RMT parameter.

rdfcuu

Specifies the z/OS device number of a source R1 device.

RMT

Specifies that the operation affects remote directors in an SRDF configuration.

startingdev#

Specifies the Symmetrix device number at which to start the display. This parameter is optional.

count | ALL | *state*

Specifies the number of devices to display. You can set this value from one to the value specified in the MAX_QUERY initialization parameter, ALL or STATE. If you omit this parameter, the value defaults to one.

Example The following example shows information about spares that have been invoked for a member. In the example, a hot spare has been invoked for member 4. The physical address of the spare is displayed.

One member is reported per line. All not-rdy and write-disabled information is displayed for both the member and for any spare that may be invoked for that member. Note that the '>' on the line for member # 4 indicates the copy direction for the spare. In this case, data is being copied from the member to the spare.

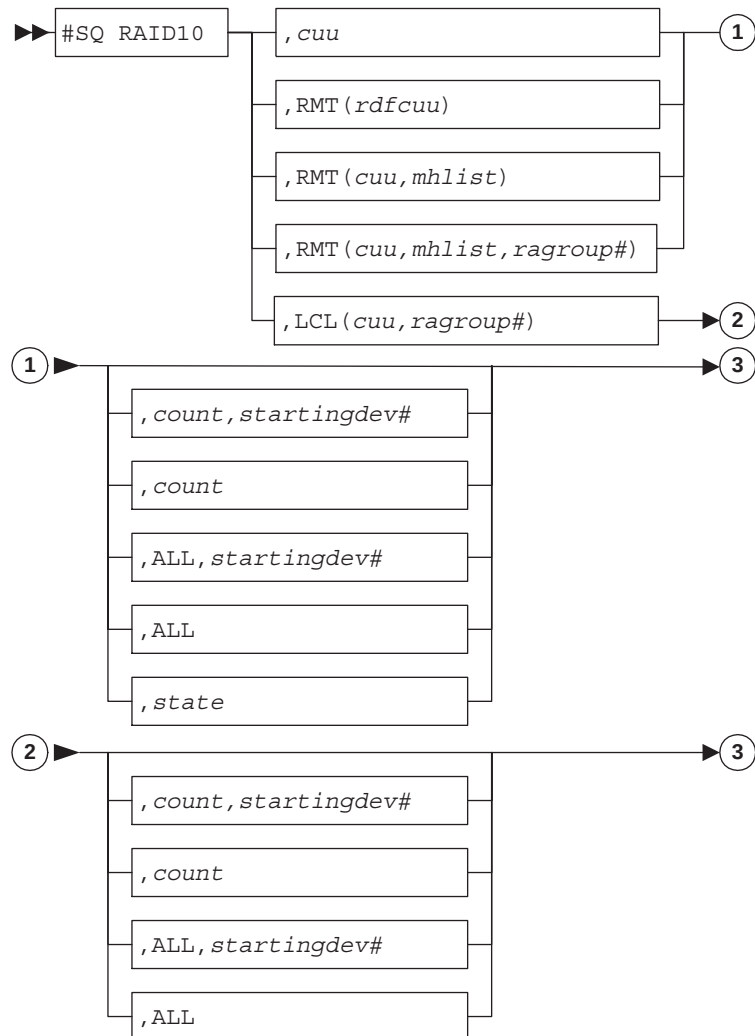
```
EMCQV19I SRDF-HC DISPLAY FOR (10) //SQ RAID5,6F60
```

STRIPE			DEV		SPARE		MEMBER		SPARE		
CUU_	DEV_	WIDTH	R D	MEM	DA-IF	#	DA-IF	R D	R D		
6F60	0060	0004	.	.	4	3A-C0	1	01-C0	.	.	X X
						2	04-D8	.	.	X X	
						3	1A-C2	.	.	X X	
						4	20-C0	.	X >	.	
						5	22-C0	.	.	X X	
						6	28-C0	.	.	X X	
						7	30-C2	.	.	X X	
						8	31-C0	.	.	X X	

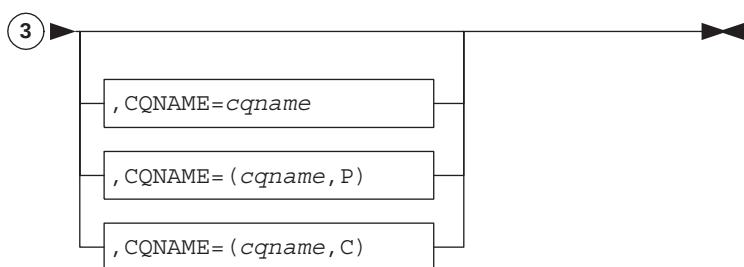
#SQ RAID10

The #SQ RAID10 command displays the Symmetrix devices making up a RAID10 logical volume. The z/OS device number is displayed as well as the Symmetrix device numbers.

Syntax



The #SQ RAID10 command syntax continues on the next page.



Parameters *count* | ALL | STATE

Specifies the number of devices to display. You can set this value from one to the value specified in the MAX_QUERY initialization parameter, ALL, or STATE. If you omit this parameter, the value defaults to one. The *count* and ALL parameters cannot be used in conjunction with the *G (smsgroupname)* or *G (usergroupname)* parameters.

More Information: For a description of valid STATE values, refer to Table 5-5 on page 5-105.

cqname

Specifies the name of a command queue into which this command should be placed.

cuu

Specifies the z/OS device number.

G (smsgroupname)

Specifies the SMS groupname of the devices to display. This parameter specifies that the mirror configurations of devices in the specified SMS group name be displayed. Only online devices are selected for display.

Note that SMS groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group.

G (usergroupname)

Specifies the Defined Group name of the devices to display. This parameter specifies that the mirror configurations of devices in the specified Defined Group name be displayed.

Note that Defined Groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group.

If a Defined Group has the same name as an SMS Group, the Defined Group is used.

LCL

Specifies that the operation affects local directors in an SRDF configuration.

mhlist

Specifies the *ragroup#* used to identify the remote Symmetrix unit.

For multihop remote configurations, the *mhlist#* can be a single *ragroup#* or a list of up to eight hops, delineated by periods.

For example, an *mhlist* of 0.1.2 is for three hops. The command hops from the source box on an RA for *ragroup#* 0 to first hop box, through the first hop box on an RA for *ragroup#* 1 to second hop box, through second hop box on an RA for *ragroup#* 2 to third hop box.

P|C

P (purge) specifies that in the event of a command failure, all subsequent commands in the *qname* queue are to be purged. *C* (continue) specifies that even though a command failed, processing is to continue with the next command in the *qname* queue. If you do not specify the failcode on the first command for the *qname* queue, the default is *P*.

ragroup#

Specifies the *ragroup#* through which you want to perform an operation. This must be a 1- or 2-digit (hex) value representing the *ragroup#*.

For concurrent SRDF configurations, *ragroup#* identifies the R2 device for which the operation is to be performed.

In the `LCL(cuu[,ragroup#])` format of the command, `ragroup#` is used to identify the R2 partner device.

In the `RMT(cuu[,mhlist][,ragroup#])` format of the command:

- The `ragroup#` can default in most cases, because the `ragroup#` defaults to the partner `ragroup#` of the last hop of the `mhlist`.
- The `ragroup#` can be either the “*” character or the `ragroup#` of the mirror to operate upon. The “*” character means to perform the action on both R2s of a concurrent R1 device. The “*” character is only valid as the third value of the RMT parameter.

`rdfcuu`

Specifies the z/OS device number of a source R1 device.

RMT

Specifies that the operation affects remote directors in an SRDF configuration.

`startingdev#`

Specifies the Symmetrix device number to start the display. This parameter is optional. This parameter cannot be used with the `G(msggroupname)` or `G(usergroupname)` parameters.

Example `#SQ RAID10,9820,4` command displays the output shown in Figure 5-14:

```
EMCMN00I SRDF-HC : (96) #SQ RAID10,9820,4
EMCQV18I SRDF-HC DISPLAY FOR (96) #SQ RAID10,9820,4
CUU_ | DEV_ DEV_ DEV_ DEV_
9820  0020 0040 0060 0080
9821  0021 0041 0061 0081
9822  0022 0042 0062 0082
9823  0023 0043 0063 0083
END OF DISPLAY
```

Figure 5-14 #SQ RAID10 Command Output for SRDF

- ◆ CUU
z / OS device number.
- ◆ DEV
Symmetrix device number in hex.

The `#SQ RDFGRP` command displays the Symmetrix RAGROUPs configuration.

```

graph LR
    Start((1)) --> Header["#SQ RDFGRP"]
    Header --> Arg1[", cuu"]
    Arg1 --> Arg2[", LCL (cuu, ragroup#)"]
    Arg2 --> Arg3[", RMT (rdfcuu)"]
    Arg3 --> Arg4[", RMT (cuu, mhlist)"]
    Arg4 --> Arg5[", RMT (cuu, mhlist, ragroup#)"]
    Arg5 --> Arg6[", G (smsgroupname)"]
    Arg6 --> Arg7[", G (usergroupname)"]
    Arg7 --> Arg8[", SCFG (scfgroupname)"]
    Arg8 --> Branch(( ))
    Branch --> Path1[", RA (ragroup#)"]
    Path1 --> Path2[", ALL"]
    Branch --> Path3[", CQNAME=cqname"]
    Path3 --> Path4[", CQNAME= (cqname, P)"]
    Path4 --> Path5[", CQNAME= (cqname, C)"]
    Path5 --> End(( ))
  
```

Parameters

ALL

Specifies to display complete details for every ragroup in the Symmetrix unit.

cqname

Specifies the name of a command queue into which this command should be placed.

cuu

Specifies the z/OS device number.

G (*smsgroupname*)

Specifies the SMS groupname of the devices to display. This parameter specifies that the RDFGRP information of devices in the specified SMS group name be displayed. Only online devices are selected for display.

Note that SMS groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group.

G (*usergroupname*)

Specifies the Defined Group name of the devices to display. This parameter specifies that the RDFGRP information of devices in the specified Defined Group name be displayed.

Note that Defined Groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group.

If a Defined Group has the same name as an SMS group, the Defined Group is used.

LCL

Specifies that the operation affects local directors in an SRDF configuration.

mhlist

Specifies the *ragroup#* used to identify the remote Symmetrix unit.

For multihop remote configurations, the *mhlist#* can be a single *ragroup#* or a list of up to eight hops, delineated by periods.

For example, an *mhlist* of 0.1.2 is for three hops. The command hops from the source box on an RA for *ragroup#* 0 to first hop box, through the first hop box on an RA for *ragroup#* 1 to second hop box, through second hop box on an RA for *ragroup#* 2 to third hop box.

P | C

P (purge) specifies that in the event of a command failure, all subsequent commands in the *qname* queue are to be purged. C (continue) specifies that even though a command failed, processing is to continue with the next command in the *qname* queue. If you do not specify the failcode on the first command for the *qname* queue, the default is P.

ragroup#

Specifies the *ragroup#* through which you want to perform an operation. This must be a 1- or 2-digit (hex) value representing the *ragroup#*.

For concurrent SRDF configurations, *ragroup#* identifies the R2 device for which the operation is to be performed.

In the LCL (*cuu* [, *ragroup#*]) format of the command, *ragroup#* is used to identify the R2 partner device.

In the RMT (*cuu* [, *mhlist*] [, *ragroup#*] format of the command:

- The *ragroup#* can default in most cases, because the *ragroup#* defaults to the partner *ragroup#* of the last hop of the *mhlist*.
- The *ragroup#* can be either the "*" character or the *ragroup#* of the mirror to operate upon. The "*" character means to perform the action on both R2s of a concurrent R1 device. The "*" character is only valid as the third value of the RMT parameter.

RA (*ragroup#*)

Specifies the *ragroup#* for which you want to display complete details.

rdfcuu

Specifies the z/OS device number of a source R1 device.

RMT

Specifies that the operation affects remote directors in an SRDF configuration.

SCFG (*scfgroupname*)

Specifies the SCF Group name of the devices to display. This parameter specifies that the mirror configurations of devices in the specified SCF group name be displayed.

Note that SCF groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group. SCF Groups are defined using the Group Name Services feature of EMCSCF.

Comments

The #SQ RDFGRP command supports Symmetrix units running Engenuity microcode levels lower than 5x67. Note that ALL and RA (*ragroup#*) parameters are ignored on the lower levels.

If no remote commands have been issued, the output appears similar to the following:

```
EMCQR00I RDF-HC DISPLAY FOR (3) #SQ RDFGRP,2804
MY SERIAL #    MY MICROCODE
-----
000000003273    5266-41

MY GRP ONL PC OS GRP  OS SERIAL  OS MICROCODE SYNCHDIR
-----
00      .  .  00  000000003274  UNKNOWN  G (NONE)
01      .  .  01  000000003274  UNKNOWN  G (NONE)
02      .  .  02  000000003274  UNKNOWN  G (NONE)
03      .  .  03  000000003274  UNKNOWN  G (NONE)
04      .  .  04  000000003274  UNKNOWN  G (NONE)
05      .  .  05  000000003274  UNKNOWN  G (NONE)
06      .  .  06  000000003274  UNKNOWN  G (NONE)
07      .  .  07  000000003274  UNKNOWN  G (NONE)
```

Once a Remote command has been issued to a remote Symmetrix unit, the output looks similar to the following:

```
EMCQR00I RDF-HC DISPLAY FOR (8) ¢¢SQ RDFGRP,2804
MY SERIAL #    MY MICROCODE
```

```
-----
000000003273    5266-41
```

MY	GRP	ONL	PC	OS	GRP	OS SERIAL	OS MICROCODE	SYNCHDIR
00	.	.		00		000000003274	5266-41	G (NONE)
01	.	.		01		000000003274	5266-41	G (NONE)
02	.	.		02		000000003274	5266-41	G (NONE)
03	.	.		03		000000003274	5266-41	G (NONE)
04	.	.		04		000000003274	5266-41	G (NONE)
05	.	.		05		000000003274	5266-41	G (NONE)
06	.	.		06		000000003274	5266-41	G (NONE)
07	.	.		07		000000003274	5266-41	G (NONE)

ONL and PC are not filled in on these Symmetrix units. The RDFGRP cannot be taken online/offline, and the protocol is not at the RDFGRP level but at the director level.

Examples

Example 1 **#SQ RDFGRP,6E4C** command displays output shown in Figure 5-15:

```
EMCQR00I SRDF-HC DISPLAY FOR (5) ¢¢SQ RDFGRP,6E4C 750
```

```
MY SERIAL #    MY MICROCODE
```

```
-----
000000006185    5671-11
```

MY	GRP	ONL	PC	OS	GRP	OS SERIAL	OS MICROCODE	SYNCHDIR	FEATURE
	LABEL		TYPE			AUTO-LINKS-RECOVERY	LINKS_DOMINO	MSC_GROUP	
01	Y	F	32		000187990132	5671-12	G(R1>R2)	SRDFA	ACTIVE
	RDFDVGROUP		STATIC			NO-AUTO-LINKS-RECOVERY	LINKS-DOMINO:NO		
06	Y	F	16		000187990132	5671-12	G(R1>R2)		
	LRGROUPB		DYNAMIC			NO-AUTO-LINKS-RECOVERY	LINKS-DOMINO:NO		
07	Y	F	07		000187990175	5670-77	G(R1>R2)		
	LRGROUPC		DYNAMIC			NO-AUTO-LINKS-RECOVERY	LINKS-DOMINO:NO		
08	Y	F	18		000187990171	5671-11	G(R1>R2)		STAR
	LRGROUP5		DYNAMIC			NO-AUTO-LINKS-RECOVERY	LINKS-DOMINO:NO		(LRSTAR)
0D	Y	F	00		000184600309	5568-65	G(R1>R2)		
	UWE2U6A		STATIC			AUTO-LINKS-RECOVERY	LINKS-DOMINO:NO		
0E	Y	F	06		000184500309	5568-65	G(R1>R2)		
	UWF2U6A		STATIC			AUTO-LINKS-RECOVERY	LINKS-DOMINO:NO		
10	Y	F	05		000187990132	5671-12	G(R1>R2)		
	RDFDVGROUP		STATIC			NO-AUTO-LINKS-RECOVERY	LINKS-DOMINO:NO		
11	Y	F	14		000187990171	5671-11	G(R1>R2)		
	LRGROUP6		DYNAMIC			NO-AUTO-LINKS-RECOVERY	LINKS-DOMINO:NO		

```

      13      Y      F      33      000000006205      5670-79      G(R1>R2)
LRGROUP7    DYNAMIC NO-AUTO-LINKS-RECOVERY LINKS-DOMINO:NO

      15      Y      F      25      000187900699      5670-71      G(R1>R2)
RDFDVGROUP  STATIC  NO-AUTO-LINKS-RECOVERY LINKS-DOMINO:NO

      17      Y      F      27      000187990171      5671-11      G(R1>R2)
WJGRP1      DYNAMIC NO-AUTO-LINKS-RECOVERY LINKS-DOMINO:NO

      18      Y      F      28      000187990132      5671-12      G(R1>R2)
WJGRP2      DYNAMIC NO-AUTO-LINKS-RECOVERY LINKS-DOMINO:NO

      24      Y      F      27      000187990132      5671-12      G(R1>R2)
MSF01      DYNAMIC  AUTO-LINKS-RECOVERY LINKS-DOMINO:NO

      25      Y      F      15      000187790072      5670-77      G(R1>R2)
RDFDVGROUP  STATIC  NO-AUTO-LINKS-RECOVERY LINKS-DOMINO:NO

      27      Y      F      24      000187990171      5671-11      G(R1>R2)
MAKOTO      DYNAMIC  AUTO-LINKS-RECOVERY LINKS-DOMINO:NO

      2A      Y      F      2A      000187990132      5671-12      G(R1>R2)
AMRAG1      DYNAMIC NO-AUTO-LINKS-RECOVERY LINKS-DOMINO:NO

      2B      Y      F      2B      000187990171      5671-11      G(R1>R2)
AMRAG2      DYNAMIC NO-AUTO-LINKS-RECOVERY LINKS-DOMINO:NO

      2C      Y      F      2C      000187990132      5671-12      G(R1>R2)
AMRAG3      DYNAMIC NO-AUTO-LINKS-RECOVERY LINKS-DOMINO:NO

      2D      Y      F      2D      000187990171      5671-11      G(R1>R2)
AMRAG4      DYNAMIC NO-AUTO-LINKS-RECOVERY LINKS-DOMINO:NO
      3D      Y      F      3B      000187990132      5671-12      G(R1>R2) SRDFA ACTIVE
BRUCE      DYNAMIC  AUTO-LINKS-RECOVERY LINKS-DOMINO:NO

      3E      Y      F      3F      000187990132      5671-12      G(R1>R2) SRDFA ACTIVE
LRGROUP4    DYNAMIC NO-AUTO-LINKS-RECOVERY LINKS-DOMINO:NO

      3F      Y      F      3E      000187990132      5671-12      G(R1>R2)          STAR
LRGROUP3    DYNAMIC NO-AUTO-LINKS-RECOVERY LINKS-DOMINO:NO  (LRSTAR )

END OF DISPLAY

```

Figure 5-15 #SQ RDFGRP Command Output for SRDF

Example 2 **#SQ RDFGRP,6E4C,RA(25)** command displays output shown in Figure 5-16:

```
EMCQR00I SRDF-HC DISPLAY FOR (165) ¢¢SQ RDFGRP,6E4C,RA(25) 986
MY SERIAL #    MY MICROCODE
-----
000000006185    5671-08

MY GRP ONL PC OS GRP  OS SERIAL  OS MICROCODE SYNCHDIR FEATURE
-----
  LABEL      TYPE      AUTO-LINKS-RECOVERY  LINKS_DOMINO
-----
   25      Y   F   15    000187990132  5671-08    G(R1>R2)
RDFDVGROUP STATIC NO-AUTO-LINKS-RECOVERY LINKS-DOMINO:NO

MY DIR# OS RA# ST -----MY WWN----- ----IN COUNT---- ---OUT COUNT----
-----
   33      17   02 5006048800060A52 00000000043D23F8 00000000005B4118
                                00000000043DE608 00000000005D7450
                                00000000087B0A00 0000000000B8B568

   3E      17   02 5006048800060A5D 0000000004474650 0000000000641C40
                                000000000426FAC0 0000000000627418
                                00000000086E4110 0000000000C69058

END OF DISPLAY
```

Figure 5-16 **#SQ RDFGRP Command Output for SRDF**

Example 3 **#SQ RDFGRP,6F60,RA(15)** command displays the labels associated with SRDF groups as shown in Figure 5-17:

```
EMCQR00I SRDF-HC DISPLAY FOR (2) #SQ RDFGRP,6F60,RA(15)
MY SERIAL #    MY MICROCODE
-----
000000006185    5670-05

MY GRP ONL PC OS GRP  OS SERIAL  OS MICROCODE SYNCHDIR FEATURE
-----
   15      Y   F   10    000000006205  5670-05    G(R1>R2) SRDFA ACTIVE
        GROUP LABEL: RDFGROUP2    STATIC

MY DIR# OS RA# ST -----MY WWN----- ----IN COUNT---- ---OUT COUNT----
-----
   13      22   02 5006048800060A52 0000000073247748 00000004B1B018C0
                                0000000073247748 00000004B1B018C0
```

Figure 5-17 **#SQ RDFGRP Command Output for SRDF**

The fields in the previous examples have the following meanings:

- ◆ MY SERIAL #

The complete 12-digit serial number of the Symmetrix unit to which the command was issued.

- ◆ MY MICROCODE
The major-minor Enginuity microcode level of the Symmetrix unit to which the command was issued.
- ◆ MY GRP
The ragroup in the Symmetrix unit to which the command was issued.
- ◆ ONL
The ragroup is online if Y and offline if N.
- ◆ PC
The protocol of the ragroup. Valid values are: ESCON, Fiber, IP.
- ◆ OS GRP
The ragroup on the remote Symmetrix unit.
- ◆ OS SERIAL
The complete 12-digit serial number of the remote Symmetrix unit.
- ◆ OS MICROCODE
The major-minor Enginuity microcode level of the remote Symmetrix unit.
- ◆ SYNCHDIR
The current synchronization direction. G indicates the setting is at the global level, C for the control unit, and R for the RDFGRP.
- ◆ FEATURE
Indicates which feature(s) are currently enabled.
- ◆ LABEL
An alphanumeric group label (up to 10 characters).
- ◆ TYPE
The group type - STATIC or DYNAMIC.
- ◆ AUTO-LINKS-RECOVERY
Indicates YES if AUTO-LINKS-RECOVERY mode is in effect and NO if the mode is not in effect.

◆ LINKS_DOMINO

Indicates YES if the LINKS-DOMINO mode is in effect, NO if the mode is not in effect, or RDFGRP if the feature is in effect by RDF group. LINKS-DOMINO mode is a mode of operation in which all R1 devices go SRDF-NOT READY if all links are dropped.

◆ MSC_GROUP

If an RDFGRP is running MSC or Star, then this field will display the first eight bytes of the MSC_GROUP that was specified on the MSC_GROUP_NAME initialization statement that defined the MSC_GROUP.

◆ MY DIR#

The RA director that supports the ragroup in the Symmetrix unit to which the command was issued.

◆ OS RA#

The RA on the remote Symmetrix unit supporting the ragroup.

◆ ST

The state of the port on the remote Symmetrix unit supporting the ragroup.

◆ -----MY WWN-----

The World Wide Name (WWN) of the RA in the Symmetrix unit to which the command was issued.

◆ ----IN COUNT----

The number of I/O on the logical link coming from the remote Symmetrix unit.

◆ ---OUT COUNT----

The number of I/O on the logical link coming from the Symmetrix unit to which the command was issued.

The `#SQ SRDFA` command displays information about the SRDF/A RDFGRPs in the Symmetrix.

Note that the device used in the command does not have to be a SRDF/A device. The device is used as a gatekeeper and locates the RDFGRP (or multiple RDFGRPs when running Enginuity microcode level 5x71) with SRDF/A in the box.

The `#SQ SRDFA,DDDD` command displays data about the entire SRDFA configuration in the Symmetrix (i.e. the display will be for all RDFGRPs found with `SRDF/A`). The `#SQ SRDFA,LCL(DDDD,nn)` and the `#SQ SRDFA,RMT(DDDD,nn)` commands will display data about the single RDFGRP *nn*.

```

graph LR
    Start(( )) --> SQ[#SQ SRDFA]
    SQ --> CUU[, cuu]
    CUU --> LCL[, LCL (cuu, ragroup#)]
    LCL --> RMT1[, RMT (rdfcuu)]
    RMT1 --> RMT2[, RMT (cuu, mhlist)]
    RMT2 --> RMT3[, RMT (cuu, mhlist, ragroup#)]
    RMT3 --> G1[, G (smsgroupname)]
    G1 --> G2[, G (usergroupname)]
    G2 --> SCFG[, SCFG (scfgroupname)]
    SCFG --> End1((1))
    End1 --> Loop1((1))
    Loop1 --> CQNAME1[, CQNAME=cqname]
    CQNAME1 --> CQNAME2[, CQNAME= (cqname, P)]
    CQNAME2 --> CQNAME3[, CQNAME= (cqname, C)]
    CQNAME3 --> End2(( ))
  
```

Parameters*cuu*

Specifies the z/OS device number.

LCL

Specifies that the operation affects local directors in an SRDF configuration.

RMT

Specifies that the operation affects remote directors in an SRDF configuration.

ragroup#

Specifies the *ragroup#* number to display.

mhlist

Specifies the *ragroup#* used to identify the remote Symmetrix unit.

For multihop remote configurations, the *mhlist#* can be a single *ragroup#* or a list of up to eight hops, delineated by periods.

G (smsgroupname)

Specifies the SMS groupname of the devices to display. This parameter requests that the configurations of devices in the specified SMS group name be displayed. Only online devices are selected for display.

G (usergroupname)

Specifies the Defined Group name of the devices to display. This parameter specifies that the configurations of devices in the specified Defined Group name be displayed.

Note that Defined Groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group.

If a Defined Group has the same name as an SMS Group, the Defined Group is used.

SCFG (scfgroupname)

Specifies the SCF Group name of the devices to display. This parameter specifies that the mirror configurations of devices in the specified SCF group name be displayed.

Note that SCF groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group. SCF Groups are defined using the Group Name Services feature of EMCSCF.

cqname

Specifies the name of a command queue into which this command should be placed.

Examples

Example 1 The **#SQ SRDFA** command displays output shown in Figure 5-18:

```
EMCQR00I SRDF-HC DISPLAY FOR (8) ¢¢SQ SRDFA,DBF8 174
MY SERIAL #    MY MICROCODE
-----
000000006134    5671-11

MY GRP ONL PC OS GRP  OS SERIAL  OS MICROCODE SYNCHDIR FEATURE
-----
  LABEL      TYPE      AUTO-LINKS-RECOVERY  LINKS_DOMINO  MSC_GROUP
-----
  12      Y      F      32      000000006143    5671-11      G(R1>R2) SRDFA A MSC
KCH12AC      DYNAMIC      AUTO-LINKS-RECOVERY LINKS-DOMINO:NO  (KCHMSC )

-----
PRIMARY SIDE: CYCLE NUMBER      26,067  MIN CYCLE TIME                      30
SECONDARY CONSISTENT ( Y )      TOLERANCE ( N )
CAPTURE CYCLE SIZE              0  TRANSMIT CYCLE SIZE                  0
AVERAGE CYCLE TIME              23  AVERAGE CYCLE SIZE                  0
TIME SINCE LAST CYCLE SWITCH    12  DURATION OF LAST CYCLE              16
MAX THROTTLE TIME              0  MAX CACHE PERCENTAGE                94
HA WRITES                      5,518,747  RPTD HA WRITES                      4,267
HA DUP. SLOTS                  30  SECONDARY DELAY                      16
LAST CYCLE SIZE                0  DROP PRIORITY                        33
CLEANUP RUNNING                ( N )      MSC WINDOW IS OPEN ( N )
MSC ACTIVE                     ( Y )      ACTIVE SINCE    10/19/2004 13:18:29
CAPTURE TAG                    C0000003 00000004  TRANSMIT TAG      C0000002 00000003
GLOBAL CONSISTENCY             ( Y )      STAR RECOVERY AVAILABLE ( N )

-----

  14      Y      F      34      000000006143    5671-11      G(R1>R2) SRDFA A STAR
KCH14AC      DYNAMIC      AUTO-LINKS-RECOVERY LINKS-DOMINO:NO  (MGSARA )

-----
PRIMARY SIDE: CYCLE NUMBER      715  MIN CYCLE TIME                      30
SECONDARY CONSISTENT ( Y )      TOLERANCE ( N )
CAPTURE CYCLE SIZE              0  TRANSMIT CYCLE SIZE                  0
AVERAGE CYCLE TIME              15  AVERAGE CYCLE SIZE                  0
TIME SINCE LAST CYCLE SWITCH    1  DURATION OF LAST CYCLE              15
MAX THROTTLE TIME              0  MAX CACHE PERCENTAGE                94
HA WRITES                      5,518,747  RPTD HA WRITES                      4,267
HA DUP. SLOTS                  30  SECONDARY DELAY                      15
LAST CYCLE SIZE                0  DROP PRIORITY                        33
CLEANUP RUNNING                ( N )      MSC WINDOW IS OPEN ( N )
MSC ACTIVE                     ( Y )      ACTIVE SINCE    10/19/2004 10:21:28
CAPTURE TAG                    E0000000 000002C4  TRANSMIT TAG      E0000000 000002C3
GLOBAL CONSISTENCY             ( Y )      STAR RECOVERY AVAILABLE ( Y )

-----
```

```

16      Y      F      36      000000006143      5671-11      G(R1>R2) SRDFA A MSC
KCH16AC      DYNAMIC      AUTO-LINKS-RECOVERY LINKS-DOMINO:NO (KCHMSC )

-----
PRIMARY SIDE: CYCLE NUMBER      26,067 MIN CYCLE TIME                      30
SECONDARY CONSISTENT ( Y )      TOLERANCE ( N )
CAPTURE CYCLE SIZE              0 TRANSMIT CYCLE SIZE                    0
AVERAGE CYCLE TIME             23 AVERAGE CYCLE SIZE                    0
TIME SINCE LAST CYCLE SWITCH    12 DURATION OF LAST CYCLE              16
MAX THROTTLE TIME              0 MAX CACHE PERCENTAGE                  94
HA WRITES                      5,518,747 RPTD HA WRITES                  4,267
HA DUP. SLOTS                  30 SECONDARY DELAY                      16
LAST CYCLE SIZE                0 DROP PRIORITY                        33
CLEANUP RUNNING ( N )          MSC WINDOW IS OPEN ( N )
MSC ACTIVE ( Y )              ACTIVE SINCE      10/19/2004 13:18:29
CAPTURE TAG      C0000003 00000004 TRANSMIT TAG      C0000002 00000003
GLOBAL CONSISTENCY ( Y )      STAR RECOVERY AVAILABLE ( N )
-----
END OF DISPLAY

```

Figure 5-18 #SQ SRDFA Command Issued to the Primary Side

The fields in Figure 5-18 have the following meanings:

◆ PRIMARY SIDE

Primary Side indicates that the query was done on the primary side of the RDF configuration.

◆ CYCLE NUMBER

The Cycle Number is a number representing the current SRDF / A.

◆ MIN CYCLE TIME

Min Cycle Time is the interval time that SRDF / A is targeting for cycle switches. When running without MSC, this is the time the Symmetrix will try to cycle switch. When running with MSC active, this time is not used.

◆ SECONDARY CONSISTENT

Secondary Consistent is a (Y / N / ?) flag that indicates whether the secondary side is consistent:

Y SRDF/A is consistent

N SRDF/A is not consistent

? SRDF/A is not Active, and the data on the secondary side may or may not be consistent. Since SRDF/A is not active the consistency cannot be determined by SRDFA.

◆ TOLERANCE

Tolerance is a (Y / N) flag that signals whether if Tolerance Mode is on or off:

Y Tolerance mode is on for the SRDF / A sessions

N Tolerance mode is not on for the SRDF / A sessions

◆ CAPTURE CYCLE SIZE

Capture Cycle Size is the number of cache slots currently in the active cycle.

◆ TIME SINCE LAST CYCLE SWITCH

Time Since Last Cycle Switch is the number of seconds since the last time SRDF / A has cycle switched.

◆ DURATION OF LAST CYCLE

Duration of Last Cycle is the number of seconds the last cycle lasted.

◆ TRANSMIT CYCLE SIZE

Transmit Cycle Size is the number of slots left in the cycle being sent to the secondary side.

◆ AVERAGE CYCLE TIME

Average Cycle Time is the average time each cycle is taking over the past sixteen cycles.

◆ AVERAGE CYCLE SIZE

Average Cycle Size is the average number of slots in the past sixteen cycles.

◆ MAX THROTTLE TIME

Maximum Throttle Time indicates how long SRDF / A will slow the host adapters once cache limits are reached. If the value is 0, then once Cache limits are reached, SRDF / A is dropped.

If the value is 65535 then the host adapters will work at write pending limits speed indefinitely.

If any other value then that is the number of seconds the host adapters will work at write pending limits speed before SRDF / A will be dropped.

- ◆ MAX CACHE PERCENTAGE

Maximum Cache Percentage is the percentage of cache that SRDF/A will be allowed to use.

In the initial release of SRDF/A, the Maximum Cache Percentage is 100%.

- ◆ HA WRITES

HA (Host Adapter) Writes is the number of tracks written by the host adapters.

- ◆ RPTD HA WRITES

Repeated HA (Host Adapter) Writes is the total number of tracks written multiple times in a cycle by the host adapters.

- ◆ HA DUP SLOTS

Host Adapter Duplicated Slots is the number of times a slot had to be duplicated because it was written to in multiple cycles.

- ◆ SECONDARY DELAY

Secondary Delay is the approximate time the data on the secondary side is behind the primary side.

- ◆ LAST CYCLE SIZE

The Last Cycle Size is the size of the complete previous cycle.

- ◆ DROP PRIORITY

Drop Priority displays the relative priority of this SRDF/A session. If the percent of cache SRDF/A can use is exceeded, the Drop Priority determines the order, high to low priority, in which SRDF/A sessions are dropped in this Symmetrix to relieve the condition. The highest priority is 1; the lowest is 64.

Note that the Drop Priority set in the remote side of this RDFGRP has no affect on the Drop Priority in this RDFGRP.

◆ CLEANUP RUNNING

Cleanup Running is a (Y / N) flag:

- | | |
|---|---|
| Y | The secondary side will reject non-SRDF/A for a small window of time (approximately 30 seconds) Cleanup only runs immediately after SRDF/A goes from the Active to the Inactive state. Cleanup prevents RDF-RSUM, REFRESH RFR-RSUM, or VALIDATE INVALIDATE from being run on the SRDF/A devices. After the cleanup is finished the RDF-RSUM, REFRESH RFR-RSUM, or, VALIDATE INVALIDATE commands may be run. |
| N | Cleanup is not running. |

◆ MSC WINDOW IS OPEN

The SRDF / A Multi-Session Consistency window is a small time frame that the cycle switch must be run in when running in MSC. When the MSC window is open, all write I / Os to SRDF / A primary devices are disconnected. Read I / Os continue to run.

◆ MSC ACTIVE

Host Active is a (Y / N) flag:

- | | |
|---|---|
| Y | The SRDF/A session is part of a multiple SRDF/A session group. The multiple SRDF/A session group is a group of multiple SRDF/A sessions that are having the cycle switch coordinated by the Host. When SRDF/A is not active and MSC "Y," SRDF/A is deactivated when MSC was active. |
| N | SRDF/A is not running in MSC mode. |

◆ ACTIVE SINCE

Active Since is the date and time that the SRDF / A session joined MSC.

◆ CAPTURE TAG

The Capture Tag is the tag for the data in the capture cycle. The Capture Tag verifies the multiple SRDF / A sessions in the MSC group are coordinated. When MSC is active, the Capture Tag functions like the cycle number when SRDF / A is active and MSC is not active.

◆ TRANSMIT TAG

The Transmit Tag is the tag for the data in the transmit cycle. The Transmit Tag verifies that the multiple SRDF / A sessions in the MSC group are coordinated. When MSC is active, the Transmit Tag functions like the cycle number when SRDF / A is active and MSC is not active.

◆ GLOBAL CONSISTENCY

Global Consistency is a (Y / N) flag:

Y	Dependent write consistency has been achieved at the remote site across all RDFGRPs in the MSC Group.
N	SRDF/A is not running in MSC or dependent write consistency has not been achieved at the remote site across all RDFGRPs in the MSC Group.

◆ STAR RECOVERY AVAILABLE

Star Recovery Available is a (Y / N) Flag:

Y	MSC is running in SRDF/Star mode and the SRDF/Star environment is now able to provide a differential resynchronization between the two remote sites.
N	MSC is either not running in SRDF/Star mode or has not yet achieved the ability to provide differential resynchronization between the two remote sites.

Example 2 #SQ SRDFA command displays output shown in Figure 5-19:

```
EMCQR00I SRDF-HC DISPLAY FOR (174) @@SQ SRDFA,RMT(6E4C,0F) 545
MY SERIAL #    MY MICROCODE
-----
000187990171    5671-08

MY GRP ONL PC OS GRP  OS SERIAL  OS MICROCODE SYNCHDIR FEATURE
-----
  LABEL      TYPE      AUTO-LINKS-RECOVERY  LINKS_DOMINO
-----
  OB      Y      F      OF      000000006185    5671-08    G(R1>R2) SRDFA A STAR
MSFUMD      DYNAMIC      AUTO-LINKS-RECOVERY LINKS-DOMINO:NO

-----
SECONDARY SIDE: CYCLE NUMBER      629
CYCLE SUSPENDED      ( N )      RESTORE DONE ( Y )
RECEIVE CYCLE SIZE      0 APPLY CYCLE SIZE      0
AVERAGE CYCLE TIME      16 AVERAGE CYCLE SIZE      0
TIME SINCE LAST CYCLE SWITCH      9 DURATION OF LAST CYCLE      16
MAX THROTTLE TIME      7 MAX CACHE PERCENTAGE      94
TOTAL RESTORES      1 TOTAL MERGES      0
SECONDARY DELAY      16 DROP PRIORITY      33
CLEANUP RUNNING      ( N )      HOST INTERVENTION REQUIRED ( N )
MSC ACTIVE      ( Y )      ACTIVE SINCE      09/24/2004 10:55:58
RECEIVE TAG      E0000000 00000043      APPLY TAG      E0000000 00000042
GLOBAL CONSISTENCY      ( Y )      STAR RECOVERY AVAILABLE      ( Y )
STAR SRDFA AHEAD      ( N )

-----
END OF DISPLAY
```

Figure 5-19 #SQ SRDFA Command Secondary Side

The fields in Figure 5-19 have the following meanings:

◆ SECONDARY SIDE

Secondary Side indicates that the query was done on the secondary side of the RDF configuration.

◆ CYCLE NUMBER

The Cycle Number is a number representing the cycle that SRDF/A is on. When running in either MSC active or not this number will continue to increase each time a cycle switch occurs.

◆ MIN CYCLE TIME

Minimum Cycle Time is the time that SRDF/A is targeting to do cycle switches. When running without MSC, this is the time the Symmetrix will try to cycle switch. When running with MSC active, this time is not used.

◆ CYCLE SUSPENDED

Cycle Suspended is a (Y / N) flag:

Y	The cycle switching will be delayed by software to perform a consistent operation (i.e. Time Finder Remote Consistent Split).
N	SRDF/A will operate in the normal cycle switching mechanism.

◆ RESTORE DONE

Restore Done is a (Y / N) flag:

Y	The apply cycle is completely restored.
N	The apply cycle is not completely restored.

◆ RECEIVE CYCLE SIZE

Receive Cycle Size is the number of slots currently in the cycle actively being written to from the primary side.

◆ APPLY CYCLE SIZE

Apply Cycle Size is the number of slots currently in the cycle actively being restored to the secondary devices.

◆ AVERAGE CYCLE TIME

Average Cycle Time is the average time each cycle is taking over the past sixteen cycles.

- ◆ AVERAGE CYCLE SIZE

Average Cycle Size is the average number of slots in the past sixteen cycles.

- ◆ TIME SINCE LAST CYCLE SWITCH

Time Since Last Cycle Switch is the number of seconds since the last time SRDF/A has cycle switched.

- ◆ DURATION OF LAST CYCLE

The Duration of Last Cycle is the number of seconds the last cycle lasted.

- ◆ MAX THROTTLE TIME

Maximum Throttle Time indicates how long SRDF/A will slow the host adapters once cache limits are reached. If the value is zero (0), then SRDF/A drops after Cache fills. If the value is 65535, then the host adapters work at write pending limits speed indefinitely.

If Maximum Throttle Time is any other value, then that value is the number of seconds the host adapters work at write pending limits speed before SRDF/A is dropped.

- ◆ MAX CACHE PERCENTAGE

Maximum Cache Percentage is the percentage of cache that SRDF/A is allowed to use.

For this release, Max Cache Percentage is always 100%.

- ◆ TOTAL RESTORES

Total Restores is the total number of slots restored from all of the apply cycles to the current time.

- ◆ TOTAL MERGES

Total Merges is the total number of slots merged in cache during the restore of all of the apply cycles to the current time.

- ◆ SECONDARY DELAY

Secondary Delay is the approximate time the data on the secondary side is behind the primary side.

◆ DROP PRIORITY

Drop Priority displays the relative priority of this SRDF / A session. If the percent of cache SRDF / A can use is exceeded, the Drop Priority determines the order, high to low priority, in which SRDF / A sessions are dropped in this Symmetrix to relieve the condition. The highest priority is 1; the lowest is 64.

Note that the Drop Priority set in the remote side of this RDFGRP has no affect on the Drop Priority in this RDFGRP.

◆ CLEANUP RUNNING

Cleanup Running is a (Y / N) flag:

Y	Indicates that a small window of time (approximately 30 seconds when not running in MSC) that non-SRDF/A I/O will be rejected by the secondary side. Cleanup will only run immediately after SRDF/A goes from the Active to the Inactive state. Cleanup will prevent RDF-RSUM, REFRESH RFR-RSUM, or VALIDATE INVALIDATE from being run on the SRDF/A devices. After the cleanup is finished the RDF-RSUM, REFRESH RFR-RSUM, or VALIDATE INVALIDATE commands may be run.
N	Cleanup is not running.

If cleanup is running on the secondary side and Host Intervention Required is also “Y”, then Cleanup will not finish until MSC tells SRDF / A what to do with the complete receive cycle on.

◆ HOST INTERVENTION REQUIRED

Host Intervention Required is a (Y / N) flag:

Y	When Cleanup Running is also Y, MSC must tell SRDF/A what to do with the complete receive cycle on.
N	Host intervention is not required.

◆ MSC ACTIVE

MSC Active is a (Y / N) flag:

Y	The SRDF/A session is part of a multiple SRDF/A session group. The multiple SRDF/A session group is a group of multiple SRDF/A sessions that are having the cycle switch controlled by the Host and not the Symmetrix. When SRDF/A is not active and MSC Active = “Y”, it indicates that SRDF/A deactivated when MSC was active.
N	SRDF/A is not running in MSC mode.

◆ ACTIVE SINCE

Active Since is the date and time that the SRDF/A session joined MSC.

◆ RECEIVE TAG

Receive Tag is the tag for the data in the receive cycle. The tag is used to verify the multiple SRDF/A sessions in the MSC group are in step. The tag when MSC is active is like the cycle number when SRDF/A is active and MSC is not active.

◆ APPLY TAG

Apply Tag is the tag for the data in the apply cycle. Apply Tag is used to verify the multiple SRDF/A sessions in the MSC group are in step. When MSC is active, Apply Tag is like the Cycle Number when SRDF/A is active and MSC is not active.

◆ GLOBAL CONSISTENCY

Global Consistency is a (Y / N) flag:

Y	Dependent write consistency has been achieved at the remote site across all RDFGRPs in the MSC Group.
N	SRDF/A is not running in MSC or dependent write consistency has not been achieved at the remote site across all RDFGRPs in the MSC Group.

◆ STAR RECOVERY AVAILABLE

Star Recovery Available is a (Y / N) flag:

Y	MSC is running in SRDF/Star mode and the SRDF/Star environment is now able to provide a differential resynchronization between the two remote sites.
N	MSC is either not running in SRDF/Star mode or has not yet achieved the ability to provide differential resynchronization between the two remote sites.

◆ STAR SRDFA AHEAD

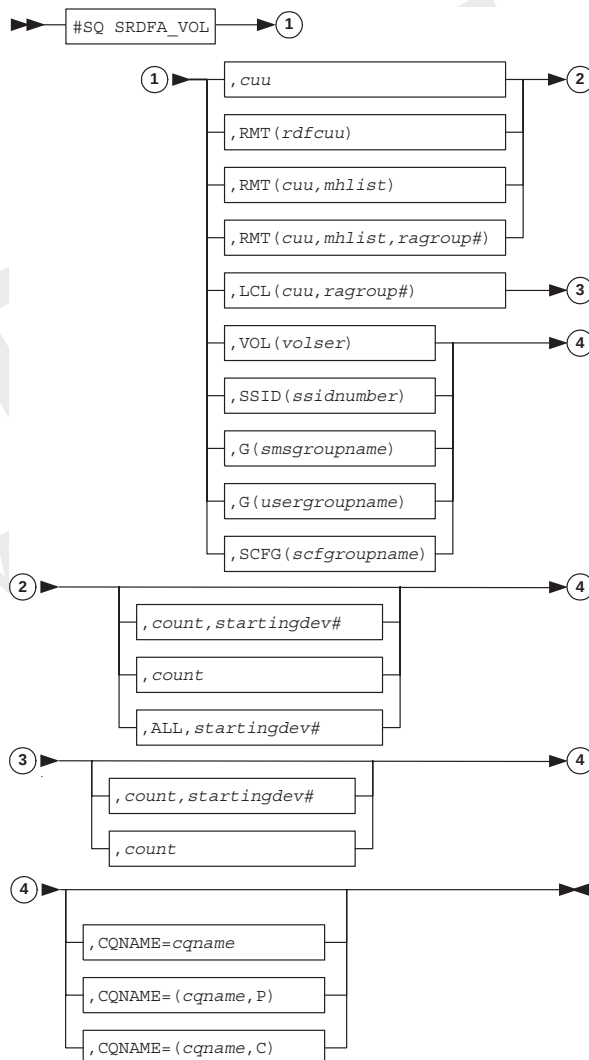
Star SRDFA Ahead is a (Y / N) flag:

Y	MSC is running in SRDF/Star mode and the SRDF/A Secondary device contains more current data than the non-SRDF/A Secondary device.
N	MSC is either not running in SRDF/Star mode or the SRDF/A Secondary device does not contain more current data than the non-SRDF/A Secondary device.

#SQ SRDFA_VOL

The #SQ SRDFA_VOL command displays volume information. The session number SN (session#) defaults to zero (0), and if specified, only 0 is valid for Phase I SRDF / A (SRDF / A).

Note that the device used in the command does not have to be in SRDFA. The device is used as a gatekeeper and locates the SRDFGRP with SRDFA in the box. It displays data about the entire SRDFA configuration.

Syntax

Parameters*cuu*

Specifies the z/OS device number.

RMT

Specifies that the operation affects remote directors in an SRDF configuration.

LCL

Specifies that the operation affects local directors in an SRDF configuration.

VOL (volser)

Requests a specific VOLSER or a pattern that includes multiple online VOLSERS. To specify a pattern, you must specify at least one unique alphanumeric value followed by an asterisk (*). The * character means to include all values that match starting in this position.

For example, the `#SQ VOL, VOL (UG*)` command generates a list of all online VOLSERS that have the first two characters of UG.

SSID (ssidnumber)

The SSID and the *ssidnumber* that identifies the devices to be used for the command.

G (usergroupname)

Specifies the Defined Group name of the devices to display. This parameter specifies that the configurations of devices in the specified Defined Group name be displayed.

Note that Defined Groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group.

If a Defined Group has the same name as an SMS Group, the Defined Group is used.

SCFG (scfgroupname)

Specifies the SCF Group name of the devices to display. This parameter specifies that the mirror configurations of devices in the specified SCF group name be displayed.

Note that SCF groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group. SCF Groups are defined using the Group Name Services feature of EMCSCF.

count

Specifies the number of SSIDs to display. This value can be set from 1 to 64 (decimal), or *ALL*. If this parameter is not specified, *count* defaults to 1.

ALL

All indicates that all devices are to be included up to the number of MAX_QUERY initialization parameter.

cqname

Specifies the name of a command queue into which this command should be placed.

Examples

Example 1 **#SQ SRDFA_VOL** command displays output shown in Figure 5-20:

```
EMCMN00I SRDF-HC : (9) ¢¢SQ SRDFA_VOL,6F00
EMCQV31I SRDF-HC DISPLAY FOR (9) ¢¢SQ SRDFA_VOL,6F00 225
DV_ADDR|_SYM|          CAPTURE |   TRANSMIT |
SYS  CH|DEV  RDEV GP|VOLSER| CYCLE SIZE | CYCLE SIZE |
6C00 00 0000 0000 01 U6A000          0          0
END OF DISPLAY
```

Figure 5-20 #SQ SRDFA_VOL Command Primary Side

The fields in have the following meanings:

- ◆ CAPTURE CYCLE SIZE

Capture Cycle Size is the current number of tracks for the specific device in the cycle that is being written to from the primary side.

- ◆ TRANSMIT CYCLE SIZE

Transmit Cycle Size is the current number of tracks for the specific device left the cycle that is being transmitted to the secondary side.

Example 2 **#SQ SRDFA_VOL** command displays output shown in Figure 5-21:

```
EMCMN00I SRDF-HC : (10) ¢¢SQ SRDFA_VOL,RMT(6F00,01)
EMCQV31I SRDF-HC DISPLAY FOR (10) ¢¢SQ SRDFA_VOL,RMT(6F00,01)
DV_ADDR|_SYM_|RECEIVE|APPLY|
SYS CH|DEV RDEV GP|VOLSER|CYCLE SIZE|CYCLE SIZE|
???? ?? 0000 0000 32 OFFLINE 0 0
END OF DISPLAY
```

Figure 5-21 #SQ SRDFA_VOL Command Secondary Side

The fields in Figure 5-21 have the following meanings:

- ◆ RECEIVE CYCLE SIZE

Receive Cycle Size is the current number of tracks for the specific device in the cycle that is being sent from the primary side.

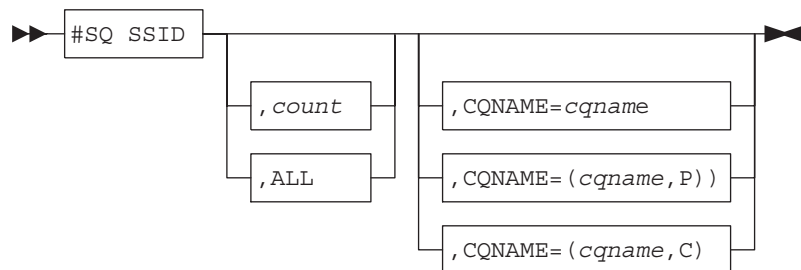
- ◆ APPLY CYCLE SIZE

Apply Cycle Size is the current number of tracks for the specific device left that are being applied to the secondary side devices.

#SQ SSID

The #SQ SSID command displays the subsystem IDs found on this z/OS image and the number of devices associated with them during the SRDF initialization, or after an #SC GLOBAL,SSID_REFRESH. command.

Syntax



Parameters *count*

Specifies the number of SSIDs to display. You can set this value from 1 to 64 (decimal), or ALL. If you do not specify this parameter, *count* defaults to 1.

ALL

All indicates that all ISSIDs are to be included up to the number of MAX_QUERY initialization parameter.

cqname

Specifies the name of a command queue into which this command should be placed.

P | C

P (purge) specifies that in the event of a command failure, all subsequent commands in the qname queue are to be purged. C (continue) specifies that even though a command failed, processing is to continue with the next command in the qname queue. If the failcode is not specified on the first command for the qname queue, the default is P.

Comments Setting the parameter value to ALL displays all SSIDs found with devices online to the z/OS image.

Example **#SQ SSID,ALL** command displays the output shown in Figure 5-22:

```
EMCQS81I SRDF-HC DISPLAY FOR (1) &&SQ SSID,ALL
  SSID #DEV FLAG  CUU_ CH _DV_  CUU_ CH _DV_  ONLN SERIAL#
  3000  00BD B4   3000  00  0000  30BF  BF  00BF  0010  01175
  3001  0100 B4   3100  00  00C0  31FF  FF  01BF  0100  01175
  END OF DISPLAY
```

Figure 5-22 #SQ SSID Command Output for SRDF

The fields in this example have the following meaning:

- ◆ SSID
Subsystem ID.
- ◆ #DEV
Number of devices (in hex) that are known for this SSID.

- ◆ FLAG
 - x'80' 1... Symmetrix subsystem
 - x'40' .1.. Symmetrix 5100, 52XX, 5500
 - x'20' ..1. 3990 controller emulation
 - x'10' ...1 DEV number is valid
 - x'08' 1... Symmetrix 53XX, 54XX, 5700
 - x'04' 1.. Symmetrix 8430, 8730
 - x'02' 1 DMX Series
 - x'01' 1 Symmetrix 2105 controller emulation

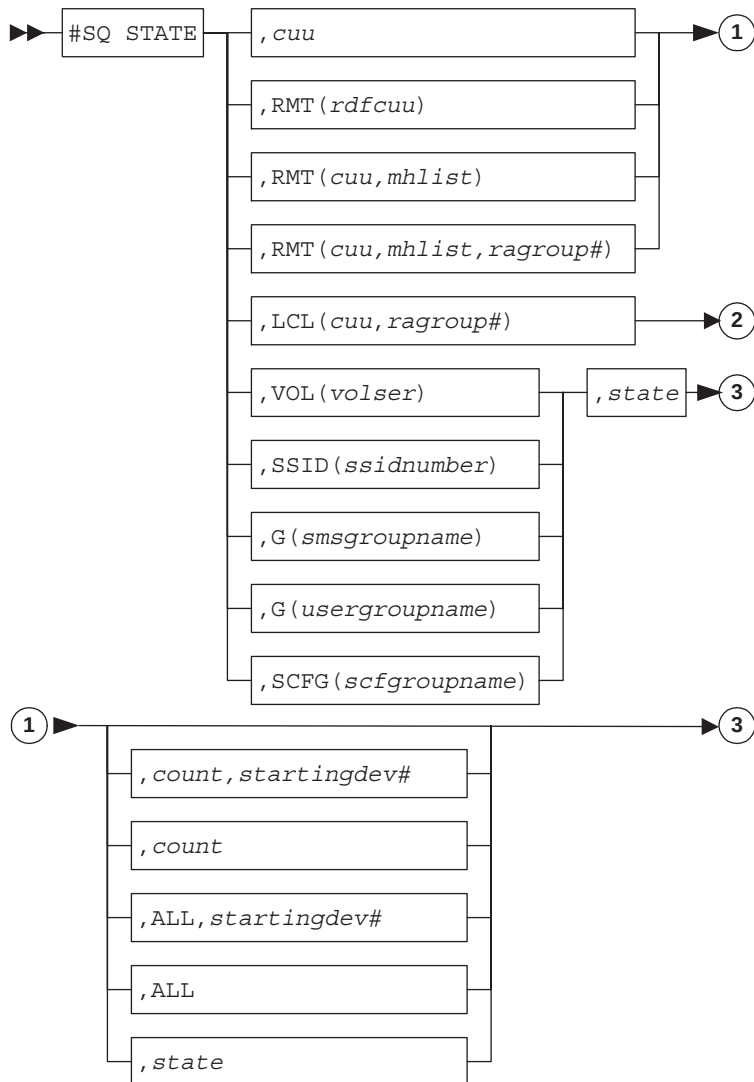
Treat this field as a bit mask. More than one of these bits may be on at a given time. You may for instance see a value of "F0", which indicates that the controller is a EMC controller, Symmetrix 5xxx Series, in 3990 mode, and that the device numbers are valid.

- ◆ CUU
First z/OS device number found online for this SSID.
- ◆ CH
First device address (hex) on the channel, as specified in the IOCP gen.
- ◆ DV
First Symmetrix device number.
- ◆ CUU
Last *cuu* found online for this SSID.
- ◆ CH
Last device address (hex) on the channel as specified in the IOCP gen.
- ◆ DV
Last Symmetrix device number.
- ◆ OL
Number of devices (in hex) that are online (at this point in time) for this SSID.

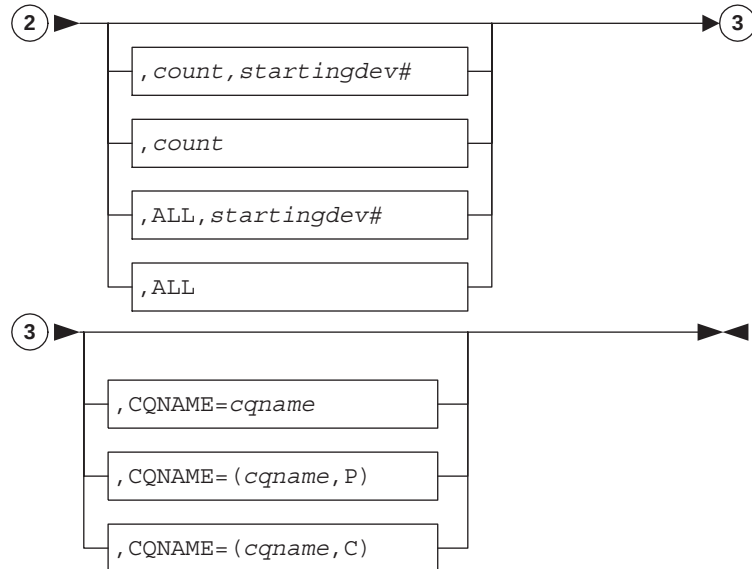
#SQ STATE

The #SQ STATE command displays the status of individual Symmetrix volumes including online, offline, synchronization state, write protection state, SRDF mode of operation, etc. It also shows all of the statuses that a volume has at the point in time the command is issued.

Syntax



The #SQ STATE command syntax continues on the next page.



Parameters *count* | *ALL* | *state*

Specifies the number of devices to display or include. *Count* can be set to one or the value specified in the MAX_QUERY initialization parameter.

ALL indicates that all devices are to be included up to the number of MAX_QUERY initialization parameter.

Note: The maximum value for MAX_QUERY is 8192. If the Symmetrix being displayed has more than 8192 devices, use command syntax specifying the starting Symmetrix device number. For example:

```
#SQ STATE, cuu, count, startingdev#
```

Console buffering should be considered when setting MAX_QUERY.

State works like a filter, thus only including the devices matching the *state*.

The *count* and ALL parameters cannot be used with the VOL(*volser*), G(*msggroupname*), G(*usergroupname*), or SCFG(*scfgroupname*) parameters.

More Information: For a description of valid *state* values, refer to Table 5-5 on page 5-105.

cqname

Specifies the name of a command queue into which this command should be placed.

cuu

Specifies the z/OS device number.

G (smsgroupname)

Specifies the SMS groupname of the devices to display. This parameter requests that the configurations of devices in the specified SMS group name be displayed. Only online devices are selected for display.

Note that SMS groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group.

G (usergroupname)

Specifies the Defined Group name of the devices to display. This parameter specifies that the configurations of devices in the specified Defined Group name be displayed.

Note that Defined Groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group.

If a Defined Group has the same name as an SMS Group, the Defined Group is used.

LCL

Specifies that the operation affects local directors in an SRDF configuration.

mhlist

Specifies the *ragroup#* used to identify the remote Symmetrix unit. For multihop remote configurations, the *mhlist#* can be a single *ragroup#* or a list of up to eight hops, delineated by periods.

For example, an *mhlist* of 0.1.2 is for three hops. The command hops from the source box on an RA for *ragroup#* 0 to first hop box, through the first hop box on an RA for *ragroup#* 1 to second hop box, through second hop box on an RA for *ragroup#* 2 to third hop box.

P | C

P (purge) specifies that in the event of a command failure, all subsequent commands in the *qname* queue are to be purged. C (continue) specifies that even though a command failed, processing is to continue with the next command in the *qname* queue. If you do not specify the failcode on the first command for the *qname* queue, the default is P.

ragroup#

Specifies the *ragroup#* through which you want to perform an operation. This must be a 1- or 2-digit (hex) value representing the *ragroup#*.

For concurrent SRDF configurations, *ragroup#* identifies the R2 device for which the operation is to be performed.

In the `LCL(cuu [, ragroup#])` format of the command, *ragroup#* is used to identify the R2 partner device.

In the `RMT(cuu [, mhlist] [, ragroup#])` format of the command:

- The *ragroup#* can default in most cases, because the *ragroup#* defaults to the partner *ragroup#* of the last hop of the *mhlist*.
- The *ragroup#* can be either the “*” character or the *ragroup#* of the mirror to operate upon. The “*” character means to perform the action on both R2s of a concurrent R1 device. The “*” character is only valid as the third value of the RMT parameter.

rdfcuu

Specifies the z/OS device number of a source R1 device.

RMT

Specifies that the operation affects remote directors in an SRDF configuration.

`SCFG(scfgroupname)`

Specifies the SCF Group name of the devices to display. This parameter specifies that the mirror configurations of devices in the specified SCF group name be displayed.

Note that SCF groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group. SCF Groups are defined using the Group Name Services feature of EMCSCF.

SSID(ssidnumber)

The SSID and the ssidnumber that identifies the devices to be used for the command.

startingdev#

Specifies the Symmetrix device number to start the display. This parameter is optional. This parameter cannot be used in conjunction with the *G(smsgroupname)* or *G(usergroupname)* parameters.

VOL(volser)

Requests a specific VOLSER or a pattern that includes multiple online VOLSERS. To specify a pattern, you must specify at least one unique alphanumeric value followed by an asterisk (*). The * character means to include all values that match starting in this position.

For example, the *#SQ VOL, VOL(UG*)* command generates a list of all online VOLSERS that have the first two characters of UG.

Comments

Only SRDF volumes display INV_TRK values.

The *count* parameter can display either a range of SRDF devices, or the status of ALL SRDF devices on a specified control unit or only those SRDF devices with a nonzero invalid track count.

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 is passed to the target device, and once it is written there, it is no longer invalid. If the source and target devices are not in communication for some reason, for instance, if the SRDF links are disabled, the invalid tracks 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 Chapter 6, *SRDF Procedures*.

Example #SQ STATE,9820,32 command displays the output shown
Figure 5-23:

```
EMCMN00I SRDF-HC : (2) #SQ STATE,9820,32
EMCQV01I SRDF-HC DISPLAY FOR (2) ¢¢SQ STATE,9820,32
DVA |  _SYM_ | |SYS|W S A L R T I D A N|
SYS|DEV  RDEV GP|VOLSER|STAT|R N D N N G T O C /|MR|INVTRK|INVTRK| %
    |         | |         |         |T C C R R T A M T R|
9820 0020          UGH020 ONPV W . . . . . ML
9821 0021          UGH021 ONPV W . . . . . ML
9822 0022          UGH022 ONPV W . . . . . ML
9823 0023          UGH023 ONPV W . . . . . ML
9824 0024          UGH024 ONPV W . . . . . ML
9825 0025          UGH025 ONPV W . . . . . ML
9826 0026          UGH026 ONPV W . . . . . ML
9827 0027          UGH027 ONPV W . . . . . ML
9828 0028 0028 00 UGG028 ONPV . . . . . L2      0      0 **
9829 0029 0029 00 UGG029 ONPV . . . . . L2      0      0 **
982A 002A 002A 00 UGG02A ONPV W . . . . . L2      0      0 **
982B 002B 002B 00 UGG02B ONPV W . . . . . L2      0      0 **
982C 002C 002C 01 UGG02C ONPV W . . . . . B2      0      0 **
982D 002D 002D 01 UGG02D ONPV W . . . . . B2      0      0 **
982E 002E 002E 01 UGG02E ONPV W . . . . . B2      0      0 **
982F 002F 002F 01 UGG02F ONPV W . . . . . B2      0      0 **
9830 0030 0030 00 UGH030 ONPV W SY. . . . . L1      0      0 **
9831 0031 0031 00 UGH031 ONPV W SY. . . . . L1      0      0 **
9832 0032 0032 00 UGH032 ONPV W SY. . . . . L1      0      0 **
9833 0033 0033 00 UGH033 ONPV W SY. . . . . L1      0      0 **
???? 0034 0034 01 OFFLINE N/A W SY. . . T . . . B1      0 16,755 0
9835 0035 0035 01 UGH035 ONPV W SY. . . . . B1      0      0 **
9836 0036 0036 01 UGH036 ONPV W SY. . . . . B1      0      0 **
9837 0037 0037 01 UGH037 ONPV W SY. . . . . B1      0      0 **
???? 0038          OFFLINE N/A W . . . . . BC
???? 0039          OFFLINE N/A W . . . . . BC
983A 003A          UGH03A ONPV W . . . . . BC
983B 003B          UGH03B ONPV W . . . . . BC
983C 003C          UGH03C ONPV W . . . . . BC
983D 003D          UGH03D ONPV W . . . . . BC
983E 003E          UGH03E ONPV W . . . . . BC
983F 003F          UGH03F ONPV W . . . . . BC
END OF DISPLAY
```

Figure 5-23 #SQ State Command Output for SRDF

The fields in Figure 5-23 on page 5-99 have the following meaning:

◆ DVA SYS

z/OS device number.

This field displays “????” for devices specified in the SCF exclude list.

◆ SYM_DEV

Symmetrix device number in hex.

◆ SYM_RDEV

Remotely mirrored device number in hex.

◆ SYM_GP

RDF group #.

◆ VOLSER

Device VOLSER. If the device was online at EMCRDF start or during an #SC GLOBAL, SSID_REFRESH command, the VOLSER is from the UCB; otherwise, it is the VOLSER assigned to the device when the Symmetrix unit was installed or the value set in the INIT_VOLSER parameter in the initialization deck. If the device is identified as a Fixed Block Architecture (FBA) device, it appears as *FBA*.

◆ SYS STATUS

z/OS device status. Valid values are:

NOSC	No subchannel for device
HTIO	Device is in hot I/O status
PAPV	Pending offline, allocated, mounted private
PAPB	Pending offline, allocated, mounted public
PAST	Pending offline, allocated, mounted storage
OFFL	Device offline to z/OS
ONPV	Online, mounted private
ONPB	Online, mounted public
ONST	Online, mounted storage
OAPV	Online allocated, mounted private

- | | |
|------|-----------------------------------|
| OAPB | Online allocated, mounted public |
| OAST | Online allocated, mounted storage |
| N/A | UCB was not available |
- ◆ WRT
Read / Write mode. Valid values are:

W	Read / Write enabled
.	Read / Write disabled
 - ◆ SNC
Synchronous mode. Valid values are:

SS	Semi-synchronous mode
SY	Synchronous mode
.	Neither
 - ◆ ADC
Adaptive Copy mode. Valid values are:

W	Adaptive Copy mode
D	Adaptive Copy Disk mode
.	Neither
 - ◆ LNR
Link status. Valid values are:

L	Links not ready
.	Links ready
 - ◆ RNR
RDF status. Valid values are:

R	RDF not ready
.	RDF ready

◆ TGT

Target status. Valid values are:

R	RDF write disabled
T	Target not ready
.	Neither

◆ ITA

Invalid track attribute status. Valid values are:

I	Invalid track attribute enabled
.	Invalid track attribute disabled

◆ DOM

Domino mode. Valid values are:

D	Domino mode enabled
.	Domino mode disabled

◆ ACT

Recovery action. Valid values are:

R	Refresh
V	Validate
.	Neither

◆ N/R

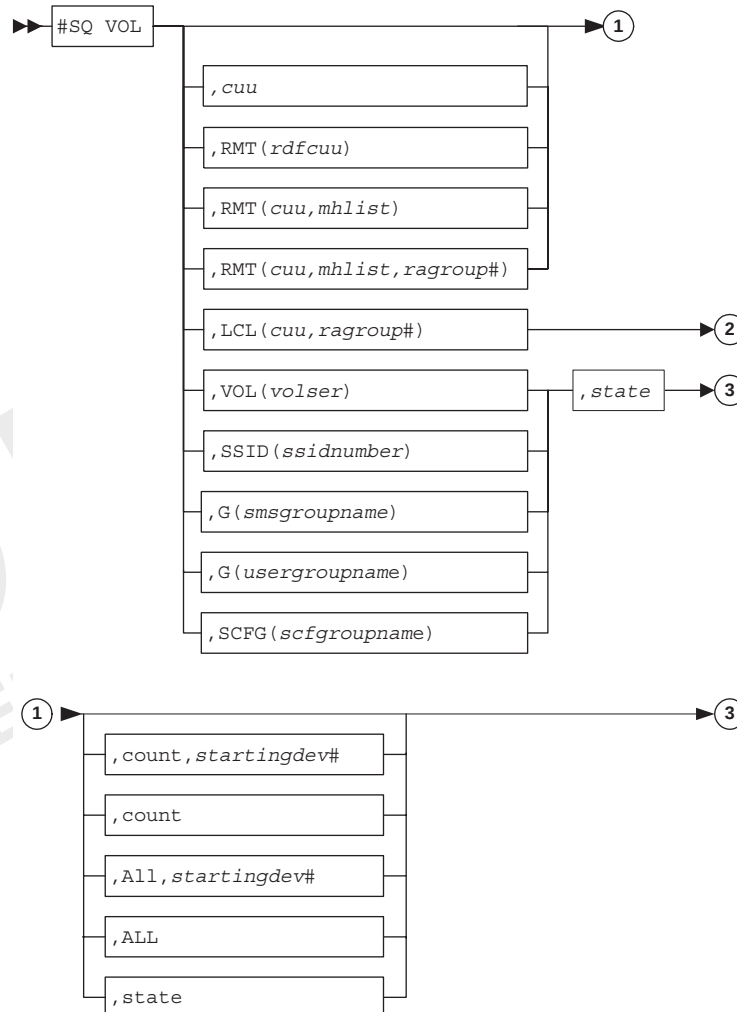
Not ready. Valid values are:

N	Not ready
.	Ready

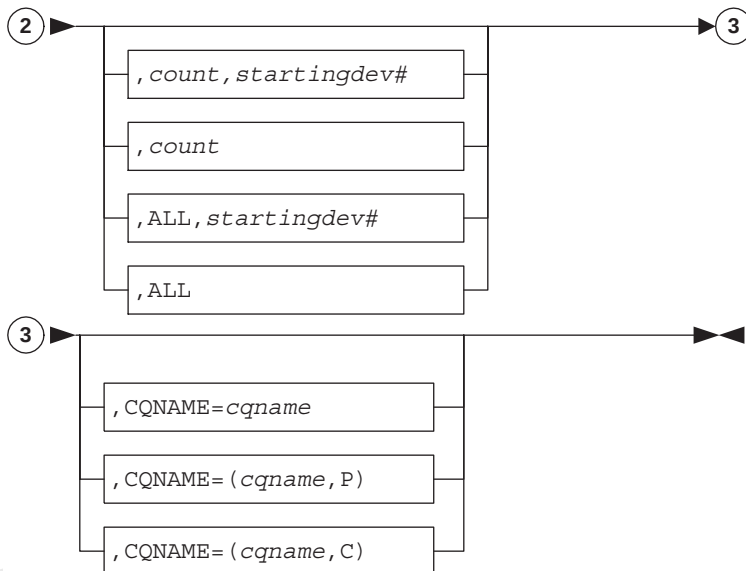
#SQ VOL

The #SQ VOL command displays the status of individual Symmetrix volumes including online, offline, synchronization state, write protection state, SRDF mode of operation, and so on.

Syntax



The #SQ VOL command syntax continues on the next page.



Parameters *count* | *ALL* | *state*

Specifies the number of devices to display or include. *Count* can be set one or to the value specified in the MAX_QUERY initialization parameter.

ALL indicates that all devices are to be included up to the number of MAX_QUERY initialization parameter.

Note: The maximum value for MAX_QUERY is 8192. If the Symmetrix being displayed has more than 8192 devices, use command syntax specifying the starting Symmetrix device number. For example:

```
#SQ VOL, cuu, count, startingdev#
```

Console buffering should be considered when setting MAX_QUERY.

The *state* parameter works like a filter, thus only including the devices matching the *state*.

The *count* and ALL parameters cannot be used with the SCFG(*scfgroupname*), G(*smsgroupname*), G(*usergroupname*), or VOL(*volser*) parameters.

Table 5-5 lists valid values for state.

Table 5-5 Valid State Values

Value	Includes devices that
ADCOPY	have a Control Unit status of AW
ADCOPY-DISK	have a Control Unit status of AD
B1	are Business Continuanace Volumes source (R1)
B2	are Business Continuanace Volumes target (R2)
BCV	are Business Continuanace Volumes
BCVATT	are standard devices with an attached BCV This support is only available at Enginuity microcode level 5x66 or greater.
CGROUP	belong to consistency groups
COVD ^a	Cache only Virtual Device
DOMINO	have a Domino Attribute
DR	are Dynamic Reallocation Volumes (used by the Optimizer)
DYNR1	Dynamic R1 capable
DYNR1_ONLY	Only capable of dynamic R1
DYNR2	Dynamic R2 capable
DYNR2_ONLY	Only capable of dynamic R2
DYNRDF	are devices able to do dynamic functions
ESTBCV	are BCV volumes actively being used as BCVs This support is only available at Enginuity microcode level 5x66 or greater.
FBA	have a Fixed Block Architecture
FSD	are File System Devices.
INV_TRKS	have nonzero invalid tracks
ITA	have an Invalid Track Attribute

Table 5-5 Valid State Values (continued)

Value	Includes devices that
L1	are Source (R1) volumes that are also mirrored locally
L2	are Target (R2) volumes that are also mirrored locally
LNR	have a Control Unit status of LNR
ML	are Local mirror volumes
NRDY	have a Control Unit status of N/R
PREFRESH	have a PREFRESH attribute
R/O	have a Control Unit status of R/O
R/W	have a Control Unit status of R/W
R1	are Source (R1) volumes
R2	are Target (R2) volumes
RA(<i>ragroup</i>)	belong to RA group <i>number</i> , a number from 0 to 15
RAID	are RAID volumes
RAID10	are striped CKD devices.
RAID5	are RAID5 volumes
RDF_WR_DISABLE	have a Control Unit status of RWD
RDF-NRDY	have a Control Unit status of RNR
REFRESH	have a Refresh Attribute
SEMI-SYNC	have a Control Unit status of SS
SRDFA	includes SRDF/A devices
SV	Saved Device
SYNC	have a Control Unit status SY
TGT-NRDY	have a Control Unit status of TNR
VD	Virtual Device

a. COVDs are required only with Enginuity version 5x70 and earlier. For version 5x71, COVDs are not required.

cqname

Specifies the name of a command queue into which this command should be placed.

cuu

Specifies the z/OS device number.

G (msgroupname)

Specifies the SMS groupname of the devices to display. This parameter requests that the configurations of devices in the specified SMS group name be displayed. Only online devices are selected for display.

Note that SMS groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group.

G (usergroupname)

Specifies the Defined Group name of the devices to display. This parameter specifies that the configurations of devices in the specified Defined Group name be displayed.

Note that Defined Groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group.

If a Defined Group has the same name as an SMS Group, the Defined Group is used.

LCL

Specifies that the operation affects local directors in an SRDF configuration.

mhlist

Specifies the *ragroup#* used to identify the remote Symmetrix unit. For multihop remote configurations, the *mhlist#* can be a single *ragroup#* or a list of up to eight hops, delineated by periods.

For example, an *mhlist* of 0.1.2 is for three hops. The command hops from the source box on an RA for *ragroup#* 0 to first hop box, through the first hop box on an RA for *ragroup#* 1 to second

hop box, through second hop box on an RA for ragroup# 2 to third hop box.

P | C

P (purge) specifies that in the event of a command failure, all subsequent commands in the qname queue are to be purged. C (continue) specifies that even though a command failed, processing is to continue with the next command in the qname queue. If you did not specify the failcode on the first command for the qname queue, the default is P.

ragroup#

Specifies the *ragroup#* through which you want to perform an operation. This must be a 1- or 2-digit (hex) value representing the *ragroup#*.

For concurrent SRDF configurations, *ragroup#* identifies the R2 device for which the operation is to be performed.

In the LCL (*cuu* [, *ragroup#*]) format of the command, *ragroup#* is used to identify the R2 partner device.

In the RMT (*cuu* [, *mhlist*] [, *ragroup#*] format of the command:

- The *ragroup#* can default in most cases, because the *ragroup#* defaults to the partner *ragroup#* of the last hop of the *mhlist*.
- The *ragroup#* can be either the “*” character or the *ragroup#* of the mirror to operate upon. The “*” character means to perform the action on both R2s of a concurrent R1 device. The “*” character is only valid as the third value of the RMT parameter.

rdfcuu

Specifies the z/OS device number of a source R1 device.

RMT

Specifies that the operation affects remote directors in an SRDF configuration.

SCFG (*scfgroupname*)

Specifies the SCF Group name of the devices to display. This parameter specifies that the mirror configurations of devices in the specified SCF group name be displayed.

Note that SCF groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group. SCF Groups are defined using the Group Name Services feature of EMCSCF.

`SSID(ssidnumber)`

The SSID and the *ssidnumber* that identifies the devices to display.

`startingdev#`

Specifies the Symmetrix device number to start the display. This parameter is optional. This parameter cannot be used with the `G(smsgroupname)`, `G(usergroupname)` or `state` parameters.

`VOL(volser)`

Requests a specific VOLSER or a pattern that includes multiple online VOLSERS. To specify a pattern, you must specify at least one unique alphanumeric value followed by an asterisk (*). The * character means to include all values that match starting in this position.

For example, the `#SQ VOL, VOL(UG*)` command generates a list of all online VOLSERS that have the first two characters of UG.

Comments

Only SRDF volumes display INV_TRK values.

The *count* parameter can display either a range of SRDF devices or the status of ALL SRDF devices on a specified control unit, or only those SRDF devices with a nonzero invalid tracks count.

If GLOBAL sort order is set to VOLSER, this is a starting VOLSER.

If GLOBAL sort order is set to MVSCUU, this is a starting MVSCUU.

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 is passed to the target device, and once it is written there, it is no longer invalid. If the source and target devices are not in communication for some reason, for instance, if the SRDF links are disabled, the invalid tracks 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.

More Information: These may be cleared using the procedures outlined in Chapter 6, *SRDF Procedures*.

For #SQ VOL, #SQ STATE, #SQ RAID, #SQ MIRROR, and #SQ RAID10 commands, the *startingdev#* can be a starting VOLSER, or starting MVSCUU if the SORT_BY_MVSCUU or SORT_BY_VOLSER parameters are used.

Example #SQ VOL,F00,15 command displays the output shown in Figure 5-24:

```
EMCQV00I SRDF-HC DISPLAY FOR #SQ VOL,F00,15
DV_ADDR | _SYM_ | TOTAL | SYS | DCB | CNTLUNIT | MR | R1 | R2 | SY
SYS CH | DEV | RDEV | GP | VOLSER | CYLS | STAT | OPN | STATUS | MR | INVTRK | INVTRK | %
0F00 00 0000 | PCB000 | 1113 | N/A | 0 | R/W | ML
???? ?? 0001 | PCB001 | 1113 | N/A | 0 | R/W | ML
???? ?? 0002 | PCB002 | 1113 | N/A | 0 | R/W | BC
???? ?? 0003 | PCB003 | 1113 | N/A | 0 | R/W | BC
???? ?? 0004 | PCB004 | 1113 | N/A | 0 | R/W | RS
???? ?? 0005 | PCB005 | 1113 | N/A | 0 | R/W | RS
???? ?? 0006 | PCB006 | 1113 | N/A | 0 | R/W | RS
???? ?? 0007 | PCB007 | 1113 | N/A | 0 | R/W | RS
???? ?? 0008 | PCB008 | 1113 | N/A | 0 | R/W | RS
0C0A 0A 000A 000F 00 | PCB010 | 1113 | ONPV | 0 | R/W-SY | R1 | 0 | 6,001 | 64
0C0B 0B 000B 000E 00 | PCB011 | 1113 | ONPV | 0 | R/W-SY | R1 | 0 | 751 | 95
0C0C 0C 000C 000D 00 | PCB012 | 1113 | ONPV | 0 | R/W-SY | R1 | 0 | 1,487 | 91
0C0D 0D 000D 000C 00 | PCB013 | 1113 | ONPV | 0 | R/W-SY | L1 | 0 | 0 | **
0C0E 0E 000E 000B 00 | PCC014 | 1113 | ONPV | 0 | R/O | R2 | 0 | 0 | **
0C0F 0F 000F 000A 00 | PCC015 | 1113 | ONPV | 0 | R/O | L2 | 0 | 0 | **
END OF DISPLAY
```

Figure 5-24 #SQ VOL Command Output for SRDF

The fields in this example have the following meaning:

- ◆ DV_ADDR SYS

z/OS device number.

This field displays “????” for devices specified in the SCF exclude list.

- ◆ DV_ADDR CH

First device address (hex) on the channel as specified in the IOCP gen.

This field displays “??” for devices not online during startup and devices put online after the last #SC GLOBAL, SSID_REFRESH command.

- ◆ SYM_DEV
Symmetrix device number in hex.
- ◆ SYM_RDEV
Remotely mirrored device number in hex.
- ◆ SYM_GP
RDF group #.
- ◆ VOLSER
Device VOLSER. If the device was online at EMC RDF start or during an #SC GLOBAL, SSID_REFRESH command, the VOLSER is from the UCB; otherwise, it is the VOLSER assigned to the device when the Symmetrix unit was installed, or the value set in the INIT_VOLSER parameter in the initialization deck. If the device is identified as a Fixed Block Architecture (FBA) device, it appears as *FBA*.
- ◆ TOTAL_CYLS
Total number of cylinders on a volume.
- ◆ SYS_STATUS
z/OS device status. Valid values are:

NOSC	No subchannel for device
HTIO	Device is in hot I/O status
PAPV	Pending offline, allocated, mounted private
PAPB	Pending offline, allocated, mounted public
PAST	Pending offline, allocated, mounted storage
OFFL	Device offline to z/OS
ONPV	Online, mounted private
ONPB	Online, mounted public
ONST	Online, mounted storage
OAPV	Online allocated, mounted private
OAPB	Online allocated, mounted public
OAST	Online allocated, mounted storage
N/A	UCB was not available

◆ DCB OPN

Number of open DCBs.

◆ CNTLUNIT STATUS

Control Unit status. Format is xxx-yy-z. Valid values are:

Format	Possible Values
xxx	R/W = read/write mode R/O = read only mode N/R = not ready mode RNR = SRDF devices globally not ready^{a, b} TNR = target (R2) not ready^{b, c} RWD = SRDF write-disabled^{b, d} LNR = link not ready^e
yy	SY = Synchronous mode SS = Semi-Synchronous mode AW = Adaptive Copy - Write Pending mode AD = Adaptive Copy - Disk mode
z	I = Invalid Track Attribute = a target (R2) volume to go not ready if the source (R1) volume (its mirrored device) has invalid tracks on target (R2) volume and a state of change has been requested on the target (R2) volume D = Domino Attribute = source (R1) volume to go not ready if target (R2) volume is not ready or links are down R = Refresh command has been issued for this device. P = A PREFRESH command has been issued for this device. V = A VALIDATE command has been issued for this device.

- This status indicates a status of SRDF-NOT-READY (RNR). When a device is in this state, any attempt to perform I/O to the device from the host results in an INTERVENTION-REQUIRED status. The RNR status can occur as a result of the Domino Attribute, Invalid Tracks Attribute, or as a result of an #SC VOL, cuu, RDF-NRDY command.
- For more information on this field, refer to *Recovery Procedures* on page A-1.
- This status indicates that communication between the SRDF pair is currently inactive because the SRDF pair is SRDF-Suspended.
- If the source (R1) and target (R2) volumes are write enabled and links are not suspended, any writes to the source (R1) volume suspends the link between that pair. These writes accumulate as R2 invalid tracks on the source (R1) volume until the target (R2) volume is write enabled. Synchronization can then occur by issuing the #SC VOL, cuu, RDF_WR_ENABLE command.
- This status indicates that communication between the SRDF pair is currently inactive because the link is offline or the link path is physically unavailable.

◆ MR

Type of Symmetrix device. Valid values are:

- A1 Asynchronous volume
- R1 Source (R1) volume
- R2 Target (R2) volume
- ML Local mirror volume
- RS Raid-S volume
- L1 Source (R1) volume that is also mirrored locally
- L2 Target (R2) volume that is also mirrored locally
- BC Business Continance Volume
- B1 Business Continance Volume source (R1)
- B2 Business Continance Volume target (R2)
- DR Dynamic Reallocation Volume (used by the Optimizer)
- blank* A *blank* field denotes a standard, local, non-mirrored device

◆ R1 INVTRK

Source (R1) volume invalid track count.

Symmetrix units maintain their own invalid track tables that identify the invalid tracks on both the source (R1) and the target (R2) volumes.

◆ R2 INVTRK

Target (R2) volume invalid track count.

Symmetrix units maintain their own invalid track tables that identify the invalid tracks on both the source (R1) and the target (R2) volumes.

The number of R2 invalid tracks displayed for an R2 (target) volume indicates the number of tracks that the source Symmetrix unit has accumulated to be sent to the target Symmetrix unit, as a result of adaptive copy mode or when the R1 source volumes have been updated while SRDF is suspended (TNR status). This value provides an indication of how “out of sync” the R1 and R2 volumes are when entering a recovery situation. The actual physical mirror invalid tracks can be displayed with the `#SQ MIRROR` command.

◆ SY%

Source (R1) / target (R2) volume synchronization percentage. The ** denotes 100% synchronization.

SRDF Configuration Commands

The SRDF Host Component commands presented in this section allow you to manage the operation of the SRDF environment from a system console.

For all command examples in this chapter, the “#” character is used for the COMMAND_PREFIX parameter. When executing the SRDF Host Component commands, substitute the COMMAND_PREFIX you specify for your system.

#STOP

The #STOP command terminates the SRDF Host Component.

Syntax #STOP

Parameters None.

#SC BCV

The #SC BCV command dynamically controls mirror relationships for Business Continuance Volumes (BCVs).

The command syntax in this section uses the following conventions:

- CAPITALIZATION = must be typed
- [] = optional entry
- *Italics* = parameter
- | = alternative parameter value

Syntax **CONFIG**

```
#SC BCV, cuus, CONFIG, DELINC|HOLD|RELEASE|NR|READY[, CQNAME=[ ( ) cqname[, P|C] [ ] ]]
```

or

```
#SC BCV, cuus-cuus, CONFIG, DELINC|HOLD|RELEASE|NR|READY[, CQNAME=[ ( ) cqname[, P|C] [ ] ]]
```

or

```
#SC BCV, RMT(cuu, sym#bcv[, ragroup#]), CONFIG, DELINC|HOLD|RELEASE|NR|READY[, CQNAME=[ ( ) cqname[, P|C] [ ] ]]
```

or

```
#SC BCV, RMT(cuu, sym#bcv-sym#bcv[, ragroup#]), CONFIG, DELINC|HOLD|RELEASE|NR|READY[, CQNAME=[ ( ) cqname[, P|C] [ ] ]]
```

or

ESTABLISH

```
#SC BCV, cuus, cuup, ESTABLISH[, CQNAME=[ ( ) cqname[, P|C] [ ] ]]
```

or

```
#SC BCV, cuus-cuus, cuup-cuup, ESTABLISH[, CQNAME=[ ( ) cqname[, P|C] [ ] ]]
```

or

```
#SC BCV, RMT(cuu, sym#bcv, sym#std[, ragroup#]), ESTABLISH[, CQNAME=[ ( ) cqname[, P|C] [ ] ]]
```

or

```
#SC BCV, RMT(cuu, sym#bcv-sym#bcv, sym#std-sym#std[, ragroup#]), ESTABLISH  
[, CQNAME=[ ( ) cqname[, P|C] [ ] ]]
```

or

```
#SC BCV, cuus, RE-ESTABLISH[, CQNAME=[ ( ) cqname[, P|C] [ ] ]]
```

or

RE-ESTABLISH

```
#SC BCV, cuus-cuus, RE-ESTABLISH[, CQNAME=[ ( ) cqname[, P|C] [ ] ]]
```

or

```
#SC BCV, RMT(cuu, sym#bcv[, ragroup#]), RE-ESTABLISH[, CQNAME=[ ( ) cqname[, P|C] [ ] ]]
```

or

```
#SC BCV, RMT(cuu, sym#bcv-sym#bcv[, ragroup#]), RE-ESTABLISH  
[, CQNAME=[ ( ) cqname[, P|C] [ ] ]]
```

or

RESTORE

```
#SC BCV, cuus[, cuup], RESTORE[, VERIFY(volser)] [, R1SYNC(Y/N)]  
[, CQNAME=[ ( ) cqname[, P|C] [ ] ]]
```

or

```
#SC BCV, cuus, RESTORE[, R1SYNC(Y/N)] [, CQNAME=[ ( ) cqname[, P|C] [ ] ]]
```

or

```
#SC BCV, cuus-cuus, RESTORE[, R1SYNC(Y/N)] [, CQNAME=[ ( ) cqname[, P|C] [ ] ]]
```

or

```
#SC BCV,RMT(cuu,sym#bcv[,ragroup#]),RESTORE,[,R1SYNC(Y|N)]
[,CQNAME=[()]cqname[,P|C][]) ]]
```

or

```
#SC BCV,RMT(cuu,sym#bcv-sym#bcv,sym#std-sym#std[,ragroup#]),RESTORE,
[,R1SYNC(Y|N)] [,CQNAME=[()]cqname[,P|C][]) ]]
```

or

SPLIT

```
#SC BCV,cuus,SPLIT[,WAIT] [,FORCE|NOFORCE] [,CHANGEDONLY(Y|N)] [,BCVREFRESH(Y|N)]
[,HOLD] [,Instant(Y|N)] [,R2SYNC(Y|N)] [,CQNAME=[()]cqname[,P|C][]) ]]
```

or

```
#SC BCV,cuus-cuus,SPLIT[,WAIT] [,FORCE|NOFORCE] [,VOLID(volser[,E])]
[CHANGEDONLY(Y|N)] [,BCVREFRESH(Y|N)] [,HOLD] [,Instant(Y|N)]
[,R2SYNC(Y|N)] [,CQNAME=[()]cqname[,P|C][]) ]]
```

or

```
#SC BCV,RMT(cuu,sym#bcv[,ragroup#]),SPLIT[,FORCE|NOFORCE] [,CHANGEDONLY(Y|N)]
[,BCVREFRESH(Y|N)] [,HOLD] [,Instant(Y|N)]
[,R2SYNC(Y|N)] [,CQNAME=[()]cqname[,P|C][]) ]]
```

or

```
#SC BCV,RMT(cuu,sym#bcv-sym#bcv[,ragroup#]),SPLIT[,FORCE|NOFORCE]
[,CHANGEDONLY(Y|N)] [,BCVREFRESH(Y|N)] [,HOLD] [,Instant(Y|N)] [,R2SYNC(Y|N)]
[,CQNAME=[()]cqname[,P|C][]) ]]
```

Parameters CONFIG,HOLD

Configure the BCV device so that it is not available for TimeFinder operations.

CONFIG,NR

Configure a BCV device so that it is not ready to the host.

CONFIG,READY

Configure a BCV device so that it is ready to the host.

CONFIG,RELEASE

Configure a BCV device that was held previously by a CONFIG,HOLD command so that it is available for TimeFinder operations.

cqname

Specifies the name of a command queue into which this command should be placed.

cuu

Specifies any device on a controller for a remote operation (RMT). If the RA group (*ragroup*) is not specified, the *cuu* must be an R1 device.

cuup

Specifies a standard device.

cuup-cuup

Specifies a standard device range. The first *cuup* and second *cuup* are the starting and ending standard device, respectively.

cuus

Specifies a BCV device.

cuus-cuus

Specifies a BCV device range. The first *cuus* and second *cuus* are the starting and ending BCV device, respectively.

FORCE/NOFORCE

FORCE allows you to split the pair during an ESTABLISH or RESTORE operation (invalid tracks exist on the device). NOFORCE specifies that the pair may not be split until the ESTABLISH or RESTORE operation completes. The default value is NOFORCE.

P | C

P (purge) specifies that in the event of a command failure, all subsequent commands in the *qname* queue are to be purged. C (continue) specifies that even though a command failed, processing is to continue with the next command in the *qname* queue. If you do not specify the failcode on the first command for the *qname* queue, the default is P.

R2SYNC (Y | N)

Specifies in the case of a R1 BCV if after the split the data is propagated to the R2. Only valid with Enginuity microcode level 5265 or higher. If R2SYNC (N) is specified and the BCV SRDF pair is suspended, a subsequent split with R2SYNC (Y) does not resume the BCV SRDF pair.

ragroup#

Specifies the *ragroup#* through which you want to perform an operation. This must be a 1- or 2-digit (hex) value representing the *ragroup#*.

For concurrent SRDF configurations, *ragroup#* identifies the R2 device for which the operation is to be performed.

In the LCL (*cuu* [, *ragroup#*]) format of the command, *ragroup#* is used to identify the R2 partner device.

In the RMT (*cuu* [, *mhlist*] [, *ragroup#*] format of the command:

- The *ragroup#* can default in most cases, because the *ragroup#* defaults to the partner *ragroup#* of the last hop of the *mhlist*.
- The *ragroup#* can be either a “*” character or the *ragroup#* of the mirror to operate upon. The “*” character means to perform the action on both R2s of a concurrent R1 device. The “*” character is only valid as the third value of the RMT parameter.

RMT

Specifies that the operation affects BCV volumes on a remote (by using an SRDF link) Symmetrix unit.

SPLIT

Stops the mirroring process between the two devices. Once the standard to BCV relationship is split, the changed tracks for both devices are logged and the BCV becomes ready to the host.

sym#bcv

Specifies the Symmetrix device number of a BCV device residing in a local or remote Symmetrix unit.

sym#bcv-sym#bcv

Specifies a range of Symmetrix device numbers of the BCV devices. The first *sym#bcv* value is the starting device number, and the second *sym#bcv* is the ending device number. Both starting and ending range must be a 4-digit value.

sym#std

Specifies the Symmetrix device number of a standard device residing in a local or remote Symmetrix unit.

sym#std-sym#std

Specifies a range of Symmetrix device numbers of the standard devices. The first *sym#std* value is the starting device number, and the second *sym#std* is the ending device number. Both starting and ending range must be a 4-digit value.

VOLID

Changes the VOLSER of the BCV after the BCV pair splits. This option is only allowed when the **WAIT** option is specified by the command. The **E** option expands the processing of the BCV device by updating the VVDS and index VTOC names, updating the VVDS name entry, and updating the DSCBs to reflect the new VOLSER. If the *cuus* specified is an FBA device, this parameter is invalid.

WAIT

Specifies the ability to wait for the completion of the action or to continue once the command is passed to the controller. *WAIT*= wait for the completion of the specified action.

Comments

You must have the EMC TimeFinder option installed on your Symmetrix unit to take advantage of this command. For information on EMC TimeFinder, contact your EMC representative.

When **ESTABLISH** is specified, the devices specified must have the same geometry and the BCV must be offline to *z/OS*. If the BCV was split previously, all tracking of the changed data for the previous standard/BCV pair is discarded. You must specify both the *cuup* and *cuus* parameters.

To use the device range support, you must specify *cuus-cuus* and *cuup-cuup* parameters. The number of BCV and standard devices within the specified device ranges must be equal. BCV and standard devices are paired together and processed sequentially.

When you specify RE-ESTABLISH, the data flow is from the standard device to the BCV. The BCV must be offline to z/OS. Only the data changed on the standard device is copied to the BCV. If there was any changed data on the BCV device, this data is lost.

The RE-ESTABLISH process may take a period of time to complete if there was a large amount of update activity to the standard device and/or BCV.

When you specify RESTORE and do not specify *cuup*, the operation is a partial restore to the last standard device attached to the BCV, and only the changed data on the standard device and BCV is synchronized. If there was any changed data on the standard device this data is lost. If *cuup* is specified, the entire contents of the BCV is copied to the specified standard device. The *VERIFY* parameter is required for a full restore operation.

The BCV must be offline to z/OS for both full and partial restore operations. The standard device must be offline to z/OS for a full restore operation. If you perform a partial restore with the standard device online, you may need to vary the device offline, then online again, depending on the data that was refreshed.

A WTOR is issued to the system console for operator confirmation for both full and partial restore operations.

The RESTORE process may take a period of time to complete if there was a large amount of update activity to the standard device and/or BCV. A device range is not allowed on a full restore.

Important: The BCV must be offline to z/OS for both partial and full RESTORE operations. The standard device must be offline to z/OS for full restore operations.

After the SPLIT occurs, you can resume the relationship between the two devices, in which case, only the modified tracks are synchronized. You may also change the standard device associated with this BCV, in which case, the entire device would be copied.

The *FORCE* option allows you to split the pair during an ESTABLISH or a RESTORE (invalid tracks on device) action.

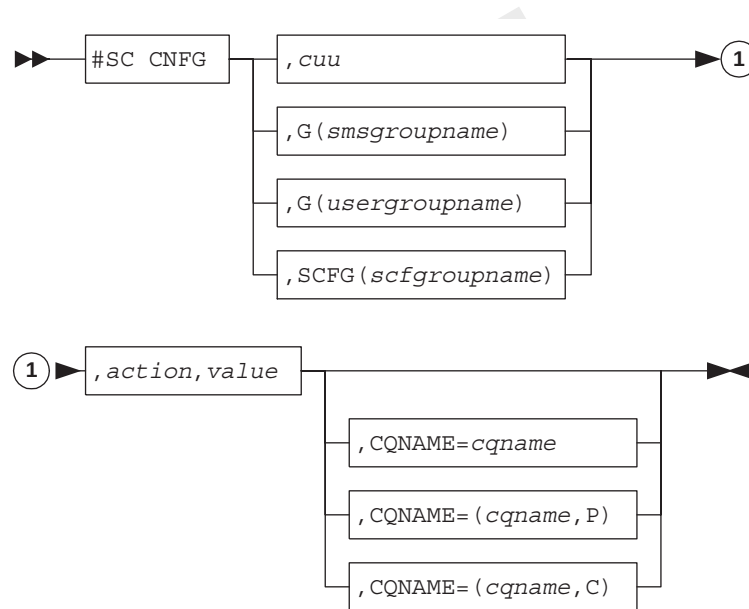
VOLID (volser) is not allowed when a range of BCV devices (*cuus-cuus*) is specified.

The Extended VALID option allows you to perform logical restores from a physical backup. You can also recatalog the VSAM files using IDCAMS. Refer to the samples in the file unloaded during the installation for more information.

#SC CNFG

The #SC CNFG command sets the operating state for one entire Symmetrix unit.

Syntax



Parameters *action*

Refer to Table 5-6 on page 5-123.

cqname

Specifies the name of a command queue into which this command should be placed.

cuu

Specifies the z/OS device number.

G (smsgroupname)

Specifies the SMS groupname of the devices to display. This parameter requests that the action be performed to the volumes in the specified SMS group name. Only online devices are selected.

Note that SMS groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group.

G (usergroupname)

Specifies the Defined Group name of the devices to display. This parameter requests that the action be performed to the volumes in the specified Defined Group.

Note that Defined Groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group.

If a Defined Group has the same name as an SMS Group, the Defined Group is used.

Important: The *cuu*, *G (usergroupname)*, *G (smsgroupname)*, and *SCFG (scfggroupname)* parameters are mutually exclusive. You must only select one of these options at a time.

P | C

P (purge) specifies that in the event of a command failure, all subsequent commands in the qname queue are to be purged. *C* (continue) specifies that even though a command failed, processing is to continue with the next command in the qname queue. If the failcode is not specified on the first command for the qname queue, the default is *P*.

value

SYNCH_DIRECTION represents the desired synchronization direction for recovery procedures.

Important: *SYNCH_DIRECTION* set at the CNFG level does not change the *SYN SYNCH_DIRECTION* set at the SRDFGRP level. Attempting to do so results in an EMCCC30W warning message.

Comments Table 5-6 lists the possible actions for the #SC CNFG command.

Table 5-6 #SC CNFG Command Actions for SRDF

Action	Values	Description
SYNCH_DIRECTION	<i>R1>R2</i> , <i>R1<R2</i> , <i>NONE</i> , or <i>GLOBAL</i>	Set synchronization direction for an individual Symmetrix unit. A setting of <i>GLOBAL</i> causes the global synch_direction value to be used for this Symmetrix unit. Refer to #SC GLOBAL on page 5-123 for further information on each setting.

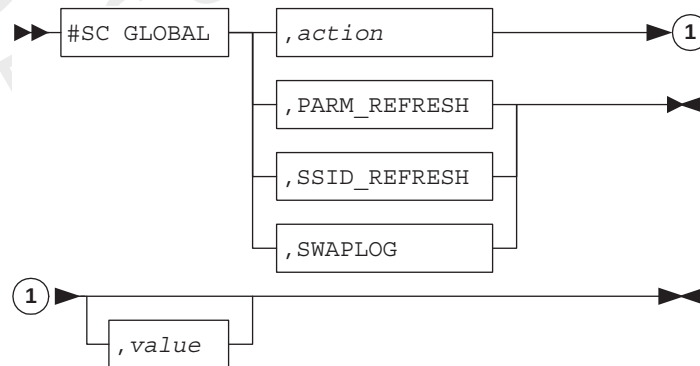
Example The following command example sets the synchronization direction to *NONE*, so synchronization direction commands cannot be issued.

```
#SC CNFG, cuu, SYNCH_DIRECTION, NONE
```

#SC GLOBAL

The #SC GLOBAL command sets the operating state for overall function of the SRDF Host Component subsystem. For example, this command, when used with the SSID_REFRESH parameter, causes the SRDF Host Component to “refresh” its internal control blocks with information regarding any SSIDs, devices, and VOLSERs that have been brought online since the SRDF Host Component was started or the last refresh command was issued. This command may also be used to reset the current SYNCH_DIRECTION, and to change how FBA devices are affected by the #SC VOL command.

Syntax



Parameters *action*

Valid actions include:

Action ^a	Values
SYNCH_DIRECTION	<i>R1>R2, R1<R2, NONE</i>
FBA_ENABLE	N/A
FBA_DISABLE	N/A
SORT_BY_COMMAND	N/A
SORT_BY_MVSCUU	N/A
SORT_BY_SYMDEV	N/A
SORT_BY_VOLSER	N/A
MSGX	<i>ON, OFF</i>

a. These actions are described later in this section.

FBA_DISABLE

Disables the #SC VOL command from changing operating parameters for FBA devices.

FBA_ENABLE

Enables the #SC VOL command to be used to change the operating parameters for FBA devices.

MSGX

Enables or disables the message exit.

PARM_REFRESH

When issued, Host Component rereads the initialization parameter file, and does the following:

a. Makes any necessary changes to the following:

- ALIAS
- EXCLUDE_DEVICE_RANGE
- SINGLE CONCURRENT
- SRDF GROUP Statements:
GROUP_NAME
GROUP_END

EXCLUDE_CUU
 EXCLUDE_SYM
 EXCLUDE_VOL
 FILTER_KNOWN
 FILTER_ONLINE
 FILTER_R1
 FILTER_R2
 INCLUDE_CUU
 INCLUDE_RAG
 INCLUDE_VOL
 – MAX_QUERY
 – MAX_COMMANDQ
 – MSC statements:
 MSC_ACTIVATE_MS
 MSC_INCONSISTENT
 MSC_CYCLE_TARGET
 MSC_GROUP_END
 MSC_GROUP_NAME
 MSC_INCLUDE_SESSION
 – SHOW_COMMAND_SEQ#
 – OPERATOR_VERIFY
 – SYNCH_DIRECTION_ALLOWED
 – MESSAGE_LABELS

b. Deletes the SSID tables.

c. Performs an SSID_REFRESH.

P | C

P (purge) specifies that in the event of a command failure, all subsequent commands in the qname queue are to be purged.

C (continue) specifies that even though a command failed, processing is to continue with the next command in the qname queue. If the failcode is not specified on the first command for the qname queue, the default is P.

SORT_BY_COMMAND

The display sort order is determined by the type of query request:

Command	Displays output according to
#SQ VOL, <i>cuu</i>	MVSCUU
#SQ VOL, LCL(<i>cuu</i>)	SYMDEV
#SQ VOL, RMT(<i>cuu</i>)	SYMDEV
#SQ VOL, V(<i>volser</i>)	VOLSER
#SQ VOL, SSID(<i>ssid</i>)	SYMDEV
#SQ VOL, G(<i>groupname</i>)	Refer to the following descriptions for SORT_BY_VOLSER and SORT_BY_MVSCUU

SORT_BY_MVSCUU

Use MVSCUU as the primary sort order for displays of #SQ VOL, #SQ STATE, #SQ RAID, #SQ MIRROR, and #SQ RAID10 commands. Devices without MVSCUU appear at the end in Symmetrix device number order.

SORT_BY_SYMDEV

Use SYMDEV as the primary sort order for displays of #SQ VOL, #SQ STATE, #SQ RAID, #SQ MIRROR, and #SQ RAID10 commands.

SORT_BY_VOLSER

Use VOLSER as the primary sort order for displays of #SQ VOL, #SQ STATE, #SQ RAID, #SQ MIRROR, and #SQ RAID10 commands. Devices without VOLSER appear at the end in Symmetrix device number order.

SSID_REFRESH

Refreshes SRDF Host Component internal control blocks with the latest information on SSIDs, devices, and VOLSERs.

The *cqname* parameter is not valid with this parameter.

SWAPLOG

Closes the current log file and opens the alternate log file. DDnames for the log files are HCLOG1 and HCLOG2.

The *cqname* parameter is not valid with this parameter.

SYNCH_DIRECTION

Sets current synchronization direction. Valid values are subject to restrictions set by the SYNCH_DIRECTION_ALLOWED initialization parameter.

This parameter identifies the intended resynchronization command sequence so that Host Component can validate the sequence. This parameter has no effect on Symmetrix units.

Comments

Devices that have been taken offline are not deleted from the SRDF Host Component internal control blocks during refresh processing. This condition allows the SRDF Host Component to maintain the z/OS device number to Symmetrix device number mapping to simplify the entry of #SC VOL commands.

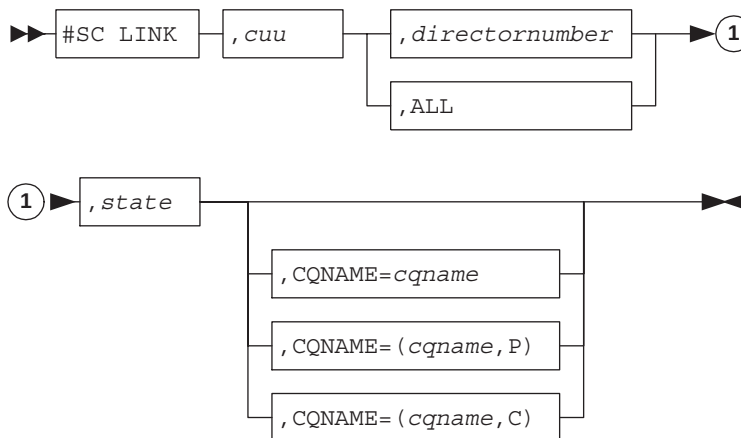
R1>R2 only allows synchronization commands (REFRESH, VALIDATE, and INVALIDATE) to cause synchronization from source (R1) -> target (R2). The REFRESH and VALIDATE action codes on the #SC VOL command may only be used on a target (R2) volume and INVALIDATE may only be used on a source (R1) volume.

R1<R2 only allows synchronization commands (REFRESH, VALIDATE, and INVALIDATE) to cause synchronization from target (R2) -> source (R1). The REFRESH and VALIDATE action codes on the #SC VOL command may only be used on a source (R1) volume and INVALIDATE may only be used on a target (R2) volume.

NONE specifies no synchronization direction.

#SC LINK

The #SC LINK command modifies the status of a Remote Link Director.

Syntax**Parameters**

cqname

Specifies the name of a command queue into which this command should be placed.

cuu

Specifies the z/OS device number.

dir#

Specifies the Remote Link Director number. Valid values are from 1 to 40 (hex) or ALL.

P | C

P (purge) specifies that in the event of a command failure, all subsequent commands in the *qname* queue are to be purged.
C (continue) specifies that even though a command failed, processing is to continue with the next command in the *qname* queue. If the failcode is not specified on the first command for the *qname* queue, the default is P.

state

Specifies the states of the specified Remote Link Director(s). Valid values are OFFLINE and ONLINE.

Comments

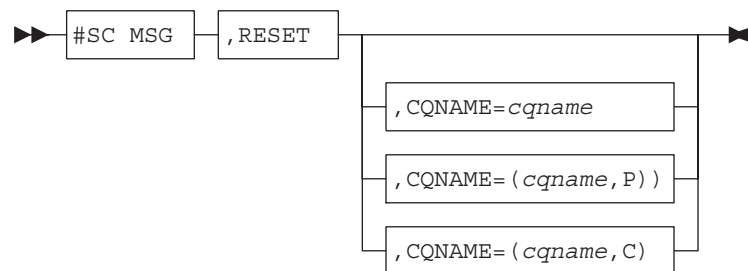
The director number specified must be a Remote Link Director. If necessary, issue the #SQ CNFG command to determine the Remote Link Director numbers.

When ALL is specified as the *dir#* parameter value, the requested state of change is applied to all Remote Link Directors.

#SC MSG

The #SC MSG command, when used with the RESET parameter, clears the message log.

Syntax



Parameters

cqname

Specifies the name of a command queue into which this command should be placed.

P | C

P (purge) specifies that in the event of a command failure, all subsequent commands in the *qname* queue are to be purged.
C (continue) specifies that even though a command failed,

processing is to continue with the next command in the qname queue. If the failcode is not specified on the first command for the qname queue, the default is P.

RESET

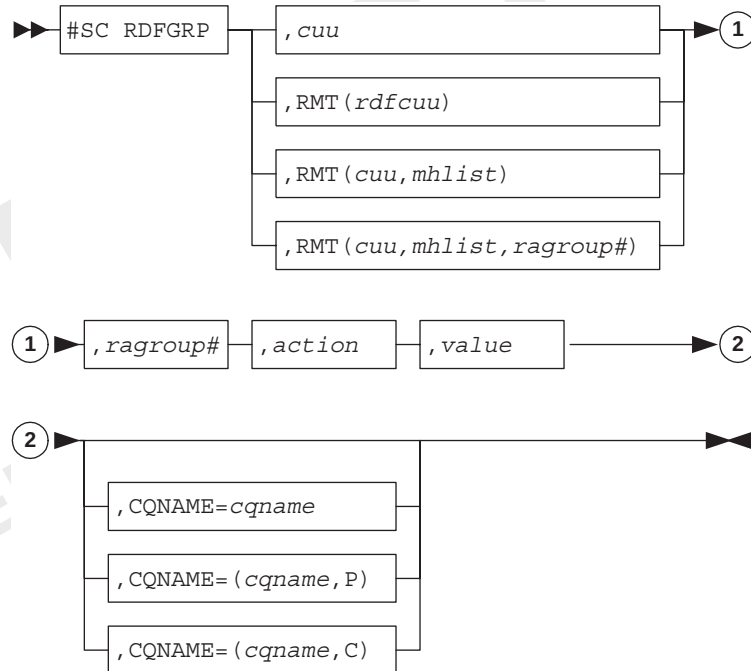
Clears the message log of all entries.

Comments None.

#SC RDFGRP

The #SC RDFGRP command modifies the state of an RA Group.

Syntax



Parameters *action*

Refer to Table 5-7 on page 5-132.

cqname

Specifies the name of a command queue into which this command should be placed.

cuu

Specifies the z/OS device number.

mhlist

Specifies the *ragroup#* used to identify the remote Symmetrix unit. For multihop remote configurations, the *mhlist#* can be a single *ragroup#* or a list of up to eight hops, delineated by periods.

For example, an *mhlist* of 0.1.2 is for three hops. The command hops from the source box on an RA for *ragroup#* 0 to the first hop box, through the first hop box on an RA for *ragroup#* 1 to the second hop box, through the second hop box on an RA for *ragroup#* 2 to the third hop box. The action is performed on the third hop box using the *ragroup#* specified in `RMT(cuu[,mhlist][,ragroup#])`.

P | C

P (purge) specifies that in the event of a command failure, all subsequent commands in the *qname* queue are to be purged.

C (continue) specifies that even though a command failed, processing is to continue with the next command in the *qname* queue. If the failcode is not specified on the first command for the *qname* queue, the default is P.

ragroup#

Specifies the *ragroup#* through which you want to perform an operation. This must be a 1- or 2-digit (hex) value representing the *ragroup#*.

For concurrent SRDF configurations, *ragroup#* identifies the R2 device for which the operation is to be performed.

In the `LCL(cuu[,ragroup#])` format of the command, *ragroup#* is used to identify the R2 partner device.

In the `RMT(cuu[,mhlist][,ragroup#])` format of the command:

- The *ragroup#* can default in most cases, because the *ragroup#* defaults to the partner *ragroup#* of the last hop of the *mhlist*.

- The *ragroup#* can be either a “*” character or the *ragroup#* of the mirror to operate upon. The “*” character means to perform the action on both R2s of a concurrent R1 device. The “*” character is only valid as the third value of the RMT parameter.

rdfcuu

Specifies the z/OS device number of a source R1 device.

RMT

Specifies that the operation affects remote directors in an SRDF configuration.

Comments Table 5-7 lists the possible actions for the #SC RDFGRP command.

Table 5-7 #SC RDFGRP Command Actions for SRDF

Action	Values	Description
SYNCH_DIRECTION	R1>R2, R1<R2, NONE, or CNFG	Sets synchronization direction for an individual SRDF Group. A setting of CNFG causes the config synch_direction value to be used for this RDF Group. Refer to #SC CNFG on page 5-121 for further information on each setting.
ADD([([DOM] [,NO-AUTO-RCVRY][)])	LDIR([action] ^a directorlist ^b) RDIR([action]directorlist) [,LABEL(label) RGRP(group#) RSER(symmserial#)	Optionally, sets the Links Domino and/or Prevent Auto Links Recovery flags for the SRDF group. LDIR and RDIR identify the local and remote directors, and RSER specifies the full 12-digit serial number. RGRP supplies the RDF group # for the remote side.
MODIFY	LDIR([action]directorlist) RDIR([action]directorlist)	Adds or removes the directors identified in the LDIR or RDIR parameter from the identified SRDF group.
DELETE		Deletes the identified SRDF group.

- action*, if present, specifies whether a director is added to the SRDF group. For the ADD, *action* can only be missing or “+”. For the MODIFY action, the value may be missing or “+” to add a director to the group or “-” to remove.
- directorlist* specifies the director number in hex in the range of x'01' through x'40' to be added or removed from the local (LDIR) or remote (RDIR) group.

Examples #SC RDFGRP, 3004, 04, SYNCH_DIRECTION, R1>R2

Sets Synch Direction to R1>R2 in both Symmetrix units using the RDFGRP. Refer to Figure 5-25 on page 5-133.

```
#SC RDFGRP, 3004, 04, SYNCH_DIRECTION, R1<R2
```

Sets Synch Direction to R1<R2 in both Symmetrix units using the RDFGRP. Refer to Figure 5-25 on page 5-133.

```
#SC RDFGRP, 3004, 04, SYNCH_DIRECTION, NONE
```

Sets Synch Direction to NONE in both Symmetrix units using the RDFGRP. Refer to Figure 5-25 on page 5-133.

```
#SC RDFGRP, 3004, 04, SYNCH_DIRECTION, CNFG
```

Sets Synch Direction to use Control Unit level Synch Direction in both Symmetrix units using the RDFGRP. Refer to Figure 5-26 on page 5-134.

The default SYNCH_DIRECTION for RDF Groups not explicitly set by the #SC RDFGRP command is either the control units synchronize direction (#SC CNFG command) or, if absent, the GLOBAL synchronize direction. The two Symmetrix units in an SRDF relationship may have the control unit level set differently.

Related RDF Groups always have the same synchronization direction.

```
EMCQR00I SRDF-HC DISPLAY FOR (6) #SQ RDFGRP, 3004
```

```
MY SERIAL #    MY MICROCODE
```

```
-----
000184501175    5567-37
```

MY	GRP	ONL	PC	OS	GRP	OS	SERIAL	OS	MICROCODE	SYNCHDIR
00		Y	F	00		000184500399		5567-37		R1>R2
01		Y	F	01		000184500399		5567-37		G (NONE)
02		Y	F	02		000184500399		5567-37		R1<R2
03		Y	F	03		000184500399		5567-37		G (NONE)
04		Y	E	04		000184500399		5567-37		G (NONE)
05		Y	E	05		000184500399		5567-37		G (NONE)
06		Y	E	09		000184500399		5567-37		G (NONE)
07		Y	E	08		000184500399		5567-37		G (NONE)
08		Y	E	07		000184500399		5567-37		G (NONE)
09		Y	E	06		000184500399		5567-37		G (NONE)

```
END OF DISPLAY
```

Set at RDFGRP level
(both Symmetrix units)
R1>R2

Set at Global as
Synch Direction of None.
That is, RDFGRP SYNC
of CNFG and CNFG
Synch of Global

Set at RDFGRP level
(both Symmetrix units)
R1<R2

Figure 5-25 #SQ RDFGRP Command Output for SRDF

```
EMCQR00I SRDF-HC DISPLAY FOR (8) #SQ RDFGRP,3404
```

```
MY SERIAL #    MY MICROCODE
```

```
-----
000184500399    5567-37
```

```
MY GRP ONL PC OS GRP  OS SERIAL  OS MICROCODE SYNCHDIR
```

```
-----
 00      Y   F   00    000184501175    5567-37    R1>R2
 01      Y   F   01    000184501175    5567-37    C(R1<R2)
 02      Y   F   02    000184501175    5567-37    R1<R2
 03      Y   F   03    000184501175    5567-37    C(R1<R2)
 04      Y   E   04    000184501175    5567-37    C(R1<R2)
 05      Y   E   05    000184501175    5567-37    C(R1<R2)
 06      Y   E   09    000184501175    5567-37    C(R1<R2)
 07      Y   E   08    000184501175    5567-37    C(R1<R2)
 08      Y   E   07    000184501175    5567-37    C(R1<R2)
 09      Y   E   06    000184501175    5567-37    C(R1<R2)
```

```
END OF DISPLAY
```

Set at Control Unit level
R1<R2

Figure 5-26 #SQ RDFGRP Command Output for SRDF

When issuing range commands that have devices synchronizing in opposite directions, the following messages appear:

```
EMCMN00I SRDF-HC : (9) ¢¢SQ RDFGRP,3004
EMCQR00I SRDF-HC DISPLAY FOR (9) ¢¢SQ RDFGRP,3004
MY SERIAL #    MY MICROCODE
-----
```

```
000184501175    5567-37
```

MY GRP	ONL	PC	OS GRP	OS SERIAL	OS MICROCODE	SYNCHDIR
00	Y	F	00	000184500399	5567-37	R1>R2
01	Y	F	01	000184500399	5567-37	G(NONE)
02	Y	F	02	000184500399	5567-37	R1<R2
03	Y	F	03	000184500399	5567-37	G(NONE)
04	Y	E	04	000184500399	5567-37	G(NONE)
05	Y	E	05	000184500399	5567-37	G(NONE)
06	Y	E	09	000184500399	5567-37	G(NONE)
07	Y	E	08	000184500399	5567-37	G(NONE)
08	Y	E	07	000184500399	5567-37	G(NONE)
09	Y	E	06	000184500399	5567-37	G(NONE)

END OF DISPLAY

```
EMCMN00I SRDF-HC : (10) ¢¢SC VOL,3004,REFRESH,ALL
EMCCVF8I DEVICE(S) EXCLUDED WITH SYNC DIRECTION OF NONE
0040-0083,0088-008F,0095,0098-01BF,0200-027F,02C0-033F
EMCCVF9I DEVICE(S) CHOSEN WITH SYNC DIRECTION OF R1>R2
0280-02BF
EMCCVFAI DEVICE(S) CHOSEN WITH SYNC DIRECTION OF R1<R2
0340-037F
*89 EMCCVFBR RANGE W/ DIFFERENT SYNC DIRECTIONS,
REPLY CONTINUE TO PROCEED OR CANCEL TO TERMINATE
```

Any REFRESH, VALIDATE, or INVALIDATE command that would select both R1 and R2 devices because the Synch Directions are set differently generates the EMCCVF8I, EMCCVF9I, and /or, EMCCVFAI messages, as appropriate.

If OPERATOR VERIFY is set to CRITICAL, an EMCCVFBR message is issued.

```
#SC RDFGRP,6F60,12,ADD(DOM,NO-AUTO-RCVRY),
LDIR(1-3,5),RDIR(2-4,8),LABEL(TEST),RSER(771877900065),R
GRP(21)
```

This command adds group 12. The optional flags are set to add Domino mode to the group and prevent auto link recovery. The defaults for these flags are no domino and allow auto link recovery. Local directors 1, 2, 3, and 5 are included in the group as well as remote directors 2, 3, 4, and 8. All director # specifications

are in hex. The Label “TEST” are assigned to this group, and RSER specifies the full 12-digit serial number. The remote group number will be 21.

```
#SC RDFGRP,6F60,08,MODIFY,LDIR(-1,+2-3),  
RDIR(-1,+2-3)
```

This command modifies group 08 by removing director 1 and adding directors 2 and 3 to the local side, and removing director 1 and adding directors 2 and 3 to the remote side. A director number prefixed by '-' indicates that the director is to be removed while a director number prefixed by a '+' indicates that the director is to be added. When this form of director list is used, each item in the list must be prefixed by a '+' or '-'.

```
#SC RDFGRP,6F60,08,MODIFY,LDIR(1-3,5),RDIR(2-4,B)
```

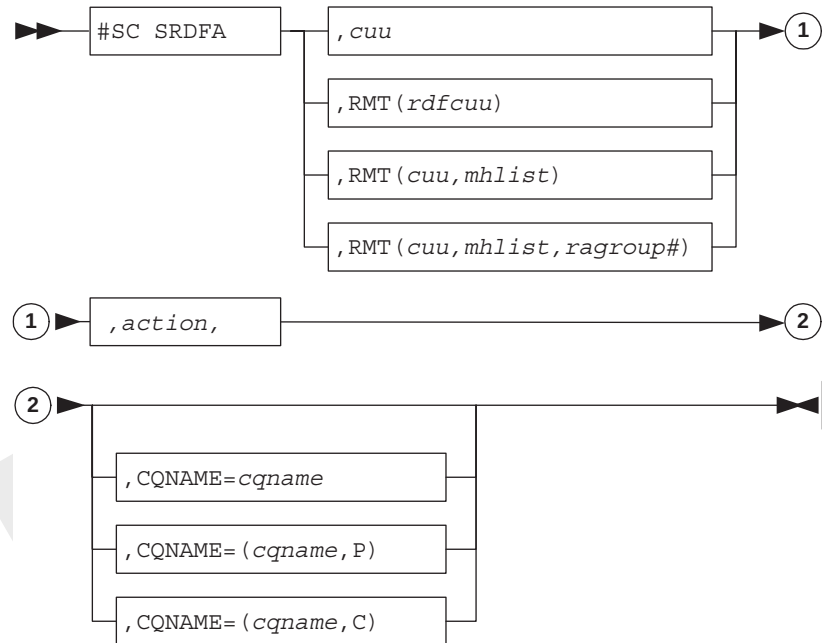
This command modifies group 8, and specifies the full list of directors for each side.

```
#SC RDFGRP,6F60,08,DELETE
```

This command deletes group 8. The group must be empty for this command to work. In other words, all device pairs must have been deleted.

#SC SRDFA

The #SC SRDFA command is an alias of the #SC RDFGRP command similar to the #SQ SRDFA command.

Syntax**Parameters**

cuu

Specifies the z/OS device number.

RMT

Specifies that the operation affects remote directors in an SRDF configuration.

cqname

Specifies the name of a command queue into which this command should be placed.

Table 5-8 lists #SC SRDFA command actions for SRDF/A mode.

Table 5-8 #SC SRDFA Command Actions for SRDF/A Mode

Action	Description	Requirements
ACT	Activate the SRDFA session.	1. The SRDF/A session must not be active. 2. All Primary devices must be ready on the link.
CONS_DEACT	CONS_DEACT takes an SRDF/A RDFGRP from SRDF/A active to SRDF/S while maintaining consistency. Note that this is a long running command and it requires several cycle switches before it is complete.	The SRDF/A session must be active. This command will be rejected if the RDFGRP is in an active MSC_GROUP.
DEACT_TO_ADCOPY	DEACT_TO_ADCOPY takes an SRDF/A RDFGRP from SRDF/A active to ADCOPY. Note that this is basically a PEND_DEACT followed by internally setting the devices to ADCOPY.	The SRDF/A session must be active. This command will be rejected if the RDFGRP is in an active MSC_GROUP.
DEACT_TO_ADCOPY_DISK	DEACT_TO_ADCOPY_DISK takes an SRDF/A RDFGRP from SRDF/A active to ADCOPY_DISK. Note that this is basically a PEND_DEACT followed by internally setting the devices to ADCOPY_DISK.	The SRDF/A session must be active. This command will be rejected if the RDFGRP is in an active MSC_GROUP.
DROP	Deactivate the SRDF/A session and make all devices TNR. Primary side has R2 IT. Secondary side has R1 Invalid Tracks. A consistent copy is on the secondary side. Issuing this command to a RDFGRP running in an active MSC_GROUP will cause MSC to DROP all SRDF/A sessions in the MSC_GROUP.	The SRDF/A session must be active.
PEND_DEACT	Wait until the end of the SRDF/A cycle, and then deactivate the SRDF/A session, but leave all devices Ready on the link. The secondary side cannot be considered consistent.	The SRDF/A session must be active. This command will be rejected if the RDFGRP is in an active MSC_GROUP.
PEND_DROP	Wait until the end of the SRDF/A cycle, and then do a DROP. Primary side has R2 Invalid Tracks. Secondary side <i>does not</i> have R1 Invalid Tracks. A consistent copy is on the secondary side. Issuing this command to a RDFGRP running in an active MSC_GROUP will cause MSC to DROP all SRDF/A sessions in the MSC_GROUP.	1. The SRDF/A session must be active. 2. Must be issued to the primary side. This command will be rejected if the RDFGRP is in an active MSC_GROUP.

Table 5-8 #SC SRDFA Command Actions for SRDF/A Mode

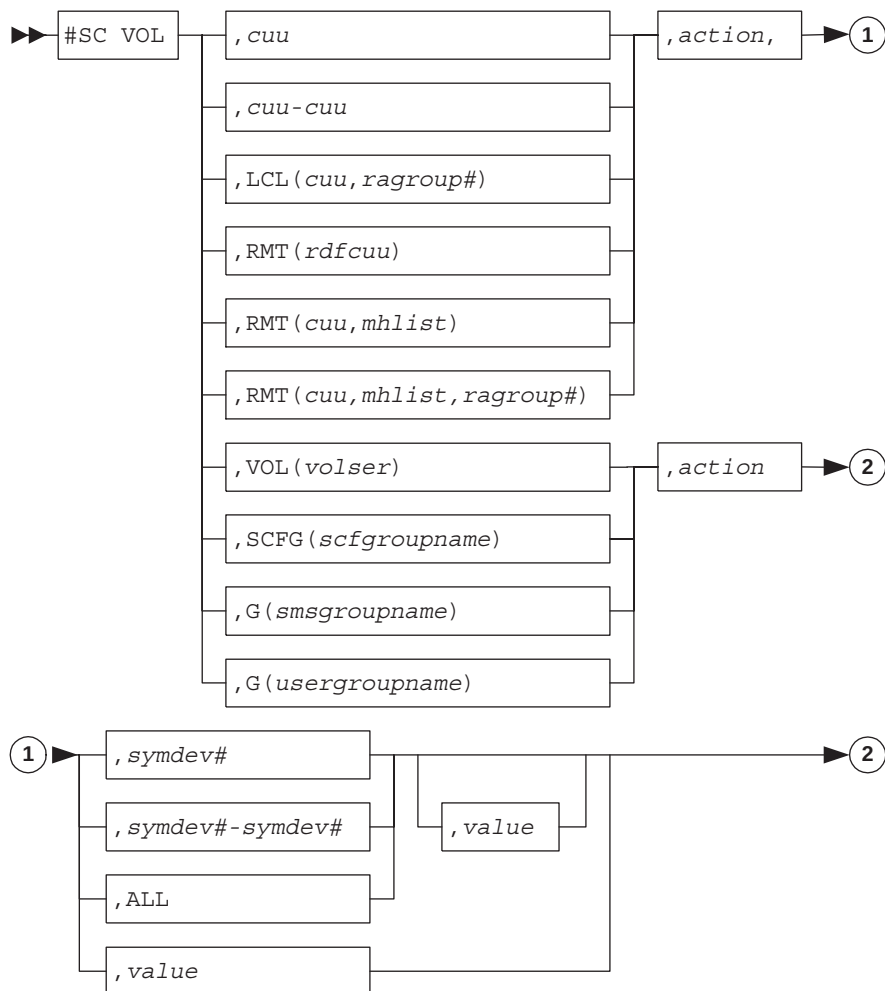
Action	Description	Requirements
SET_CACHE_LIMIT,VVV	Where $0 \leq VVV \leq 100$ Setting the Cache Limit is a Symmetrix level setting. It applies to all RDFGRPs. The value is the percentage of write pending space that SRDF/A can use before the Symmetrix will start dropping SRDF/A groups	
SET_DROP_PRIORITY,VV	Where $1 \leq VV \leq 64$ Setting the Drop Priority is a RDFGRP specific change. You can set the drop priority differently on the R1 side as compared to the R2 side. The priority within the Symmetrix is what matters. The highest priority is 1 and the lowest is 64	
SET_HOST_THROTTLE,VVVV	Where $0 \leq VVVV \leq 65535$ Sets the I/O delay for writes to SRDF/A devices when cache resources for SRDF/A exceed preset limits. Note that setting a non-zero value to Host Throttle will cause the Cache Usage and Drop Priority to be not used. Setting the Host Throttle is a Symmetrix level setting. It applies to all RDFGRPs.	
SET_MIN_CYCLE_TIME,VV	Where $5 \leq VV \leq 59$ Setting the Minimum Cycle Time is a RDFGRP specific change. Setting this value does not impact MSC. MSC uses the cycle time specified in the MSC_CYCLE_TARGET.	
TOL_ON	Turn Tolerance mode on ^a .	Must be issued to the primary side. This command will be rejected if the RDFGRP is in an active MSC_GROUP.
TOL_OFF	Turn Tolerance mode off.	1. Must be issued to the primary side. 2. All Primary devices must be ready on the link.

- a. Tolerance Mode: When Tolerance mode is on, SRDF/A can be Active and the following events *do not* make it DROP: R2 made R/W and R1 made TNR.

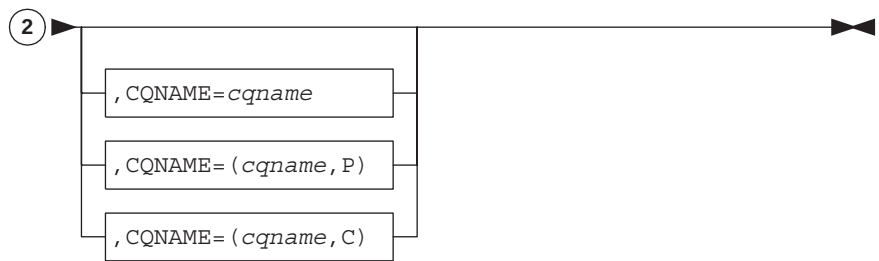
#SC VOL

The #SC VOL command modifies the status of SRDF volumes. This command provides the ability to set the SRDF operational mode.

All #SC VOL commands require you to confirm the action you have specified, unless this has been disabled by the OPERATOR_VERIFY sysparm.

Syntax

The #SC VOL command syntax continues on the next page.

**Parameters***action*

Refer to Table 5-9 on page 5-145.

cqname

Specifies the name of a command queue into which this command should be placed.

cuu

Specifies the z/OS device number.

cuu-cuu

Specifies a z/OS device number or a range of z/OS device numbers in the form of *cuu1-cuu2* where *cuu1* is the starting z/OS device number and *cuu2* is the ending z/OS device number.

symdev#

Specifies a Symmetrix device number or a range of Symmetrix device numbers in the form of *dev1-dev2* where *dev1* is the starting Symmetrix device number and *dev2* is the ending Symmetrix device number. If ALL is specified, all devices on the Symmetrix unit that are eligible for the specified action are affected.

G (smsgroupname)

Specifies the SMS groupname of the devices to display. This parameter requests that the action be performed to the volumes in the specified SMS group name. Only online devices are selected.

Note that SMS groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group. When *G(smsgroupname)* is specified, *dev-range* must be omitted.

G(usergroupname)

Specifies the Defined Group name of the devices to display. This parameter requests that the action be performed to the volumes in the specified Defined Group.

Note that Defined Groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group. When *G(smsgroupname)* is specified, *dev-range* must be omitted.

If a Defined Group has the same name as an SMS Group, the Defined Group is used.

LCL

Specifies that the operation affects local directors in an SRDF configuration.

mhlist

Specifies the *ragroup#* used to identify the remote Symmetrix unit.

For multihop remote configurations, the *mhlist#* can be a single *ragroup#* or a list of up to eight hops, delineated by periods.

For example, an *mhlist* of 0.1.2 is for three hops. The command hops from the source box on an RA for *ragroup#* 0 to first hop box, through the first hop box on an RA for *ragroup#* 1 to second hop box, through second hop box on an RA for *ragroup#* 2 to third hop box. The action is performed on the third hop box using the *ragroup#* specified in *RMT(cuu[,mhlist][,ragroup#])*.

P | C

P (purge) specifies that in the event of a command failure, all subsequent commands in the *qname* queue are to be purged. C (continue) specifies that even though a command failed, processing is to continue with the next command in the *qname* queue. If the failcode is not specified on the first command for the *qname* queue, the default is P.

ragroup#

Specifies the *ragroup#* through which you want to perform an operation. This must be a 1- or 2-digit (hex) value representing the *ragroup#*.

For concurrent SRDF configurations, *ragroup#* identifies the R2 device for which the operation is to be performed.

In the `LCL(cuu[, ragroup#])` format of the command, *ragroup#* is used to identify the R2 partner device.

In the `RMT(cuu[, mhlist] [, ragroup#])` format of the command:

- The *ragroup#* can default in most cases, because the *ragroup#* defaults to the partner *ragroup#* of the last hop of the *mhlist*.
- The *ragroup#* can be either the “*” character or the *ragroup#* of the mirror to operate upon. The “*” character means to perform the action on both R2s of a concurrent R1 device. The “*” character is only valid as the third value of the RMT parameter.

rdfcuu

Specifies the z/OS device number of a source R1 device.

RMT

Specifies that the operation affects remote directors in an SRDF configuration.

SCFG(*scfgroupname*)

Specifies the SCF Group name of the devices to display. This parameter specifies that the mirror configurations of devices in the specified SCF group name be displayed.

Note that SCF groups can span multiple Symmetrix units. If this is the case, multiple display tasks are triggered, one for each Symmetrix unit with volumes in the group. SCF Groups are defined using the Group Name Services feature of EMCSCF.

value

Used with the ADC_MAX action.

If setting `ADC_MAX`, this value represents the maximum skew value for the device(s) in the Adaptive Copy mode. This value can range from 1 to 65535 (decimal).

`VOL (volser)`

Requests a specific `VOLSER` or a pattern that includes multiple online `VOLSERs`. To specify a pattern, you must specify at least one unique alphanumeric value followed by an asterisk (*). The * character means to include all values that match starting in this position.

For example, the `#SQ VOL, VOL (UG*)` command generates a list of all online `VOLSERs` that have the first two characters of `UG`.

Comments

If no *dev-range* parameter is specified, the SRDF Host Component attempts to use the *cuu-range* to determine the Symmetrix device number on which to perform the action.

If you choose to specify a range of devices, you may specify either a range of z/OS device numbers, or a range of Symmetrix device numbers, but not both.

On R1 R2 personality swap actions, the new R2 defaults to not ready to the host (NRDY) unless specified in the `SWAP` action. It is strongly suggested that the R1 devices be offline prior to the `SWAP` action.

If the `CONCURRENT DRDF` feature is enabled (see `#SQ CNFG`) then you can use the `CREATEPAIR` action code to create an RDF relationship to a second R2 mirror. The second R2 mirror must be in a different RDF Group from the first.

When an R1 device has two remote mirrors, the `SWAP` action is disabled. If, when adding the second R2 mirror, `KEEPR2` is specified, the 1st R2 must be in an `RDF-SUSP` state.

When using the `DELETEPAIR` action with a concurrent RDF set, take care to ensure that you correctly identify which R2 to remove. This can be done either by deleting the pair from the R2 side, or by selecting the appropriate RDF group using the `LCL(cuu,ragroup#)` parameter when deleting the pair from the R1 side.

Table 5-9 on page 5-145 lists the possible actions.

Table 5-9 #SC VOL Command Actions for SRDF

Action	Valid Volume Type ^a	Description
ADC-MAX	R1/L1/B1	Set the Adaptive Copy maximum skew value for the volume(s). Example: #SC VOL, F00, ADC-MAX, , 80 The maximum skew value may be specified in the range of from 1 to 65535. This command may only be entered when the volume is in one of the supported Adaptive Copy modes. Setting this value too high in Adaptive Copy - Write Pending mode could result in excessive cache use adversely affecting subsystem performance.
ADCOPY ^e	R1/L1/B1	Enable Adaptive Copy function for source (R1) volume. When this attribute is enabled, the Symmetrix unit acknowledges all writes to source (R1) volumes as if they were local volumes. This value must be reset following an IML.
ADCOPY-DISK ^e	R1/L1/B1	Place the specified volume(s) in Adaptive Copy Disk mode. This value must be reset following an IML.

Table 5-9 #SC VOL Command Actions for SRDF (continued)

Action	Valid Volume Type ^a	Description
CREATEPAIR [[<i>flag-list</i>],FORCE [NOFORCE]] ^f	Dynamic SRDF Devices	Establish a SRDF relationship between two dynamic SRDF enabled devices. <i>flag-list</i> is a comma delimited list of flags affecting the new R1 and R2 after the operation completes. The default synchronization direction is primary to secondary. This action must be issued in the LCL format. For example: <pre>#SC VOL,LCL(cuu,ragroup#),CREATEPAIR(flag-list),r1dv-r1dv,r2dv</pre> To create a Concurrent Dynamic RDF set, issue a CREATEPAIR to establish a normal RDF pair. Then, issue a second CREATEPAIR to add a second R2 mirror. The maximum Symmetrix device number on either side is based on the Engenuity level of the Symmetrix software. The maximum device number that can participate in the RDF configuration is the lower of the maximum numbers on both sides. The maximum device numbers for the various Engenuity levels that support dynamic RDF are as follows: <pre>5X68 - 0FFF 5X69 - 1F3F 5X70 - 1F3F 5671 - 3E7F 5771 - F9FF</pre> More Information: Refer to Table 5-10 on page 5-152 for a description of the flags available to the CREATEPAIR action.
DELETEPAIR [[FORCE] [NOFORCE]] ^f	Dynamic SRDF Devices	Remove the SRDF relationship between two dynamic SRDF enabled devices that have a relationship established by CREATEPAIR. The devices must be TNR. To delete one of the concurrent mirrors with Concurrent Dynamic RDF, either: • Issue a DELETEPAIR to the R2 device • Issue a DELETEPAIR to the R1 device, specifying the LCL(cuu,rdfgrp#) format
DOMINO	R1/L1/B1	Enable Domino mode for source (R1) device. This ensures that the data on the source (R1) and target (R2) volumes are fully synchronized at all times in the event of a failure.
HDELETEPAIR [[FORCE] [NOFORCE]] ^f	Dynamic SRDF Devices	Half Deletepair. This action deletes only one side of the RDF pair, leaving the remote partner unchanged. If HDELETEPAIR is issued to an R2 device and the remote partner is an R1 device, the R1 must be suspended. This action code is provided for use in a disaster situation. When the failing site becomes operational, you should be prepared to do an HDELETEPAIR on that side as well and do a CREATEPAIR to re-establish the partnership. Special procedures are provided for a SRDF/Star environment.

Table 5-9 #SC VOL Command Actions for SRDF (continued)

Action	Valid Volume Type ^a	Description
HSWAP[(flag-list [,FORCE NOFORCE])] ^f	Dynamic SRDF Devices	Half SWAP. This action SWAPs the SRDF relationship between only one side of the RDF pair, leaving the remote partner unchanged. If HSWAP is issued to an R2 device and the remote partner is an R1 device, the R1 must be suspended This action is allowed only for devices that are part of an SRDF/Star configuration. This action code is provided for use in a disaster situation. When the failing site becomes operational, you should be prepared to do an HDELETEPAIR on that side as well and do a CREATEPAIR to re-establish the partnership. Special procedures are provided for a SRDF/Star environment. Caution: The use of HSWAP will result in an invalid RDF environment. You may end up with an R1 partnered with an R1 or an R2 partnered with an R2. SRDF will <i>not</i> track updates to the partner device in this situation. If you write to one of the partners and then use HSWAP to swap back, you must do a full re-synchronization using VALIDATE/INVALIDATE or DELETEPAIR/CREATEPAIR to resume normal RDF processing.
INVALIDATE	R1/R2/ L1/L2/ B1/B2	This action is taken when all tracks on the SRDF partner volume are considered to be invalid from the point of view of the volume to which the command was issued. Keep in mind that in an SRDF configuration, both Symmetrix units maintain their own invalid track tables for both the source (R1) and target (R2) volumes. When the SYNCH_DIRECTION is set to R1>R2, this command may be issued to the source (R1) volume to ensure that all of the R2 tracks are considered invalid from the source (R1) volume point of view. When the SYNCH_DIRECTION is set to R1<R2, this command may be issued to the target (R2) volume to ensure that all of the R1 tracks are considered invalid from the target (R2) volume point of view. Refer to Chapter 6, <i>SRDF Procedures</i>, for further information on the use of this command.
ITA	R2/L2/B2	This action sets the Invalid Track Attribute. When set, if tracks are owed from the R1/L1 and the R2/L2 changes state, the R2/L2 is put into the RDF-NRDY state allowing a decision to be made concerning the invalid tracks owed to the R2/L2.

Table 5-9 #SC VOL Command Actions for SRDF (continued)

Action	Valid Volume Type ^a	Description
NADCOPY	R1/L1/B1	Disable Adaptive Copy function for source (R1) volume. When switching from the Disk mode to Write Pending mode or from Write Pending mode to Disk mode, this command must first be used before setting the new Adaptive Copy mode. When this command is issued to remove a volume from Adaptive Copy mode, the state change does not take place until the volumes are synchronized.
NDOMINO ^c	R1/L1/B1	Disable Domino mode for source (R1) volume. During this default operating condition, a source (R1) volume continues processing I/Os with its host even when an SRDF volume or link failure occurs. These failures cause loss of source (R1) and target (R2) synchronization. When the failure is corrected, the volumes begin synchronizing.
NITA	R2/L2/B2	This action removes the Invalid Track Attribute. When not set, if tracks are owed from the R1/L1 and the R2/L2 changes state, the R2/L2 is not put into the RDF-NRDY state.
NRDY	R2/L2/B2	Make target (R2) volume(s) not ready. In this state, the target (R2) volume responds "intervention required" to the host for all read and write operations to that volume. This is the default state for a target (R2) volume.
PREFRESH	R1/L1/B1	This action code causes only the updated tracks to be refreshed from the SRDF partner volume. The command is entered from the system with access to the volume that is being refreshed. This action is used when the R2 is R/W. The R1 must be RNR.⁹ When the SYNCH_DIRECTION is set to R1<R2, invalid tracks are to be refreshed from the target (R2) volume to the source (R1) volume. Enter the PREFRESH command from the system with access to the source (R1) volume. This action is not valid when the SYNCH_DIRECTION is set to R1>R2. The tracks are refreshed after a subsequent PRE-RSUM command is issued for the source (R1) volume. PREFRESH executes the REFRESH code by bypassing tests related to working with a R/W R2. Other than echoing the command, all messages indicate REFRESH processing. When used, a PREFRESH flag is set. When this flag is set, RFR-RSUM is rejected until either a REFRESH or PRE-RSUM is issued. If a device has the PREFRESH flag set, an #SQ VOL command displays a P for PREFRESH rather than an R for REFRESH.

Table 5-9 #SC VOL Command Actions for SRDF (continued)

Action	Valid Volume Type ^a	Description
PRE-RSUM	R1/L1/B1	This action code is used after an #SC VOL, cuu, PREFRESH command to commence synchronization. This command should be entered from the same system that the PREFRESH action code was entered on.^g This action only operates on devices that have been objects of a PREFRESH action. PRE-RSUM executes the RFR-RSUM code but bypassing tests related to working with a R/W R2. Other than echoing the command, all messages indicate RFR-RSUM processing.
RDY	R2/L2/B2	Make target (R2) volume(s) ready to the host.
RDF-NRDY	R1/R2/ L1/L2/ B1/B2	Set volume not ready to the host. This action is valid for both source (R1) and target (R2) volumes. When a volume is set RDF-NRDY, (RNR in the control unit status of the #SQ VOL command output) any attempt to perform I/O to the volume from the host results in an "intervention required" status. This command action may be used during R2 Read/Write testing to prevent host access during critical phases of recovery.
RDF-RDY	R1/R2/ L1/L2/ B1/B2	Set volume ready to the host. This action is valid for both source (R1) and target (R2) volumes.
RDF-RSUM ^e	R1/L1/B1	Resume SRDF operation on a specified SRDF pair.
RDF-SUSP [[CEXMPT]]	R1/L1/B1	Suspend SRDF operation on a specified volume. If the volume is already suspended or in SRDF Write Disable status, this action is ignored. If the volume is configured for the Adaptive Copy mode, that volume is suspended immediately. All Adaptive Copy skew tracks that have not been sent to the target (R2) volume become invalid and are not sent until resynchronization begins after an RDF-RSUM action code.^d The CEXMPT flag is provided for an SRDF/A environment to indicate that the volume should be considered exempt from the consistency requirements for the group.
RDF_WR_ENABLE	R1/L1/B1	This command is issued to a source (R1) volume that has a control unit status of RWD as displayed in the #SQ VOL command. Before issuing this command, you must set the target (R2) volume to Read/Only status. This command clears the RWD status and allow the SRDF pair to begin synchronization. If the R2 volume indicates R1 invalid tracks, you must RDF-SUSP the R1 and follow the recovery procedures (starting with procedure 2) outlined in Chapter 6, <i>SRDF Procedures</i>.

Table 5-9 #SC VOL Command Actions for SRDF (continued)

Action	Valid Volume Type ^a	Description
REFRESH	R1/R2/ L1/L2/ B1/B2	This action code causes only the updated tracks to be refreshed from the SRDF partner volume. The command is entered from the system with access to the volume that is being refreshed. When the SYNCH_DIRECTION is set to R1>R2, invalid tracks are to be refreshed from the source (R1) volume to the target (R2) volume. Enter the refresh command from the system with access to the target (R2) volume. When the SYNCH_DIRECTION is set to R1<R2, invalid tracks are to be refreshed from the target (R2) volume to the source (R1) volume, enter the refresh command from the system with access to the source (R1) volume. The tracks are refreshed after a subsequent RFR-RSUM command is issued for the source (R1) volume.
RFR-RSUM	R1/R2/ L1/L2/ B1/B2	This action code is used after a #SC VOL,uuu,REFRESH command to commence synchronization. This command should be entered from the same system that the REFRESH action code was entered on.
R/O	R2/L2/B2	Make target (R2) volume(s) read only. When a target (R2) volume is in this state, any attempt to issue a write from the host produces an I/O error.
R/W	R2/L2/B2	Make target (R2) volume(s) read and write enabled. This allows a target (R2) volume to be written to from the channel. If you are running in SRDF/A mode, R/W cannot be issued to an R2 unless the R1 is TNR. SRDFA drops if an R2 goes R/W. If you write to the target (R2) volume, you need to perform the testing and recovery procedures listed in Chapter 6, <i>SRDF Procedures</i>.
SEMI-SYN ^b	R1/L1/B1	Set source (R1) volume to the semi-synchronous mode. This is an SRDF mode of operation that provides an asynchronous mode of operation. This value does not need to be reset following an IML.
SUSP-CGRP	R1/L1/B1	This is a special form of the RDF-SUSP operation that works in conjunction with Consistency Groups. The SUSP-CGRP action code functions exactly as RDF-SUSP, except it triggers a SRDF consistency group. Refer to <i>RDF-SUSP [(CEXMPT)]</i> for more information.

Table 5-9 #SC VOL Command Actions for SRDF (continued)

Action	Valid Volume Type ^a	Description
SWAP[(<i>flag-list</i> [,FORCE <u>NOFORCE</u>])] ^f	Dynamic SRDF Devices or R1/L1/B1/R2/L2/B2	SWAPs the SRDF relationship between two SRDF devices. <i>flag-list</i> is a comma delimited list of flags affecting the new R1 and R2 after the operation completes. If none of the device flags (DOMINO <u>NODOMINO</u>.SYNC SEMI-SYNC, ADCOPY ADCOPY-DISK <u>NADCOPY</u>.ITRK <u>NOITRK</u>, RDY <u>NRDY</u>, R O R/W) are specified, these flags are set according to the R1/R2 state prior to the dynamic SRDF action. Otherwise, the requested states are set, and for any flag not specified, the default value (underlined) is set. For all other flags, (INVALIDATER1 <u>INVALIDATER2</u>.LCLISR1 LCLISR2, FORCE <u>NOFORCE</u>) if the flag is not specified, the default value (underlined) is set. When the swap completes, the devices are placed into the state defined by the flags. Refer to Table 5-10 on page 5-152 for a description of the flags available to the SWAP action. Because the R1 has to be TNR to perform the SWAP, setting the Domino flag causes the R1 to go RNR. Important: SWAP is not supported for Concurrent Dynamic RDF.
SYNC ^b	R1/L1/B1	Set source (R1) volume to the synchronous mode. This is an SRDF mode of operation that ensures 100% synchronized mirroring between the two Symmetrix units. This value does not need to be reset following an IML.
VALIDATE	R1/R2/L1/L2/B1/B2	Updates the invalid track table to remove all invalid track flags for all tracks residing on the SRDF partner device. Once this action is taken, all tracks on the SRDF partner volume are considered to be valid from the point of view of the volume to which the command was issued. Keep in mind that in an SRDF configuration, both Symmetrix units maintain their own invalid track tables for both the source (R1) and target (R2) volumes. When the SYNCH_DIRECTION is set to R1>R2, this command may be issued to the target (R2) volume to ensure that all of the R1 device tracks are considered valid from the target (R2) volume point of view. Conversely, when the SYNCH_DIRECTION is set to R1<R2, this command may be issued to the source (R1) volume to ensure that all of the R2 device tracks are considered valid from the source (R1) volume point of view. Refer to Chapter 6, <i>SRDF Procedures</i>, for further information on the use of this command.

a. R1 = source volume, R2 = target volume. For additional mirror types, refer to page 5-113

b. Setting SYNC or SEMI-SYNC does not affect Adaptive Copy mode if in effect.

c. When switching from DOMINO mode to NDOMINO mode to clear an SRDF Not Ready (RNR) intervention required condition, after setting the state to NDOMINO and to RDF-RDY, issue the z/OS VARY ONLINE command to the device to clear the "intervention required" state.

- d. To ensure that the remotely mirrored volumes are synchronized, volumes operating in the adaptive copy mode must first be set to a synchronous or semi-synchronous state using the NADCOPY action code. Use the #SQ VOL command to verify that the volumes are in the synchronous or semi-synchronous mode prior to issuing the RDF-SUSP action code.
- e. This action is not valid against volumes in a consistency group.
- f. FORCE applies to Dynamic SRDF actions when a range is specified and one or more (but not all) devices are ineligible for any reason. Ineligible devices are those having invalid status to be processed by the Dynamic SRDF action. FORCE causes the requested action to be performed on those ineligible device(s) and issues a warning message. If FORCE is not specified and ineligible device(s) exist, a warning message is issued and the action fails. FORCE is required for DELETEPAIR if there are invalid tracks.
- g. The PREFRESH and PRE-RSUM actions provide a way to start the synchronization of an R1 from an R2 that is still R/W to a host. Refer to Chapter 6, *SRDF Procedures*, for a discussion of how this can be used as an additional recovery option.

Table 5-10 describes the flags available to SWAP and CREATEPAIR.

Table 5-10 Flag Descriptions

Device	Valid Action	Flags
New primary R1	SWAP and CREATEPAIR	• <u>SYNC</u> SEMI-SYNC - set the SYNC flag to sync or semi-sync mode. • ADCOPY ADCOPY-DISK <u>NADCOPY</u> - set the adaptive copy flag to: • Adaptive copy write pending mode (ADCOPY). • Adaptive copy disk mode (ADCOPY-DISK). • Off (NADCOPY). • SUSPEND <u>NOSUSPEND</u> - have RDF automatically resume or suspend.
	CREATEPAIR	• ADSRDF (allow different size SRDF) - Allows a dynamic SRDF pair with different size devices to be created. R1 can be smaller than R2. • NOCOPY - Creates the RDF pair without copying data from one device to the other. This option assumes that the devices are already in sync. This can cause errors in the Symmetrix when RDF is resumed, if the devices are not in sync. This flag may be used in the failover procedures in an SRDF/Star environment. • DIFFERENTIAL - This flag is allowed only for devices that are part of an SRDF/Star configuration. In an SRDF/Star environment, this flag makes use of special processing in SRDF/Star which keeps track of updates to the various nodes. This flag causes the pair to be created and only tracks that are different between them are synchronized. • CEXMPT (consistency exempt) - This flag is used in an SRDF/Star environment to indicate that until the devices are synchronized; they will not be considered when determining that the SRDF/Star group is consistent. This provides a mechanism to add devices to an SRDF/Star group.
	SWAP	• <u>DOMINO</u> <u>NODOMINO</u> - set DOMINO mode on or off.

Table 5-10 Flag Descriptions (continued)

Device	Valid Action	Flags
New Primary R2	SWAP and CREATEPAIR	- ITRK <u>NOITRK</u> - set the Invalid Track Attribute on or off. - RDY <u>NRDY</u> - set the device ready or not ready to the host. - RW <u>R/O</u> - set the device to read-write or read only.
		- INVALIDATER1 <u>INVALIDATER2</u> KEEPR2 <u>KEEPR1</u> - INVALIDATER1 KEEP R2 - set the synchronization direction to R1<R2. - INVALIDATER2 KEEP R1 - set the synchronization direction to R1>R2. Important: The synchronization is set only for the current command. It has no effect on the <code>synch_direction</code> settings at the group, cnfg, or global levels. <u>LCLISR1</u> <u>LCLISR2</u> - LCLISR1 - set the local device to be the R1. - LCLISR2 - set the local device to be the R2. - FORCE <u>NOFORCE</u> - force the action.
R1 and R2	SWAP, CREATEPAIR, and DELETEPAIR	STAR - the command is to be executed in a Star environment. If STAR is specified for devices that are not in a Star environment, then this flag is ignored. The STAR flag is not required for HSWAP or CREATEPAIR(DIFFERENTIAL) since these actions imply a Star environment. Otherwise, this flag is required for dynamic RDF actions to devices in a Star environment.

For a SWAP operation, any device in the *dev-range* is ineligible if it is:

- ◆ Not TNR
- ◆ Part of a Concurrent SRDF relationship
- ◆ Part of a consistency group

The command fails unless FORCE is specified, in which case, a warning message is issued, and the command proceeds for eligible devices.

If OPERATOR_VERIFY is set to ALL or CRITICAL, operator verification is requested for SWAP operations. If any primary (source R1) or secondary (target R2) in the *dev-range* has invalid tracks on either mirror, an operator confirmation is requested (regardless of the setting of OPERATOR_VERIFY) or a warning message is issued that resynchronization procedures need to be performed after the swap completes.

The R2 in all CREATEPAIR actions is set to Read Only (RO) and Not Ready (NR). If another state is desired, use the Host Component #SC VOL command on the R2.

If the Adaptive Copy states are selected, the ADC-MAX skew is defaulted to the maximum value of 65535. To select other values, use the Host Component #SC VOL command to set the desired ADC-MAX for the device.

Restrictions Refer to Table 5-11 for #SC VOL command restrictions.

Table 5-11 #SC VOL Command Restrictions

Action	Description	Exception	Messages
R/W	R/W cannot be issued to an R2 unless the R1 is TNR. SRDFA drops if an R2 goes R/W.	If the link is down when this action is issued, the informational message EMCPC081 RAGROUP SPECIFIED DOES NOT EXIST is generated. However, the R2 does change to R1. You can issue an SQ STATE command to confirm the flag setting. When a REFRESH is issued, the link must be available because the R1 is checked to see if it's in TNR status.	None

#TF

The #TF command allows EMC TimeFinder commands to be issued. The commands are issued one at a time directly to EMC TimeFinder using TimeFinder syntax. All #TF commands require you to confirm the action you have specified, unless this has been disabled by the OPERATOR_VERIFY initialization parameter. TimeFinder security is also honored.

Format #TF *TimeFinderCommand*

Parameters *TimeFinderCommand*

EMC TimeFinder commands use the syntax described in the *TimeFinder/Mirror for z/OS Product Guide*.

Host Component Examples

This section provides examples of the following:

- ◆ #SC VOL Configuration Command
- ◆ Multihop List
- ◆ Resetting an R1's TNR Status

#SC VOL Configuration Command

The examples in this section illustrate how to use the #SC VOL command.

Example 1 Suspend SRDF for one z/OS address:

```
#SC VOL,2150,RDF-SUSP
```

In Example 1, SRDF suspends z/OS address 2150.

Example 2 Suspend SRDF for a range of z/OS addresses:

```
#SC VOL,2150-215F,RDF-SUSP
```

In Example 2, SRDF suspends z/OS addresses 2150 - 215F.

Example 3 Resume SRDF for one device using Symmetrix device number:

```
#SC VOL,2100,RDF-RSUM,0050
```

Example 3 accesses the Symmetrix associated with z/OS address 2100 and SRDF suspend Symmetrix device number 0050. The device for z/OS address 2100 is used as a gatekeeper. In other words, the software uses that device to communicate with the Symmetrix. The action is not performed on 2100.

Example 4 Resume SRDF for a range of devices using Symmetrix device numbers:

```
#SC VOL,2100,RDF-RSUM,0050-005F
```

Example 4 accesses the Symmetrix unit associated with z/OS address 2100 and SRDF suspends Symmetrix device numbers 0050 thru 005F. The device for z/OS address 2100 is used as a gatekeeper. In other words, the software uses that device to communicate with the Symmetrix unit. The action is not performed on 2100.

Example 5 Resume SRDF for a range of devices using Symmetrix device numbers in a concurrent SRDF environment:

```
#SC VOL,LCL(4440,3),RDF-RSUM,0050-005F
```

Example 5 accesses the Symmetrix unit associated with z/OS address 4440, and SRDF suspends Symmetrix device numbers 0050 thru 005F for only SRDF group 03. The device for z/OS address 4440 is used as a gatekeeper. In other words, the software uses that device to communicate with the Symmetrix. The action is not performed on 4440.

Example 6 Change status to ready for a range of R2 devices from a host connected to an R1 device:

```
#SC VOL,RMT(8BD0),RDY,01D0-01DF
```

Example 6 accesses the Symmetrix unit associated with z/OS address 8BD0, and passes the command over the SRDF link to the target Symmetrix unit and changes the remote target Symmetrix device numbers 01D0 thru 01DF to a READY status.

Example 7 Change status to read only for one R2 device from host connected to a R1 device:

```
#SC VOL,RMT(8BD0,1),R/O,01D0
```

Example 7 accesses the Symmetrix unit associated with z/OS address 8BD0, and passes the command over the SRDF link defined to SRDF Group 01 to the target Symmetrix unit and changes the remote target Symmetrix device number 01D0 to READ ONLY status.

Example 8 Change status to read / write for a range of R2 devices from a host connected to an R1 device in a concurrent SRDF environment:

```
#SC VOL,RMT(4450,3),R/W,0060-006F
```

Example 8 accesses the Symmetrix unit associated with z/OS address 4450, and passes the command over the SRDF link defined to SRDF Group 03 to the target Symmetrix unit and changes the remote target Symmetrix device numbers 0060 thru 006F to READ / WRITE status.

Multihop List

The examples in this section explain how to carry out various SRDF operations in a multihop configuration. Refer to Figure 5-27.

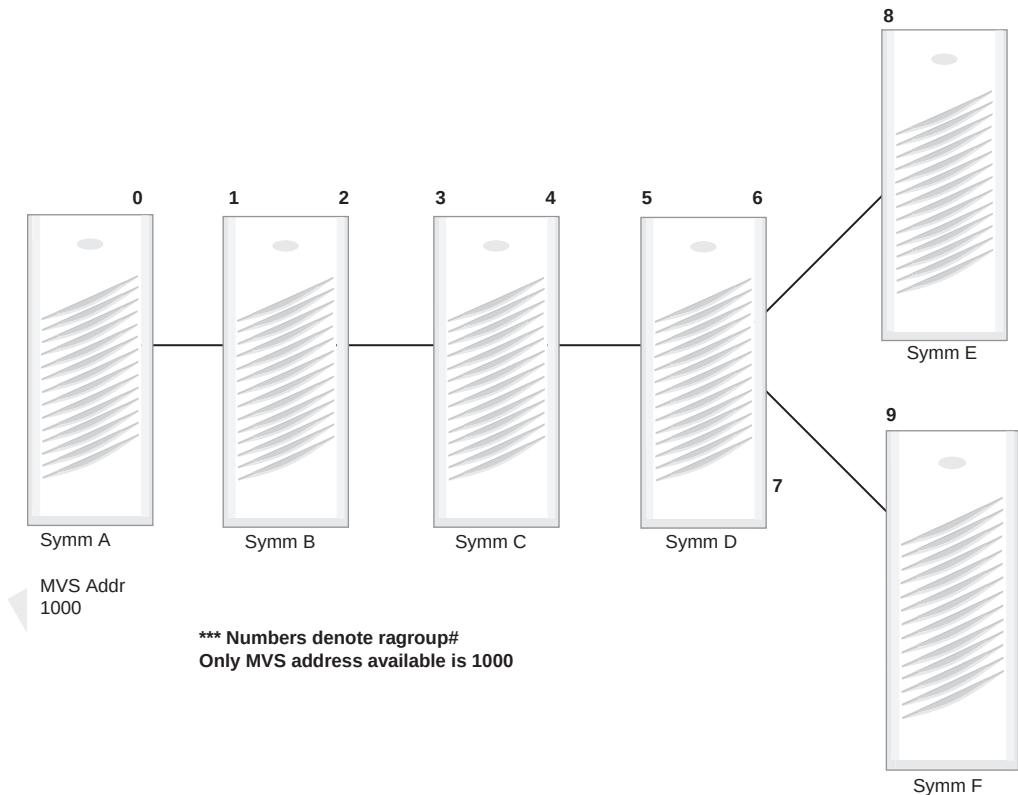


Figure 5-27 SRDF Multihop Configuration

Normally, configurations are created starting at SRDF group 0, but to make these examples easier to understand, we made them unique.

- ◆ Query 16 devices on Symm C, starting at symdev# 0070:
#SQ VOL,RMT(1000,0.2),16,0070
- ◆ Query all devices on Symm F:
#SQ VOL,RMT(1000,0.2.4.7),ALL

- ◆ Change all devices on Symm C to adaptive copy disk mode:
#SC VOL,RMT(1000,0.2),ADCOPY-DISK,ALL
- ◆ RDF Suspend devices 0080 - 00AF on Symm D to Symm E only:
#SC VOL,RMT(1000,0.2.4,6),RDF-SUSP,0080,48
- ◆ Change all R2s to R/W on Symm F:
#SC VOL,RMT(1000,0.2.4.7),R/W,ALL

Resetting an R1's TNR Status

The following examples assume an R1 controller at cuu=2100 and an R2 controller with no host attachment. The Symmetrix device range for the R1 controller is 020-02F. The Symmetrix device range for the R2 controller is 031-03F. The R1 controller (2100) is channel attached to the host. The R2 controller is connected to the R1 controller through RAGROUP 01.

A range of SRDF R1 devices can be in TNR status for a number of reasons. The most common is caused by RDF-SUSP action for the #SC VOL command:

```
#SC VOL,2100,RDF-SUSP,020-02F
```

The previous command sets the TNR status for the range of Symmetrix devices 020-02F in control unit 2100. Refer to Figure 5-28.

EMCQV00I SRDF-HC DISPLAY FOR (96) #SQ VOL,2100,16,020													
DV_ADDR	_SYM_				TOTAL	SYS	DCB	CNTLUNIT		R1	R2		
SYS CH	DEV	RDEV	GP	VOLSER	CYLS	STAT	OPN	STATUS	MR	INVTRK	INVTRK	%	
2120	20	0020	0030	00	MV2120	3339	OFFL	0 TNR-SY	L1	0	0	**	
2121	21	0021	0031	00	MV2121	3339	OFFL	0 TNR-SY	L1	0	0	**	
2122	22	0022	0032	00	MV2122	3339	OFFL	0 TNR-SY	L1	0	0	**	
2123	23	0023	0033	00	MV2123	3339	OFFL	0 TNR-SY	L1	0	0	**	
2124	24	0024	0034	00	MV2124	3339	OFFL	0 TNR-SY	L1	0	0	**	
2125	25	0025	0035	00	MV2125	3339	OFFL	0 TNR-SY	L1	0	0	**	
2126	26	0026	0036	00	MV2126	3339	OFFL	0 TNR-SY	L1	0	0	**	
2127	27	0027	0037	00	MV2127	3339	OFFL	0 TNR-SY	L1	0	0	**	
2128	28	0028	0038	00	MV2128	3339	OFFL	0 TNR-SY	L1	0	0	**	
2129	29	0029	0039	00	MV2129	3339	OFFL	0 TNR-SY	L1	0	0	**	
212A	2A	002A	003A	00	MV212A	3339	OFFL	0 TNR-SY	L1	0	0	**	
212B	2B	002B	003B	00	MV212B	3339	OFFL	0 TNR-SY	L1	0	0	**	
212C	2C	002C	003C	00	MV212C	3339	OFFL	0 TNR-SY	L1	0	0	**	
212D	2D	002D	003D	00	MV212D	3339	OFFL	0 TNR-SY	L1	0	0	**	
212E	2E	002E	003E	00	MV212E	3339	OFFL	0 TNR-SY	L1	0	0	**	
212F	2F	002F	003F	00	MV212F	3339	OFFL	0 TNR-SY	L1	0	0	**	

Figure 5-28 R1 Device Range After RDF-SUSP Action

If no I/O has been performed on the partner R2 devices, the R1 TNR status can be reset by the following command:

```
#SC VOL,2100,RDF-RSUM,020-02F
```

If the partner R2 devices have received I/O while the R1 TNR status existed, the RDF-RSUM action may fail. Refer to Figure 5-29.

The EMCCVCFE THE FOLLOWING DEVICES REQUIRE SPECIAL PROCESSING BEFORE RESUME message indicates that the partner R2 devices can be set to discard any changes that may have occurred.

```
EMCMN00I SRDF-HC : (58) #SQ VOL,RMT(2100,01),16,030
EMCQV00I SRDF-HC DISPLAY FOR (58) #SQ VOL,RMT(2100,01),16,020
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT| |R1| R2 |SY
SYS CH|DEV RDEV GP|VOLSER| CYLS|STAT|OPN|STATUS |MR|INVTRK|INVTRK| %
3130 30 0030 0020 00 MV2120 3339 ONPV 0 R/W -I L2 8 0 99
3131 31 0031 0021 00 MV2121 3339 ONPV 0 R/W -I L2 8 0 99
3132 32 0032 0022 00 MV2122 3339 ONPV 0 R/W -I L2 8 0 99
3133 33 0033 0023 00 MV2123 3339 ONPV 0 R/W -I L2 8 0 99
3134 34 0034 0024 00 MV2124 3339 ONPV 0 R/W -I L2 8 0 99
3135 35 0035 0025 00 MV2125 3339 ONPV 0 R/W -I L2 8 0 99
3136 36 0036 0026 00 MV2126 3339 ONPV 0 R/W -I L2 8 0 99
3137 37 0037 0027 00 MV2127 3339 ONPV 0 R/W -I L2 8 0 99
3138 38 0038 0028 00 MV2128 3339 ONPV 0 R/W -I L2 7 0 99
3139 39 0039 0029 00 MV2129 3339 ONPV 0 R/W -I L2 7 0 99
313A 3A 003A 002A 00 MV212A 3339 ONPV 0 R/W -I L2 7 0 99
313B 3B 003B 002B 00 MV212B 3339 ONPV 0 R/W -I L2 7 0 99
313C 3C 003C 002C 00 MV212C 3339 ONPV 0 R/W -I L2 7 0 99
313D 3D 003D 002D 00 MV212D 3339 ONPV 0 R/W -I L2 7 0 99
313E 3E 003E 002E 00 MV212E 3339 ONPV 0 R/W -I L2 7 0 99
313F 3F 003F 002F 00 MV212F 3339 ONPV 0 R/W -I L2 7 0 99
END OF DISPLAY
```

Figure 5-29 R2 Device Range Prior to Procedure

To reset TNR status of R1 devices and to clear R1 invalid tracks from R2 device display, perform the following steps:

1. Ensure the R1 control unit is set for SYNCH_DIRECTION of R1>R2 by issuing the following command:

```
#SC CNFG,2100,SYNCH_DIRECTION,R1>R2
```

2. Set the R2 device range to Read Only by issuing the following command:

```
#SC VOL,RMT(2100,01),R/O,030-03F
```

3. Prepare the range of changed R2 devices to discard any changed tracks by issuing the following command:

```
#SC VOL,RMT(2100,01),REFRESH,030-03F
```

4. Replace the R2 discarded tracks with R1 track data, and reset the R1 TNR status by issuing the following command:

```
#SC VOL,RMT(2100,01),RFR-RSUM,030-03F
```

5. Monitor the resynchronization process until all invalid tracks show zero by issuing the following commands:

```
#SQ VOL,2100,16,020
#SQ VOL,RMT(2100,01),16,030
```

Refer to Figure 5-30 and Figure 5-31 on page 5-161 for the status of the R1 and R2 devices after the procedure completes.

```
EMCMN00I SRDF-HC : (84) #SQ VOL,2100,16,020
EMCQV00I SRDF-HC DISPLAY FOR (84) #SQ VOL,2100,16,020 166
```

DV_ADDR	_SYM_		TOTAL	SYS	DCB	CNTLUNIT		R1	R2	SY			
SYS	CH	DEV	RDEV	GP	VOLSER	CYLS	STAT	OPN	STATUS	MR	INVTRK	INVTRK	%
2120	20	0020	0030	00	MV2120	3339	OFFL	0	R/W-SY	L1	0	0	**
2121	21	0021	0031	00	MV2121	3339	OFFL	0	R/W-SY	L1	0	0	**
2122	22	0022	0032	00	MV2122	3339	OFFL	0	R/W-SY	L1	0	0	**
2123	23	0023	0033	00	MV2123	3339	OFFL	0	R/W-SY	L1	0	0	**
2124	24	0024	0034	00	MV2124	3339	OFFL	0	R/W-SY	L1	0	0	**
2125	25	0025	0035	00	MV2125	3339	OFFL	0	R/W-SY	L1	0	0	**
2126	26	0026	0036	00	MV2126	3339	OFFL	0	R/W-SY	L1	0	0	**
2127	27	0027	0037	00	MV2127	3339	OFFL	0	R/W-SY	L1	0	0	**
2128	28	0028	0038	00	MV2128	3339	OFFL	0	R/W-SY	L1	0	0	**
2129	29	0029	0039	00	MV2129	3339	OFFL	0	R/W-SY	L1	0	0	**
212A	2A	002A	003A	00	MV212A	3339	OFFL	0	R/W-SY	L1	0	0	**
212B	2B	002B	003B	00	MV212B	3339	OFFL	0	R/W-SY	L1	0	0	**
212C	2C	002C	003C	00	MV212C	3339	OFFL	0	R/W-SY	L1	0	0	**
212D	2D	002D	003D	00	MV212D	3339	OFFL	0	R/W-SY	L1	0	0	**
212E	2E	002E	003E	00	MV212E	3339	OFFL	0	R/W-SY	L1	0	0	**
212F	2F	002F	003F	00	MV212F	3339	OFFL	0	R/W-SY	L1	0	0	**

```
END OF DISPLAY
```

Figure 5-30 Status of R1 Devices After the Procedure

```

EMCMN00I SRDF-HC : (98) #SQ VOL,RMT(2100,01),16,030
EMCQV00I SRDF-HC DISPLAY FOR (98) #SQ VOL,RMT(2100,01),16,030
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT| |R1| R2 |SY
SYS CH|DEV RDEV GP|VOLSER| CYLS|STAT|OPN|STATUS |MR|INVTRK|INVTRK| %
3130 30 0030 0020 00 MV2120 3339 ONPV 0 R/O L2 0 0 **
3131 31 0031 0021 00 MV2121 3339 ONPV 0 R/O L2 0 0 **
3132 32 0032 0022 00 MV2122 3339 ONPV 0 R/O L2 0 0 **
3133 33 0033 0023 00 MV2123 3339 ONPV 0 R/O L2 0 0 **
3134 34 0034 0024 00 MV2124 3339 ONPV 0 R/O L2 0 0 **
3135 35 0035 0025 00 MV2125 3339 ONPV 0 R/O L2 0 0 **
3136 36 0036 0026 00 MV2126 3339 ONPV 0 R/O L2 0 0 **
3137 37 0037 0027 00 MV2127 3339 ONPV 0 R/O L2 0 0 **
3138 38 0038 0028 00 MV2128 3339 ONPV 0 R/O L2 0 0 **
3139 39 0039 0029 00 MV2129 3339 ONPV 0 R/O L2 0 0 **
313A 3A 003A 002A 00 MV212A 3339 ONPV 0 R/O L2 0 0 **
313B 3B 003B 002B 00 MV212B 3339 ONPV 0 R/O L2 0 0 **
313C 3C 003C 002C 00 MV212C 3339 ONPV 0 R/O L2 0 0 **
313D 3D 003D 002D 00 MV212D 3339 ONPV 0 R/O L2 0 0 **
313E 3E 003E 002E 00 MV212E 3339 ONPV 0 R/O L2 0 0 **
313F 3F 003F 002F 00 MV212F 3339 ONPV 0 R/O L2 0 0 **
END OF DISPLAY

```

Figure 5-31 Status of R2 Devices After the Procedure

Personality Swap

The following example performs a personality swap of R1 and R2.

1. Query the R1s and R2s that will be swapped.

```

EMCMN00I SRDF-HC : (106) #SQ VOL,70CE,2
EMCQV00I SRDF-HC DISPLAY FOR (106) #SQ VOL,70CE,2 150
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT| |R1| R2 |SY
SYS CH|DEV RDEV GP|VOLSER| CYLS|STAT|OPN|STATUS |MR|INVTRK|INVTRK| %
70CE CE 008E 008E 01 ?????? 1113 OFFL 0 R/W-SY B1 0 0 **
70CF CF 008F 008F 01 ?????? 1113 OFFL 0 R/W-SY B1 0 0 **
END OF DISPLAY

EMCMN00I SRDF-HC : (108) #SQ VOL,RMT(70CE),2
EMCQV00I SRDF-HC DISPLAY FOR (108) #SQ VOL,RMT(70CE),2 201
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT| |R1| R2 |SY
SYS CH|DEV RDEV GP|VOLSER| CYLS|STAT|OPN|STATUS |MR|INVTRK|INVTRK| %
58CE CE 008E 008E 01 UDA08E 1113 OFFL 0 R/O -I R2 0 0 **
58CF CF 008F 008F 01 ?????? 1113 OFFL 0 R/O -I R2 0 0 **
END OF DISPLAY

```

2. Issue SWAP command to perform a personality swap of R1 and R2. Set the mode to ADCOPY-DISK. However, an error is received because RDF was not suspended.

```
EMCMN00I SRDF-HC : (109) #SC VOL,70CE,SWAP(ADCOPY-DISK)
EMCCV20E DEVICES MUST BE SUSPENDED 206
008E
EMCCV25I NO ELIGIBLE DEVICES FOUND, COMMAND ABORTED (CMD:109)
```

3. Suspend RDF.

```
EMCMN00I SRDF-HC : (110) #SC VOL,70CE-70CF,RDF-SUSP
EMCGM07I COMMAND COMPLETED (CMD:110)
```

4. Query devices to confirm RDF is suspended.

```
EMCMN00I SRDF-HC : (111) #SQ VOL,70CE,2
EMCQV00I SRDF-HC DISPLAY FOR (111) #SQ VOL,70CE,2 215
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT| |R1| R2 |SY
SYS CH|DEV RDEV GP|VOLSER|CYLS|STAT|OPN|STATUS |MR|INVTRK|INVTRK| %
70CE CE 008E 008E 01 ?????? 1113 OFFL 0 TNR-SY B1 0 0 **
70CF CF 008F 008F 01 ?????? 1113 OFFL 0 TNR-SY B1 0 0 **
END OF DISPLAY
```

5. Issue SWAP again for device 70CE.

```
EMCMN00I SRDF-HC : (112) #SC VOL,70CE,SWAP(ADCOPY-DISK)
EMCGM07I COMMAND COMPLETED (CMD:112)
```

6. Query devices to show the R1BCV is now a R2BCV and the remote R2 is now the R1.

```
EMCMN00I SRDF-HC : (113) #SQ VOL,70CE,2
EMCQV00I SRDF-HC DISPLAY FOR (113) #SQ VOL,70CE,2 224
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT| |R1| R2 |SY
SYS CH|DEV RDEV GP|VOLSER|CYLS|STAT|OPN|STATUS |MR|INVTRK|INVTRK| %
70CE CE 008E 008E 01 ?????? 1113 OFFL 0 N/R B2 0 0 **
70CF CF 008F 008F 01 ?????? 1113 OFFL 0 TNR-SY B1 0 0 **
END OF DISPLAY
```

```
EMCMN00I SRDF-HC : (114) #SQ VOL,RMT(70CE),2
EMCQV00I SRDF-HC DISPLAY FOR (114) #SQ VOL,RMT(70CE),2 227
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT| |R1| R2 |SY
SYS CH|DEV RDEV GP|VOLSER|CYLS|STAT|OPN|STATUS |MR|INVTRK|INVTRK| %
58CE CE 008E 008E 01 UDA08E 1113 OFFL 0 TNR-AD R1 0 0 **
58CF CF 008F 008F 01 ?????? 1113 OFFL 0 R/O -I R2 0 0 **
END OF DISPLAY
```


7. Issue a remote swap. It fails because it's not supported.

```
EMCMN00I SRDF-HC : (115) #SC VOL,RMT(70CE),SWAP(ADCOPY-DISK),8F
EMCMN50E RMT SPECIFICATION NOT SUPPORTED FOR SWAP (CMD:115)
```

8. Swap the other device.

```
EMCMN00I SRDF-HC : (116) #SC VOL,70CE,SWAP(ADCOPY-DISK),8F
EMCGM07I COMMAND COMPLETED (CMD:116)
```

```
EMCMN00I SRDF-HC : (117) #SQ VOL,70CE,2
EMCQV00I SRDF-HC DISPLAY FOR (117) #SQ VOL,70CE,2 441
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT| |R1| |R2|SY
SYS CH|DEV RDEV GP|VOLSER|CYLS|STAT|OPN|STATUS |MR|INVTRK|INVTRK| %
70CE CE 008E 008E 01 ?????? 1113 OFFL 0 N/R B2 0 0 **
70CF CF 008F 008F 01 ?????? 1113 OFFL 0 N/R B2 0 0 **
END OF DISPLAY
```

```
EMCMN00I SRDF-HC : (118) #SQ VOL,RMT(70CE),2
EMCQV00I SRDF-HC DISPLAY FOR (118) #SQ VOL,RMT(70CE),2 543
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT| |R1| |R2|SY
SYS CH|DEV RDEV GP|VOLSER|CYLS|STAT|OPN|STATUS |MR|INVTRK|INVTRK| %
58CE CE 008E 008E 01 UDA08E 1113 OFFL 0 TNR-AD R1 0 0 **
58CF CF 008F 008F 01 ?????? 1113 OFFL 0 TNR-AD R1 0 0 **
END OF DISPLAY
```

9. Resume RDF on the devices that are now the R1s.

```
EMCMN00I SRDF-HC : (119) #SC VOL,RMT(70CE),RDF-RSUM,8E-8F
EMCGM07I COMMAND COMPLETED (CMD:119)
```

10. Query the devices.

```
EMCMN00I SRDF-HC : (120) #SQ VOL,RMT(70CE),2
EMCQV00I SRDF-HC DISPLAY FOR (120) #SQ VOL,RMT(70CE),2 683
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT| |R1| |R2|SY
SYS CH|DEV RDEV GP|VOLSER|CYLS|STAT|OPN|STATUS |MR|INVTRK|INVTRK| %
58CE CE 008E 008E 01 UDA08E 1113 OFFL 0 R/W-AD R1 0 0 **
58CF CF 008F 008F 01 ?????? 1113 OFFL 0 R/W-AD R1 0 0 **
END OF DISPLAY
```

```
EMCMN00I SRDF-HC : (121) #SQ VOL,70CE,2
EMCQV00I SRDF-HC DISPLAY FOR (121) #SQ VOL,70CE,2 686
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT| |R1| |R2|SY
SYS CH|DEV RDEV GP|VOLSER|CYLS|STAT|OPN|STATUS |MR|INVTRK|INVTRK| %
70CE CE 008E 008E 01 ?????? 1113 OFFL 0 N/R B2 0 0 **
70CF CF 008F 008F 01 ?????? 1113 OFFL 0 N/R B2 0 0 **
END OF DISPLAY
```

Creating a Dynamic RDF Pair

The following example creates dynamic RDF pairs using the #SC VOL CREATEPAIR action code.

1. The #SQ CNFG command shows that dynamic RDF is turned on for the Symmetrix. It needs to be set for each device also.
#SQ LINK shows that it is a switched configuration.
#SQ RDFGRP displays the RDF group information.

```
EMCMN00I SRDF-HC : (44) #SQ CNFG,EC50
EMCGM11I SRDF-HC DISPLAY FOR (44) #SQ CNFG,EC50 466
SERIAL NUMBER: 000185500038 MEM: 8,192 MB TYPE:3990 MODEL: 8430
MICROCODE LEVEL: 5568-44
SWITCHED-RDF DYNAMIC-RDF NO-AUTO-LINK-RECOVERY LINKS-OFF-ON-POWERUP
LINKS-DOMINO: NO SYNCH_DIRECTION: GLOBAL LINK: LOCAL
SSID(S): EC00 EC01 EC02 EC03 EC04 EC05 EC06 EC07
          EC08 EC09 EC0A EC0B EC0C EC0D EC0E EC0F
          EC10 EC11 EC12 EC13 EC14 EC15
D01: DA D02: DA D03: EA D04: ___ D05: ___ D06: ___ D07: ___ D08: ___
D09: ___ D10: ___ D11: ___ D12: RF D13: ___ D14: EA D15: DA D16: DA
D17: DA D18: DA D19: EA D20: ___ D21: ___ D22: ___ D23: ___ D24: ___
D25: ___ D26: ___ D27: ___ D28: RF D29: ___ D30: EA D31: DA D32: DA
D33: ___ D34: ___ D35: EA D36: ___ D37: ___ D38: ___ D39: ___ D40: ___
D41: ___ D42: ___ D43: ___ D44: ___ D45: ___ D46: EA D47: ___ D48: ___
D49: ___ D50: ___ D51: EA D52: ___ D53: ___ D54: ___ D55: ___ D56: ___
D57: ___ D58: ___ D59: ___ D60: ___ D61: ___ D62: EA D63: ___ D64: ___
END OF DISPLAY
```

```
EMCMN00I SRDF-HC : (45) #SQ CNFG,9500
EMCGM11I SRDF-HC DISPLAY FOR (45) #SQ CNFG,9500 473
SERIAL NUMBER: 000184501803 MEM: 4,096 MB TYPE:2105 MODEL: 8430
MICROCODE LEVEL: 5568-44 CONCURRENT-RDF
SWITCHED-RDF DYNAMIC-RDF NO-AUTO-LINK-RECOVERY LINKS-OFF-ON-POWERUP
LINKS-DOMINO: NO SYNCH_DIRECTION: GLOBAL LINK: LOCAL
SSID(S): 9400 9401 9402
D01: DA D02: DA D03: RF D04: EA D05: ___ D06: ___ D07: ___ D08: ___
D09: ___ D10: ___ D11: ___ D12: ___ D13: SA D14: EA D15: DA D16: DA
D17: DA D18: DA D19: RF D20: R2 D21: ___ D22: ___ D23: ___ D24: ___
D25: ___ D26: ___ D27: ___ D28: ___ D29: SA D30: R2 D31: DA D32: DA
D33: ___ D34: ___ D35: ___ D36: ___ D37: ___ D38: ___ D39: ___ D40: ___
D41: ___ D42: ___ D43: ___ D44: ___ D45: ___ D46: ___ D47: ___ D48: ___
D49: ___ D50: ___ D51: ___ D52: ___ D53: ___ D54: ___ D55: ___ D56: ___
D57: ___ D58: ___ D59: ___ D60: ___ D61: ___ D62: ___ D63: ___ D64: ___
END OF DISPLAY
```

```
EMCMN00I SRDF-HC : (117) #SQ LINK,EC50,E
EMCQL01I SRDF-HC EXTENDED DISPLAY FOR (117) #SQ LINK,EC50,E
DR GP _OTHER_ S/N_ OD OG RCS | %S M:SS RATE| %L DD:HH:MM:SS  TOTAL-I/O
0C SW 000184501803 .. .. FYY | .. 6:59 12 | .. 19:21:04:58 13,672,690
1C SW 000184501803 .. .. FYY | .. 6:59 15 | .. 19:21:04:58 13,388,009
END OF DISPLAY
```

```
EMCMN00I SRDF-HC : (118) #SQ RDFGRP,EC50
EMCQR00I SRDF-HC DISPLAY FOR (118) #SQ RDFGRP,EC50
MY SERIAL #    MY MICROCODE
```

```
-----
000185500038      5568-44
```

```
MY GRP ONL PC OS GRP  OS SERIAL  OS MICROCODE SYNCHDIR
```

```
-----
00      N  U   00  .....
01      N  U   00  .....
02      N  U   00  .....
03      N  U   00  .....
04      Y  F   05  000184501803  5568-44  G(NONE)
05      Y  F   04  000184501803  5568-44  G(NONE)
```

```
END OF DISPLAY
```

2. EC50 – EC5F will be changed to the R1 devices. 9500 – 950F will be changed to the R2 devices. Notice because they are BCVs, they will become R2 BCVs. All normal TimeFinder operations can be completed on a R2 BCV, just like on a R1 BCV.

```
EMCMN00I SRDF-HC : (110) #SQ VOL,EC50,16
EMCQV00I SRDF-HC DISPLAY FOR (110) #SQ VOL,EC50,16
DV_ADDR| _SYM_ | |TOTAL|SYS|DCB|CNTLUNIT| | R1 | R2 |SY
SYS CH|DEV RDEV GP|VOLSER| CYLS|STAT|OPN|STATUS |MR|INVTRK|INVTRK| %
EC50 50 0050      MVEC50 3339 ONPV 0 R/W ML
EC51 51 0051      MVEC51 3339 ONPV 0 R/W ML
EC52 52 0052      MVEC52 3339 ONPV 0 R/W ML
EC53 53 0053      MVEC53 3339 ONPV 0 R/W ML
EC54 54 0054      MVEC54 3339 ONPV 0 R/W ML
EC55 55 0055      MVEC55 3339 ONPV 0 R/W ML
EC56 56 0056      MVEC56 3339 ONPV 0 R/W ML
EC57 57 0057      MVEC57 3339 ONPV 0 R/W ML
EC58 58 0058      MVEC58 3339 ONPV 0 R/W ML
EC59 59 0059      MVEC59 3339 ONPV 0 R/W ML
EC5A 5A 005A      MVEC5A 3339 ONPV 0 R/W ML
EC5B 5B 005B      MVEC5B 3339 ONPV 0 R/W ML
EC5C 5C 005C      MVEC5C 3339 ONPV 0 R/W ML
EC5D 5D 005D      MVEC5D 3339 ONPV 0 R/W ML
EC5E 5E 005E      MVEC5E 3339 ONPV 0 R/W ML
EC5F 5F 005F      MVEC5F 3339 ONPV 0 R/W ML
END OF DISPLAY
```

```

EMCMN00I SRDF-HC : (111) #SQ VOL,9500,16
EMCQV00I SRDF-HC DISPLAY FOR (111) #SQ VOL,9500,16
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT| |R1| R2 |SY
SYS CH|DEV RDEV GP|VOLSER| CYLS|STAT|OPN|STATUS |MR|INVTRK|INVTRK| %
9500 00 0100      ?????? 3339 OFFL 0 R/W      BC
9501 01 0101      ?????? 3339 OFFL 0 R/W      BC
9502 02 0102      ?????? 3339 OFFL 0 R/W      BC
9503 03 0103      ?????? 3339 OFFL 0 R/W      BC
9504 04 0104      ?????? 3339 OFFL 0 R/W      BC
9505 05 0105      ?????? 3339 OFFL 0 R/W      BC
9506 06 0106      ?????? 3339 OFFL 0 R/W      BC
9507 07 0107      ?????? 3339 OFFL 0 R/W      BC
9508 08 0108      ?????? 3339 OFFL 0 R/W      BC
9509 09 0109      ?????? 3339 OFFL 0 R/W      BC
950A 0A 010A      ?????? 3339 OFFL 0 R/W      BC
950B 0B 010B      ?????? 3339 OFFL 0 R/W      BC
950C 0C 010C      ?????? 3339 OFFL 0 R/W      BC
950D 0D 010D      ?????? 3339 OFFL 0 R/W      BC
950E 0E 010E      ?????? 3339 OFFL 0 R/W      BC
950F 0F 010F      ?????? 3339 OFFL 0 R/W      BC
END OF DISPLAY

```

3. Issue the CREATEPAIR command. The flags set to indicate the RDF mode will be adaptive copy disk and the R2s will be made not ready.

```

EMCMN00I SRDF-HC : (112) #SC
VOL,LCL(EC50,4),CREATEPAIR(ADCOPY-DISK,NRDY),0050-005F,100
EMCGM07I COMMAND COMPLETED (CMD:112)

```

4. Query devices to show they are now RDF devices and RDF is active.

```

EMCMN00I SRDF-HC : (120) #SQ VOL,9500,16
EMCQV00I SRDF-HC DISPLAY FOR (120) #SQ VOL,9500,16
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT| |R1| R2 |SY
SYS CH|DEV RDEV GP|VOLSER| CYLS|STAT|OPN|STATUS |MR|INVTRK|INVTRK| %
9500 00 0100 0050 04 ?????? 3339 OFFL 0 N/R      B2      0 40,024 20
9501 01 0101 0051 04 ?????? 3339 OFFL 0 N/R      B2      0 50,145 0
9502 02 0102 0052 04 ?????? 3339 OFFL 0 N/R      B2      0 25,314 49
9503 03 0103 0053 04 ?????? 3339 OFFL 0 N/R      B2      0 50,145 0
9504 04 0104 0054 04 ?????? 3339 OFFL 0 N/R      B2      0 32,178 35
9505 05 0105 0055 04 ?????? 3339 OFFL 0 N/R      B2      0 50,145 0
9506 06 0106 0056 04 ?????? 3339 OFFL 0 N/R      B2      0 50,145 0
9507 07 0107 0057 04 ?????? 3339 OFFL 0 N/R      B2      0 45,348 9
9508 08 0108 0058 04 ?????? 3339 OFFL 0 N/R      B2      0 45,486 9
9509 09 0109 0059 04 ?????? 3339 OFFL 0 N/R      B2      0 50,145 0
950A 0A 010A 005A 04 ?????? 3339 OFFL 0 N/R      B2      0 33,874 32
950B 0B 010B 005B 04 ?????? 3339 OFFL 0 N/R      B2      0 50,145 0

```

```

950C 0C 010C 005C 04 ?????? 3339 OFFL 0 N/R B2 0 50,145 0
950D 0D 010D 005D 04 ?????? 3339 OFFL 0 N/R B2 0 50,145 0
950E 0E 010E 005E 04 ?????? 3339 OFFL 0 N/R B2 0 50,145 0
950F 0F 010F 005F 04 ?????? 3339 OFFL 0 N/R B2 0 50,145 0
END OF DISPLAY

```

EMCMN00I SRDF-HC : (119) #SQ VOL,EC50,16

EMCQV00I SRDF-HC DISPLAY FOR (119) #SQ VOL,EC50,16

DV_ADDR	_SYM_			TOTAL	SYS	DCB	CNTLUNIT	R1	R2	SY			
SYS	CH	DEV	RDEV	GP	VOLSER	CYLS	STAT	OPN	STATUS	MR	INVTRK	INVTRK	%
EC50	50	0050	0100	05	MVEC50	3339	ONPV	0	R/W-AD	L1	0	40,777	18
EC51	51	0051	0101	05	MVEC51	3339	ONPV	0	R/W-AD	L1	0	50,145	0
EC52	52	0052	0102	05	MVEC52	3339	ONPV	0	R/W-AD	L1	0	25,995	48
EC53	53	0053	0103	05	MVEC53	3339	ONPV	0	R/W-AD	L1	0	50,145	0
EC54	54	0054	0104	05	MVEC54	3339	ONPV	0	R/W-AD	L1	0	32,799	34
EC55	55	0055	0105	05	MVEC55	3339	ONPV	0	R/W-AD	L1	0	50,145	0
EC56	56	0056	0106	05	MVEC56	3339	ONPV	0	R/W-AD	L1	0	50,145	0
EC57	57	0057	0107	05	MVEC57	3339	ONPV	0	R/W-AD	L1	0	45,599	8
EC58	58	0058	0108	05	MVEC58	3339	ONPV	0	R/W-AD	L1	0	46,089	7
EC59	59	0059	0109	05	MVEC59	3339	ONPV	0	R/W-AD	L1	0	50,145	0
EC5A	5A	005A	010A	05	MVEC5A	3339	ONPV	0	R/W-AD	L1	0	34,361	31
EC5B	5B	005B	010B	05	MVEC5B	3339	ONPV	0	R/W-AD	L1	0	50,145	0
EC5C	5C	005C	010C	05	MVEC5C	3339	ONPV	0	R/W-AD	L1	0	50,145	0
EC5D	5D	005D	010D	05	MVEC5D	3339	ONPV	0	R/W-AD	L1	0	50,145	0
EC5E	5E	005E	010E	05	MVEC5E	3339	ONPV	0	R/W-AD	L1	0	50,145	0
EC5F	5F	005F	010F	05	MVEC5F	3339	ONPV	0	R/W-AD	L1	0	50,145	0

END OF DISPLAY

5. Suspend RDF for devices EC58 through EC5F and query devices until all invalid tracks are sent for devices EC50 thru EC57.

EMCMN00I SRDF-HC : (121) #SC VOL,EC50,RDF-SUSP,58-5F

EMCGM07I COMMAND COMPLETED (CMD:121)

EMCMN00I SRDF-HC : (122) #SQ VOL,EC50,16

EMCQV00I SRDF-HC DISPLAY FOR (122) #SQ VOL,EC50,16

DV_ADDR	_SYM_			TOTAL	SYS	DCB	CNTLUNIT	R1	R2	SY			
SYS	CH	DEV	RDEV	GP	VOLSER	CYLS	STAT	OPN	STATUS	MR	INVTRK	INVTRK	%
EC50	50	0050	0100	05	MVEC50	3339	ONPV	0	R/W-AD	L1	0	22,304	55
EC51	51	0051	0101	05	MVEC51	3339	ONPV	0	R/W-AD	L1	0	41,812	16
EC52	52	0052	0102	05	MVEC52	3339	ONPV	0	R/W-AD	L1	0	6,808	86
EC53	53	0053	0103	05	MVEC53	3339	ONPV	0	R/W-AD	L1	0	50,145	0
EC54	54	0054	0104	05	MVEC54	3339	ONPV	0	R/W-AD	L1	0	20,927	58
EC55	55	0055	0105	05	MVEC55	3339	ONPV	0	R/W-AD	L1	0	50,145	0
EC56	56	0056	0106	05	MVEC56	3339	ONPV	0	R/W-AD	L1	0	50,145	0
EC57	57	0057	0107	05	MVEC57	3339	ONPV	0	R/W-AD	L1	0	35,477	29
EC58	58	0058	0108	05	MVEC58	3339	ONPV	0	TNR-AD	L1	0	36,424	27
EC59	59	0059	0109	05	MVEC59	3339	ONPV	0	TNR-AD	L1	0	50,145	0
EC5A	5A	005A	010A	05	MVEC5A	3339	ONPV	0	TNR-AD	L1	0	25,028	50
EC5B	5B	005B	010B	05	MVEC5B	3339	ONPV	0	TNR-AD	L1	0	46,429	7

```

EC5C 5C 005C 010C 05 MVEC5C 3339 ONPV 0 TNR-AD L1 0 50,145 0
EC5D 5D 005D 010D 05 MVEC5D 3339 ONPV 0 TNR-AD L1 0 50,145 0
EC5E 5E 005E 010E 05 MVEC5E 3339 ONPV 0 TNR-AD L1 0 47,525 5
EC5F 5F 005F 010F 05 MVEC5F 3339 ONPV 0 TNR-AD L1 0 50,145 0
END OF DISPLAY

```

```

EMCMN00I SRDF-HC : (125) #SQ VOL,EC50,16
EMCQV00I SRDF-HC DISPLAY FOR (125) #SQ VOL,EC50,16
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT| |R1| |R2|SY
SYS CH|DEV RDEV GP|VOLSER|CYLS|STAT|OPN|STATUS |MR|INVTRK|INVTRK| %
EC50 50 0050 0100 05 MVEC50 3339 ONPV 0 R/W-AD L1 0 0 **
EC51 51 0051 0101 05 MVEC51 3339 ONPV 0 R/W-AD L1 0 0 **
EC52 52 0052 0102 05 MVEC52 3339 ONPV 0 R/W-AD L1 0 0 **
EC53 53 0053 0103 05 MVEC53 3339 ONPV 0 R/W-AD L1 0 0 **
EC54 54 0054 0104 05 MVEC54 3339 ONPV 0 R/W-AD L1 0 0 **
EC55 55 0055 0105 05 MVEC55 3339 ONPV 0 R/W-AD L1 0 0 **
EC56 56 0056 0106 05 MVEC56 3339 ONPV 0 R/W-AD L1 0 0 **
EC57 57 0057 0107 05 MVEC57 3339 ONPV 0 R/W-AD L1 0 0 **
EC58 58 0058 0108 05 MVEC58 3339 ONPV 0 TNR-AD L1 0 36,424 27
EC59 59 0059 0109 05 MVEC59 3339 ONPV 0 TNR-AD L1 0 50,145 0
EC5A 5A 005A 010A 05 MVEC5A 3339 ONPV 0 TNR-AD L1 0 25,028 50
EC5B 5B 005B 010B 05 MVEC5B 3339 ONPV 0 TNR-AD L1 0 46,429 7
EC5C 5C 005C 010C 05 MVEC5C 3339 ONPV 0 TNR-AD L1 0 50,145 0
EC5D 5D 005D 010D 05 MVEC5D 3339 ONPV 0 TNR-AD L1 0 50,145 0
EC5E 5E 005E 010E 05 MVEC5E 3339 ONPV 0 TNR-AD L1 0 47,525 5
EC5F 5F 005F 010F 05 MVEC5F 3339 ONPV 0 TNR-AD L1 0 50,145 0
END OF DISPLAY

```

- Issue DELETEDPAIR to delete RDF pairs for EC50 through EC57. You will receive EMCCV20E because RDF was still active. Suspend RDF and re-issue the DELETEDPAIR command successfully. Notice in the last queries that R1s are now standard devices and R2s are now BCVs.

```

EMCMN00I SRDF-HC : (128) #SC VOL,EC50,DELETEDPAIR,0050-0057
EMCCV20E DEVICES MUST BE SUSPENDED
0050-0057
EMCCV25I NO ELIGIBLE DEVICES FOUND, COMMAND ABORTED (CMD:128)

```

```

EMCMN00I SRDF-HC : (129) #SC VOL,EC50-EC5F,RDF-SUSP
EMCGM07I COMMAND COMPLETED (CMD:129)

```

```

EMCMN00I SRDF-HC : (130) #SQ VOL,EC50,16
EMCQV00I SRDF-HC DISPLAY FOR (130) #SQ VOL,EC50,16
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT| |R1| |R2|SY
SYS CH|DEV RDEV GP|VOLSER|CYLS|STAT|OPN|STATUS |MR|INVTRK|INVTRK| %
EC50 50 0050 0100 05 MVEC50 3339 ONPV 0 TNR-AD L1 0 0 **
EC51 51 0051 0101 05 MVEC51 3339 ONPV 0 TNR-AD L1 0 0 **
EC52 52 0052 0102 05 MVEC52 3339 ONPV 0 TNR-AD L1 0 0 **
EC53 53 0053 0103 05 MVEC53 3339 ONPV 0 TNR-AD L1 0 0 **

```

```

EC54 54 0054 0104 05 MVEC54 3339 ONPV 0 TNR-AD L1 0 0 **
EC55 55 0055 0105 05 MVEC55 3339 ONPV 0 TNR-AD L1 0 0 **
EC56 56 0056 0106 05 MVEC56 3339 ONPV 0 TNR-AD L1 0 0 **
EC57 57 0057 0107 05 MVEC57 3339 ONPV 0 TNR-AD L1 0 0 **
EC58 58 0058 0108 05 MVEC58 3339 ONPV 0 TNR-AD L1 0 36,424 27
EC59 59 0059 0109 05 MVEC59 3339 ONPV 0 TNR-AD L1 0 50,145 0
EC5A 5A 005A 010A 05 MVEC5A 3339 ONPV 0 TNR-AD L1 0 25,028 50
EC5B 5B 005B 010B 05 MVEC5B 3339 ONPV 0 TNR-AD L1 0 46,429 7
EC5C 5C 005C 010C 05 MVEC5C 3339 ONPV 0 TNR-AD L1 0 50,145 0
EC5D 5D 005D 010D 05 MVEC5D 3339 ONPV 0 TNR-AD L1 0 50,145 0
EC5E 5E 005E 010E 05 MVEC5E 3339 ONPV 0 TNR-AD L1 0 47,525 5
EC5F 5F 005F 010F 05 MVEC5F 3339 ONPV 0 TNR-AD L1 0 50,145 0
END OF DISPLAY

```

```

EMCMN00I SRDF-HC : (131) #SC VOL,EC50,DELETEPAIR,0050-0057
EMCGM07I COMMAND COMPLETED (CMD:131)

```

```

EMCMN00I SRDF-HC : (132) #SQ VOL,EC50,16
EMCQV00I SRDF-HC DISPLAY FOR (132) #SQ VOL,EC50,16
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT| |R1| R2 |SY
SYS CH|DEV RDEV GP|VOLSER|CYLS|STAT|OPN|STATUS |MR|INVTRK|INVTRK| %
EC50 50 0050 MVEC50 3339 ONPV 0 R/W ML
EC51 51 0051 MVEC51 3339 ONPV 0 R/W ML
EC52 52 0052 MVEC52 3339 ONPV 0 R/W ML
EC53 53 0053 MVEC53 3339 ONPV 0 R/W ML
EC54 54 0054 MVEC54 3339 ONPV 0 R/W ML
EC55 55 0055 MVEC55 3339 ONPV 0 R/W ML
EC56 56 0056 MVEC56 3339 ONPV 0 R/W ML
EC57 57 0057 MVEC57 3339 ONPV 0 R/W ML
EC58 58 0058 0108 05 MVEC58 3339 ONPV 0 TNR-AD L1 0 36,424 27
EC59 59 0059 0109 05 MVEC59 3339 ONPV 0 TNR-AD L1 0 50,145 0
EC5A 5A 005A 010A 05 MVEC5A 3339 ONPV 0 TNR-AD L1 0 25,028 50
EC5B 5B 005B 010B 05 MVEC5B 3339 ONPV 0 TNR-AD L1 0 46,429 7
EC5C 5C 005C 010C 05 MVEC5C 3339 ONPV 0 TNR-AD L1 0 50,145 0
EC5D 5D 005D 010D 05 MVEC5D 3339 ONPV 0 TNR-AD L1 0 50,145 0
EC5E 5E 005E 010E 05 MVEC5E 3339 ONPV 0 TNR-AD L1 0 47,525 5
EC5F 5F 005F 010F 05 MVEC5F 3339 ONPV 0 TNR-AD L1 0 50,145 0
END OF DISPLAY

```

```

EMCMN00I SRDF-HC : (133) #SQ VOL,9500,16
EMCQV00I SRDF-HC DISPLAY FOR (133) #SQ VOL,9500,16
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT| |R1| R2 |SY
SYS CH|DEV RDEV GP|VOLSER|CYLS|STAT|OPN|STATUS |MR|INVTRK|INVTRK| %
9500 00 0100 ?????? 3339 OFFL 0 R/W BC
9501 01 0101 ?????? 3339 OFFL 0 R/W BC
9502 02 0102 ?????? 3339 OFFL 0 R/W BC
9503 03 0103 ?????? 3339 OFFL 0 R/W BC
9504 04 0104 ?????? 3339 OFFL 0 R/W BC
9505 05 0105 ?????? 3339 OFFL 0 R/W BC
9506 06 0106 ?????? 3339 OFFL 0 R/W BC
9507 07 0107 ?????? 3339 OFFL 0 R/W BC
9508 08 0108 0058 04 ?????? 3339 OFFL 0 N/R B2 0 36,424 27

```

```

9509 09 0109 0059 04 ?????? 3339 OFFL 0 N/R B2 0 50,145 0
950A 0A 010A 005A 04 ?????? 3339 OFFL 0 N/R B2 0 25,028 50
950B 0B 010B 005B 04 ?????? 3339 OFFL 0 N/R B2 0 46,429 7
950C 0C 010C 005C 04 ?????? 3339 OFFL 0 N/R B2 0 50,145 0
950D 0D 010D 005D 04 ?????? 3339 OFFL 0 N/R B2 0 50,145 0
950E 0E 010E 005E 04 ?????? 3339 OFFL 0 N/R B2 0 47,525 5
950F 0F 010F 005F 04 ?????? 3339 OFFL 0 N/R B2 0 50,145 0
END OF DISPLAY

```

7. Issue the DELETEPAIR command to devices EC58 thru EC5F. However; because of invalid tracks owed to the R2, an EMCCVE5W warning is received and the command is aborted.

```

EMCMN00I SRDF-HC : (134) #SC VOL,EC50,DELETEPAIR,0058-005A
EMCCVE5W DELETEPAIR: R1 INDICATES DATA OWED TO THE R2
0108-010A
EMCGM10I COMMAND ABORTED (CMD:134)

```

8. Issue the DELETEPAIR command to devices EC58 thru EC5F with the FORCE option. You will continue to receive EMCCVE5W warnings because there are tracks owed, but the command is successful. The last queries show that devices are as they were in step 2.

```

EMCMN00I SRDF-HC : (135) #SC VOL,EC50,DELETEPAIR(FORCE),0058-005F
EMCCVE5W DELETEPAIR: R1 INDICATES DATA OWED TO THE R2
0108-010F
EMCGM07I COMMAND COMPLETED (CMD:135)

```

```

EMCMN00I SRDF-HC : (136) #SQ VOL,EC50,16
EMCQV00I SRDF-HC DISPLAY FOR (136) #SQ VOL,EC50,16
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT| |R1| |R2|SY
SYS CH|DEV RDEV GP|VOLSER|CYLS|STAT|OPN|STATUS |MR|INVTRK|INVTRK| %
EC50 50 0050 MVEC50 3339 ONPV 0 R/W ML
EC51 51 0051 MVEC51 3339 ONPV 0 R/W ML
EC52 52 0052 MVEC52 3339 ONPV 0 R/W ML
EC53 53 0053 MVEC53 3339 ONPV 0 R/W ML
EC54 54 0054 MVEC54 3339 ONPV 0 R/W ML
EC55 55 0055 MVEC55 3339 ONPV 0 R/W ML
EC56 56 0056 MVEC56 3339 ONPV 0 R/W ML
EC57 57 0057 MVEC57 3339 ONPV 0 R/W ML
EC58 58 0058 MVEC58 3339 ONPV 0 R/W ML
EC59 59 0059 MVEC59 3339 ONPV 0 R/W ML
EC5A 5A 005A MVEC5A 3339 ONPV 0 R/W ML
EC5B 5B 005B MVEC5B 3339 ONPV 0 R/W ML
EC5C 5C 005C MVEC5C 3339 ONPV 0 R/W ML
EC5D 5D 005D MVEC5D 3339 ONPV 0 R/W ML
EC5E 5E 005E MVEC5E 3339 ONPV 0 R/W ML
EC5F 5F 005F MVEC5F 3339 ONPV 0 R/W ML

```


END OF DISPLAY

```
EMCMN00I SRDF-HC : (137) #SQ VOL,9500,16
EMCQV00I SRDF-HC DISPLAY FOR (137) #SQ VOL,9500,16
DV_ADDR|_SYM_|TOTAL|SYS|DCB|CNTLUNIT| |R1| |R2|SY
SYS CH|DEV RDEV GP|VOLSER|CYLS|STAT|OPN|STATUS |MR|INVTRK|INVTRK| %
9500 00 0100      ?????? 3339 OFFL 0 R/W      BC
9501 01 0101      ?????? 3339 OFFL 0 R/W      BC
9502 02 0102      ?????? 3339 OFFL 0 R/W      BC
9503 03 0103      ?????? 3339 OFFL 0 R/W      BC
9504 04 0104      ?????? 3339 OFFL 0 R/W      BC
9505 05 0105      ?????? 3339 OFFL 0 R/W      BC
9506 06 0106      ?????? 3339 OFFL 0 R/W      BC
9507 07 0107      ?????? 3339 OFFL 0 R/W      BC
9508 08 0108      ?????? 3339 OFFL 0 R/W      BC
9509 09 0109      ?????? 3339 OFFL 0 R/W      BC
950A 0A 010A      ?????? 3339 OFFL 0 R/W      BC
950B 0B 010B      ?????? 3339 OFFL 0 R/W      BC
950C 0C 010C      ?????? 3339 OFFL 0 R/W      BC
950D 0D 010D      ?????? 3339 OFFL 0 R/W      BC
950E 0E 010E      ?????? 3339 OFFL 0 R/W      BC
950F 0F 010F      ?????? 3339 OFFL 0 R/W      BC
END OF DISPLAY
```

Creating an RDF Group

The following example demonstrates how to create an RDF group.

1. Find the remote box's serial number using the #SQ CNFG,cuu command (or #SQ CNFG,RMT(cuu)).

```
EMCGM11I SRDF-HC DISPLAY FOR (43) #SQ CNFG,9680
SERIAL NUMBER: 000187990132 MEM:32,768 MB TYPE:2105 MODEL: DMX800
MICROCODE LEVEL: 5671-00 CONCURRENT-RDF
CONCURRENT DRDF: YES
SWITCHED-RDF DYNAMIC-RDF NO-AUTO-LINKS RDFGRP LINKS-OFF-ON-POWERUP
LINKS-DOMINO: RDFGRP SYNCH_DIRECTION: GLOBAL LINK: LOCAL
SSID(S): 9600 9601 0001 0140 0141
D01: DF D02: EF D03: __ D04: __ D05: __ D06: __ D07: __ D08: __
D09: __ D10: __ D11: __ D12: __ D13: __ D14: __ D15: EF D16: DF
D17: DF D18: __ D19: __ D20: __ D21: __ D22: __ D23: __ D24: __
D25: __ D26: __ D27: __ D28: __ D29: __ D30: __ D31: __ D32: DF
D33: SF D34: __ D35: __ D36: __ D37: __ D38: __ D39: __ D40: __
D41: __ D42: __ D43: __ D44: __ D45: __ D46: __ D47: __ D48: SF
D49: RF D50: RE D51: __ D52: __ D53: __ D54: __ D55: __ D56: __
D57: __ D58: __ D59: __ D60: __ D61: __ D62: __ D63: RE D64: RF
END OF DISPLAY
```

2. Get the link director numbers for both the remote and local boxes using the #SQ LINK, cuu and the #SQ LINK, RMT(cuu) commands.

Multiple RAs can be selected and specified in the command. See *Modifying an RDF Group* on page 5-175.

```
EMCQL00I SRDF-HC DISPLAY FOR (46) #SQ LINK, 6D50
CUU_ DIR RA P CONN _STATUS_ MM:SS I/O-RATE DDD:HH:MM:SS _TOTAL-I/O_
6D50 33 RF 1 Y ONLINE 04:17 2 000:15:25:15 409,986
6D50 3E RF 1 Y ONLINE 04:18 2 000:15:25:15 281,568
END OF DISPLAY
```

```
EMCQL00I SRDF-HC DISPLAY FOR (47) #SQ LINK, RMT(6D50, 01)
CUU_ DIR RA P CONN _STATUS_ MM:SS I/O-RATE DDD:HH:MM:SS _TOTAL-I/O_
6D50 31 RF 1 Y ONLINE 07:20 27 000:18:35:31 1,557,176
6D50 32 RE 1 Y ONLINE 07:16 0 000:18:35:43 29,709
6D50 3F RE 1 Y ONLINE 07:16 0 000:18:35:39 29,588
6D50 40 RF 1 Y ONLINE 07:19 10 000:18:35:31 727,387
END OF DISPLAY
```

3. Select an RDFGRP group number that is not already being used on both the local and the remote boxes. Use the #SQ RDFGRP, cuu command and the #SQ RDFGRP, RMT(cuu) command to see what is being used.

```
EMCQR00I SRDF-HC DISPLAY FOR (48) #SQ RDFGRP, 6D50
MY SERIAL # MY MICROCODE
-----
000000006185 5671-00

MY GRP ONL PC OS GRP OS SERIAL OS MICROCODE SYNCHDIR FEATURE
-----
 LABEL TYPE AUTO-LINKS-RECOVERY LINKS_DOMINO
-----
 01 Y F 32 000187990132 5671-00 G(R1>R2)
RDFDVGROUP STATIC NO-AUTO-LINKS-RECOVERY LINKS-DOMINO:NO

 10 Y F 05 000187990132 5671-00 G(R1>R2)
RDFDVGROUP STATIC NO-AUTO-LINKS-RECOVERY LINKS-DOMINO:NO

END OF DISPLAY
```

```
EMCMN00I SRDF-HC : (49) #SQ RDFGRP,RMT(6D50,01)
EMCQR00I SRDF-HC DISPLAY FOR (49) #SQ RDFGRP,RMT(6D50,01) 375
MY SERIAL #    MY MICROCODE
-----
000187990132    5671-00
```

```
MY GRP ONL PC OS GRP  OS SERIAL    OS MICROCODE SYNCHDIR FEATURE
-----
```

```
  LABEL          TYPE      AUTO-LINKS-RECOVERY    LINKS_DOMINO
-----
   05      Y      F      10      000000006185    5671-00    G(R1>R2)
RDFDVGROUP STATIC NO-AUTO-LINKS-RECOVERY LINKS-DOMINO:NO
```

```
   11      Y      I      10      000187990175    5670-73    G(R1>R2)
GIGEB2C    STATIC      AUTO-LINKS-RECOVERY LINKS-DOMINO:NO
```

```
   12      Y      I      13      000187990171    5670-71    G(R1>R2)
GIGEC2D    STATIC      AUTO-LINKS-RECOVERY LINKS-DOMINO:NO
```

```
   32      Y      F      01      000000006185    5671-00    G(R1>R2)
RDFDVGROUP STATIC NO-AUTO-LINKS-RECOVERY LINKS-DOMINO:NO
END OF DISPLAY
```

4. Select a label name (any 8 characters).
5. Build the command.

```
#SC
RDFGRP,cuu,lclrdfgrp,ADD,LDIR(##),RDIR(##),RSER(#####),RGRP
(##),LABEL(XXXXXXXX)
```

or from the displays above:

```
EMCMN00I SRDF-HC : (17) #SC
  RDFGRP,6D50,14,ADD,LDIR(33),RDIR(31),RSER(000187990132),RGRP(17),LABEL(MSF71)
EMCGM07I COMMAND COMPLETED (CMD:17)
EMCGM40I COMMAND HAS FINISHED FOR BOX 000000006185 (CMD:17)
```

Build the ragroup on multiple directors:

```
#SC
RDFGRP,cuu,lclrdfgrp,ADD,LDIR(##,##),RDIR(##,##),RSER(#####)
),RGRP(##),LABEL(XXXXXXXX)
```

```
EMCMN00I SRDF-HC : (55) #SC
  RDFGRP,6D50,14,ADD,LDIR(33,3E),RDIR(31,40),RGRP(17),RSER(000187990132),LABEL(
MSF71)
EMCGM07I COMMAND COMPLETED (CMD:55)
EMCGM40I COMMAND HAS FINISHED FOR BOX 000000006185 (CMD:55)
```

6. Issue SQ RDFGRP, cuu to see the newly created group:

```
EMCMN00I SRDF-HC : (50) #SQ RDFGRP,6D50
EMCQR00I SRDF-HC DISPLAY FOR (50) #SQ RDFGRP,6D50 859
MY SERIAL #    MY MICROCODE
-----
000000006185    5671-00
```

```
MY GRP ONL PC OS GRP  OS SERIAL    OS MICROCODE SYNCHDIR FEATURE
-----
```

LABEL	TYPE	AUTO-LINKS-RECOVERY	LINKS_DOMINO
01	Y F 32	000187990132 5671-00	G(R1>R2)
RDFDVGROUP	STATIC	NO-AUTO-LINKS-RECOVERY	LINKS-DOMINO:NO

10	Y F 05	000187990132 5671-00	G(R1>R2)
RDFDVGROUP	STATIC	NO-AUTO-LINKS-RECOVERY	LINKS-DOMINO:NO

14	Y F 17	000187990132 5671-00	G(R1>R2)
MSF71	DYNAMIC	AUTO-LINKS-RECOVERY	LINKS-DOMINO:NO

END OF DISPLAY

```
EMCQR00I SRDF-HC DISPLAY FOR (51) #SQ RDFGRP,RMT(6D50,01) 867
MY SERIAL #    MY MICROCODE
-----
000187990132    5671-00
```

```
MY GRP ONL PC OS GRP  OS SERIAL    OS MICROCODE SYNCHDIR FEATURE
-----
```

LABEL	TYPE	AUTO-LINKS-RECOVERY	LINKS_DOMINO
05	Y F 10	000000006185 5671-00	G(R1>R2)
RDFDVGROUP	STATIC	NO-AUTO-LINKS-RECOVERY	LINKS-DOMINO:NO

11	Y I 10	000187990175 5670-73	G(R1>R2)
GIGEB2C	STATIC	AUTO-LINKS-RECOVERY	LINKS-DOMINO:NO

12	Y I 13	000187990171 5670-71	G(R1>R2)
GIGEC2D	STATIC	AUTO-LINKS-RECOVERY	LINKS-DOMINO:NO

17	Y F 14	000000006185 5671-00	G(R1>R2)
MSF71	DYNAMIC	AUTO-LINKS-RECOVERY	LINKS-DOMINO:NO

32	Y F 01	000000006185 5671-00	G(R1>R2)
RDFDVGROUP	STATIC	NO-AUTO-LINKS-RECOVERY	LINKS-DOMINO:NO

END OF DISPLAY

Modifying an RDF Group

Director numbers can be modified, added, or deleted.

1. Issue command #SQ RDFGRP, cuu, RA(#):

```
EMCQR00I SRDF-HC DISPLAY FOR (57) #SQ RDFGRP, 6D50, RA(23)
MY SERIAL #    MY MICROCODE
-----
000000006185    5671-00

MY GRP ONL PC OS GRP  OS SERIAL  OS MICROCODE SYNCHDIR FEATURE
-----
  LABEL      TYPE    AUTO-LINKS-RECOVERY    LINKS_DOMINO
-----
    23      Y    F    23    000187990132    5671-00    G(R1>R2)
MSF712      DYNAMIC    AUTO-LINKS-RECOVERY LINKS-DOMINO:NO

MY DIR# OS RA# ST -----MY WWN----- --IN COUNT---- --OUT COUNT----
-----
    33      30    02 5006048800060A52 000000000008FBF8 000000000002C538
                                000000000008FBF8 000000000002C538

END OF DISPLAY
```

2. Issue the RDFGRP modify command to add another director to the group.

```
EMCMN00I SRDF-HC : (58) #SC RDFGRP, 6D50, 23, MODIFY, LDIR(+3E), RDIR(+40)
EMCGM07I COMMAND COMPLETED (CMD:58)
EMCGM40I COMMAND HAS FINISHED FOR BOX 000000006185 (CMD:58)
```

- Issue the `SQ RDFGRP,uu,RA(xx)` command to see the change. Note that the other side director number is one less than what is actually specified.

```
EMCQR00I SRDF-HC DISPLAY FOR (59) #SQ RDFGRP,6D50,RA(23)
MY SERIAL #    MY MICROCODE
-----
000000006185    5671-00

MY GRP ONL PC OS GRP  OS SERIAL  OS MICROCODE SYNCHDIR FEATURE
-----
  LABEL      TYPE    AUTO-LINKS-RECOVERY    LINKS_DOMINO
-----
    23      Y    F    23    000187990132    5671-00    G(R1>R2)
MSF712      DYNAMIC    AUTO-LINKS-RECOVERY    LINKS-DOMINO:NO

MY DIR# OS RA# ST -----MY WWN----- ----IN COUNT----- --OUT COUNT----
-----
    33      30    02 5006048800060A52 000000000000DAE20 00000000000035280
          3F    02                      00000000000029348 000000000000105C8
                               00000000000104168 00000000000045848

    3E      3F    02 5006048800060A5D 000000000000189E8 000000000000080D0
          30    02                      00000000000010568 00000000000008888
                               00000000000028F50 00000000000010958

END OF DISPLAY
```

- You can also remove director numbers by issuing the modify command.

```
EMCMN00I SRDF-HC : (60) #SCRDFGRP,6D50,23,MODIFY,LDIR(-3E),RDIR(-40)
EMCGM07I COMMAND COMPLETED (CMD:60)
EMCGM40I COMMAND HAS FINISHED FOR BOX 000000006185 (CMD:60)

EMCMN00I SRDF-HC : (61) #SQ RDFGRP,6D50,RA(23)
EMCQR00I SRDF-HC DISPLAY FOR (61) #SQ RDFGRP,6D50,RA(23) 754
MY SERIAL #    MY MICROCODE
-----
000000006185    5671-00

MY GRP ONL PC OS GRP  OS SERIAL  OS MICROCODE SYNCHDIR FEATURE
-----
  LABEL      TYPE    AUTO-LINKS-RECOVERY    LINKS_DOMINO
-----
    23      Y    F    23    000187990132    5671-00    G(R1>R2)
MSF712      DYNAMIC    AUTO-LINKS-RECOVERY    LINKS-DOMINO:NO

MY DIR# OS RA# ST -----MY WWN----- ----IN COUNT----- --OUT COUNT----
-----
    33      30    02 5006048800060A52 0000000000010C9E0 00000000000035A80
                               0000000000010C9E0 00000000000035A80

END OF DISPLAY
```

5. SRDF Batch can be set up to run this as needed.

```
//EMCSRDF EXEC PGM=EMCSRDF
//STEPLIB DD DSN=YOUR.SRDF.LINKLIB,DISP=SHR
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
#SQ RDFGRP,6D50
#SC RDFGRP,6D50,17,ADD,LDIR(33),RDIR(31),RSER(000187990132), -
  LABEL(MSF71),RGRP(14)
#SQ RDFGRP,6D50
#SQ V,6D50
```

DRAFT
EMC CONFIDENTIAL

DRAFT
EMC CONFIDENTIAL

This chapter outlines the steps involved in performing data recovery procedures in an SRDF environment. Topics include:

- ◆ Getting Started.....6-2
- ◆ Recovering Using Operational Host 6-3
- ◆ Testing Recovery Procedures 6-6
- ◆ Procedure 1: R2 Read / Write Testing 6-9
- ◆ Procedure 2: Synchronization Method Selection.....6-14
- ◆ Procedure 3: R1>R2 Full Volume Resynchronization 6-17
- ◆ Procedure 4: R1<R2 Full Volume Resynchronization 6-26
- ◆ Procedure 5: R1>R2 Changed Tracks Resynchronization 6-35
- ◆ Procedure 6: R1<R2 Changed Tracks Resynchronization 6-41
- ◆ SRDF / A Recovery Scenarios.....6-50
- ◆ SRDF / A MSC Recovery Scenario.....6-52
- ◆ Stand-Alone Recovery for SRDF / A MSC 6-54

Getting Started

Before attempting any of the procedures in this chapter, please review the following:

- ◆ Note that cuu refers to the z/OS device number of the device and dev# refers to the Symmetrix device number.
- ◆ The following Symmetrix configuration parameters must be specified:
 - Enable Links Domino NO
 - Prevent auto links recovery after all links failure? YES
 - Force RAs Links offline after power-up? YES

Contact your EMC Customer Support Engineer to verify parameters.

Resuming SRDF/A Operation

Resuming SRDF/A involves planning. If you are going to use the SRDF/A target R2 disks for processing after an SRDF/A suspension caused by a DROP or PEND_DROP, follow the same procedures for resuming SRDF that are documented in this chapter.

More Information: Refer to *SRDF/A Recovery Scenarios* on page 6-50 for a discussion of SRDF/A recovery.



CAUTION

Your configuration, the specific nature of the outage, and any special circumstances that may exist, dictate the specific recovery steps that are required. Always contact the EMC Customer Support Center for assistance in a recovery situation. EMC personnel are trained for proper handling of these situations. An incorrect action during the recovery process can result in data corruption. Concurrent SRDF configurations require special recovery considerations.

Recovering Using Operational Host

This section describes an example of procedures to be performed in an actual recovery situation.

The following site definitions are used throughout these procedures:

- ◆ Operational site — host and Symmetrix unit containing target (R2) volumes to be brought online.
- ◆ Nonoperational site — host and Symmetrix unit containing source (R1) volumes that experienced an outage.

Making the Operational Site Available

To write enable all target (R2) volumes to the host at the operational site, perform the following steps:

1. Disable the links by either disabling the Remote Link Director (RLD) switches on both Symmetrix units, disconnecting the link cables, or entering the following command:

```
#SC LINKS, cuu, ALL, OFFLINE
```

2. Set all target (R2) volumes to a “ready” state to the operational host by entering the following command:

```
#SC VOL, cuu, RDY, ALL
```

3. Write enable all volumes on the operational Symmetrix unit with an R2 designation by entering the following command:

```
#SC VOL, cuu, R/W, ALL
```

Any target (R2) volume configured with the Invalid Tracks Attribute (#SQ VOL command shows status xxx-xx-I) goes RNR (RDF - not ready) if the R1 partner device indicates R2 invalid tracks. Use the RDF-RDY action with the #SC VOL command to clear this not ready condition.

If the links are offline, you receive the EMCPC081I RAGROUP SPECIFIED DOES NOT EXIST message. However, the devices are changed to a read / write status. You can issue an SQ STATE message to confirm.

More Information: Refer to #SQ STATE on page 5-94.

4. Vary the devices online.

All volumes at the operational Symmetrix unit are now available for I/O operations with the host at that site.

When Nonoperational Site Becomes Available

When the host and Symmetrix unit at the nonoperational site are ready to be brought back online, perform the following steps:

Important: Remember that before read / write operations to the source (R1) volumes can be resumed, all target (R2) volumes must be set to read only.

At the operational site, perform the following steps:

1. Stop I/O operations with the operational Symmetrix unit, and vary devices offline from the operational host.
2. Make all target (R2) volumes on the operational Symmetrix unit read only and optionally not ready to the operational host (as per the original configuration) by entering the following command:

```
#SC VOL, cuu, R/O, ALL
```

and optionally:

```
#SC VOL, cuu, NRDY, ALL
```

3. Enable the Remote Link Directors on the operational Symmetrix unit by either enabling the RLD switches on both Symmetrix, connecting the link cables, or entering the following command:

```
#SC LINK, cuu, ONLINE
```

At the site of the original outage (nonoperational host and Symmetrix unit), perform the following steps:

1. Disable the channel directors and RLDs on the nonoperational Symmetrix unit to prevent host I/O processing until ready for synchronization.
2. Reconnect the link cables, if they were previously disconnected.
3. Power up the newly-operational Symmetrix unit.

At this point, the EMC technician verifies that no invalid tracks exist, and that the Symmetrix unit is ready for resynchronization. In concurrent SRDF configurations, special considerations apply. If both target (R2) devices have invalid tracks for their partner source (R1), manual intervention is required.

4. Enable the Remote Link Directors.

The two Symmetrix units begin synchronizing. When the links synchronize, the previously operational Symmetrix unit begins copying its data to the newly operational Symmetrix unit.

After synchronization begins, the newly operational Symmetrix can be made available for host I/O processing.

5. Enable the channel directors.
6. IPL the newly operational host system.
7. Vary the devices of the newly operational host system online, if necessary.

You can track the resynchronization process by entering the following command:

```
#SQ VOL, cuu, INV_TRKS
```

DRAFT
EMC CONFIDENTIAL

Testing Recovery Procedures

In a normal SRDF device relationship, the source (R1) device may be synchronized with its target (R2) device, or it may contain updated tracks, which the RLD has not yet sent to the target (R2) device (semi-synchronous or adaptive copy state). In addition, in a normal operating environment, the target (R2) volume is in a read-only mode.

- ◆ R1>R2 resynchronization describes a process by which any updates to the target (R2) volume made during read / write testing are discarded, and updates made to the source (R1) volume during that same time are sent to the target (R2) volume.
- ◆ R1<R2 resynchronization describes a process by which any updates to the source (R1) volume made during read / write testing to the target (R2) volume are discarded, and updates made to the target (R2) volume are sent to the source (R1) volume.

Resynchronization control is a result of the SYNCH_DIRECTION setting, and the sequence of SRDF Host Component commands issued in the following procedures. SYNCH_DIRECTION is not saved in the Symmetrix storage subsystem.

You can test recovery procedures by enabling write operations to the target (R2) volumes. The procedures in this section show how to do this task and how to resynchronize your SRDF pairs, and resume normal operations when testing is completed.

When performing the procedures described in this chapter, you are directed to issue commands either at the host with access to the source (R1) device or at the host with access to the target (R2) device. For Enginuity microcode at 5x66 and higher, you can redirect commands across the link using the `RMT(cuu[,mhlist][,ragroup#])` option. For Enginuity microcode at 5x64 and higher, you can redirect commands across a single link, not multihop configurations. Therefore, you are given the option to enter all commands from the same host and to redirect the commands to be issued for a remote Symmetrix across the link.

In concurrent SRDF configurations, special considerations apply. The procedures in this chapter are designed to apply to only one of the partner (R2) devices at a time. If both partner devices (R2) have been updated, the partner (R2) whose changes are to be retained must be determined. The procedures are then to be executed completely for this partner (R2). At that time, the process to discard the other partner (R2) updates should be performed.

The following procedures are provided:

- ◆ *Procedure 1: R2 Read/Write Testing* on page 6-9
- ◆ *Procedure 2: Synchronization Method Selection* on page 6-14
- ◆ *Procedure 3: R1>R2 Full Volume Resynchronization* on page 6-17
 - *3-R1: Resynchronization from a Host with R1 Access* on page 6-20
 - *3-R2: Resynchronization from a Host with R2 Access* on page 6-23
- ◆ *Procedure 4: R1<R2 Full Volume Resynchronization* on page 6-26
 - *4-R1: Resynchronization from a Host with R1 Access* on page 6-29
 - *4-R2: Resynchronization from a Host with R2 Access* on page 6-32
- ◆ *Procedure 5: R1>R2 Changed Tracks Resynchronization* on page 6-35
 - *5-R1: Resynchronization from a Host with R1 Access* on page 6-37
 - *5-R2: Resynchronization from a Host with R2 Access* on page 6-39
- ◆ *Procedure 6: R1<R2 Changed Tracks Resynchronization* on page 6-41
 - *6-R1: Resynchronization from a Host with R1 Access* on page 6-44
 - *6-R2: Resynchronization from a Host with R2 Access* on page 6-47

Conventions

The following conventions are used in these procedures:

- ◆ dev# = Symmetrix device number
- ◆ R1 = source volume
- ◆ R2 = target volume
- ◆ R1cuu = z / OS address of an R1 device

For concurrent SRDF configurations, the LCL (cuup, ragroup#) or RMT (cuup, mhlist, ragroup#) syntax is used to specify the correct partner device.

- ◆ R2cuu = z / OS address of a R2 device

For concurrent SRDF configurations, the LCL (*cuup*, *ragroup#*) or RMT (*cuup*, *mhlist*, *ragroup#*) syntax is used to specify the correct partner device.

- ◆ *ragrp#* = specifies the *ragroup#* through which you want to perform an operation. This must be a 1- or 2-digit (hex) value, representing the *ragroup#*. For concurrent SRDF configurations, *ragroup#* identifies the partner device for the operation to be performed.

DRAFT
EMC CONFIDENTIAL

Procedure 1: R2 Read/Write Testing

Before performing R2 Read / Write testing, you must:

- ◆ Synchronize the source (R1) and target (R2) volumes
- ◆ Suspend SRDF operations between the devices
- ◆ Make the devices ready
- ◆ Write enable the target (R2) volumes

Any source (R1) volumes configured in the Adaptive Copy mode may have a number of tracks (up to the value of the Adaptive Copy Skew) that have not been synchronized.

To ensure complete synchronization prior to suspending SRDF operations, Adaptive Copy mode must be disabled, and all tracks allowed to synchronize. This synchronization can be verified with the `#SQ ADC` command. When all tracks have been synchronized, volumes return to their default mode (synchronous or semi-synchronous) and no longer list when the `#SQ ADC` command is run. Use the `#SQ VOL` command to verify that the volumes are in the synchronous or semi-synchronous mode prior to issuing the `RDF-SUSP` action code.

Perform the following steps:

1. Suspend SRDF operations for the pair(s) by entering the following command at the host with access to the source (R1) volume(s):

```
#SC VOL, R1cuu, RDF-SUSP [, dev# | ALL]
```

Any source (R1) volume configured with the Domino Attribute option goes RNR (volumes not ready for SRDF operations) when SRDF operations are suspended. To clear this not ready condition, you must disable the Domino Attribute option on those “not ready” volumes, and enable those devices for SRDF operation, using the `RDF-RDY` action with the `#SC VOL` command.

2. Make the target (R2) volume(s) ready to receive I / O from the host by entering the following command at the host with access to the target (R2) volume(s):

```
#SC VOL, R2cuu, RDY [, dev# | ALL]
```

3. Write enable the target (R2) volume(s) by entering the following command at the host with access to the target (R2) volume(s):

```
#SC VOL, R2cuu, R/W [, dev# | ALL]
```

Any target (R2) volume configured with the Invalid Tracks Attribute (#SQ VOL command shows status xxx-xx-I) goes RNR if the R1 partner device indicates R2 invalid tracks. Use the RDF-RDY action with the #SC VOL command to clear this not ready condition.

4. Vary the target (R2) volume(s) online to z/OS by entering the following command at the host with access to the target (R2) volume(s):

```
V, R2cuu, ONLINE
```

DRAFT
EMC CONFIDENTIAL

Figure 6-1 is a representation of this procedure. Please note that actions to be performed on the host with access to the source (R1) volume are shown in the boxes on the left, and actions to be performed on the host with access to the target (R2) volume are shown in the boxes to the right.

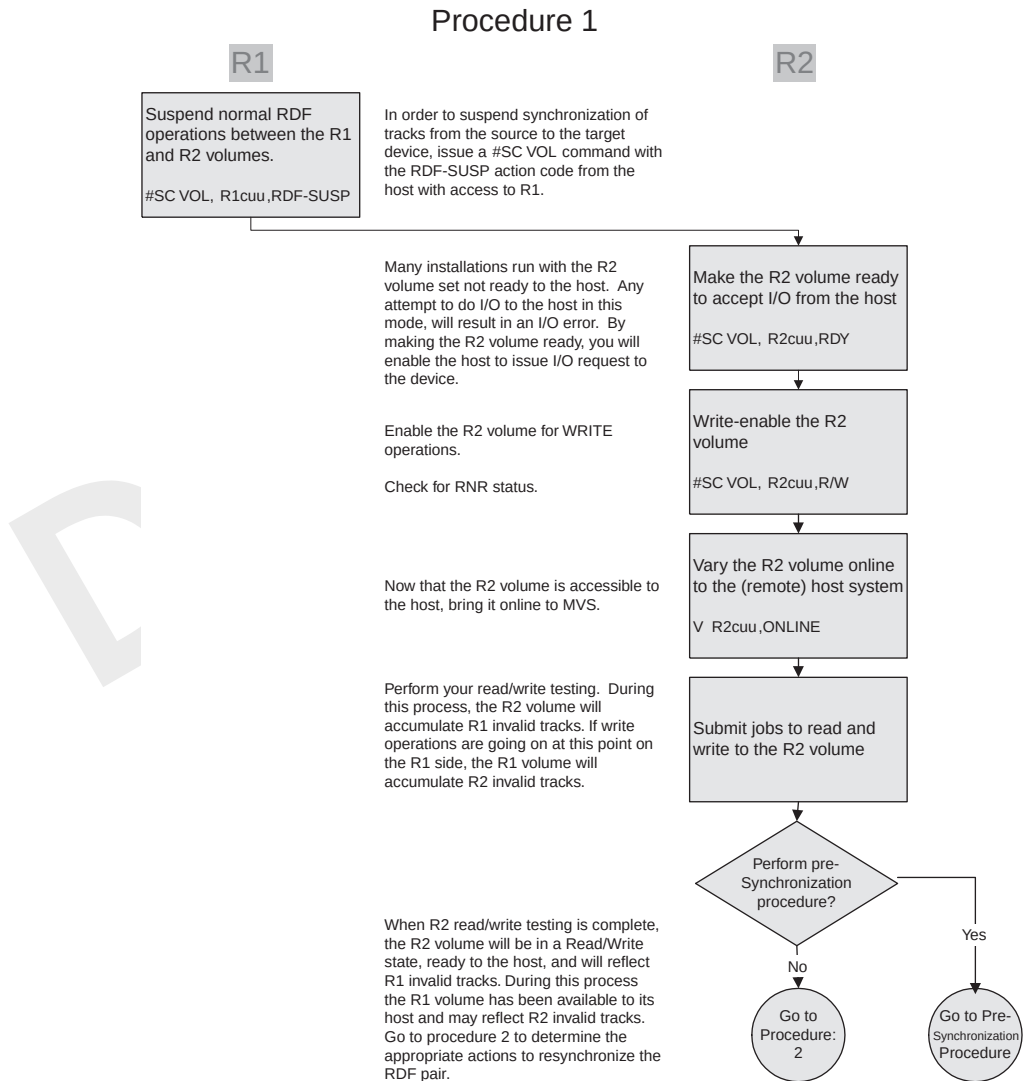


Figure 6-1 R2 Read/Write Testing

Presynchronization Procedure R1<R2

The #SC VOL command actions, PREFRESH and PRE-RSUM, provide a way to begin synchronizing an R1 from an R2 that is still R/W to a host. This option is useful when work needs to continue at the R2 site prior to moving the active workload back to the R1 site.

Performing a presynchronization procedure before the workload is restarted on the R1 can result in many of the tracks owed to the R1 from the R2 to already be synchronized when the R2 is made R/O. This reduces the number of I/Os that need to access the R/O R2 to resolve invalid tracks owed to the R1. The number of remaining tracks to synchronize can be determined with the #SQ VOL command. This information can be useful in determining when to move the workload to the R1 site.

Multiple cycles of commands are used to move the invalids owed the R1 from the R2. Each cycle of commands determines the invalid tracks that exist at the time the commands are executed. While this group of invalid tracks is moving from the R2 to the R1, new invalid tracks are accumulating on the R/W R2. Each command cycle determines the invalid tracks at that point in time. This probably includes tracks that have previously been moved. This is due to the continued write activity on the R2 where tracks may be written to multiple times during the presynchronization period.

Each command cycle progresses toward a lower total number of invalids. The invalid count does not reach zero unless the write activity on the R2 stops. After a relatively low number of invalids is achieved, the decision to stop the workload and make the R2 R/O can occur.

After the desired number of invalid tracks is achieved, the R2 workload is stopped. The R2 is placed in an R/O state and optionally not ready.

Go to 6-R2: *Resynchronization from a Host with R2 Access* on page 6-47 to complete the resynchronization of the SRDF pair.

Important: The R1 must not be used for work during the presynchronization procedure. This procedure is only valid for moving information from an active R2 to the nonoperational sites R1.

Because it is likely that the commands are issued from the operation host that the R/W R2s are attached to, the RMT formats of the commands are used in the examples.

The sequence of commands for each cycle are:

Cycle 1:

```
#SC VOL,R2cuu,SYNCH_DIRECTION,R1<R2           Set synch_direction R1<R2
#SC VOL,RMT(R2cuu,ragroup#),RDF-NRDY[,dev#|ALL] Place the R1 into the RNR state
#SC VOL,RMT(R2cuu,ragroup#),PREFRESH[,dev#|ALL] Prepare to refresh from the updated R2 tracks
#SC VOL,RMT(R2cuu,ragroup#),PRE-RSUM[,dev#|ALL] Commence synchronization R1<R2
```

Cycle 2:

```
#SC VOL,R2cuu, SYNCH_DIRECTION, R1<R2           Set synch_direction R1<R2
#SC VOL,RMT(R2cuu,ragroup#),RDF-NRDY[,dev#|ALL] Place the R1 into the RNR state
#SC VOL,RMT(R2cuu,ragroup#),PREFRESH[,dev#|ALL] Prepare to refresh from the updated R2 tracks
#SC VOL,RMT(R2cuu,ragroup#),PRE-RSUM[,dev#|ALL] Commence synchronization R1<R2
```

Final Cycle:

Vary the target (R2) volume(s) offline, and make them read only, and optionally not ready by entering the following command(s) at the host with access to the target (R2) volume(s):

```
#SC VOL,R2cuu,R/O[,dev#|ALL]
```

and optionally:

```
#SC VOL,R2cuu,NRDY[,dev#|ALL]
```

When the INV_TRK value reaches the desired level, go to 6-R2: *Resynchronization from a Host with R2 Access* on page 6-47 to complete the resynchronization of the SRDF pair.

Procedure 2: Synchronization Method Selection

Select the appropriate procedure for resynchronization of the source (R1) and the target (R2), and resume normal operations. This procedure sets the target (R2) volume to the read-only mode and not ready for host access.

The recovery procedures require that SRDF activity be suspended (RDF-SUSP) and the SRDF links be operational. The first step in Procedure 1 is to suspend SRDF operations using the `#SC VOL, cuu, RDF-SUSP` command. If the SRDF links have been physically disconnected (due to link failure or intentional action) prior to executing Step 1 to RDF-SUSP the volumes, an `#SC VOL, cuu, RDF-SUSP, ALL` command must be issued to suspend the volumes before the SRDF links are physically reconnected and before beginning the resynchronization processes of Procedure 2 and Procedures 3, 4, 5, or 6.

Perform the following steps:

1. Vary the target (R2) volume(s) offline, and make them read only and optionally not ready by entering the following command at the host with access to the target (R2) volume(s):
`#SC VOL, R2cuu, R/O [, dev# | , ALL]`
 and optionally:
`#SC VOL, R2cuu, NRDY [, dev# | , ALL]`
2. Determine the invalid tracks of each source (R1) and target (R2) volume involved in R2 read / write testing by entering the following command:
`#SQ VOL, cuu, INV_TRKS`
3. Choose your synchronization procedure from Table 6-1 on page 6-15, based on the state of the remotely mirrored pair and the desired scope of the synchronization (in other words, changed tracks or full volume).

Table 6-1 Synchronization Procedure Selections

R1 indicates R2 Invalid Tracks	R2 indicates R1 Invalid Tracks	Discard Updates to	Scope	
			Full Volume	Changed Tracks
N	N		Procedure 3	Procedure 5
Y	N	NONE	Procedure 3	Procedure 5
Y	N	R1	Procedure 4	Procedure 6
	Y	NONE/R1	Procedure 4	Procedure 6
	Y	R2	Procedure 3	Procedure 5

If circumstances encountered during your testing prevent you from determining the correct procedure to follow, or if you encounter unexpected results, contact the EMC Customer Support Center for technical assistance.

Figure 6-2 is a representation of the previous procedure. Please note that actions to be performed on the host with access to the source (R1) volume are shown in the boxes on the left, and actions to be performed on the host with access to the target (R2) volume are shown in the boxes to the right.

Procedure 2:

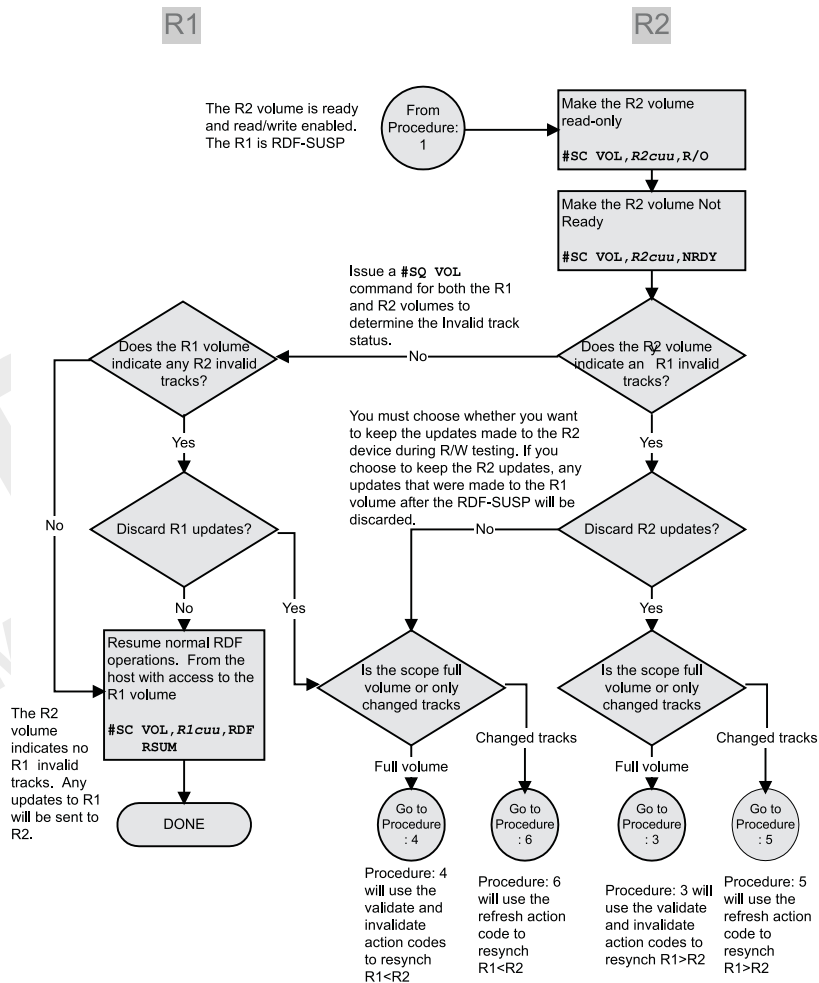


Figure 6-2 Synchronization Method

Procedure 3: R1>R2 Full Volume Resynchronization

This procedure resynchronizes the SRDF pair after R2 read / write testing. Any updates to the target (R2) volume that were made after the RDF-SUSP action code was executed are discarded, and any updates to the source (R1) volume are retained.

Perform the following steps:

1. Set the current synchronization direction from source to target (R1 > R2) by entering the following command at the host with access to the source (R1) volumes:


```
#SC CNFG, R1cuu, SYNCH_DIRECTION, R1>R2
```

and entering the following command at the host with access to the target (R2) volumes:


```
#SC CNFG, R2cuu, SYNCH_DIRECTION, R1>R2
```
2. Determine which target (R2) volumes have a nonzero R1 INV_TRKS value by entering the following command at the host with access to the target (R2) volume(s):


```
#SQ VOL, R2cuu, INV_TRKS
```
3. For all target (R2) volumes with nonzero R1 INV_TRKS values:

Validate all invalid tracks for the source (R1) volume(s) on the target (R2) volume by entering the following command at the host with access to the target (R2) volume:

```
#SC VOL, R2cuu, VALIDATE[, dev#|, ALL]
```

(dev# = target (R2) volume with an R1 INV_TRKS value greater than 0)

If ALL was not the specified parameter, repeat Step 3 for each target (R2) volume with a nonzero R1 INV_TRKS value for a source (R1) volume.

4. Verify all target (R2) volumes have an R1 INV_TRKS value equal to 0 by entering the following command at the host with access to the target (R2) volume(s):


```
#SQ VOL, R2cuu, INV_TRKS
```

5. For all source (R1) volumes whose target (R2) volume was write enabled and had an R1 INV_TRK value greater than 0 (prior to Step 2):

Invalidate all valid tracks for the target (R2) volume on the source (R1) volume by entering the following command at the host with access to the source (R1) volume:

```
#SC VOL, R1cuu, INVALIDATE[, dev# | , ALL]
```

(dev# = source (R1) volume whose target (R2) volume had an R1 INV_TRKS value greater than 0)

When the Invalidate completes, the R2 Invalid track count goes to maximum for the device, the TNR status disappears, and resynchronization begins.

The SRDF Host Component monitors the process of invalidating all target tracks until complete.

6. Monitor the resynchronization process until complete by entering the following command at the host with access the source (R1) volumes:

```
#SQ VOL, R1cuu, INV_TRKS
```

Figure 6-3 is a representation of this procedure. Please note that actions to be performed on the host with access to the source (R1) volume are shown in the boxes on the left, and actions to be performed on the host with access to the target (R2) volume are shown in the boxes to the right.

Procedure 3:

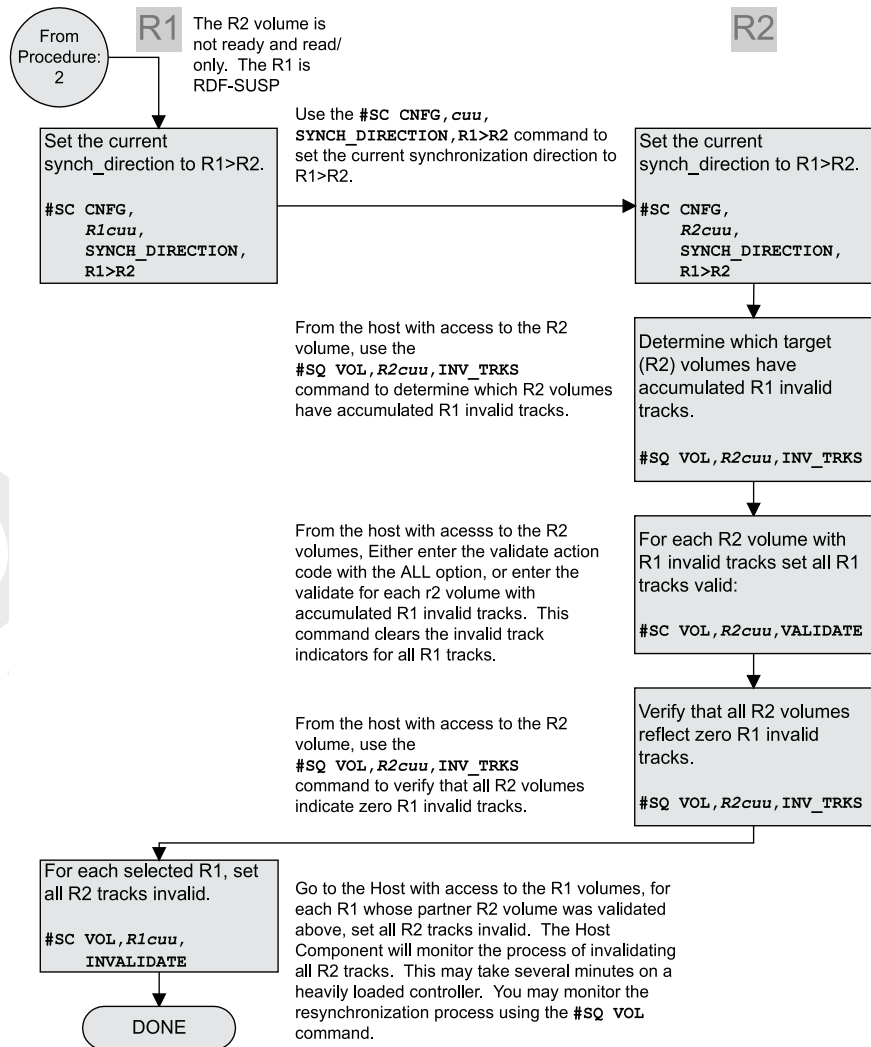


Figure 6-3 R1>R2 Full Volume Resynchronization

3-R1: Resynchronization from a Host with R1Access

This procedure applies to Symmetrix units at Enginuity microcode level 5x64 and higher.

This procedure resynchronizes the SRDF pair after R2 read / write activity. All updates to the target (R2) volume that were made after the RDF-SUSP action code was executed are discarded, and all updates to the source (R1) volume are retained.

This procedure requires that all commands are entered using a local R1 (source) Symmetrix.

Perform the following steps:

1. Set the current synchronization direction from source to target (R1 > R2) by entering the following command at the host with access to the source (R1) volumes:

```
#SC CNFG, R1cuu, SYNCH_DIRECTION, R1>R2
```
2. Identify which target (R2) volumes have a nonzero R1 INV_TRKS value by entering the following command:

```
#SQ VOL, RMT (R1cuu, ragrp#) , INV_TRKS
```
3. For all target (R2) volumes with nonzero R1 INV_TRKS values:
 Validate all invalid tracks for the source (R1) volume(s) on the target (R2) volume by entering the following command:

```
#SC VOL, RMT (R1cuu, ragrp#) , VALIDATE [ , dev# | , ALL]
```
4. Verify all target (R2) volumes have an R1 INV_TRKS value equal to 0 by entering the following command:

```
#SQ VOL, RMT (R1cuu, ragrp#) , INV_TRKS
```
5. For all source (R1) volumes whose target (R2) volumes were write enabled and had an R1 INV_TRK value greater than 0 (prior to Step 2):

Invalidate all valid tracks for the target (R2) volume on the source (R1) volume by entering the following command:

```
#SC VOL, R1cuu, INVALIDATE [ , dev# | , ALL]
```

When the Invalidate completes, the R2 Invalid track count goes to maximum for the device, the TNR status disappears, and resynchronization begins.

The SRDF Host Component monitors the process of invalidating all target tracks until complete. This may take several minutes per device in a busy Symmetrix.

6. Monitor the resynchronization process until complete by entering the following command at the host with access the source (R1) volumes:

```
#SQ VOL, R1cuu, INV_TRKS
```

DRAFT
EMC CONFIDENTIAL

Figure 6-4 is a representation of this procedure. Please note that actions to be performed on the host with access to the source (R1) volume are shown in the boxes on the left, and actions to be performed on the host with access to the target (R2) volume are shown in the boxes to the right.

Procedure 3-R1

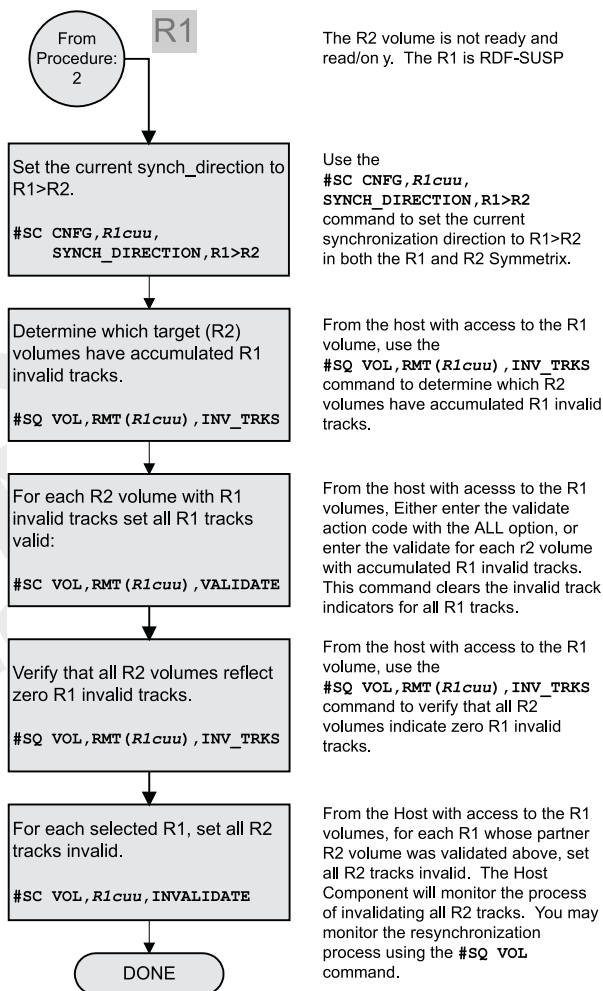


Figure 6-4 R1>R2 Full Volume Resynchronization from a Host with R1 Access

3-R2: Resynchronization from a Host with R2 Access

This procedure applies to Symmetrix units at Enginuity microcode level 5x64 and higher.

This procedure resynchronizes the SRDF pair after R2 read / write host activity. All updates to the target (R2) volume that were made after the RDF-SUSP action code was executed are discarded, and all updates to the source (R1) volume are retained.

This procedure requires that all commands are entered using a local R2 (target) Symmetrix.

Perform the following steps:

1. Set the current synchronization direction from source to target (R1 > R2) by entering the following command at the host with access to the source (R1) volumes:

```
#SC CNFG, R2cuu, SYNCH_DIRECTION, R1>R2
```
2. Identify which target (R2) volumes have a nonzero R1 INV_TRKS value by entering the following command:

```
#SQ VOL, R2cuu, INV_TRKS
```
3. For all target (R2) volumes with nonzero R1 INV_TRKS values:
 Validate all invalid tracks for the source (R1) volume(s) on the target (R2) volume by entering the following command:

```
#SC VOL, R2cuu, VALIDATE[, dev# | , ALL]
```
4. Verify all target (R2) volumes have an R1 INV_TRKS value equal to 0 by entering the following command:

```
#SQ VOL, R2cuu, INV_TRKS
```
5. For all source (R1) volumes whose target (R2) volumes were write enabled and had an R1 INV_TRK value greater than 0 (prior to step 2): Invalidate all valid tracks for the target (R2) volume on the source (R1) volume by entering the following command:

```
#SC VOL, RMT (R2cuu, ragrp#) , INVALIDATE[, dev# | , ALL]
```

When the Invalidate completes, the R2 Invalid track count goes to maximum for the device, the TNR status goes away, and resynchronization begins.

The SRDF Host Component monitors the process of invalidating all target tracks until complete. This may take several minutes per device in a busy Symmetrix.

6. Monitor the resynchronization process until complete by entering the following command at the host with access the source (R1) volumes:

```
#SQ VOL, R2cuu, INV_TRKS
```

DRAFT
EMC CONFIDENTIAL

Figure 6-5 is a representation of this procedure. Please note that actions to be performed on the host with access to the source(R1) volume are shown in the boxes on the left, and actions to be performed on the host with access to the target (R2) volume are shown in the boxes to the right.

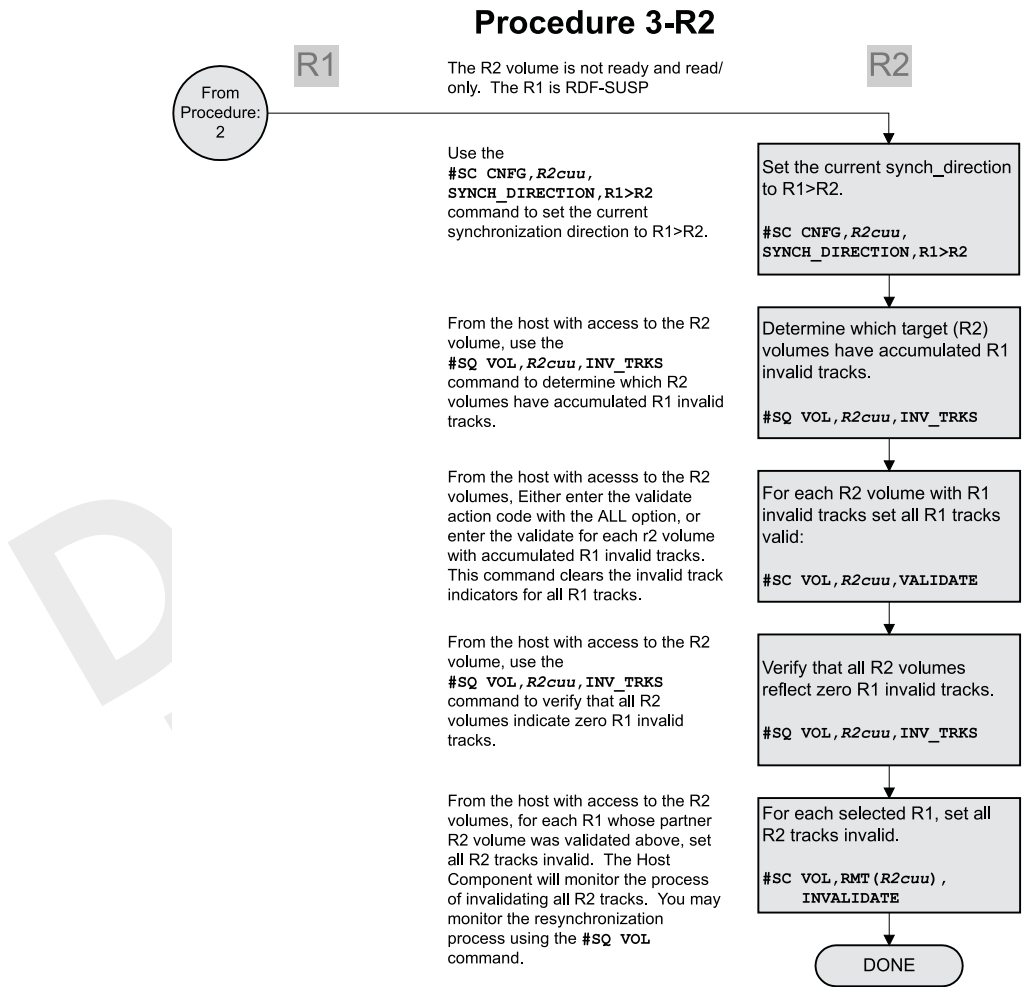


Figure 6-5 R1>R2 Full Volume Resynchronization from a Host with R2 Access

Procedure 4: R1<R2 Full Volume Resynchronization

This procedure resynchronizes the SRDF pair after R2 read / write testing. Any updates to the R1 device that were made after the RDF-SUSP action code was executed are discarded, and any updates to the R2 device are kept.

Perform the following steps:

1. Set the current synchronization direction from target to source (R1<R2) by entering the following command at the host with access to the source (R1) volumes:

```
#SC CNFG, R1cuu, SYNCH_DIRECTION, R1<R2
```

and entering the following command at the host with access to the target (R2) volumes:

```
#SC CNFG, R2cuu, SYNCH_DIRECTION, R1<R2
```

2. Vary the R1 device offline to z/OS by entering the following command at the host with access to the source (R1) volumes:

```
V R1cuu, OFFLINE
```

3. Make the source (R1) device unavailable to the host by entering the following command at the host with access to the source (R1) volumes:

```
#SC VOL, R1cuu, RDF-NRDY[, dev# | , ALL]
```

4. Determine which target (R2) volumes have a nonzero R1 INV_TRKS value by entering the following command at the host with access to the target (R2) volumes:

```
#SQ VOL, R2cuu, INV_TRKS
```

5. For all target (R2) volumes with nonzero R1 invalid tracks, set the R1 invalid track count to max by entering the following command at the host with access to the target (R2) volume:

```
#SC VOL, R2cuu, INVALIDATE[, dev# | ALL]
```

6. For all target (R2) volumes with nonzero R1 INV_TRKS values:

Set R2 invalid tracks to zero and prepare the source (R1) volume for synchronization by entering the following command at the host with access to the source (R1) volume:

```
#SC VOL, R1cuu, VALIDATE[, dev# | , ALL]
```

(dev# = source (R1) volume whose target (R2) volume has an R1 INV_TRKS value greater than 0)

If *ALL* was not the specified parameter, repeat Step 5 for each source (R1) volume with a nonzero R2 INV_TRKS value for a target (R2) volume.

When the validate completes, the R1 Invalid track count goes to maximum for the device, the TNR status disappears, and resynchronization begins.

7. If you are using Enginuity levels 5x67 or earlier and if the devices are in the RNR state, make the source (R1) devices available to the host by entering the following command:

```
#SC VOL, R1cuu, RDF-RDY [dev# | ALL]
```

Otherwise, proceed to step 8.

8. Vary the R1 device online to z/OS by entering the following command at the host with access to the source (R1) volumes:

```
V R1cuu, online
```

Figure 6-6 on page 6-28 is a representation of this procedure. Please note that actions to be performed on the host with access to the source (R1) volume are shown in the boxes on the left, and actions to be performed on the host with access to the target (R2) volume are shown in the boxes to the right.

Procedure 4:

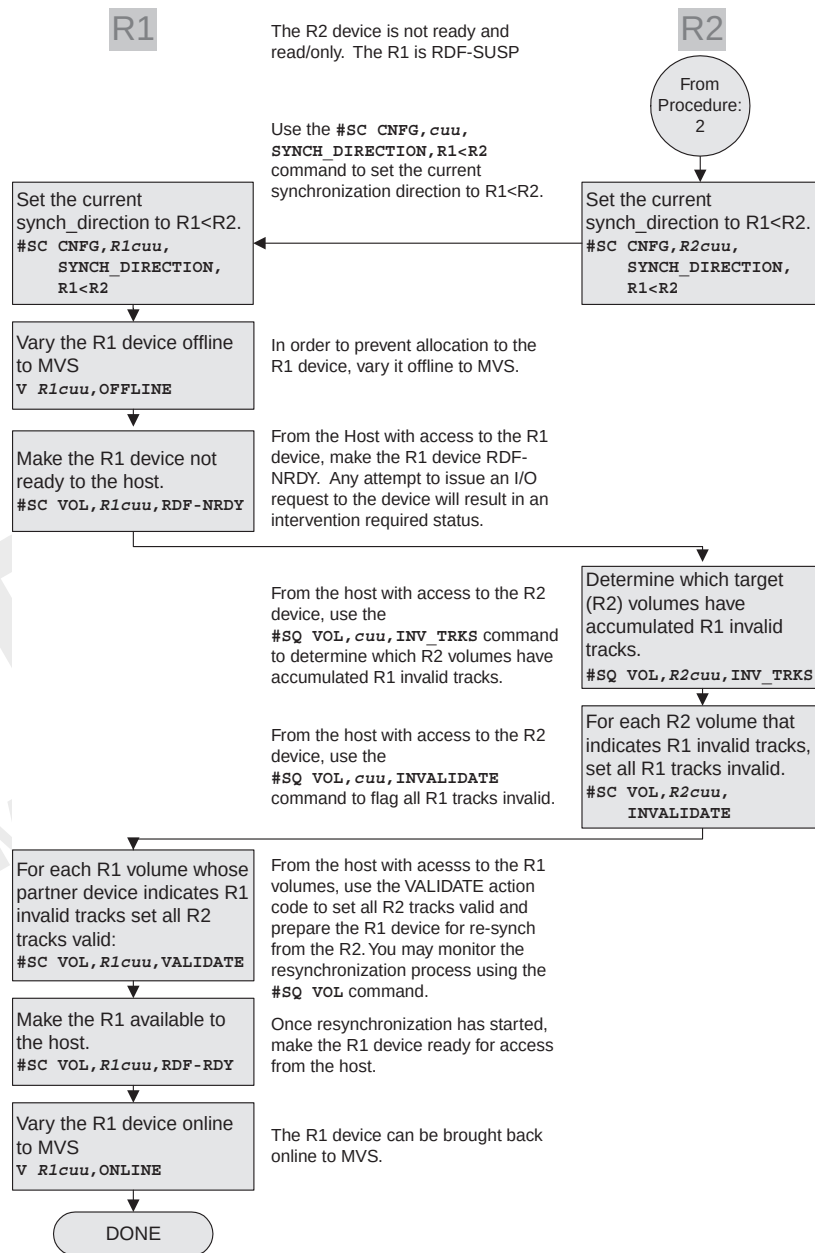


Figure 6-6 R1<R2 Full Volume Resynchronization

4-R1: Resynchronization from a Host with R1 Access

This procedure applies to Symmetrix units at Enginuity microcode level 5x64 and higher.

This procedure resynchronizes the SRDF pair after R2 read / write activity. All updates to the R1 device that were made after the RDF-SUSP action code was executed are discarded, and all updates to the R2 device are retained.

This procedure requires that all commands are entered using a local R1 (source) Symmetrix.

Perform the following steps:

1. Set the current synchronization direction from target to source (R1<R2) by entering the following command:

```
#SC CNFG, R1cuu, SYNCH_DIRECTION, R1<R2
```

2. Vary the R1 devices offline to z/OS by entering some of the following commands:

```
V R1cuu, OFFLINE
V R1cuu-R1cuu, OFFLINE
```

Important: All source (R1) devices should be varied offline on all hosts that have access to them.

3. Make the source (R1) device unavailable to the host by entering the following command:

```
#SC VOL, R1cuu, RDF-NRDY [ , dev# | , ALL]
```

4. Identify which target (R2) volumes have a nonzero R1 INV_TRKS value by entering the following command:

```
#SQ VOL, RMT (R1cuu, ragrp#) , INV_TRKS
```

5. For all target (R2) volumes with nonzero R1 invalid tracks, set the R1 invalid track count to maximum by entering the following command:

```
#SC VOL, RMT (R1cuu, ragrp#) , INVALIDATE [ , dev# | , ALL]
```

6. For all target (R2) volumes with nonzero R1 INV_TRKS values:

Set R2 invalid tracks to zero and prepare the source (R1) volume for synchronization by entering the following command:

```
#SC VOL,R1cuu,VALIDATE[,dev#|,ALL]
```

When the validate completes, the R1 Invalid track count goes to maximum for the device, the TNR status disappears, and resynchronization begins.

7. If you are using Enginuity levels 5x67 or earlier and if the devices are in the RNR state, make the source (R1) devices available to the host by entering the following command:

```
#SC VOL,R1cuu,RDF-RDY[dev#|ALL]
```

Otherwise, proceed to step 8.

8. Vary the R1 device online to z/OS by entering some of the following commands:

```
V R1cuu,ONLINE
V R1cuu-R1cuu,ONLINE
```

All source (R1) devices should be varied online on all hosts that need access to them.

Figure 6-7 on page 6-31 is a representation of this procedure. Please note that actions to be performed on the host with access to the source (R1) volume are shown in the boxes on the left, and actions to be performed on the host with access to the target (R2) volume are shown in the boxes to the right.

Procedure 4-R1

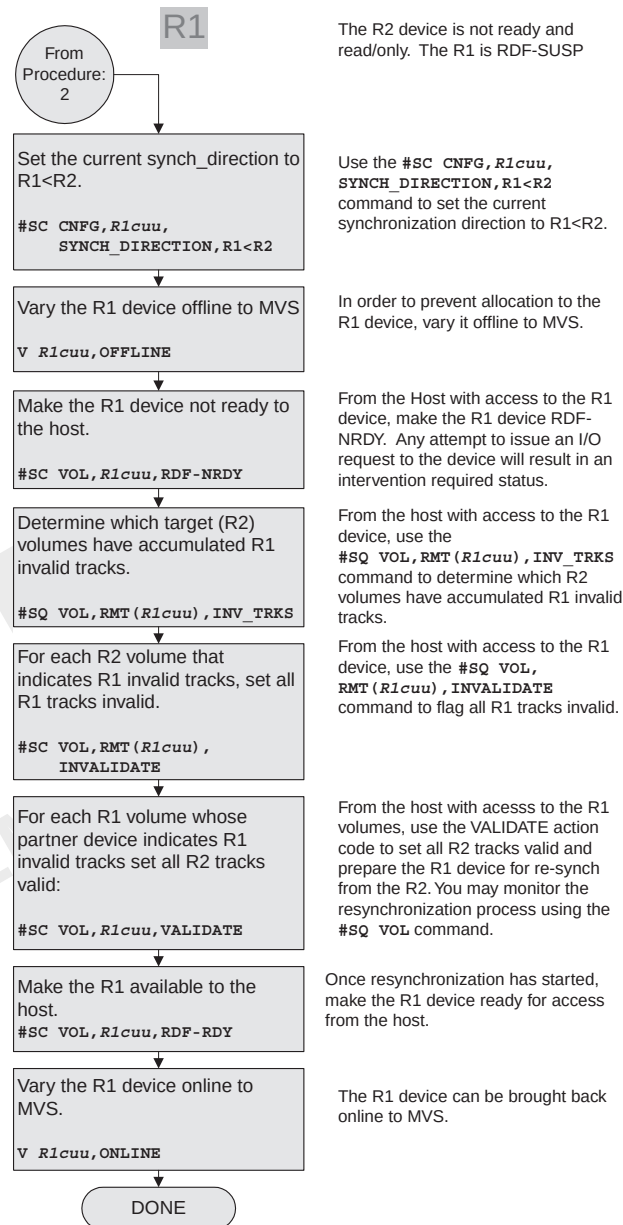


Figure 6-7 R1<R2 Full Volume Resynchronization from a Host with R1 Access

4-R2: Resynchronization from a Host with R2 Access

This procedure applies to Symmetrix units at Enginuity microcode level 5x64 and higher.

This procedure resynchronizes the SRDF pair after R2 read / write host activity. All updates to the R1 device that were made after the RDF-SUSP action code was executed are discarded, and all updates to the R2 device are retained.

This procedure requires that all Host Component commands are entered using a local R2 (Target) Symmetrix.

This procedure requires the R1 devices to be varied offline from all hosts that have access to them. This might not be able to be accomplished on the same host that has access to the R2 devices, so it requires the z/OS VARY commands to be issued on ALL hosts with access to the R1 devices.

Perform the following steps:

1. Set the current synchronization direction from target to source (R1<R2) by entering the following command:

```
#SC CNFG, R2cuu, SYNCH_DIRECTION, R1<R2
```

2. Vary the R1 devices offline to z/OS by entering some of the following commands:

```
V R1cuu, OFFLINE
V R1cuu-R1cuu, OFFLINE
```

All source (R1) devices should be varied offline on all hosts that have access to them.

3. Make the source (R1) device unavailable to the host by entering the following command:

```
#SC VOL, RMT (R2cuu, ragrp#) , RDF-NRDY [ , dev# | , ALL]
```

4. Identify which target (R2) volumes have a nonzero R1 INV_TRKS value by entering the following command:

```
#SQ VOL, R2cuu, INV_TRKS
```


5. For all target (R2) volumes with nonzero R1 invalid tracks, set the R1 invalid track count to maximum by entering the following command:

```
#SC VOL, R2cuu, INVALIDATE[, dev# | , ALL]
```

6. For all target (R2) volumes with nonzero R1 INV_TRKS values:
Set R2 invalid tracks to zero and prepare the source (R1) volume for synchronization by entering the following command:

```
#SC VOL, RMT(R2cuu, ragrp#) , VALIDATE[, dev# | , ALL]
```

When the validate completes, the R1 Invalid track count goes to maximum for the device, the TNR status disappears, and resynchronization begins.

7. If you are using Enginuity levels 5x67 or earlier and if the devices are in the RNR state, make the source (R1) devices available to the host by entering the following command:

```
#SC VOL, R1cuu, RDF-RDY[dev# | ALL]
```

Otherwise, proceed to step 8.

8. Vary the R1 device online to z/OS by entering some of the following commands:

```
V R1cuu, ONLINE
V R1cuu-R1cuu, ONLINE
```

All source (R1) devices should be varied online on all hosts that need access to them.

Figure 6-8 on page 6-34 is a representation of this procedure. Please note that actions to be performed on the host with access to the source (R1) volume are shown in the boxes on the left, and actions to be performed on the host with access to the target (R2) volume are shown in the boxes to the right.

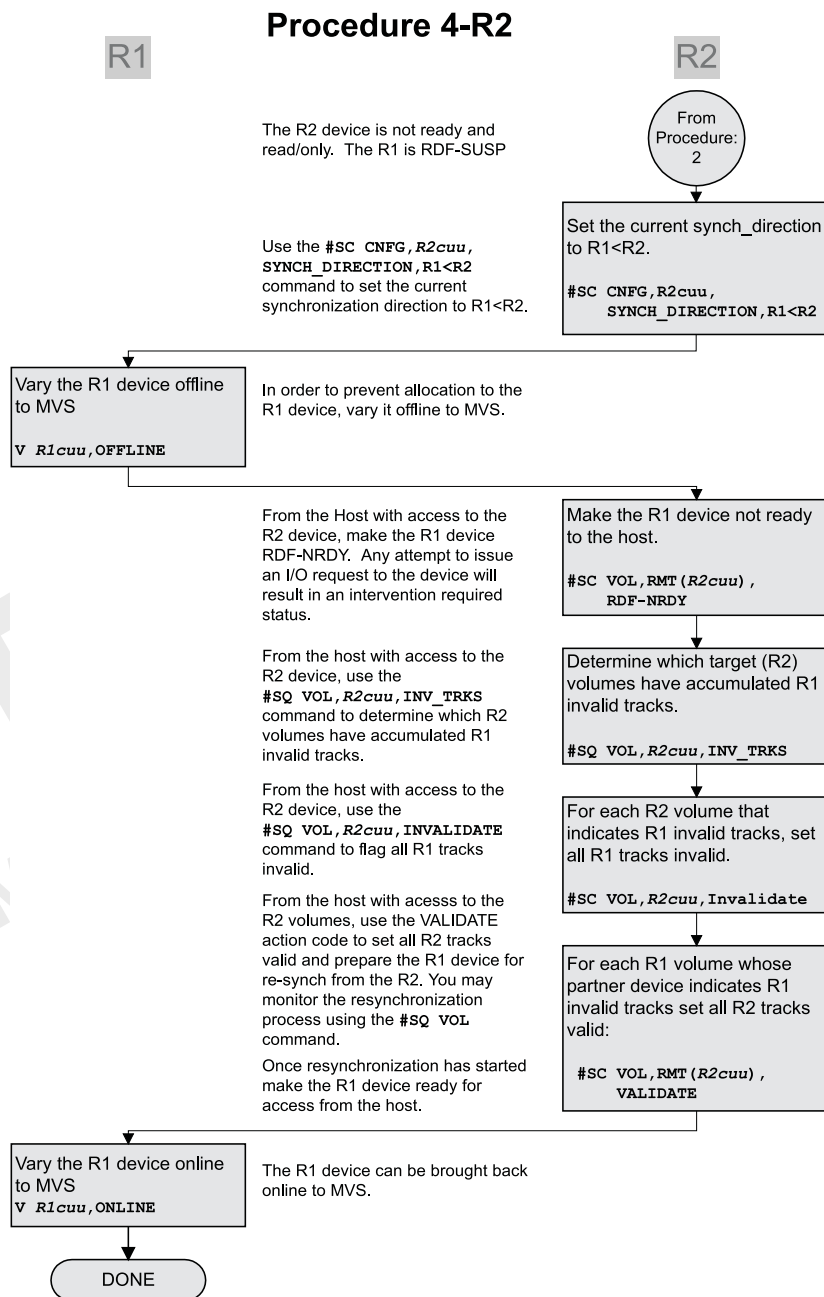


Figure 6-8 R1<R2 Full Volume Resynchronization from a Host with R2 Access

Procedure 5: R1>R2 Changed Tracks Resynchronization

Any updates to the target (R2) volume that were made after the RDF-SUSP action code was executed are discarded, and any updates to the source (R1) volume are retained.

Perform the following steps:

1. Set the current synchronization direction from source to target (R1 > R2) by entering the following command at the host with access to the source (R1) volumes:

```
#SC CNFG, R1cuu, SYNCH_DIRECTION, R1>R2
```

and entering the following command at the host with access to the target (R2) volumes:

```
#SC CNFG, R2cuu, SYNCH_DIRECTION, R1>R2
```

2. Determine which target (R2) volumes have a nonzero R1 INV_TRKS value by entering the following command at the host with access to the target (R2) volumes:

```
#SQ VOL, R2cuu, INV_TRKS
```

3. Flag any tracks that were updated on the R2 as valid on the R1 and invalid on the R2 by entering the following command at the host with access to the target (R2) volumes:

```
#SC VOL, R2cuu, REFRESH[, dev# | , ALL]
```

4. Resume SRDF operation by entering the following command at the host with access to the target (R2) volumes:

```
#SC VOL, R2cuu, RFR-RSUM[, dev# | , ALL]
```

Only the tracks that were updated during R2 read / write testing are copied from R1>R2.

5. Monitor the resynchronization process until complete by entering the following command at the host with access the source (R1) volumes:

```
#SQ VOL, R1cuu, INV_TRKS
```

Figure 6-9 is a representation of this procedure. Please note that actions to be performed on the host with access to the source (R1) volume are shown in the boxes on the left, and actions to be performed on the host with access to the target (R2) volume are shown in the boxes to the right.

Procedure 5:

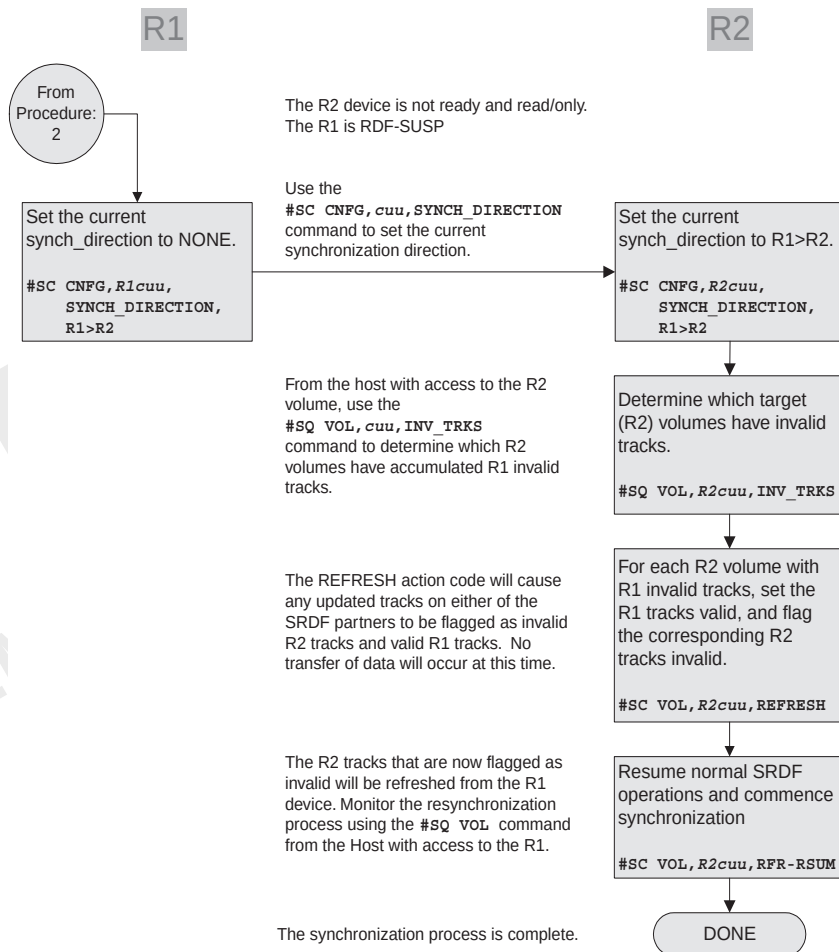


Figure 6-9 R1>R2 Changed Tracks Resynchronization

Figure 6-9 on page 6-36 shows R1>R2 resynchronization procedures when executed entirely by commands on the R2 side. As a safety mechanism, the procedure sets the `synch_direction` at the CNFG level on the R1 side to NONE because no commands are going to be executed on the R1 side.

5-R1: Resynchronization from a Host with R1 Access

This procedure applies to Symmetrix units at Enginuity microcode level 5x64 and higher.

This procedure resynchronizes the SRDF pair after R2 read / write host activity. All updates to the target (R2) volume that were made after the RDF-SUSP action code was executed are discarded, and all updates to the source (R1) volume are retained.

This procedure requires that all commands are entered using a local R1 (Source) Symmetrix.

Perform the following steps:

1. Set the synchronization direction from source to target (R1>R2) by entering the following command:
`#SC CNFG, R1cuu, SYNCH_DIRECTION, R1>R2`
2. Identify which target (R2) volumes have a nonzero R1 INV_TRKS value by entering the following command:
`#SQ VOL, RMT (R1cuu, ragrp#) , INV_TRKS`
3. Flag any tracks that were updated on the R2 as valid on the R1 and invalid on the R2 by entering the following command:
`#SC VOL, RMT (R1cuu, ragrp#) , REFRESH [ , dev# | , ALL]`
4. Resume SRDF operation by entering the following command:
`#SC VOL, RMT (R1cuu, ragrp#) , RFR-RSUM [ , dev# | , ALL]`

Only the tracks that were updated during R2 read / write testing are copied from R1>R2.

5. Monitor the resynchronization process until complete by entering
`#SQ VOL, R1cuu, INV_TRKS.`

Figure 6-10 is a representation of this procedure. Please note that actions to be performed on the host with access to the source (R1) volume are shown in the boxes on the left, and actions to be performed on the host with access to the target (R2) volume are shown in the boxes to the right.

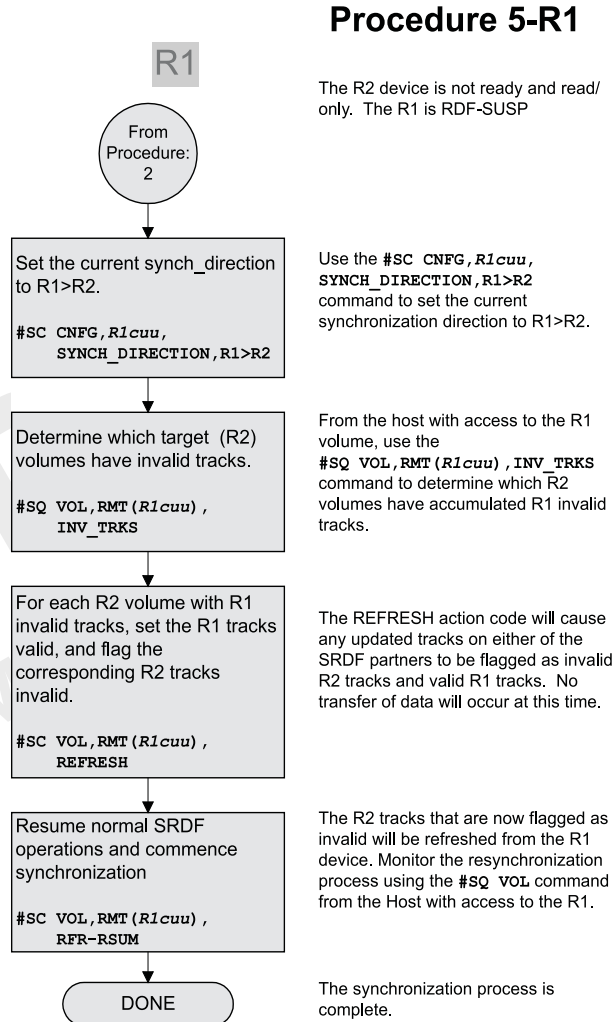


Figure 6-10 R1>R2 Changed Tracks Resynchronization from an R1 Host

5-R2: Resynchronization from a Host with R2 Access

This procedure applies to Symmetrix units at Enginuity microcode level 5x64 and higher.

This procedure resynchronizes the SRDF pair after R2 read / write host activity. All updates to the target (R2) volume that were made after the RDF-SUSP action code was executed are discarded, and all updates to the source (R1) volume are retained.

This procedure requires that all Host Component commands are entered using a local R2 (Target) Symmetrix.

Perform the following steps:

1. Set the synchronization direction from source to target (R1>R2) by entering the following command:

```
#SC CNFG, R2cuu, SYNCH_DIRECTION, R1>R2
```

2. Identify which target (R2) volumes have a nonzero R1 INV_TRKS value by entering the following command:

```
#SQ VOL, R2cuu, INV_TRKS
```

3. Flag any tracks that were updated on the R2 as valid on the R1 and invalid on the R2 by entering the following command:

```
#SC VOL, R2cuu, REFRESH[, dev#|, ALL]
```

4. Resume SRDF operation by entering the following command:

```
#SC VOL, R2cuu, RFR-RSUM[, dev#|, ALL]
```

Only the tracks that were updated during R2 read / write testing are copied from R1>R2.

5. Monitor the resynchronization process until complete, by entering the following command:

```
#SQ VOL, RMT(R2cuu, ragrp#), INV_TRKS
```

Figure 6-11 is a representation of this procedure. Please note that actions to be performed on the host with access to the source (R1) volume are shown in the boxes on the left, and actions to be performed on the host with access to the target (R2) volume are shown in the boxes to the right.

Procedure 5-R2

R1

The R2 device is not ready and read/only. The R1 is RDF-SUSP

Use the `#SC CNFG,R2cuu,SYNCH_DIRECTION,R1>R2` command to set the current synchronization direction to R1>R2 in both the R1 and R2 Symmetrix.

From the host with access to the R2 volume, use the `#SQ VOL,R2cuu,INV_TRKS` command to determine which R2 volumes have accumulated R1 invalid tracks.

The REFRESH action code will cause any updated tracks on either of the SRDF partners to be flagged as invalid R2 tracks and valid R1 tracks. No transfer of data will occur at this time.

The R2 tracks that are now flagged as invalid will be refreshed from the R1 device. Monitor the resynchronization process using the `#SQ VOL` command from the Host with access to the R1.

The synchronization process is complete.

R2

From Procedure: 2

Set the current synch_direction to R1>R2.

`#SC CNFG,R2cuu,SYNCH_DIRECTION,R1>R2`

Determine which target (R2) volumes have invalid tracks.

`#SQ VOL,R2cuu,INV_TRKS`

For each R2 volume with R1 invalid tracks, set the R1 tracks valid, and flag the corresponding R2 tracks invalid.

`#SC VOL,R2cuu,REFRESH`

Resume normal SRDF operations and commence synchronization

`#SC VOL,R2cuu,RFR-RSUM`

DONE

Figure 6-11 R1>R2 Changed Tracks Resynchronization from an R2 Host

Procedure 6: R1<R2 Changed Tracks Resynchronization

This procedure resynchronizes the SRDF pair after R2 read / write testing. Any updates to the source (R1) volume that were made after the RDF-SUSP action code was executed are discarded, and any updates to the target (R2) volume are retained.

Perform the following steps:

1. Set the current synchronization direction from target to source (R1<R2) by entering the following command at the host with access to the source (R1) volumes:


```
#SC CNFG, R1cuu, SYNCH_DIRECTION, R1<R2
```

and entering the following command at the host with access to the target (R2) volumes:


```
#SC CNFG, R2cuu, SYNCH_DIRECTION, R1<R2
```
2. Make the source (R1) device unavailable to the host by entering the following command at the host with access to the source (R1) volumes:


```
#SC VOL, R1cuu, RDF-NRDY[, dev#|, ALL]
```
3. Determine which source (R1) volumes have a nonzero R2 INV_TRKS value by entering the following command at the host with access to the source (R1) volumes, and determine which target (R2) volumes have a nonzero R1 INV_TRKS value by entering the following command at the host with access to the target (R2) volumes:


```
#SQ VOL, R2cuu, INV_TRKS
```
4. Vary the R1 devices offline.
5. Flag any tracks that were updated on the target (R2) volume as valid on the R2 and invalid on the R1 by entering the following command at the host with access to the source (R1) volumes:


```
#SC VOL, R1cuu, REFRESH[, dev#|, ALL]
```
6. Resume SRDF operation by entering the following command at the host with access to the source (R1) volumes:


```
#SC VOL, R1cuu, RFR-RSUM[, dev#|, ALL]
```

Only the tracks that were updated during R2 read / write testing are copied from the R2 to the R1.

Once resynchronization is started, the R1 devices can be varied online.

7. Monitor the resynchronization process until complete by entering the following command at the host with access the source (R1) volumes:

```
#SQ VOL, R1cuu, INV_TRKS
```

Figure 6-12 on page 6-43 is a representation of this procedure. Please note that actions to be performed on the host with access to the source (R1) volume are shown in the boxes on the left, and actions to be performed on the host with access to the target (R2) volume are shown in the boxes to the right.

DRAFT
EMC CONFIDENTIAL

Procedure 6:

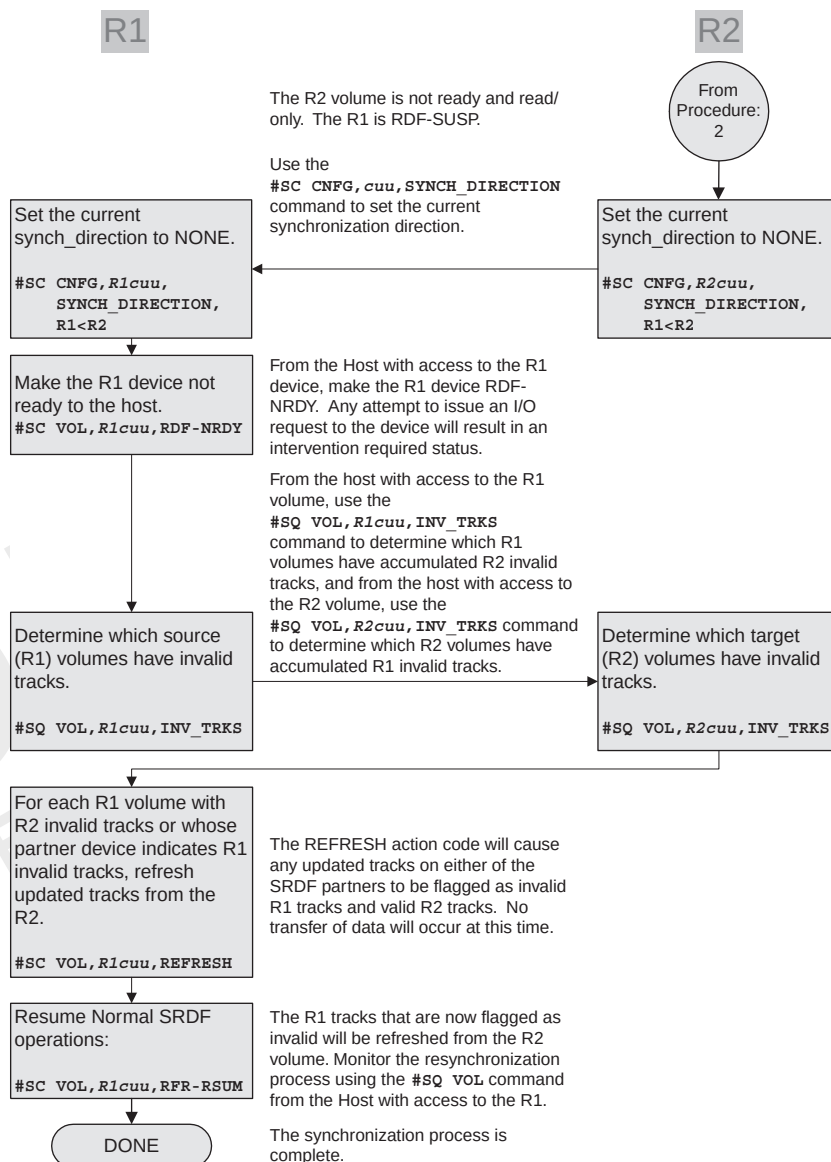


Figure 6-12 R1<R2 Changed Tracks Resynchronization

6-R1: Resynchronization from a Host with R1 Access

This procedure applies to Symmetrix units at Enginuity microcode level 5x64 and higher.

This procedure resynchronizes the SRDF pair after R2 read / write host activity. All updates to the source (R1) volume that were made after the RDF-SUSP action code was executed are discarded, and all updates to the target (R2) volume are retained.

This procedure requires that all commands are entered using a local R1 (Source) Symmetrix.

1. Set the synchronization direction from target to source (R1<R2) by entering the following command:

```
#SC CNFG,R1cuu,SYNCH_DIRECTION,R1<R2
```

2. Identify which target (R2) volumes have a nonzero R1 INV_TRKS value by entering the following command:

```
#SQ VOL,RMT(R1cuu,ragrp#),INV_TRKS
```

3. Vary the R1 devices offline to z/OS by entering some of the following commands:

```
V R1cuu,OFFLINE
V R1cuu-R1cuu,OFFLINE
```

All source (R1) devices should be varied offline on all hosts that have access to them.

4. Make the source (R1) device unavailable to the host by entering the following command:

```
#SC VOL,R1cuu,RDF-NRDY[,dev#|,ALL]
```

5. Flag any tracks that were updated on the target (R2) volume as valid on the R2 and invalid on the R1 by entering the following command:

```
#SC VOL,R1cuu,REFRESH[,dev#|,ALL]
```

6. Resume SRDF operation by entering the following command:

```
#SC VOL,R1cuu,RFR-RSUM[,dev#|,ALL]
```

Only the tracks that were updated during R2 read / write testing are copied from the R2 to the R1.

7. Once the previous command completes, the R1 devices can be varied online. Vary the R1 device online to z / OS by entering some of the following commands:

```
V R1cuu, ONLINE
V R1cuu-R1cuu, ONLINE
```

All source (R1) devices should be varied online on all hosts that need access to them.

8. Monitor the resynchronization process until complete by entering the following command:

```
#SQ VOL, R1cuu, INV_TRKS
```

Figure 6-13 on page 6-46 is a representation of this procedure. Please note that actions to be performed on the host with access to the source (R1) volume are shown in the boxes on the left, and actions to be performed on the host with access to the target (R2) volume are shown in the boxes to the right.

Procedure 6-R1

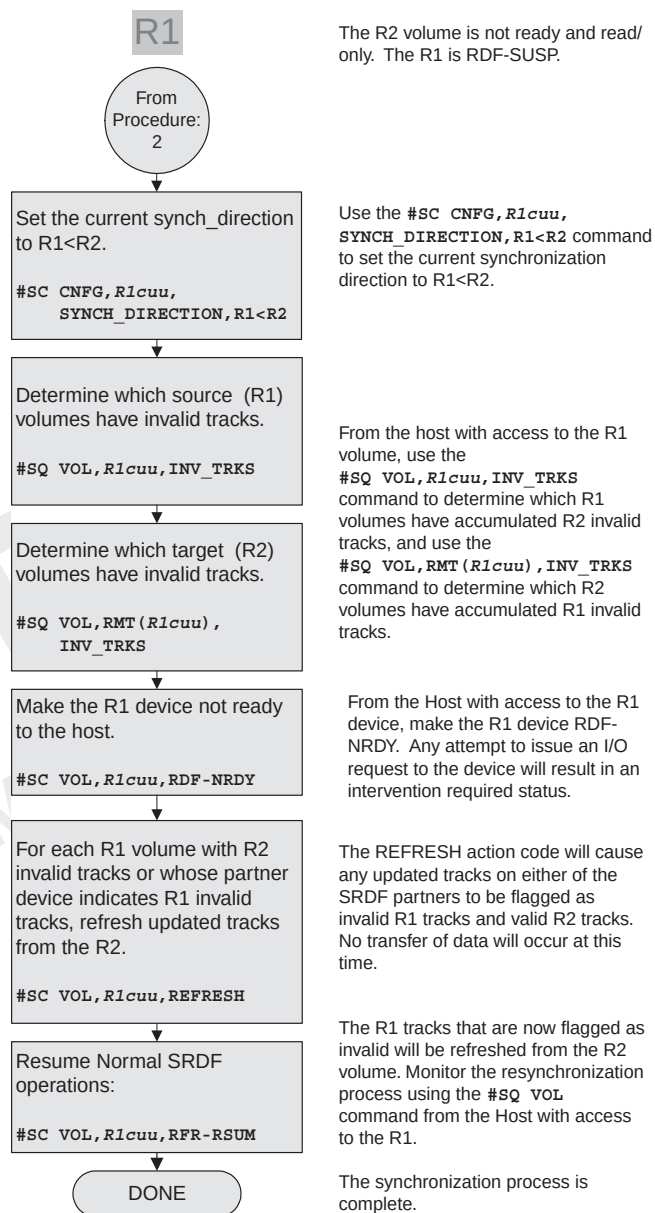


Figure 6-13 R1<R2 Changed Tracks Resynchronization from an R1 Host

6-R2: Resynchronization from a Host with R2 Access

This procedure applies to Symmetrix units at Enginuity microcode level 5x64 and higher.

This procedure resynchronizes the SRDF pair after R2 read / write host activity. All updates to the source (R1) volume that were made after the RDF-SUSP action code was executed are discarded, and all updates to the target (R2) volume are kept.

This procedure requires that all Host Component commands are entered using a local R2 (Target) Symmetrix.

This procedure requires the R1 devices to be varied offline from all hosts that have access to them. This might not be able to be accomplished on the same host that has access to the R2 devices, so it requires the z/OS VARY commands to be issued on ALL hosts with access to the R1 devices.

1. Set the synchronization direction from target to source (R1<R2) by entering the following command:

```
#SC CNFG, R2cuu, SYNCH_DIRECTION, R1<R2
```

2. Identify which target (R2) volumes have a nonzero R1 INV_TRKS value by entering the following command:

```
#SQ VOL, R2cuu, INV_TRKS
```

3. Vary the R1 devices offline to z/OS by entering some of the following commands:

```
V R1cuu, OFFLINE
V R1cuu-R1cuu, OFFLINE
```

All source (R1) devices should be varied offline on all hosts that have access to them.

4. Make the source (R1) device unavailable to the host by entering the following command:

```
#SC VOL, RMT (R2cuu, ragrp#) , RDF-NRDY [ , dev# | , ALL]
```

5. Flag any tracks that were updated on the target (R2) volume as valid on the R2 and invalid on the R1 by entering the following command:

```
#SC VOL,RMT(R2cuu,ragrp#),REFRESH[,dev#|,ALL]
```

6. Resume SRDF operation by entering the following command:

```
#SC VOL,RMT(R2cuu,ragrp#),RFR-RSUM[,dev#|,ALL]
```

Only the tracks that were updated during R2 read / write testing are copied from the R2 to the R1.

7. Once the previous command completes, the R1 devices can be varied online. Vary the R1 device online to z/OS by entering some of the following commands:

```
V R1cuu,ONLINE
V R1cuu-R1cuu,ONLINE
```

All source (R1) devices should be varied online on all hosts that need access to them.

8. Monitor the resynchronization process until complete by entering the following command:

```
#SQ VOL,RMT(R2cuu,ragrp#),INV_TRKS
```

Figure 6-14 on page 6-49 is a representation of this procedure. Please note that actions to be performed on the host with access to the source (R1) volume are shown in the boxes on the left, and actions to be performed on the host with access to the target (R2) volume are shown in the boxes to the right.

Procedure 6-R2

R1

The R2 volume is not ready and read/only. The R1 is RDF-SUSP.

Use the
#SC CNFG, R2cuu,
SYNCH_DIRECTION, R1<R2
command to set the current
synchronization direction to
R1<R2.

From the Host with access to the
R2 device, make the R1 device
RDF-NRDY. Any attempt to issue
an I/O request to the device will
result in an intervention required
status.

From the host with access to the
R2 volume, use the
#SQ VOL, RMT (R2cuu) ,
INV_TRKS
command to determine which R1
volumes have accumulated R2
invalid tracks, and from the host
with access to the R2 volume, use
the #SQ VOL, R2cuu, INV_TRKS
command to determine which R2
volumes have accumulated R1
invalid tracks.

The REFRESH action code will
cause any updated tracks on either
of the SRDF partners to be flagged
as invalid R1 tracks and valid R2
tracks. No transfer of data will
occur at this time.

The R1 tracks that are now flagged
as invalid will be refreshed from the
R2 volume. Monitor the
resynchronization process using
the #SQ VOL command from the
Host with access to the R2.

The synchronization process is
complete.

R2

From
Procedure:
2

Set the current synch_direction
to R1<R2.

#SC CNFG, R2uu,
SYNCH_DIRECTION, R1<R2

Make the R1 device not ready
to the host.

#SC VOL, RMT (R2cuu) ,
RDF-NRDY

Determine which target (R2)
volumes have invalid tracks.

#SQ VOL, RMT (R2cuu) ,
INV_TRKS
#SQ VOL, R2cuu, INV_TRKS

For each R1 volume with R2
invalid tracks or whose partner
device indicates R1 invalid
tracks, refresh updated tracks
from the R2.

#SC VOL, RMT (R2cuu) ,
REFRESH

Resume Normal SRDF
operations:

#SC VOL, RMT (R2cuu) ,
RFR-RSUM

DONE

Figure 6-14 R1<R2 Changed Tracks Resynchronization from an R2 Host

SRDF/A Recovery Scenarios

The following discusses SRDF / A recovery scenarios, including:

- ◆ Temporary link loss
- ◆ Permanent link loss
- ◆ Primary Symmetrix -- cache full condition
- ◆ Failback from R2

Temporary Link Loss

If SRDF / A suffers a temporary loss (<10 seconds) of all links, the SRDF / A state remains active and data continues to accumulate in cache. This may result in an elongated cycle, but the remote consistency is not compromised and the R1-R2 relationships is not suspended. You can configure the amount of time SRDF waits until it declares a link loss permanent (between 0 and 10 seconds).

Permanent Link Loss

If SRDF / A experiences a permanent link loss, SRDF / A drops all the devices on the link to “not ready” state. This results in all data in the inactive cycle being changed from “write pending” to “invalid” on the link for both the R1 and R2 devices. In addition, any new work that enters the Symmetrix storage subsystem results in tracks being marked “invalid.”

When the links are restored, normal SRDF recovery procedures are followed. The data is then resynchronized by sending over the invalid tracks as part of the SRDF / A cycles or through SRDF adaptive copy mode.

Normally, the data on the R2 volumes is consistent in SRDF / A, even when the links fail. However, the act of starting a resynchronization activity between the R1 and the R2 destroys the consistency of the R2 data until the resynchronization is completed.

For this reason, EMC recommends that you employ a method for preserving the data on the R2 volumes before commencing resynchronization. For example, you can do this using TimeFinder BCVs.

Primary Symmetrix Cache “Full” Condition

It is possible that an imbalance may occur within SRDF/A between the incoming write I/O workload and the outgoing SRDF bandwidth so that the cache in the primary Symmetrix storage subsystem becomes “full.” The transmit and receive cycles consume all the available write cache in the Symmetrix storage subsystem.

In this situation, you have a choice as to how SRDF/A will behave:

- ◆ The Symmetrix storage subsystem can throttle the host at the speed of the links, and keep SRDF/A running. In this case the performance is equivalent to synchronous mode.
- ◆ The Symmetrix storage subsystem can throttle the host for a user-specified period of time. If the condition has not resolved itself at the expiration of this time, then SRDF/A is dropped. Running in MSC mode changes the maximum time to approximately 11 seconds to account for other Symmetrix in the MSC group.

The default behavior is to drop SRDF/A immediately when this condition occurs.

Failback from R2

If a disaster occurs on the primary site, the data on the R2 devices represents a dependent, write-consistent image of data that you can use to restart an environment with minimal data loss. After the primary site has been repaired, the process for returning to the R1 side uses exactly the same methods as are used for synchronous SRDF failback.

After the workload had been transferred back to the primary site hosts, you can activate SRDF/A and resume normal asynchronous mode protection.

SRDF/A MSC Recovery Scenario

In SRDF / A Multi-Session Consistency (MSC) mode, additional considerations exist for recovery. SRDF / A MSC coordinates multiple SRDF / A sessions running in multiple Symmetrix.

SRDF/A MSC is Deactivated or Dropped

When SRDF / A is deactivated or dropped while in Multi-Session mode, each R1-side Symmetrix storage subsystem starts the same cleanup process as in single session mode:

1. All cache slots belonging to both the transmit and capture cycles are discarded
2. The corresponding tracks are marked invalid to the RDF mirror (“owed” to the R2 side)

Host software does not need to perform any special recovery on the R1-side Symmetrix storage subsystem participating in the SRDF / A Multi-Session Group.

When SRDF / A is deactivated or dropped while in Multi-Session mode, each R2-side Symmetrix storage subsystem takes the following steps:

1. Finishes the restore of its apply cycle
2. Discards its receive cycle if the receive cycle is not marked as complete

Any R2-side Symmetrix storage subsystem that has a complete receive cycle puts the receive cycle “on hold” in cache, awaiting decision from the host software or inline user. This is done because the statuses of all the R2-side receive cycles for the R2-side Symmetrix storage subsystems participating in the Multi-Session Group must be considered before a decision can be made to commit or discard each one.

The host software must either discard (mark invalid, “owed” to the R1 side) or commit (force the restore of) the slots in each R2 receive cycle, based on the following rules.

Three different cases need to be considered when SRDF / A Multi Session Mode have been dropped when recovery is performed on the R2 side. This is where the host provided cycle tag and the list of all Symmetrix participating in the MSC group is used by SRDF / A MSC recovery software.

These cases are:

- ◆ All R2 receive cycles have the same tag, and all R2 receive cycles are complete
- ◆ All R2 receive cycles have the same tag, but one or more (but not all) R2 receive cycles are complete
- ◆ Apply cycle tags of some R2 Symmetrix storage subsystems match receive cycle tags of one or more other R2 Symmetrix storage subsystems (i.e., not all R2 receive cycles were committed) and not all receive cycles may be complete

If the SRDF links are operational on all Symmetrix pairs, this recovery is handled by the MSC host process.

DRAFT
EMC CONFIDENTIAL

Stand-Alone Recovery for SRDF/A MSC

SRDF Host Component has a stand-alone utility to perform a recovery for SRDF / A MSC. You can find this utility in the EMCSCF SAMPLIB member SRDFASR. You can run the stand-alone on either the primary side or secondary side.

The only time you should need to run the stand-alone utility is when the MSC environment of EMCSCF could not do the automatic cleanup. This happens when the SRDF link for at least one SRDF / A session in a MSC Group is not available at the time that SRDF / A dropped.

You can identify this situation by issuing the #SQ SRDFA command to the secondary side of all Symmetrix storage subsystems in the MSC Group. If one or more Symmetrix storage subsystems have both the CLEANUP (Y) and Host Intervention Required (Y) on, then you need to run the stand-alone utility.

Stand-alone Recovery Requirements

Observe the following requirements in running the stand-alone utility:

- ◆ EMCSCF must be running.
- ◆ To run the stand-alone utility from the primary side, the links for all SRDF / A sessions must be up and available. If one or more link can not be made available, then you must run this utility from the secondary side.
- ◆ Devices in the SRDF / A MSC group should not be in the EMCSCF exclude list. The devices discovered by EMCSCF are used to determine the accessibility of the R2 Symmetrix in the MSC group
- ◆ The parameter required to perform the stand-alone recovery is either the CUU or VOLSER of a device in a Symmetrix storage subsystem containing a SRDF / A session participating in a MSC group. The code then locates all of the other SRDF / A sessions participating in the MSC group and produce a report written to the RPTOUT DD (samples are listed below).

Addressing SRDF/A Sessions

You can address all, or the SRDF / A sessions, in the following ways:

- ◆ If you can run the stand-alone utility from the primary side, you can address the entire MSC group across the link from the primary side.

- ◆ If you need to run the stand-alone utility to the secondary side, you can address the entire MSC group can be addressed from the secondary side.

If the utility cannot locate one or more SRDF / A sessions then the utility is not able to complete the host intervention cleanup.

Possible MSC Group Cases

When run, the stand-alone utility determines if the MSC group is in one of three possible cases:

- Case1:** All R2 receive cycles have the same tag, and all R2 receive cycles are complete.
- Case2:** All R2 receive cycles have the same tag, but one or more (but not all) R2 receive cycles are complete.
- Case3:** Apply cycle tags of some R2 Symmetrix storage subsystems match receive cycle tags of one or more other R2 Symmetrix storage subsystems (i.e., not all R2 receive cycles were committed) and not all receive cycles may be complete.

Figures 6-15 through 6-20 illustrate SRDFSR RPTOUT for each of these cases on both the primary and secondary sides.

```

-----
00000002 SRDFA SESSIONS IN MSC
-----
000187790072/00 > 000187900699/00
000000006205/00 > 000187990175/00
-----
OUR SESSION IS RUNNING ON PRIMARY SIDE - 000000006205/00
FOUND SESSION = 000187790072/00 CUU= 2800 RDFGRP = 15
-----
000187790072/00
MSC IS ACTIVE
TRANSMIT CYCLE IS EMPTY
APPLY CYCLE IS EMPTY
HOST INTERVENTION REQUIRED
RECEIVE TAG = 00000000000000033 APPLY TAG = 00000000000000032
-----
000000006205/00
MSC IS ACTIVE
TRANSMIT CYCLE IS EMPTY
APPLY CYCLE IS EMPTY
HOST INTERVENTION REQUIRED
RECEIVE TAG = 00000000000000033 APPLY TAG = 00000000000000032
-----
CASE1 - COMMIT ALL CYCLES
SRDFA SESSION = 000187790072/00 COMMIT RECEIVE CYCLE
SRDFA SESSION = 000000006205/00 COMMIT RECEIVE CYCLE

```

Figure 6-15 SRDFSR RPTOUT for Case 1 from Primary Side


```
-----  
00000002 SRDFA SESSIONS IN MSC  
-----  
000187790072/00 > 000187900699/00  
000000006205/00 > 000187990175/00  
-----  
OUR SESSION IS RUNNING ON SECONDARY SIDE - 000187990175/00  
-----  
FOUND SESSION = 000187900699/00 CUU= EE00 RDFGRP = 25  
-----  
000187900699/00  
MSC IS ACTIVE  
TRANSMIT CYCLE IS EMPTY  
APPLY CYCLE IS EMPTY  
HOST INTERVENTION REQUIRED  
RECEIVE TAG = 0000000000000001E APPLY TAG = 0000000000000001D  
-----  
000187990175/00  
MSC IS ACTIVE  
TRANSMIT CYCLE IS EMPTY  
APPLY CYCLE IS EMPTY  
HOST INTERVENTION REQUIRED  
RECEIVE TAG = 0000000000000001E APPLY TAG = 0000000000000001D  
-----  
CASE1 - COMMIT ALL CYCLES  
SRDFA SESSION = 000187900699/00 COMMIT RECEIVE CYCLE  
SRDFA SESSION = 000187990175/00 COMMIT RECEIVE CYCLE
```

Figure 6-16 SRDFSR RPTOUT for Case 1 from Secondary Side

```

-----
00000002 SRDFA SESSIONS IN MSC
-----
000187790072/00 > 000187900699/00
000000006205/00 > 000187990175/00
OUR SESSION IS RUNNING ON PRIMARY SIDE - 000000006205/00
-----
FOUND SESSION = 000187790072/00 CUU= 2800 RDFGRP = 15
-----
000187790072/00
MSC IS ACTIVE
TRANSMIT CYCLE IS EMPTY
APPLY CYCLE IS EMPTY
HOST INTERVENTION REQUIRED
RECEIVE TAG = 0000000000000000B APPLY TAG = 0000000000000000A
-----
000000006205/00
MSC IS ACTIVE
APPLY CYCLE IS EMPTY
RECEIVE TAG = 0000000000000000B APPLY TAG = 0000000000000000A
-----
CASE2 - DISCARD ALL CYCLES
SRDFA SESSION = 000187790072/00 DISCARD RECEIVE CYCLE

```

Figure 6-17 FSRDFSR RPTOUT for Case 2 from Primary Side

```

-----
00000002 SRDFA SESSIONS IN MSC
-----
000187790072/00 > 000187900699/00
000000006205/00 > 000187990175/00
-----
OUR SESSION IS RUNNING ON SECONDARY SIDE - 000187990175/00
-----
FOUND SESSION = 000187900699/00 CUU= EE00 RDFGRP = 25
-----
000187900699/00
MSC IS ACTIVE
TRANSMIT CYCLE IS EMPTY
APPLY CYCLE IS EMPTY
HOST INTERVENTION REQUIRED
RECEIVE TAG = 000000000000001A APPLY TAG = 0000000000000019
-----
000187990175/00
MSC IS ACTIVE
APPLY CYCLE IS EMPTY
RECEIVE TAG = 000000000000001A APPLY TAG = 0000000000000019
-----
CASE2 - DISCARD ALL CYCLES
SRDFA SESSION = 000187900699/00 DISCARD RECEIVE CYCLE

```

Figure 6-18 SRDFSR RPTOUT for Case 2 from Secondary Side

```

-----
00000002 SRDFA SESSIONS IN MSC
-----
000187790072/00 > 000187900699/00
000000006205/00 > 000187990175/00
-----
OUR SESSION IS RUNNING ON PRIMARY SIDE - 000000006205/00
FOUND SESSION = 000187790072/00 CUU= 2800 RDFGRP = 15
-----
000187790072/00
MSC IS ACTIVE
TRANSMIT CYCLE IS EMPTY
APPLY CYCLE IS EMPTY
HOST INTERVENTION REQUIRED
RECEIVE TAG = 0000000000000047 APPLY TAG = 0000000000000046
-----
000000006205/00
MSC IS ACTIVE
TRANSMIT CYCLE IS EMPTY
APPLY CYCLE IS EMPTY
HOST INTERVENTION REQUIRED
RECEIVE TAG = 0000000000000046 APPLY TAG = 0000000000000045
-----
CASE3 - NOT ALL BOXES HAVE THE SAME RECEIVE TAG
SRDFA SESSION = 000187790072/00 HOST INTERVENTION REQUIRED
SRDFA SESSION = 000187790072/00 INACTIVE TAG MATCH
SRDFA SESSION = 000187790072/00 DISCARD RECEIVE CYCLE
SRDFA SESSION = 000000006205/00 HOST INTERVENTION REQUIRED
SRDFA SESSION = 000000006205/00 LOW INACTIVE TAG
SRDFA SESSION = 000000006205/00 COMMIT RECEIVE CYCLE

```

Figure 6-19 SRDFSR RPTOUT for Case 3 from Primary Side

```

-----
00000002 SRDFA SESSIONS IN MSC
-----
000187790072/00 > 000187900699/00
000000006205/00 > 000187990175/00
-----
OUR SESSION IS RUNNING ON SECONDARY SIDE - 000187990175/00
-----
FOUND SESSION = 000187900699/00 CUU= EE00 RDFGRP = 25
-----
000187900699/00
MSC IS ACTIVE
TRANSMIT CYCLE IS EMPTY
APPLY CYCLE IS EMPTY
HOST INTERVENTION REQUIRED
RECEIVE TAG = 00000000000000008 APPLY TAG = 00000000000000007
-----
000187990175/00
MSC IS ACTIVE
TRANSMIT CYCLE IS EMPTY
APPLY CYCLE IS EMPTY
HOST INTERVENTION REQUIRED
RECEIVE TAG = 00000000000000007 APPLY TAG = 00000000000000006
-----
CASE3 - NOT ALL BOXES HAVE THE SAME RECEIVE TAG
SRDFA SESSION = 000187900699/00 HOST INTERVENTION REQUIRED
SRDFA SESSION = 000187900699/00 INACTIVE TAG MATCH
SRDFA SESSION = 000187900699/00 DISCARD RECEIVE CYCLE
SRDFA SESSION = 000187990175/00 HOST INTERVENTION REQUIRED
SRDFA SESSION = 000187990175/00 LOW INACTIVE TAG
SRDFA SESSION = 000187990175/00 COMMIT RECEIVE CYCLE

```

Figure 6-20 SRDFSR RPTOUT for Case 3 from Secondary Side

DRAFT
EMC CONFIDENTIAL

External Interfaces

This chapter provides an overview of the SRDF Host Component ISPF and batch interfaces. Topics include:

- ◆ ISPF Interface.....7-2
- ◆ Batch Interface 7-33

ISPF Interface

The ISPF interface for the SRDF Host Component uses REXX and ISPF dialogs. The ISPF and TSO console access to the SRDF Host Component uses an API that provides information about the SRDF environment. This section describes the ISPF panel interface.

Product Requirements

The ISPF interface of the SRDF Host Component requires the following software:

- ◆ ISPF 3.3.0 or higher
- ◆ TSO/E 2.3.1 or higher

Using Function Keys

On any of these menus or the panels they invoke, you can press PF1 for help on any field. You can also press PF3 to exit from the current panel. If you press PF3 on the EMC Symmetrix Product List menu, you exit from the ISPF interface.

Starting the ISPF Interface Session

Before starting the SRDF Host Component ISPF interface, verify that the ISPF interface environment has been setup according to the procedure in *Setting Up the ISPF Interface Environment* on page 2-19.

To start an ISPF interface, perform the following steps:

1. Complete one of the following tasks:
 - From the ISPF Main menu, enter the following command:
`TSO EX 'ds-prefix.ispelib(EMCTOOLS)'`

or
 - From Option 6, enter the following command:
`EX 'ds-SCF-prefix.ispelib(EMCTOOLS)'`

Important: The SRDF Host Component task must be running to operate the SRDF Host Component ISPF Interface. Commands and requests through the interface fail with a Return Code (RC) 24 if the Host Component task is not active and accepting commands.

Result: The EMC Symmetrix Product List panel appears, as shown in Figure 7-1.

```
-----EMC Symmetrix Product List -----  
  
COPYRIGHT (c) 2001-2004 EMC Corporation ALL RIGHTS RESERVED. Vv.r.m  
  
Enter a command option ==>  
  
          H   Host Component Interface Functions  
          G   Group Name Service Commands  
          Q   Quality of Service Commands  
          T   TimeFinder Commands  
          S   SRDF/AR Interface Functions  
  
          I   Product Information  
  
PF1: Help   PF3: Exit
```

Figure 7-1 Main Product Panel

Vv.r.m in Figure 7-1 is the version of ResourcePak Base in use.

2. To execute the SRDF Host Component interface, select **H**.
3. The Specify the Session parameters panel opens, as shown in Figure 7-2 on page 7-4.

```

_____ Specify the Session parameters _____
Command ==>

Enter Job statement(s) and any site specific information as necessary... More: +
==>//OPERATOR JOB (1000)'OPERATOR'CLASS=AMSGCLASS*
==>//  NOTIFY=OPERATOR
==>//*
==>//*
==>//*

Command Prefix . . . . . _____SCF Suffix. . . . . EMC
Console Message Timeout. .0 (0_10)
Clear variables. . . . .N(Y/N) Restore default variables .Y(Y/N)
Stack Console output . .N(Y/N) Simulate Mode . . . . .N(Y/N)
Debug Mode . . . . .N(Y/N)

Use Log PDS. . . . .N(Y/N) Days to save. . . . .7 (1_30)
  Use Browse or View . .V(B/V)
  Log PDS Name . . . . . _____

Configuration PDS. . . . . _____
Stored Procedure PDS . . . _____

Please enter the names of the IBM ISPF Distribution data sets...
ISPLLIB. . . _____
ISPLMLIB. . . _____
ISPSLIB. . . _____
ISPLPLIB. . . _____
ISPTLIB. . . _____

UNIT . . .SYSALLDA and VOLUME . . _____(optional) for allocations

Product Load Library. . _____
                          (leave blank to default)

PF1:Help    ENTER:Save Session    PF3:Exit    PF7:Up    PF8:Down

```

Figure 7-2 Specify the Session Parameters Panel

4. Update the fields as necessary to change the behavior of your session. Use the session variables to customize a session to fit your processing needs. The following variables are available:

- **Command Prefix**

The command prefix is the SRDF Host Component command prefix. If you have multiple instances of EMCSCF and Host Component running (for example, test environments), you identify the one to use.

In the EMCTOOLS CLIST, specify the identifier of the EMCSCF to use. The HC command prefix is also entered on this panel.

- SCF Suffix

The suffix value used to define the SCF to run against.

- Console Message Timeout

The console message wait time from 0 to 10 seconds. When using the command line interface and issuing a console command, this is the amount of time for the console get option to wait for a response.

- Clear variables

Setting this value to **Y** causes the panel variables to be cleared when moving between panels. A value of **N** retains any panel variables that were entered.

- Restore default variables

Setting this value to **Y** causes the default panel variables to be restored when moving between Query (SQ) and Configuration (SC) panels. A value of **N** retains any panel default variables that were changed.

- Stack Console output

When using the command line interface, output can be accumulated by setting this option. The newest output is displayed first. If you specify **N**, the console input is not stacked and only the most recent output appears.

- Simulate Mode

This mode affects the Configure and Query commands. When this mode is enabled (**Y**), the query and configure commands are built and echoed back to the terminal, but not processed.

- Debug Mode

Setting this value to **Y** enables the debug trace facility.

Important: EMC strongly advises you not to set Debug Mode to **Y** unless you have been so advised by your EMC Customer Service representative as part of a debugging procedure.

- Use Log PDS

Setting this value to **Y** enables the logging feature. When logging is enabled, a PDS is created and each days worth of data is stored in a PDS member.

- Use Browse or View

Specify **B** to browse through the output or **V** to view output.

- PDS Name

Enter your PDS name in standard TSO format.

- Days to save

A maximum of 30 days can be retained. Members are deleted as they expire and the dataset is compressed automatically. If the dataset does not exist, you are prompted for a space allocation.

- Configuration PDS

This PDS contains the configuration members. Enter your PDS name in standard TSO format. Automatic compression of the PDS occurs when a member is deleted. If a dataset does not exist, you are prompted for a space allocation.

- Stored Procedure PDS

This PDS contains the Stored Procedure and Parameter members. Enter your PDS name in standard TSO format. Automatic compression of the PDS occurs when a member is deleted. If a dataset does not exist, you are prompted for a space allocation.

- UNIT

The default UNIT to be used for dataset allocations is SYSALLDA.

- VOLUME

VOLSER used for dataset allocations (optional).

- Product Load Library

Specify the library containing the EMCSRDFR interface modules, or leave blank to default.

5. Enter the names of the IBM ISPF Distribution datasets.

The necessary ISPF libraries are: ISPLLIB, ISPMLIB, ISPSLIB, ISPPLIB, and ISPTLIB.

6. Press ENTER to save the session parameters.

If this is the first time using the ISPF interface, press ENTER again after receiving the pop-up window that the LOG PDS dataset has been allocated. This action saves the session settings; otherwise, it defaults to ##.

Press PF3.

Result: The Symmetrix Function Controls panel, as shown in Figure 7-3, opens:

```
----- EMC Symmetrix Function Controls -----
      COPYRIGHT (C) 2001-2004 EMC Corporation  ALL RIGHTS RESERVED.   Vn.n.n
Enter a command option ==>

      Host Component Interface Functions
      Q  Query Commands
      C  Configure Commands
      D  Display Configuration Information
      M  Manage SRDF Configuration
      P  Manage Stored Procedures
      Z  Command Line Interface
      A  SRDF/A Monitor

      Session Control Options
      S  Set Session Options

PF1: Help   PF3: Exit
```

Figure 7-3 Symmetrix Function Controls Panel

The Symmetrix Function Controls panel, as shown in Figure 7-3, provides access to the following panels:

Panel	For More Information
Query Commands	<i>Query Functions Panel</i> on page 7-8
Configure Commands	<i>Configure Functions Panel</i> on page 7-9
Display Configuration Information	<i>Display Configuration Information Panel</i> on page 7-10
Manage SRDF Configuration	<i>Manage SRDF Configuration Panel</i> on page 7-11
Command Line Interface	<i>Command Line Interface Panel</i> on page 7-31
SRDF/A Monitor	<i>SRDF/A Monitor Panel</i> on page 7-32
Set Session Options	<i>Specify the Session Parameters Panel</i> on page 7-4

The following sections describe each of these panels.

Query Functions Panel

The Query Functions panel, as shown in Figure 7-4, allows you to enter SRDF Host Component Query commands.

You can access the Query Functions panel by entering **Q** on the Symmetrix Function Controls panel.

```

_____ EMC Host Component Query Functions _____
Enter a query function ====>
1  ADC      - Display the adaptive copy skew values
2  BCV      - Display Business Continuance Volumes
3  CNFG     - Display the Symmetrix configuration
4  GLOBAL   - Display global settings
5  LINK     - Display port connection information
6  MIRROR   - Display logical to physical device info
7  MSG      - Display error messages
8  RAID     - Display the Symmetrix RAID configuration
9  SSID     - Display Subsystem Id's
10 STATE    - Display volume STATE information
11 VOL      - Display volume information
12 RAID10   - Display RAID 10 volume information
13 RDFGRP   - Display RDF Group information
14 SRDFA    - Display SRDFA information
15 SRDFA VOL - Display SRDFA volume information
99 INFO     - Command Format Information
PF1: Help   PF3: Exit
  
```

Figure 7-4 Query Functions Panel

Configure Functions Panel

The Configure Functions panel allows you to enter SRDF Host Component configuration commands.

You can access the Configure Functions panel by entering **C** on the Symmetrix Function Controls panel, as shown in Figure 7-5 on page 7-9.

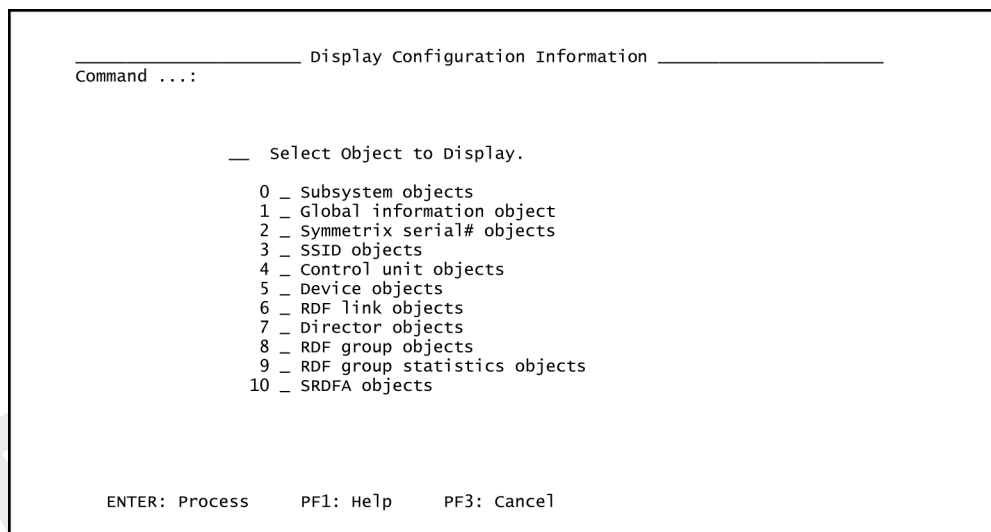
```
_____ EMC Host Component Configure Functions _____  
Enter a Configure function ==>  
  
1  BCV Establish  
2  BCV Re_Establish  
3  BCV Restore  
4  BCV Split  
5  BCV Configure  
  
6  CNFG  _  Configure the Operating State  
7  GLOBAL _  Configure Global Settings  
8  LINK  _  Configure the Remote Link  
9  MSG   _  Configure Error Messages  
10 VOL   _  Configure Volume Information  
11 RDFGRP _  Configure RDFGRP Information  
12 SRDFA _  Configure SRDFA Information  
  
99 INFO  _  Command Format Information  
  
PF1: Help      PF3: Exit
```

Figure 7-5 Configure Functions Panel

Display Configuration Information Panel

The Display Configuration Information panel, as shown in Figure 7-6, allows you to display SRDF object information using the REXX SRDF Host Component API.

You can access the Display Configuration Information panel by entering **D** on the Symmetrix Function Controls panel.



```
_____ Display Configuration Information _____  
Command ...:  
  
  _ Select Object to Display.  
0 _ Subsystem objects  
1 _ Global information object  
2 _ Symmetrix serial# objects  
3 _ SSID objects  
4 _ Control unit objects  
5 _ Device objects  
6 _ RDF link objects  
7 _ Director objects  
8 _ RDF group objects  
9 _ RDF group statistics objects  
10 _ SRDFA objects  
  
ENTER: Process      PF1: Help      PF3: Cancel
```

Figure 7-6 Display Configuration Information Panel

Manage SRDF Configuration Panel

The Manage SRDF Configuration panel, as shown in Figure 7-7 on page 7-11, allows you to create configuration images of your SRDF configuration. Each member represents SRDF information about a single Symmetrix system. This design allows you to create and modify multiple SRDF configurations with either imbedded command capabilities, or using the generated commands put into effect.

You can access the Manage SRDF Configuration panel by entering **M** on the Symmetrix Function Controls panel.

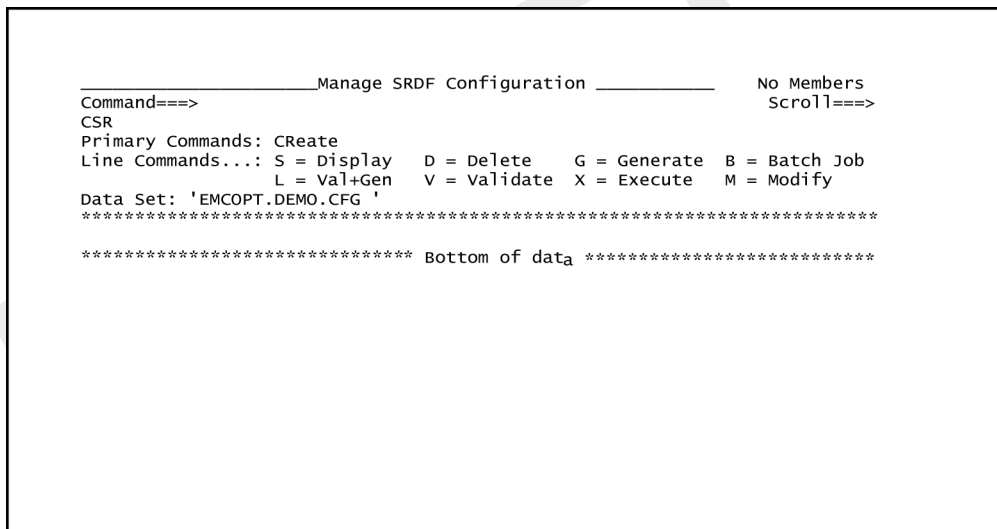


Figure 7-7 Manage SRDF Configuration Panel

To create an image of your configuration, perform the following steps:

1. In the command line, enter **CR**.

CReate is a primary command and must be entered at the command line. For information on the member types available with the CReate command, refer to *Member Types* on page 7-15.

Result: The Build Type subpanel appears.

```

----- Manage SRDF Configuration ----- Row 1 to 2 of 2
Command=> CR                               Scroll=> CSR
Primary Commands: Create
Line Commands...: S = Display    D = Delete    G = Generate    B = Batch Job
                  L = Val+Gen    V = Validate X = Execute    M = Modify
Data Set: 'EMCOPT.DEMO.CFG'
*****
- 00005800      Specify MVS device CUU on Local Symm
  *
- 50005800      To build a Configuration Member:
  *              Select with an S a build type.
  *              _ Build by Group  _ Build by Devices
  *
*****          To build a Stored Procedure Member:
                  Select with an S a build type.
                  _ Build Parms for Stored Procedure
                  _ Build Stored Procedure
                  ENTER = Process      PF03 = Cancel
*****

```

The Build Type subpanel allows you to build either configuration members or stored procedure members.

You can build a configuration member by SRDF Group or by device.

When building by group (S type member), the configuration member is presented by SRDF group. In this type of configuration, member devices are placed into SRDF groups.

If a configuration member is built by device (D type member), the member is used to manage a set of devices. Building this type of member allows you to manage specific devices as one configuration.

The comment entered here becomes the member description.

Result: The Symmetrix Serial Numbers subpanel appears.

```

----- Manage SRDF Configuration ----- Row 1 to 2 of 2
Command=> CR                               Scroll=> CSR
Primary Commands: C
Line Commands...: S
Data Set: 'EMCOPT.'
*****
- D0005800
  *
- S0005800
  *
*****

----- Symmetrix Serial Numbers ----- Row 1 to 5 of 5
Command...:
PF1: Help Enter: Create PF3: Exit
Select only 1 Symmetrix Serial#

-----
Symm Serial#   Enginuity
- 000000006205 5670-57
- 000000003187 5265-57
- 000000006185 5670-57
- 000184600058 5568-59
- 000184600045 5568-59
***** Bottom of data *****
-----
B = Batch Job
M = Modify
*****

```

2. Select the Symmetrix control unit for which you want to build the configuration, and press ENTER.

Result: The MVS Device Display subpanel appears, prompting for a CUU.

```

----- Manage SRDF Configuration ----- Row 1 to 2 of 2
Command=> CR                               Scroll=> CSR
Primary Commands: C
Line Commands...: S
Data Set: 'EMCOPT.'
*****
- D0005800
  *
- S0005800
  *
*****

----- MVS Device Display ----- Row 1 to 4 of 4
Command=>                               SCROLL=> CSR
PF1: Help Enter: Create PF3: Exit
Specify a CUU within the range(s) below = ____

MVS-Device Range(s) First Last
2001 203F
2100 21FF
2200 22FF
2300 238F
***** Bottom of data *****
-----

```

3. Specify a CUU that falls within the range(s) displayed, and press ENTER.

This is the device used to pass the configure commands.

Result: The Create Configuration Information subpanel appears for the selected Symmetrix, prompting for a range of devices to discover.

```

----- Manage SRDF Configuration ----- Row 1 to 2 of 2
Command=> CR                               Scroll=> CSR
Primary Commands: Create
Line Commands...: S = Display   D = Delete   G = Generate   B = Batch Job
                  L = Val+Gen   V = Validate   X = Execute   M = Modify
Data Set: 'EMC'
*****
- 00005800
  *
  *
- 50005800
  *
  *
*****
Symmetrix Serial#..... 000000006205
Starting Symmetrix Device# .....
and
Max# of device objects to be returned
-OR-
Range of Devices.... Begin# ____ End# ____
ENTER: Process   PF1: Help   PF3: Cancel
  
```

4. Specify the devices to be included in the configuration by either:
 - Specifying a starting device number and the number of devices
 - Specifying a range of Symmetrix devices

You can make multiple entries before entering additional devices, and pressing ENTER. Be sure that you do not overlap the device entries.

Result: The build process creates a configuration member that is named as follows:

- Build By Group
S#####XX - S = Saved Group state member
- Build By Device
D#####XX - D = Saved Device state member

Where:

= Last five digits of the serial number

XX = Member number from 00 to 99

Member Types

This section describes the member types available with the CReate command.

Type “S” Members

Creating a saved group state member (type S) allows you to manage the devices by groups, or by Symmetrix configuration (all groups within one Symmetrix). Only devices that are in an SRDF Group are added to the configuration member.

Using the S (Display) line command produces a display similar to the following Host Component RA-Group Display panel, as shown in Figure 7-8. Notice that the devices are managed by SRDF Group. The line commands available on a group level are listed on the panel.

----- Host Component RA-Group Display for S0117500 -----											
Command...:						Scroll...: GSR					
S = Display			M = Modify			D = Delete			G = Generate		
L = Validate+Generate						V = Validate			X = Execute		
—	00	64	—	01	64	—	02	64	—	03	64
—	04	128	—	05	256	—	06	0	—	07	0
—	08	0	—	09	0	—	10	0	—	11	0
—	12	0	—	13	0	—	14	0	—	15	0
—	16	0	—	17	0	—	18	0	—	19	0
—	20	0	—	21	0	—	22	0	—	23	0
—	24	0	—	25	0	—	26	0	—	27	0
—	28	0	—	29	0	—	30	0	—	31	0
—	32	0	—	33	0	—	34	0	—	35	0
—	36	0	—	37	0	—	38	0	—	39	0
—	40	0	—	41	0	—	42	0	—	43	0
—	44	0	—	45	0	—	46	0	—	47	0
—	48	0	—	49	0	—	50	0	—	51	0
—	52	0	—	53	0	—	54	0	—	55	0
—	56	0	—	57	0	—	58	0	—	59	0
—	60	0	—	61	0	—	62	0	—	63	0
PF01 = Help			PF03 = Cancel			Enter = Process					

Figure 7-8 Host Component RA-Group Display Panel

Groups can be managed on an individual basis.

To display a group, use the S line command (fields on the resulting panel cannot be modified). To modify the entries in a group, use the M line command.

Result: In either case, an SRDFGRP Display panel similar to the one in Figure 7-9 appears:

RDGroup-5 Display														
Command...: █										Row 1 to 15 of 256				
PF1: Help PF3: Process Changes and Exit Cancel= Exit(No Save)														
MVS	SYM													
CUU	DEV	RDEV	GP	VOLSER	MR	R/W	RDY	SYNC	DOM	RDF	RDF	ADC	ADC	ADC
3100	00C0	00C0	05	UGL0C0	L1	-	-	SY	.	S	.	.	.	65535
3101	00C1	00C1	05	UGL0C1	L1	-	-	SY	.	S	.	.	.	65535
3102	00C2	00C2	05	UGL0C2	L1	-	-	SY	.	S	.	.	.	65535
3103	00C3	00C3	05	UGL0C3	L1	-	-	SY	.	S	.	.	.	65535
3104	00C4	00C4	05	UGL0C4	L1	-	-	SY	.	S	.	.	.	65535
3105	00C5	00C5	05	UGL0C5	L1	-	-	SY	.	S	.	.	.	65535
3106	00C6	00C6	05	UGL0C6	L1	-	-	SY	.	S	.	.	.	65535
3107	00C7	00C7	05	UGL0C7	L1	-	-	SY	.	S	.	.	.	65535
3108	00C8	00C8	05	UGL0C8	L1	-	-	SY	.	S	.	.	.	65535
3109	00C9	00C9	05	UGL0C9	L1	-	-	SY	.	S	.	.	.	65535
310A	00CA	00CA	05	UGL0CA	L1	-	-	SY	.	S	.	.	.	65535
310B	00CB	00CB	05	UGL0CB	L1	-	-	SY	.	S	.	.	.	65535
310C	00CC	00CC	05	UGL0CC	L1	-	-	SY	.	S	.	.	.	65535
310D	00CD	00CD	05	UGL0CD	L1	-	-	SY	.	S	.	.	.	65535
310E	00CE	00CE	05	UGL0CE	L1	-	-	SY	.	S	.	.	.	65535

Figure 7-9 SRDFGRP Display Panel

More Information: For an explanation the fields on this panel, refer to *Device State Panel Definitions* on page 7-26.

The configuration member groups the SRDF devices by SRDF Group.

You can display or modify the individual SRDF Groups.

To create a new state for the SRDF configuration, select the various SRDF device states. The state of the device when the configuration was created appears. Changes are permitted in any field containing a period (.), an S, or an SY. This design allows you to specify a new SRDF configuration state.

Press PF3 to save the changes, or enter **CANCEL** and press ENTER to cancel any changes.

For example, in Figure 7-10 on page 7-17, the Symmetrix device numbers 3100 through 3104 change to SEMI through SYNC (the lower case “s” in the SYNC fields for those devices) when this new configuration is executed.

Command....: RDFGroup-5 Display Row 1 to 15 of 256

PF1: Help PF3: Process Changes and Exit Cancel= Exit(No Save)

MVS	SYM	DEV	RDEV	GP	VOLSER	MR	R/W	RDY	SYNC	DOM	RDF	RDF	ADC	ADC	ADC	ITA
											RDY	SUSP	WRT	DISK	MAX	
3100	00C0	00C0	05	UGL0C0	L1	-	-	-	Ss	.	S	.	.	.	65535	-
3101	00C1	00C1	05	UGL0C1	L1	-	-	-	Ss	.	S	.	.	.	65535	-
3102	00C2	00C2	05	UGL0C2	L1	-	-	-	Ss	.	S	.	.	.	65535	-
3103	00C3	00C3	05	UGL0C3	L1	-	-	-	Ss	.	S	.	.	.	65535	-
3104	00C4	00C4	05	UGL0C4	L1	-	-	-	SY	.	S	.	.	.	65535	-
3105	00C5	00C5	05	UGL0C5	L1	-	-	-	SY	.	S	.	.	.	65535	-
3106	00C6	00C6	05	UGL0C6	L1	-	-	-	SY	.	S	.	.	.	65535	-
3107	00C7	00C7	05	UGL0C7	L1	-	-	-	SY	.	S	.	.	.	65535	-
3108	00C8	00C8	05	UGL0C8	L1	-	-	-	SY	.	S	.	.	.	65535	-
3109	00C9	00C9	05	UGL0C9	L1	-	-	-	SY	.	S	.	.	.	65535	-
310A	00CA	00CA	05	UGL0CA	L1	-	-	-	SY	.	S	.	.	.	65535	-
310B	00CB	00CB	05	UGL0CB	L1	-	-	-	SY	.	S	.	.	.	65535	-
310C	00CC	00CC	05	UGL0CC	L1	-	-	-	SY	.	S	.	.	.	65535	-
310D	00CD	00CD	05	UGL0CD	L1	-	-	-	SY	.	S	.	.	.	65535	-
310E	00CE	00CE	05	UGL0CE	L1	-	-	-	SY	.	S	.	.	.	65535	-

Figure 7-10 SRDFGRP Display Panel

Use the Validate function, either on the one SRDF Group that has been modified or the entire configuration member, to display the SRDF Host Component commands that would be executed to achieve the new configuration state:

```

Menu Utilities Compilers Help
BROWSE      EMC#DOC.RDFMGMT(C0117500)          Line 00000000 Col 001 0:
Command ==>                                     Scroll ==> PA
***** Top of Data *****
* MEMBER GENERATED FROM S0117500 ON Friday, 19 Jul 2002 at 07:40:50
* Using RDFGroup=05
SC VOL,3018,SEMI-SYNC,00C0-00C3
*** END OF DATA ***
***** Bottom of Data *****

```

Type “D” Members

Creating a saved device state member (type D) allows you to manage any devices within the configuration. Any Symmetrix device type can be in this member:

```

_____ Manage SRDF Configuration _____ Row 1 to 2 of 2
Command==>                               Scroll==> CSR
Primary Commands: Create
Line Commands...: S = Display   D = Delete   G = Generate   B = Batch Job
                  L = Val+Gen   V = Validate   X = Execute   M = Modify
Data Set: 'EMCOPT.DEMO.CFG'
*****
- D0005800
  *
  *
- S0005800
  *
  *
***** Bottom of data *****

```

Device members manage specific devices:

- ◆ To display a device member, use the S line command (fields on the resulting panel cannot be modified).
- ◆ To modify the entries in the member, use the M line command.

Result: In either case, a Device Display panel appears:

```

_____ Device Display for D0117500 _____ Row 7 to 21 of 21
Command...: █
PF1: Help  PF3: Process Changes and Exit  Cancel= Exit(No Save)
-----
MVS      SYM
CUU  DEV  RDEV  GP  VOLSER  MR  R/W  RDY  SYNC  DOM  RDF  RDF  ADC  ADC  ADC  ITA
3066 0066 0066 04  UGL066  L1  -   -   SS   .   S   S   .   .   65535  -
3067 0067 0067 04  UGL067  L1  -   -   SS   .   S   S   .   .   65535  -
3068 0068 0068 04  UGL068  L1  -   -   SY   .   S   S   .   .   65535  -
3069 0069 0069 04  UGL069  L1  -   -   SY   .   S   S   .   .   65535  -
306A 006A 006A 04  UGL06A  L1  -   -   SS   .   S   S   .   .   65535  -
306B 006B 006B 04  UGL06B  L1  -   -   SS   .   S   S   .   .   65535  -
306C 006C 006C 04  UGL06C  L1  -   -   SY   .   S   S   .   .   65535  -
306D 006D 006D 04  UGL06D  L1  -   -   SY   .   S   .   .   S   65535  -
306E 006E 006E 04  UGL06E  L1  -   -   SY   .   S   .   .   S   65535  -
306F 006F 006F 04  UGL06F  L1  -   -   SY   .   S   .   .   .   65535  -
3140 0100 0100 05  UGL100  L2  .   -   -   -   S   -   -   -   -   S
3141 0101 0101 05  UGL101  L2  .   S   -   -   S   -   -   -   -   S
3142 0102 0102 05  UGL102  L2  .   S   -   -   S   -   -   -   -   S
3143 0103 0103 05  UGL103  L2  .   S   -   -   S   -   -   -   -   S
3144 0104 0104 05  UGL104  L2  .   S   -   -   S   -   -   -   -   S

```


More Information: Refer to *Device State Panel Definitions* on page 7-26 for an explanation of the fields on this panel.

If you select Modify, you can tab to a field to modify it. To select a state to set, specify S in the field. If a state is set to S and you would like to reset it, set the field to "." (period) or "" (blank). Press PF3 to save the changes, or enter CANCEL and press ENTER to cancel any changes. The member can now be validated, generated, or executed.

If the Execute function is selected for either the configuration or an individual SRDF Group, the SRDF Host Component commands are issued to achieve the specified new state. The Generate or Validate and Generate function save the necessary commands in a configuration type C member. These commands can later be included in other automation where different SRDF configurations are needed.

Type "C" Members

Command members are the result of the generation process and cannot be modified. They contain only #SC commands and can be executed directly. No validation is done for this type of member.

Displaying a command member results in a display similar to the following:

```

Menu  Utilities  Compilers  Help
-----
BROWSE      EMC#DOC.RDFMGMT(C0117501)                Line 00000000 Col 001 080
Command ==> _____ Scroll ==> PAGE
***** Top of Data *****
* MEMBER GENERATED FROM D0117500 ON Friday, 19 Jul 2002 at 09:17:56
*
SC VOL,3018,SYNC,006A
SC VOL,3018,SEMI-SYNC,006D-006F
*** END OF DATA ***
***** Bottom of Data *****

```

Type “PA” Members

Type PA members provide parameters for stored procedures.

To use this member, perform the following steps:

1. Select the Build ParmS for Stored Procedure option.

Result: The Configuration Comment Information subpanel appears, prompting for comments.

These comments are used as member description lines.

```

----- Manage SRDF Configuration ----- Row 2 to 4 of 4
Command==> CR                               Scroll==> CSR

Primary Commands:  CReate
Line Commands...:  S = Display  D = Delete  G = Generate  B = Batch Job
                  Configuration Comment Information
Key in up to two lines of comments.
Parameter Member
ENTER: Process          PF03: Cancel Create and Exit

- D0117500
  *DEVICE MEMBER
  *
- S0117500
  *EXAMPLE MEMBER 1
  *
***** Bottom of data *****

```

2. Enter your comments, and press ENTER.

Result: The Create Member Name subpanel appears, prompting for a member name:

```

_____ Manage Stored Procedures _____ Row 3 to 8 of 14
Command==> CR Scroll==> CSR
Primary Commands: Create
Line Commands...: S = Display D = Delete G = Generate B = Batch Job
                  L = Val+Gen V = Validate X = Execute M = Modify
Data Set: 'RGAGNE1.DEMO.SP'
*****
- PAREPT2
  *PARMS FO _____ Create Member Name _____ N A BATCH.
  *          | Specify 6 characters to be used to create |
- SPBCV      | a member name to contain the data to be |
  *          | saved ==> _____ |
  *          |
- SPBCV1      | NOTE: Member Name is prefixed with PA |
  *          | and then your 6 characters. |
  *          |
- SPDEMO3
  *DEMO STORED PROCEDURE 3. THIS PROCEDURE WILL CHECK A DEVICE RANGE USING
  *THE DEVICE OBJECTS AND CALL ANOTHER PROCEDURE. USES SPMM.
- SPDEMO4
  *DEMO STORED PROCEDURE 4. THIS PROCEDURE WILL EXECUTE A COMMAND. SINCE W
  *USING THE SDEV SYMBOLIC IT CAN ONLY BE ISSUED AFTER AN SQ OR CHKA_DEVICE
- SPMAINT
  *****

```

3. Enter a member name, and press ENTER.

You may want to use the same name as the stored procedure this member executes. You are now prompted for your parameters.

Result: The Specify the Stored Procedure Interface Parameters panel appears, prompting for your parameters:

```

----- Specify the Stored Procedure Interface parameters -----
Command ==> _____ Scroll ==> CSR
Procedure Name =====> _____ Parm Member Name =====> PAPARM1
Set Runtime Options:
Prefix==> ++ Timeout ==> _____ Long Timeout ==> _____ Message Loop ==> _____
Console Name ==> DISABLED Trace ==> OFF (ON/OFF/ALL)
Output Option ==> ON (ON/OFF/IMM)
Set Procedure Symbolics:
Discard Updates =====> _____ Scope =====> _____
Discard R1 Track Proc ==> _____ Discard R1 Volume Proc ==> _____
Discard R2 Track Proc ==> _____ Discard R2 Volume Proc ==> _____
Set Command Symbolics:
R1 CUU ==> _____ R1 Dev =====> _____ R1 Vol =====> _____
R2 CUU ==> _____ R2 Dev =====> _____ R2 Vol =====> _____
SMS/User Group =====> _____
Remote RA Multi Hop List =====> _____
Set GET Statement Symbolics:
CUU Device =====> _____ or Serial number =====> _____
Starting Device =====> _____ Number of Devices =====> _____
PF1: Help PF3: Process Changes and Exit Cancel= Exit(No Save)

```

The Stored Procedure Parameter Member sets symbolic variables that are used within a stored procedure. To pass symbolic parameters to a stored procedure, specify the procedure name in the parameter member, and execute the “PA” member. When one of these values is found in a statement to be processed, the value specified is substituted.

More Information: Refer to the *EMC Storage Procedure Executive (EMCSPE) Programmers Guide* for more information about symbolic parameters usage within a stored procedure.

The fields in this display have the following meaning:

- ◆ Procedure Name
Specify the Stored Procedure name to execute.
- ◆ Set Runtime Options
The following symbolics affect the runtime characteristics of the stored procedure:
 - Prefix
The Host Component prefix.
 - Timeout
The number of seconds the console get msg request waits for a reply. This parameter is ignored if the CONSOLE parameter DISABLED. The default is 3 seconds.
 - Long Timeout
Overrides the timeout value when long running requests are executed. This parameter varies the time that the CHK (with WAIT) statements waits before the next check is done. The default is 5 seconds.
 - Message Loop
Number of loops while waiting for a message.
 - Console Name
OS Console name. USERID must be RACF defined and have console authority. The default console name of *DISABLED* disables the console interface. If you create a stored procedure that issues z/OS console commands, you must specify a console name, and execute it by using the parameter member.

- Trace
Sets trace ON or OFF.
- ◆ Set Command Symbolics
These symbolics are substituted within the commands:
 - Discard Updates
Specify R1, R2, or NO. Any updates (invalid tracks) on the specified device are discarded. The default value of NO indicates that no invalid track action is taken.
 - Scope
Track or volume.
 - Discard R1 Track Proc
Invalidate R1 changed track procedure.
 - Discard R1 Volume Proc
Invalidate R1 volume procedure.
 - Discard R2 Track Proc
Invalidate R2 changed track procedure.
 - Discard R2 Volume Proc
Invalidate R2 volume procedure.
 - R1 CUU
Sets the R1 CUU value.
 - R1 Dev
Sets the R1 Device value.
 - R1 Vol
Sets the R1 Volume value.
 - R2 CUU
Sets the R2 CUU value.
 - R2 Dev
Sets the R2 Device value.
 - R2 Vol
Sets the R2 Volume value.

- SMS/User Group
SMS or USER Group.
- Remote RA Multihop List
Sets the HOP value.

◆ Set GET Statement Symbolics

The following symbolics are only valid on the GET commands:

- CUU Device
This field must contain a 4-character z/OS device number.
- Serial number
This field must contain a 12-character Symmetrix serial number. If you specify a serial number, Host Component chooses an eligible device. There must be at least one device online.
- Starting Device
Identifies the starting Symmetrix device number.
- Number of Devices
Specifies the maximum number of device objects to be returned.

Type “SP” Members

Type SP members build stored procedures.

To use this member, perform the following steps:

1. Select the Build Stored Procedure option.

Result: The Configuration Comment Information subpanel appears, prompting for comments.

These comments are used as member description lines.

```

----- Manage SRDF Configuration ----- Row 1 to 4 of 4
Command==> CR                               Scroll==> CSR

Primary Commands: CReate
Line Commands...: S = Display  D = Delete    G = Generate  B = Batch Job
                  Configuration Comment Information
Key in up to two lines of comments.

Stored Procedure_____
_____

ENTER: Process          PF03: Cancel Create and Exit

- C0117501
  * MEMBER GENERATED FROM D0117500 ON FRIDAY, 19 JUL 2002 AT 09:17:56
  *
- D0117500
  *DEVICE MEMBER
  *
- S0117500
  *EXAMPLE MEMBER 1
  *
***** Bottom of data *****

```

2. Enter your comments, and press ENTER.

Result: The Create Member Name subpanel appears, prompting for a member name:

```

----- Manage Stored Procedures ----- Row 1 to 6 of 14
Command==> CR                               Scroll==> CSR

Primary Commands: CReate
Line Commands...: S = Display  D = Delete    G = Generate  B = Batch Job
                  L = Val+Gen  V = Validate  X = Execute    M = Modify
Data Set: 'EMCOPT.DEMO.SP '
*****

- PAAA
  *
  *          Create Member Name
- PABCV      | Specify 6 characters to be used to create |
  *          | a member name to contain the data to be |
  *          | saved ==> _____ |
- PAREPT2    | NOTE: Member Name is prefixed with SP |
  *PARMS FO  | and then your 6 characters. | A BATCH.
  *
- SPBCV
  *
  *
- SPBCV1
  *
  *

```

3. Enter a member name, and press ENTER.


```
HELP _____ EMC Host Component RA_Group_ Display _____ HELP
COMMAND ==>
```

If display was selected the fields on this panel cannot be modified. If modify was select you will be able to tab to a field to modify. The values of the fields are as follows:

```
"S"      _ The state is set.
"."      _ The state is not set.
" "      _ The state is not applicable to this device or cannot be changed.
"SS/SY"  _ For the SYNC field either Semi_Sync or Sync.
"XXXXX"  _ For ADCMAX a numerical value.
```

If modify was selected you can change the field values. To select a state to set specify "S" in the field. If a state is set to "S" and you would like to reset it set the field to "." (period) or " " (blank). Press "PF3" + More: to save the changes or type "CANCEL" and press "ENTER" to cancel any changes.

Fields displayed on this panel are:

```
MVS      SYM                      RDF RDF  ADC ADC  ADC
CUU  DEV  RDEV GP VOLSER MR R/W RDY SYNC DOM RDY SUSP WRT DISK MAX  ITA
```

```
Mvs Cuu
Symmetrix Device number
Symmetrix Remote Device number
Symmetrix Group number
Volume Serial number
Device type
Read/Write Flag
Ready Flag
Sync Flag
Domino Flag
RDF Ready
RDF Suspend
Adaptive Copy Write
Adaptive Copy Disk
Adaptive Copy Maximum
Invalid Track Attribute
```

Figure 7-12 Related Help Panel Describing Displayed Fields

Line Commands

The following line commands can be specified next to a member:

- ◆ S = Display

Used next to any member type to display the member.

- ◆ D = Delete

Used next to any member type to delete the member. Can also be used within an S type member to delete an SRDFGrp.

◆ M = Modify

This command can be used on the following members. Behavior is dependent on the member itself. The following table describes the modify behavior:

Member Type	Description	Modify Response
D	Device member	Open a panel that allows the device state to be changed.
PA	Stored procedure parameter member	Open a panel that allows the parameters to be changed.
SP	Stored procedure	Goes into an edit session that allows the stored procedure to be edited.

◆ V = Validate

This command can be used with the members listed in the following table. Behavior is dependent on the member itself. In all cases, echoing of commands is performed. The validate process compares the saved configuration with the current state of the devices. If changes have been made to the devices that do not match the saved configuration, the Host Component commands needed to change the devices are echoed to the terminal. No changes are applied during the validate process.

The following table describes the validate behavior:

Member Type	Validate Response
S	Validate the member and echo any commands needed to the terminal.
S (RDFGrp)	Validate only the devices in the selected SRDFGrp and echo any commands needed to the terminal.
D	Validate all devices in the device member and echo any commands needed to the terminal.

◆ L = Val+Gen

This command can be executed on the members listed in the following table. Its behavior is dependent on the member itself. It is a combination of the validate and generate process.

The following table describes the generate behavior:

Member Type	Validate Response
S	Validate the member and echo any commands generated to the terminal. Produce a C command type member.
S (RDFGrp)	Validate only the devices in the selected SRDFGrp and echo any commands generated to the terminal. Produce a C command type member.
D	Validate all devices in the device member and echo any commands generated to the terminal. Produce a C command type member.

◆ G = Generate

This command can be used on the members listed in the following table. Behavior is dependent on the member itself. In all cases, an internal validation occurs and no echoing of commands is performed. The generate process produces a command member (C type). This command member contains the #SC commands needed to set the devices so they match the saved configuration. Since the generate process does an internal validation, commands are only built for the devices that need to be changed.

The following table describes the generate behavior:

Member Type	Validate Response
S	Generate a "C" (command) type member reflecting any changes necessary to all devices in all groups.
RDFGrp	Generate a "C" (command) type member reflecting any changes necessary to only the devices in the group.
D	Generate a "C" (command) type member reflecting any changes necessary to all devices in the device member.

◆ X = Execute

This command can be executed on any kind of member. Its behavior is dependent on the member itself.

The following table describes the execute behavior:

Member Type	Description	Modify Response
S	State member generated by SRDF Group	Internal Validate. No echo of commands needed. Build and execute commands for each SRDF Group in the configuration.
D	Device member	Internal Validate. No echo of commands needed. Build and execute commands for each device.
C	Command member	Immediately execute the commands.
PA	Stored procedure parameter member	Execute the stored procedure specified in the parameter member and apply any symbolic parameters to the stored procedure.
SP	Stored procedure	Execute the stored procedure directly. No symbolic parameters can be substituted.

Command Line Interface Panel

You can access the Command Line Interface panel, as shown in Figure 7-13, by entering **Z** on the Symmetrix Function Controls panel. The Command Line Interface panel allows you to enter SRDF Host Component and z/OS operator commands.

You can use the Command Line Interface panel to issue #SQ, #SC, #TF, and z/OS console commands. If you enter either an #SQ or #SC (alias) command without a command prefix, or with a command prefix that matches the prefix specified in the setup, the Host Component Interface issues the command.

Any other command causes the interface to activate a Master Console Services session. The console ID is the TSO user ID followed by a “#” (USERID#). You must have console authority to use this option.

```

----- Command Line Interface -----
Command ==>                               Scroll ==> CSR
Specify a command to process: █
*****
***** Bottom of data *****

```

Figure 7-13 Command Line Interface Panel

The console interface recognizes the following commands in addition to the #SQ and #SC (alias) commands:

- ◆ **HELP** — Display the Host Component help information.
- ◆ **SQUERY** — The long form of the “#SQ” (alias) query command.
- ◆ **SCONFIG** — The long form of the “#SC” (alias) configuration command.
- ◆ **TF** — EMC TimeFinder command.

- ◆ STACK=ON/OFF — The stack command determines how to display the console output.

More Information: Refer to the Specify the Session parameters panel, as shown in Figure 7-2 on page 7-4.

Access to the SRDF Host Component or z/OS operation commands is user controlled with installation RACF settings. Since the command prefix has been defined in the system setup panel, there is no need to specify it on the command. You can enter commands in either the #SQ or SQ formats.

SRDF/A Monitor Panel

The SRDF/A Monitor panel allows you to enter SRDF/A Monitor commands.

You can access the SRDF/A Monitor panel by pressing A on the Symmetrix Function Controls panel.

```

----- SRDF/A Monitor -----
Command=>                               Scroll ==>
System: X06                               Refresh      11:40:17 11/22/04
Line Commands: C = Cnfg  E = Excpt  G = Group  L = Local  M = Msc  R = Remote
                  S = Symm
          MSC      RA      RA Group
          Name     Num   Name or Ser      Type      Status   Delay  Exception
*****
_  MGSARB    02   KCH02CB      SRDFA/MSC/STAR ACT/ON   29
_  STARKCH   18   KCH18AC      SRDFA/MSC/STAR ACT/ON   21
_  STARKCH   38   KCH18AC      SRDFA/MSC/STAR ACT/ON   25

PF1: Help      PF3: Exit

```

Figure 7-14 SRDF/A Monitor Panel

Batch Interface

The batch interface provides a mechanism to submit Host Component commands from a batch program, and to retrieve the output from that command to a file. Output from the command is also echoed to the syslog, job log, and to the HCLOG file if active.

Details

The batch program, EMCSRDF, reads Host Component commands from SYSIN and displays output on the SYSPRINT file. The EMCSRDF batch program does not require APF authorization. Note that if the initialization parameters indicate that operator verification is required, a WTOR may be issued to the operator console, requesting confirmation for the requested action.

The LRECL for SYSIN can be up to 128 bytes. Commands on SYSIN start in column 1, and are entered in the same format as commands entered at the console.

You may continue A command onto multiple records by terminating a line with a (syntactically allowed) comma and at least one space followed by a hyphen (-). The continuation line must be blank in column 1 and the continuation text must start in or before column 50.

The first byte(s) of the command must match the COMMAND_PREFIX setting for Host Component running on your system.

Commands are submitted one at a time, with each command waiting for the completion of the previous one. If a command fails, subsequent commands are flushed.

The #STOP command and the *cqname=* parameter are not supported from the batch interface.

Sample JCL to run the batch utility appears in the SAMPLIB member EMCSRDF.

Support for the *cqname=* parameter is available for commands submitted either through the batch or the REXX interface.

Keep in mind that the SC GLOBAL command is not supported for batch interface execution. SC GLOBAL does not support the CQNAME parameter and all commands issued through the batch interface now result in a *cqname*.

More Information: Refer to #SC GLOBAL on page 5-123.

The batch program, EMCSRDF, accepts a parameter on the EXEC statement as follows:

```
// EXEC PGM=EMCSRDF, PARM=' cqname, failcode'
```

Where:

cqname

A default *cqname* to be applied to all commands in the input stream that do not have the *cqname* parameter coded.

failcode

The 1-byte failcode to be applied to all commands in the input stream that do not have the *cqname* parameter coded.

If *cqname* is coded in the PARM value, it must be from 1 to 15 alphanumeric characters, or a 1-byte value of asterisk (*). If failcode is coded, it must be one character, equal to **P** for purge or **C** for continue.

If PARM is omitted or if *cqname* is coded as an asterisk(*), EMCSRDF generates a default *cqname* for any command in the input stream that does not have *cqname* coded. The default name is

EMCdddhhmmssth

Where:

ddd

The current julian day of the year (0-366).

hhmmssth

A time stamp when the EMCSRDF program initiated.

If failcode is omitted, failcode defaults to blank.

The result of this additional support is that any command submitted to Host Component from the batch interface runs under a *cqname*. EMCSRDF submits all commands in the input stream to Host Component before checking for command completion. Command output is retrieved and printed to SYSPRINT as they are found to be complete.

Using the Host Component alias feature to create an alias for CQNAME is not supported by the batch interface.

For example, #SC VOL,G (MSFALL) , SS , CQN (where cqname is *aliased* as cqname=msf) results in an error.

Example

The following example JCL invokes the batch utility to display Host Component global information as well as Symmetrix level and volume level information for the Symmetrix addressed by mainframe device number A046:

```
//EMCSRDF JOB ...
//*****
//*
/* EMCSRDF: SAMPLE JCL TO RUN THE SRDF HOST COMPONENT BATCH UTILITY. *
/* THIS PROGRAM READS COMMANDS FROM SYSIN AND DISPLAYS THE *
/* COMMAND RESPONSE ON SYSPRINT. SRDF HOST COMPONENT MUST BE UP *
/* AND RUNNING. *
/* *
//*****
//EMCSRDF EXEC PGM=EMCSRDF
//STEPLIB DD DSN=EMC.SRDFHC.LINKLIB,DISP=SHR
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
#SQ GLOBAL
#SQ CNFG,A046
#SQ VOL,A046,10
```

To run the sample, simply add a valid jobcard for your installation, and replace the mainframe device number in the #SQ commands with a valid mainframe device number for your installation.

Output:

The following shows output from the example:

```
#SQ GLOBAL
EMCQG00I SRDF-HC DISPLAY FOR (12) #SQ GLOBAL
VERSION:          4.1.0          SYNCH_DIR_CURR: R1>R2          MSG_PROC:   YES,512
OPER_VERIFY:      NONE           SYNCH_DIR_ALWD: R1<>R2          LOG_DDNAME: HCL0G1
CONFIG_FBA:       ENABLED        MAX_QUERY:      4000          MAX_CMDQ:   4095
#SQ CNFG,A046
EMCGM11I SRDF-HC DISPLAY FOR (13) #SQ CNFG,A046
SERIAL NUMBER: 000184500193 MEM: 6,144 MB TYPE:3990 MODEL: 8430
MICROCODE LEVEL: 5566-27
LINKS-DOMINO: NO          SYNCH_DIRECTION: GLOBAL          LINK: LOCAL
SSID(S): A000      A001      A002      A003      A100      A101      A102      A103
          0148
D01: DA  D02: DA  D03: RF  D04: RF  D05: SA  D06: ___  D07: ___  D08:
D09: ___  D10: ___  D11: ___  D12: ___  D13: EA  D14: EA  D15: DA  D16: DA
D17: DA  D18: DA  D19: RF  D20: RF  D21: SA  D22: ___  D23: ___  D24: ___
D25: ___  D26: ___  D27: ___  D28: ___  D29: R1  D30: R1  D31: DA  D32: DA
D33: ___  D34: ___  D35: ___  D36: ___  D37: ___  D38: ___  D39: ___  D40: ___
D41: ___  D42: ___  D43: ___  D44: ___  D45: ___  D46: ___  D47: ___  D48: ___
D49: ___  D50: ___  D51: ___  D52: ___  D53: ___  D54: ___  D55: ___  D56: ___
D57: ___  D58: ___  D59: ___  D60: ___  D61: ___  D62: ___  D63: ___  D64: ___
END OF DISPLAY
#SQ VOL,A046,10
EMCQV00I SRDF-HC DISPLAY FOR (14) #SQ VOL,A046,10
DV_ADDR|  _SYM_  |          |TOTAL|SYS |DCB|CNTLUNIT|  | R1 | R2 |SY
SYS CH|DEV RDEV GP|VOLSER| CYLS|STAT|OPN|STATUS |MR|INVTRK|INVTRK| %
A046 46 0046          UGG046 1113 ONPV 0 R/W ML
A047 47 0047          UGG047 1113 ONPV 0 R/W ML
A048 48 0048 0048 00 UGG048 1113 ONPV 0 R/W-SY L1 0 0 **
A049 49 0049 0049 00 UGG049 1113 ONPV 0 R/W-SY L1 0 0 **
A04A 4A 004A 004A 00 UGG04A 1113 ONPV 0 R/W-SY L1 0 0 **
A04B 4B 004B 004B 00 UGG04B 1113 ONPV 0 R/W-SY L1 0 0 **
A04C 4C 004C 004C 01 UGG04C 1113 ONPV 0 R/W-SY B1 0 0 **
A04D 4D 004D 004D 01 UGG04D 1113 ONPV 0 R/W-SY B1 0 0 **
A04E 4E 004E 004E 01 UGG04E 1113 ONPV 0 R/W-SY B1 0 0 **
A04F 4F 004F 004F 01 UGG04F 1113 ONPV 0 R/W-SY B1 0 0 **
END OF DISPLAY
```

Recovery Procedures

This appendix describes the status of individual SRDF volumes and Remote Link Directors, including their impact on the host, probable cause, and the actions required to return to a normal operating status. Topics include:

- ◆ Remote Link Directory and the Host A-2
- ◆ SRDF Volume Statuses and the Host A-3

Remote Link Directory and the Host

Table A-1 provides an explanation of Remote Link Director statuses and their relationship with the host:

Table A-1 Link Status and Recovery

#SQ LINK		Host Impact	Probable Cause	Actions to Return to Normal Status
CONN	STATUS			
Y	ONLINE	Normal status.		
N	ONLINE	No synchronization can take place on this link; if all links are in this status, invalid R2 tracks accumulate on the source (R1) volume.	The link cables are physically disconnected, or the remote link director switch is offline, or an #SC LINK, cuu, dir#, OFFLINE command was issued for the remote partner Symmetrix.	Ensure that the cables are connected, and the remote link director switch is online. Issue an #SC LINK, cuu, dir#, ONLINE command at the remote partner Symmetrix, if necessary.
N	OFFLINE	No synchronization can take place on this link; if all links are in this status, invalid R2 tracks accumulate on the source (R1) volume.	An #SC LINK, cuu, dir#, OFFLINE command was issued for the local Symmetrix.	Issue an #SC Link, cuu, dir#, ONLINE command for the local Symmetrix.

SRDF Volume Statuses and the Host

Table A-2 provides an explanation of SRDF volume statuses and their relationship with the host:

Table A-2 Volume Status and Recovery

#SQ VOL		Host Impact	Probable Cause	Actions to Return to Normal Status
CNTLUNIT STATUS	Device Type			
R/W-xx-x	R1	Normal status.		
R/O-xx-x	R2	Normal R2 status. The host may read from the target (R2) volume, but all host write I/O receive a Unit Check error (write disabled).	The default Symmetrix configuration status for target (R2) volumes. An #SC VOL, cuu, R/O command was issued from the R2 host.	To set the target (R2) volume into recovery mode (host R/W), issue an #SC VOL, cuu, R/W command.
NR-xx-x	R2	Optional R2 status. The target (R2) volume does not come online during host IPL. If an I/O is attempted, an intervention required status is returned.	A Symmetrix configuration option for target (R2) volumes. An #SC VOL, cuu, NRDY command was issued from the R2 host.	Issue an #SC VOL, cuu, RDY command.
R/W-xx-x	R2	The host may write to the target (R2) volume.	An #SC VOL, cuu, R/W command was issued.	Issue an #SC VOL, cuu, R/O command.
LNR-xx-x	R1	Link not ready, no synchronization occurs, R2 invalid tracks accumulate on the source (R1) volume.	The link is disabled (refer to Table A-1 on page A-2).	Issue an #SQ LINK, cuu command. Refer to Table A-1 for recovery procedures.

Table A-2 Volume Status and Recovery (continued)

#SQ VOL		Host Impact	Probable Cause	Actions to Return to Normal Status
CNTLUNIT STATUS	Device Type			
TNR-xx-x	R1	Target not ready, no synchronization occurs, R2 invalid tracks accumulate on the source (R1) volume.	An #SC VOL, cuu, RDF-SUSP command was issued from the R1 host, or under Enginuity microcode 5x66 or higher, this may be caused when the links were up, SRDF operations were enabled, the target (R2) volume was read/write enabled, and a write was performed to the source (R1) volume.	Issue an #SC VOL, cuu, RDF-RSUM command, or if the cause is the target (R2) was R/W, set the target (R2) volume to read/only by entering an #SC VOL, cuu, R/O command, and follow the recovery procedures (starting with procedure 2) outlined in Chapter 6, <i>SRDF Procedures</i> .
RNR-xx-x	R1 or R2	If I/O is attempted, an intervention required status is returned.	A device was operating in domino mode when the links or the SRDF partner failed, an #SC VOL, cuu, RDF-NRDY command was entered, or a target (R2) device went RNR due to the Invalid Track Attribute.	Ensure that the links and the partner device are ready, and issue an #SC VOL, cuu, RDF-RDY command.
RWD-xx-x	R1	Source volume is disabled to the link, no synchronization occurs, R2 invalid tracks accumulate on the source (R1) volume.	While the links were up and SRDF operations were enabled, and the target (R2) volume was read/write enabled, a write was performed to the source (R1) volume.	Set the target (R2) volume to read/only by entering an #SC VOL, cuu, R/O command, and resume normal SRDF operations from the source (R1) by entering an #SC VOL, cuu, RDF_WR_ENABLE command. If the R2 volume indicates R1 invalid tracks, you must RDF-SUSP the R1, and follow the recovery procedures (starting with procedure 2) outlined in Chapter 6, <i>SRDF Procedures</i> .

This appendix provides a description of the security options available with the SRDF Host Component. The topic is:

- ◆ SRDF Host Component Security B-2

SRDF Host Component Security

The SRDF Host Component provides security at the command level with the option of having the command be valid at the master console or all consoles.

The SRDF Host Component provides the option to validate authorization using the z/OS SAF interface. This design allows any SAF compliant security product such as RACF, ACF2, or TOP SECRET to validate authority to enter commands.

Implementing Security

To implement this level of security, you must specify a security class and a resource name for validation purposes (refer to *Initialization Parameters* on page 3-4). Coordinate your security class and resource name selection with your security administrator and the systems programmer responsible for your security system.

Logging On

The SRDF Host Component's SAF interface requires the use of the MCS console logon facility, which allows you to logon onto an MCS console. When you type **logon** at an MCS console, you are prompted for a logon ID and password. To log off, you simply type **logoff** at the same MCS console.

More Information: Refer to the *Planning for Operations* and *Initialization and Tuning* manuals for your release of z/OS for further information on the MCS logon facility.

With the SRDF Host Component's SAF interface active, the logon ID you use to log onto an MCS console must have sufficient authority to the specified resource in order for that command to be allowed.

For example, #SQ and #HELP commands require read access to the specified resource. #SC and #STOP commands require update authority.

Shutting Down

The SRDF Host Component may be shut down at any time with the "P" operator command without logging onto an MCS console. The SRDF Host Component does not use SAF to validate the "P" operator command.

This appendix provides a comprehensive list of SRDF Host Component enhancements. The topic is:

- ◆ SRDF Host Component Enhancements C-2

SRDF Host Component Enhancements

Table C-1 provides a comprehensive list of SRDF Host Component enhancements introduced at each release:

Table C-1 SRDF Host Component Enhancements

Release	Enhancements
5.3	Support has been added for 5x71 Engenuity.
	Support has been added for SRDF/Star
	Support has been added for MSC Redundancy.
	Support has been added for Group Name Services.
5.2.1	Support has been added for controlling SRDF/A Multi-Session Consistency.
	Support has been added to display GIGE statistics.
	Support has been added for dynamic groups for GIGE directors
	Support has been added for dynamic concurrent RDF devices.
	Support has been added to display RAID5 relationships.
5.2.0	Support has been added for controlling SRDF/A mode. Additionally, a monitor function is provided in EMCSCF.
	Support has been added to SRDF Host Component for Unequal Size R1 and R2. This Symmetrix feature supports the establishment of an SRDF pair where the R1 device is smaller (fewer cylinders) than the R2 device. The devices must still be of the same emulation type, however. Resynchronization procedures are supported for sync-direction of R1>R2. Sync-direction R1<R2 is not supported.
	Support has been added for dynamic SRDF groups. This feature allows the creation, modification, and deletion of SRDF groups.
	Support of the Command Prefix Facility with up to an 8-character prefix.

Table C-1 SRDF Host Component Enhancements (continued)

Release	Enhancements
5.1.0	Synchronize direction control at the SRDF Group level using SC SRDFGRP. Previously, Host Component changed personality of R1s and R2s only at the control unit level.
	An enhanced <code>#SQ CNFG</code> command display lets customers and EMC employees verify Symmetrix configuration settings.
	Added support for the <code>cqname</code> parameter for commands submitted either through the batch or the REXX interface.
	The <code>EMCMMSGX_ON</code> parameter statement loads and enables a message exit.
	Added support of Remote Fibre Link statistics. Calculate % utilization similar to ESCON links. Enginuity microcode level 5568 or higher.
	References to MVS VOLSERs are now supported on many commands using <code>VOL (vvvvvvv)</code> syntax.
5.0.0	Dynamic SRDF management (only available at Enginuity microcode 5568 or higher).
	Added support for IBM REXX language scripts and Host Component populated variables.
	Added support for EMC Symmetrix Control Facility (EMCSCF).
	Added the <code>#TF</code> command for direct pass-through of TimeFinder commands using native syntax.
	ISPF interface provided for Host Component functions.
	Message processing now supports a Log option.
	Added sort by MVC CUU and VOLSER for device level Query commands.
4.2.0	Support added for concurrent SRDF. Enginuity microcode 5567 or higher supports the ability for a single primary (source R1) volume to be remotely mirrored to two secondary (target R2) volumes concurrently. Concurrent SRDF is supported in both ESCON and Fibre Channel SRDF configurations. Commands have been enhanced to identify the secondary (target R2) device in both single and multihop configurations.
	Support added for Switched SRDF. Enginuity microcode 5x66 or higher support SRDF over Fibre Channel SRDF configurations. These configurations may involve switched fabrics. The SRDF Group is used to identify the relationship between the primary (source R1) and secondary (target R2) devices on both dedicated or switch paths.
	Enginuity microcode 5567 or higher support R1-R2 personality swap. Support added for R1-R2 personality swap with the addition of a <code>SWAP</code> action to <code>#SC VOL</code> command.

Table C-1 SRDF Host Component Enhancements (continued)

Release	Enhancements
4.1.0	Defined Group support allows the definition of Groups that can be used on Query and configuration commands. Defined Groups allows one command to be issued to all devices that the command needs to be issued to.
	Query Volume by state support allows a filter to be applied to the #SQ VOL command to retrieve only the devices that have the state requested. The list of states is long and is documented with the #SQ VOL command.
	Query State support allows the viewing of the stacked statuses. This new query can be issued to see the complete status of the volumes. Refer to the #SQ STATE command.
	Two new parameter values, (SAF , ANY) and (SAF , MASTER), have been added to the SECURITY_CONFIG initialization statement. When set to (SAF , ANY), the SAF interface is used unless from a console. If from a console, the command is allowed. When set to (SAF , MASTER), the SAF interface is used unless from a console. If from a console, the command is only allowed if console has master authority.
	Dynamically build SSCT at MVS 5.2.0 and higher. If a SSCT is not found, one is built dynamically.
	Support added for the maximum number of devices supported by Enginuity microcode level 5x67.
	INIT_VOLSER is a 6-character, user-defined, fill value for offline volumes. This value is used as the VOLSER for all OFFLINE devices.
	The default starting device for a Remote command is the SRDF remote mirror.
	The batch utility, EMCSRDF, submits commands from SYSIN to the Host Component and to retrieves command responses for display to SYSPRINT.
	The edit macro, SRDFEDIT.CLIST, has been added as an installation enhancement.

Table C-1 SRDF Host Component Enhancements (continued)

Release	Enhancements
4.0.0	MAX_ALIAS= initialization parameter added to specify the number of allowed ALIAS= initialization statements.
	Added SHOW_COMMAND_SEQ#=YES NO initialization parameter.
	Support added for command queuing.
	Command completion status checking. For all Host Component commands that change the status of a device, the device is checked to see that it successfully changed status. If so, the command terminates normally. Otherwise, the command is retried. After a predetermined number of unsuccessful retries, the command is failed and a message is issued.
	If a #STOP command is entered and the command queues are not empty, an EMC MN99R message is issued. You may reply QUIESCE, IMMED, or CANCEL.
	Dynamic Reconfiguration Volumes are noted by 'DR' in the 'MR' column of the #SQ VOL command display.
	Consistency Group support: • The #SQ VOL, cuu, CGROUP command displays all devices that are in a consistency group. • The #SC VOL, cuu, ADCOPY and #SC VOL, cuu, ADCOPY-DISK commands are not allowed for a device in a consistency group. • The #SC VOL, cuu, RDF-SUSP and #SC VOL, cuu, RDF-RSUM commands are not allowed for a device in a consistency group. • The #SC VOL, cuu, SUSP-CGRP command is not allowed for a device that is not in a consistency group.

Table C-1 SRDF Host Component Enhancements (continued)

Release	Enhancements
3.2.1	Full function support for Symmetrix microcode level through 5x65
	Support added for 4096 devices on the #SQ/SC VOL RAID commands. New initialization parameter: MAX_QUERY=nnn - limits the maximum number of devices that can be displayed using a single #SQ VOL . . . command. This value defaults to 512. Starting device number is allowed to be specified for #SQ VOL command.
	SMS Group support: G(smsgroupname) parameter available for #SC VOL and #SQ VOL commands.
	Display and control devices across the links using RMT(cuu,ragroup#) (microcode 5x64 or higher).
	Checkpoint to the Host Component scratch area (microcode 5x64 or higher).
	Added the #SQ MIRROR command.
	Added the #SQ RAID command.
	Added the #SC VOL command action code SUSP-CGRP for consistency group support.
	Enhanced diagnostics using Symmetrix host initiated trace facility to log commands entered by user. (5x64 or higher).
	Disabled Symmetrix Manager interface.
	Added Userid and console id to HCLOG file.
3.1.1	Provided support for Symmetrix microcode level through 5x65 at the 5x64 functional level with up to 1024 logical volumes per supported Symmetrix.

Table C-1 SRDF Host Component Enhancements (continued)

Release	Enhancements
3.1	Provided support for Symmetrix microcode level 5x64.
	Added support for multitasking of SRDF commands to allow reconfiguration, display operations, and recovery testing procedures to be performed on multiple Symmetrix systems at the same time.
	Symmetrix level synchronization direction: To enhance the multitasking support, the Host Component allows synchronization direction to be set at the Symmetrix level. Refer to #SC CNFG on page 5-121.
	Message labels: To enhance the multitasking support, the Host Component allows the option to add tags to command responses to identify to which Symmetrix they apply. Refer to the MESSAGE_LABELS initialization parameter.
	Added option to have both commands and command responses to be logged to the HCLOG file. Refer to the HCLOG initialization parameter.
	The #SQ VOL command output is now distinguished between TNR (target not ready) and LNR (link not ready).
	The #SQ MSG command output has been enhanced to display a 4-digit year to provide for Year 2000 compliance.
	Added support for SIM exception code E454 to indicate that a volume with a long running channel program using suspend/resume logic (for example, a paging volume) has been automatically changed from synchronous mode to adaptive copy mode.
	Added an option to allow SRDF Host component commands to change the operating characteristics of FBA volumes. Use the FBA_ENABLE initialization option and the #SC GLOBAL command actions FBA_ENABLE and FBA_DISABLE to control this option.
	The #SQ CNFG command output now indicates the SRDF implementation used (LOCAL for campus solution or EXTENDED for extended distance solution).
3.0.2	The #SC VOL, cuu, VALIDATE INVALIDATE command action codes are now available for all supported microcode levels and for all SRDF pairs, even if one or both devices are also locally mirrored or in a RAID group.
	The output of the #SQ CNFG, cuu command has been enhanced to display up to eight SSIDS. The associated number of devices has been removed from the display. The #SQ SSID command output continues to display the number of devices detected for each SSID.

Table C-1 SRDF Host Component Enhancements (continued)

Release	Enhancements
3.0.0	Added support for Symmetrix microcode level 5x63.
	ISPF Interface: The TSO ISPF interface allows you to enter Host Component commands, and view the command responses from your TSO ISPF session.
	The Symmetrix Time Finder facility - provides the capability of dynamically establishing BCVs (Business Continuance Volumes) as mirror devices for existing primary devices. The <code>#SQ SMMF</code> command displays the current status of BCV volumes and connections. The <code>#SC SMMF</code> command is provided to establish the BCV connection, to split the connection, to reestablish the connection copying only the changed data on the primary device, and to restore partially or in total to the primary device from the BCV device.
	Command Parameter Alias Facility: A facility has been provided for installation-defined aliases for all host component command parameters. This provides the capability to define abbreviated host component command parameters as well as to define names for commonly used device ranges.
	SRDF Host Component Log File: An (optional) command log file is available to provide an audit trail of Host Component entered commands and the times they were entered. An optional secondary log file may also be specified, and a command is provided to switch logging from one log file to the other.
	SMF Recording: An option is provided for SMF to record entered commands. The SMF record contains the source of the command, the userid and groupid used for security validation, and the text of the command before and after alias translation. This feature is activated and the SMF record number is specified using the "SMFREC=smf_record_number" initialization parameter.
	Symmetrix Manager Interface: An interface is provided for the Symmetrix Manager product to send commands to and retrieve information from the Host Component. A version of the Symmetrix Manager, which is at a high enough level to support this feature, must be installed. The implementation of this feature is governed by the <code>SYMMGR_INTERFACE</code> initialization parameter.
	The <code>#SQ CNFG</code> command output now provides the model of the Symmetrix unit, and also identifies EOS units. The display also indicates whether LINKS-DOMINO mode is in effect. The <code>#SQ CNFG</code> command has been enhanced to display up to 32 directors.
	<code>#SQ GLOBAL</code> : The <code>#SQ GLOBAL</code> command now displays the ddname for the active Host Component log file.
	<code>#SQ LINK</code> : A new keyword "E" provides an extended display, which for each remote link director, displays its director group as well as the Symmetrix serial number, remote link director number, and director group on the partner Symmetrix unit.
	The <code>#SQ VOL</code> command now identifies FBA devices.
	The <code>#SQ VOL</code> command output has been enhanced to display the remote director group for each SRDF device as well as to indicate for which devices a validate or refresh command has been entered.

Table C-1 SRDF Host Component Enhancements (continued)

Release	Enhancements
	The #SC VOL command now allows for the specification of a range of devices. The range may be specified for the MVS CUU specification or for the Symmetrix device. FBA devices are excluded from the effects of any #SC VOL command.
2.2.0	At microcode level 5062, two new #SC VOL command operands, REFRESH and RFR-RSUM, have been introduced to perform volume synchronization. When an SRDF pair is synchronized using REFRESH and RFR-RSUM, only the updated tracks are refreshed. Service Information Messages (SIMs) as interpreted by the EMC9998W message are expanded into a more meaningful format. The output of the #SQ MSG command is similarly enhanced. A new CNTLUNIT STATUS flag (RWD) has been added to indicate that SRDF operations were suspended because while the R2 device was in read/write mode, a write was attempted to the R1 volume. This status is reflected in the #SQ VOL command display for the R1 device. A new #SC VOL command operand, SRDF_WR_ENABLE, has been added to reset this status. A new initialization parameter, EXCLUDE_DEVICE_RANGE, has been provided to exclude ranges of devices from SRDF Host Component processing.
2.1.0	Full User Control of Volume Synchronization: R2 volume read/write testing recovery procedures have been enhanced to allow full control of the synchronization direction. This feature allows the user to specify resynchronization from the R1 volume(s) to the R2 volume(s) or from the R2 volume(s) to the R1 volume(s). Improved Ability to Access Remote Volumes: It is now possible to suspend SRDF processing for a single SRDF pair to allow full Read/Write access to the R2 volume. In addition, the links no longer need to be brought offline to perform this function. Support for Symmetrix Microcode Level 5062: The SRDF Host Component now supports Symmetrix microcode level 5062 for up to 256 volumes per control unit. Microcode level 5062 supports local mirroring on volumes that are also mirrored remotely. Volumes configured in this manner show a mirror type of L1 or L2 on the #SQ VOL command output display. All #SC VOL command action codes are supported for L1 and L2 volumes except for VALIDATE and INVALIDATE. Improved SRDF Link Control: All SRDF Links may be taken offline or online with a single #SC LINK, cuu, ALL, OFFLINE ONLINE command. In addition, SRDF Host Component now allows taking the links offline when R2 volumes are in R/W status, or when R2 invalid tracks are detected. Enhanced User Control of Adaptive Copy: The ability has been added to control the relative rate of speed that the Symmetrix migrates updated tracks to the R2 volume when operating in the Adaptive Copy mode. The SRDFCNFG VSAM file has been added to provide the ability to save control information during subsystem operation for subsequent retrieval during a subsystem restart.

Table C-1 SRDF Host Component Enhancements (continued)

Release	Enhancements
	Selectable Suppression of Confirmation Prompts: The <code>OPERATOR_VERIFY</code> initialization parameter has been added to allow the suppression of certain WTOR's during configuration command processing. New Subsystem-level Query Command: The <code>#SQ GLOBAL</code> command has been added to display subsystem-level status and parameter settings. Message Table Customization: The <code>MESSAGE_PROCESSING</code> initialization parameter has been enhanced to accept an optional parameter, specifying the number of messages that may be retained in the message table. The <code>#SC VOL NADCOPY</code> command action terminates Adaptive Copy mode of operation when the volume is in Adaptive Copy Disk mode or in Adaptive Copy Write Pending mode. The <code>NADCOPY-DISK</code> action is no longer supported. The <code>#SQ CNFG</code> command output now displays the Symmetrix controller microcode patch level and patch date, and reports the <code>ADC_MAX_SKEW</code> value for controllers at microcode level 5060. The <code>#SQ ADC</code> command output now includes the Adaptive Copy rate. The <code>#SQ LINK</code> command output now includes the remote adapter port count and physical port connection status.
2.0.3	Added support for 5061 microcode to support the expanded adaptive copy options AD (Adaptive Copy Disk mode) and AW (Adaptive Copy Write Pending mode). The <code>#SC VOL</code> command action codes <code>ADCOPY</code>, <code>NADCOPY</code>, <code>ADCOPY-DISK</code>, and <code>NADCOPY-DISK</code> are supported. The <code>#SQ VOL</code> command now displays a new status, <code>TNR</code> (Target Not Ready). This status displays when the SRDF pair is suspended (<code>RDF-SUSP</code>), or when all remote link adapters for the controller are offline or physically disconnected. The <code>#SC VOL, cuu, ADC-MAX, [dv# ALL], value</code> command sets the maximum Adaptive Copy Skew value for the device(s). This command is supported for Enginuity microcode level 5061 or higher. The <code>#SQ ADC, cuu [, count , ALL]</code> command displays the Adaptive Copy Skew values for the specified device(s). Only Source (R1) devices in Adaptive Copy mode is displayed. The <code>#SC CNFG, cuu, ADCOPY_MAX_SKEW, count</code> command replaces <code>ADCOPY_MAX_ITRKS</code>. The <code>#SQ CNFG</code> command displays the Adaptive Copy Skew value, which reflects the maximum number of tracks to allow to be out of synchronization when in the Adaptive Copy mode. This value may range from 1 to 999,999. If the microcode level is Enginuity microcode 5061 or higher, <code>ADCOPY</code>: value displays as <code>N/A</code>.
2.0.1	Added a Dcopy dynamic flag. Added the <code>#SQ VOL, cuu, INV_TRK</code> command option.

Table C-1 SRDF Host Component Enhancements (continued)

Release	Enhancements
	Added support for ALL option on the #SC VOL command action codes VALIDATE and INVALIDATE.
	Miscellaneous fixes and display format and message enhancements.
2.0.0	Included Data migration commands.
	Added the #SC GLOBAL, SSID_REFRESH command.
	Dynamic flags (except ADcopy).
	Added SRDF suspend/resume flags commands.
	Resync direction control commands.
	Microcode level validation (must be 5060 or higher).
	Miscellaneous fixes and display format enhancement.

DRAFT
EMC CONFIDENTIAL

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.

This appendix covers the following topics:

- ◆ 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.

EMC uses the following process to resolve customer problems with its software products (Figure D-1):

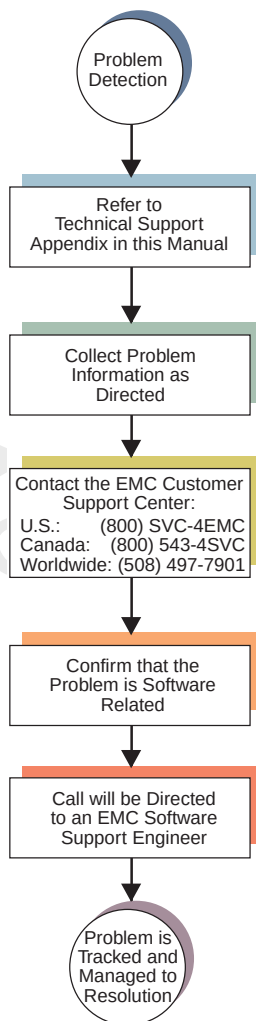


Figure D-1 Problem Detection and Resolution Process

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**

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

DRAFT
EMC CONFIDENTIAL

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.

DRAFT
EMC CONFIDENTIAL

Reporting a New Problem

For a new problem, please provide the following information:

- ☐ Release and maintenance level of the software that you are running, including ResourcePak Base
- ☐ 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.

DRAFT
EMC CONFIDENTIAL

DRAFT
EMC CONFIDENTIAL

This glossary contains terms related to the Symmetrix Remote Data Facility. Many of these terms are used in this guide.

A

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

business continuance volume (BCV) A new mirror that can be established and then split from its mirror and addressed separately.

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.

D

destage The asynchronous write of new or updated data from cache to disk device.

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 MVS environment.

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.

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.

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.

G

gigabyte (GB) 10^9 bytes.

I

identifier (ID) A sequence of bits or characters that identifies a program, device, controller, or system.

IML Initial microcode program loading.

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 is passed to the target device and once it is written there, it is no longer invalid. If the source and target devices are not in communication for some reason, for instance, if the SRDF links are disabled, the invalid tracks 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 Procedures* on page 6-1.

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.

invalidate Action for #SC VOL command that makes all tracks invalid for a target volume on a source volume.

I/O device An addressable input/output unit, such as a disk device.

K

kilobyte (K) 1024 bytes.

known device A device that meets at least one of the following criteria and is not specified in the EXCLUDE_DEVICE initialization statement:

- Found online during initialization
- Found online during an SC GLOBAL SSID_REFRESH
- Included in a Defined Group that was found online while processing a group command
- Found because it was used as the OS/390 or z/OS device number in an INCLUDE_RAG initialization statement
- Found online or offline because it was used as the z/OS device number in an EXCLUDE_SYM initialization statement

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.

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

promotion The process of moving data from a track on the disk device to cache. See also *stage*.

R

R1 Refer to *source volume (R1)*.

R2 Refer to *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 *RA1 unit*.

RAID Redundant Array of Independent Disks.

RAID5 A logical mirror configuration. In a RAID 5 mirror configuration, the data is written across multiple devices, with multiple stripes of data and one stripe of parity data being written in sets across all devices. The stripe containing the parity data is shifted across each device in the group. By spreading the parity evenly across all devices, I/O performance is increased. In the case of a disk failure, a stripe's data can be reconstructed using the parity algorithm against the data in the available stripes.

read hit Data requested by the read operation is in cache.

read miss Data requested by the read operation is not in cache.

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.

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 disconnects (non immediate retry request), and waits for the pending track to transfer to the RA2 Symmetrix unit.

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 *promotion*, *destage*.

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 *channel director*.

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.

Sysplex System complex. A processor complex which is formed by loosely coupling mainframe processors together into a single unit, using channel-to-channel adapters or ESCON or FICON fiber optic links,

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.

V

validate Action for #SC VOL command that makes all tracks for a source volume valid on a target volume.

DRAFT
EMC CONFIDENTIAL

A

- #07ACCPT member 2-8
- adaptive copy
 - ConGroup restriction 1-7
 - disabling 4-18
 - displaying adaptive copy rate 5-4
 - displaying skew values 5-4
 - enabling for an R1 volume 5-145
 - removing volumes from 5-148
 - setting maximum skew value 5-145
 - supported SRDF implementations 1-15
 - with concurrent RDF 4-25
- adaptive copy mode 1-16
- adaptive copy-disk 4-12
 - attribute 4-10
 - error conditions 4-21
 - placing volumes in adaptive copy disk mode 5-145
- adaptive copy-write pending mode 4-12, 4-16, 4-17
 - attribute 4-10
 - error conditions 4-19
 - mode 4-16 to 4-19
- ADC-MAX action 5-145
- ADCOPY action 5-145
- ADCOPY- DISK action 5-145
- AF/ OPERATOR 1-3
- ALIAS initialization parameter 3-7
- aliases, requirements 3-7
- #01ALLOC member 2-8, 2-14
- ALLOW_CRPAIR_NOCOPY initialization parameter 3-7
- APPEND_COMMAND=YES subparameter 3-34

- #06APPLY member 2-8, 2-14
- asterisk (*) 3-4
- asynchronous mode 1-16, 1-17, 1-19, 4-21
 - chunk method 1-19
 - cycle switch process 1-22
 - dependent write 1-20
- attributes
 - Adaptive Copy - Disk 4-10
 - Adaptive Copy - Write 4-10
 - Adaptive Copy-Write Pending 4-10
 - domino 4-11
 - SEMI-SYNC 4-9
 - SRDF Asynchronous 4-10
 - SYNC 4-9
- automation products 1-3
- AutoOPERATOR 1-3
- average cycle time 5-80

B

- batch interface 7-33
- BCV status, displaying 5-9
- BCVs, controlling mirror relationships 5-114
- bidirectional configuration 1-13
- bulk data transfers 4-19

C

- CA-ACF2 security package 1-3
- cache, limiting 1-25
- cache installed, displaying, 5-16
- Cache Only Virtual Device 1-18
- campus solution 1-15
 - using with synchronous mode 4-13
- capture cycle size 5-80

- capture tag 5-82
- CA-Top Secret security package 1-3
- CGPJCL member 2-13
- channel interface states 4-6
- # character 3-3
- cleanups 5-82
- CLIST library 2-13
- command automation, 1-3
- command prefixes,
 - defining 3-9
 - registering 3-32
 - registering with Sysplex 3-9
 - requirements 3-9
- command queuing 1-4
- command syntax maps, how to read 5-2
- COMMAND_DETAILS initialization parameter 3-8
- COMMAND_PREFIX initialization parameter 3-3, 3-9
- COMMAND_PREFIX, interaction with REGISTER_COMMAND_PREFIX 3-9
- commands, SRDF Host Component 1-3
- concurrent RDF 4-25
 - operating in synchronous mode 4-26
- concurrent SRDF 1-11
- configuration commands
 - #SC BCV command 5-114
 - #SC CNFG command 5-121
 - #SC GLOBAL command 5-123
 - #SC LINK command 5-128
 - #SC MSG command 5-129
 - #SC RDFGRP command 5-130
 - #SC VOL command 5-140
 - #TF command 5-154
- Consistency Group support 1-7
- COVD 1-18
- CREATEPAIR action 5-146
- Customer Support Center D-7
- customizing JCL 2-11
- cycle number 5-79
- cycle number retention 1-22
- cycle switch algorithm 1-22
- cycle switch process 1-22

D

- #04DDDEF member 2-8

- DDname, displaying 5-30
- defined groups
 - examples 3-47
 - excluding a range of Symmetrix units 3-12
 - excluding z/OS devices 3-10
 - excluding z/OS volumes 3-13
 - including a list of z/OS devices 3-19
 - including a list of z/OS volumes 3-20
 - including an entire RA group 3-20
 - including online and offline devices 3-15
 - including R1 devices 3-16
 - including R2 devices 3-16
 - rules for 3-45
 - specifying a group name 3-17
 - terminating the group definition 3-17
- defining groups of Symmetrix devices 1-7
- DELETEPAIR action 5-146
- dependent write 1-20
- device states 4-4
- #02DFZON member 2-8
- directory type, displaying 5-16
- disaster recovery
 - campus solution 1-15
 - extended distance solution 1-15
 - FarPoint 1-15
- domino
 - attribute 4-11
 - disabling domino mode 5-148
 - enabling domino mode 5-146
- DOMINO action 5-146
- DOMINO attribute 4-11
- duration of last cycle 5-80
- dynamic exclude statements 3-13
- dynamic SRDF 4-32
- dynamic SRDF groups 1-26

E

- electronic download installation 2-7
- EMCMN00I 3-37
- EMCMMSGX_ON initialization parameter 3-10
- EMCRD
 - member 2-16
 - started task 3-3
- EMCRDF address space 3-3
- EMCRDF started task 3-3
- EMCSAFD 2-15

EMCSCF 3-2
 installing 2-6
 running multiple instances of 3-2
 EMCSCF test procedure 3-2
 EMCSRDF batch utility 1-8
 EMCSRDFC ISPF load module 2-19
 EMCSRDFR ISPF load module 2-19
 Enginuity support 1-18
 enhancements C-1
 error recovery 4-19
 ESCON 1-11
 host channel interface 1-13
 remote adapters (RAs) 1-13
 SRDF link 1-14
 storage director interface 1-14
 EXCLUDE_CUU initialization parameter 3-10
 EXCLUDE_DEVICE_RANGE initialization
 parameter 3-11
 EXCLUDE_SYM initialization parameter 3-12
 EXCLUDE_VOL initialization parameter 3-13
 excluding a range of Symmetrix devices 3-12
 excluding a Symmetrix device 3-12
 EXEC library 2-13
 extended distance solution 1-15
 using in semi-synchronous mode 4-15

F

FarPoint 1-15
 FBA devices 3-14
 FBA_ENABLE initialization parameter 3-14
 features
 command completion status checking 1-7
 Consistency Group support 1-7
 ISPF 1-3
 remote Symmetrix query and config 1-6
 security 1-3
 Fibre Channel remote adapters (RAFs or RFs)
 1-13
 Fibre Channels 1-11
 FILTER_KNOWN initialization parameter 3-15
 FILTER_ONLINE initialization parameter 3-15
 FILTER_R1 initialization parameter 3-16
 FILTER_R2 initialization parameter 3-16
 first noncommented initialization parameter 3-40
 full SRDF state 4-17, 4-20

G

global sort order 3-18
 GLOBAL synchronize direction 1-6
 group definition examples 3-47
 MVS_GROUP 3-47
 SYM_GROUP 3-53
 GROUP_END initialization parameter 3-17
 GROUP_NAME initialization parameter 3-10,
 3-12, 3-13, 3-15, 3-17, 3-19, 3-20
 GROUP_SORT_BY_MVSCUU initialization
 parameter 3-18
 GROUP_SORT_BY_VOLSER initialization
 parameter 3-18

H

HCLOG dataset 1-4
 HCLOG initialization parameter 2-17, 3-18
 HCLOGn datasets 3-18
 HDELETEPAIR action 5-146
 #HELP command 5-3
 host accessibility 4-7, 4-8
 host adapter 5-81
 Host Component
 initialization parameters 3-4
 installation 2-11
 log file 2-16
 mainframe environment 2-16
 operating state, setting 5-123
 security 1-3, B-2
 stopping 5-114
 Host Component job log 1-4
 HSWAP action 5-147

I

I/O operations 4-3
 I/Os during a short interval, displaying 5-34
 IML
 displaying total I/Os since last IML 5-34
 operational modes 4-13
 INCLUDE_CUU initialization parameter 3-19
 INCLUDE_RAG initialization parameter 3-20
 INCLUDE_VOL initialization parameter 3-20
 INIT_VOLSER initialization parameter 3-22

initialization parameters

ALIAS 3-7
 ALLOW_CRPAIR_NOCOPY 3-7
 COMMAND_DETAILS 3-8
 COMMAND_PREFIX 3-9
 EMCMSGX_ON 3-10
 EXCLUDE_CUU 3-10
 EXCLUDE_DEVICE_RANGE 3-11
 EXCLUDE_SYM 3-12
 EXCLUDE_VOL 3-13
 FBA_ENABLE 3-14
 FILTER_KNOWN 3-15
 FILTER_ONLINE 3-15
 FILTER_R1 3-16
 FILTER_R2 3-16
 GROUP_END 3-17
 GROUP_NAME 3-17
 HCLOG 3-18
 INCLUDE_CUU 3-19
 INCLUDE_RAG 3-20
 INCLUDE_VOL 3-20
 INT_VOLSER 3-22
 MAX_ALIAS 3-23
 MAX_COMMANDQ 3-23
 MAX_QUERY 3-24
 MESSAGE_LABELS 3-24
 MESSAGE_PROCESSING 3-25
 MSC_ACTIVATE 3-26
 MSC_ACTIVATE_MS 3-26
 MSC_ALLOW_INCONSISTENT 3-26
 MSC_CYCLE_TARGET 3-27
 MSC_GROUP_END 3-27
 MSC_INCLUDE_SESSION 3-28
 MSC_STAR 3-29
 MSC_VALIDATION 3-30
 MSC_WEIGHT_FACTOR 3-29, 3-30, 3-31
 OPERATOR_VERIFY 3-31
 SAF_CLASS 3-33
 SAF_PROFILE 3-34
 SECURITY_CONFIG 3-36
 SECURITY_QUERY 3-36
 SHOW_COMMAND_SEQ# 3-37
 SINGLE_CONCURRENT 3-38
 SMFREC 3-38
 SORT_BY_COMMAND 3-39
 SORT_BY_MVSCUU 3-40
 SUBSYSTEM_NAME 3-40

SYNCH_DIRECTION_ALLOWED 3-41
 SYNCH_DIRECTION_INIT 3-42
 USER_VERIFICATION 3-43
 USER_VERIFICATION_TIMEOUT 3-43
 VALIDATE_CRPAIR_NOCOPY_LEVEL 3-44

installation 2-11

copying CGPJCL into a CLIST or EXEC library 2-13
 editing the JOBCARD 2-13
 JCL 2-11
 running RIMBLIB members 2-14
 specifying a DASD VOLSER for runtime datasets 2-13
 specifying a DASD VOLSER for SMP/E 2-12
 specifying the ConGroup HLQ 2-12
 specifying the edit macro CLIST library 2-12
 specifying the install tape VOLSER 2-13, 2-14
 specifying the install tape volser 2-13, 2-14
 specifying the ResourcePak Base HLQ 2-12
 specifying the SMP/E HLQ 2-12
 tape 2-9

installation by electronic download 2-7

installation requirements

z/OS systems 2-2

INT_VOLSER initialization parameter 3-22

integrating 2-16

invalid track 5-109

invalid track table, updating 5-151

invalid tracks threshold 4-10

INVALIDATE action 5-147

ISPF interface 1-3

load modules 2-19

removing prior versions 2-19

requirements 7-2

session variables 7-4

setting up 2-19

starting 7-2

ITA action 5-147

J

JCL for install 2-11

L

limiting cache 1-25

LINK DOMINO status, displaying 5-16

- link type, displaying 5-16
- Links Domino attribute 4-32
- LINKS-DOMINO Mode 5-21, 5-75
- local volumes 4-2
- log file 2-16
- logical devices, displaying relationship with physical devices 5-41
- logical volume attributes 4-9 to 4-12
 - adaptive copy 4-10
 - source volumes 4-9 to 4-12
- logical volume states 4-4 to 4-8
 - host accessibility 4-7
 - host view 4-6 to 4-7
 - source volume 4-5, 4-6
 - SRDF view 4-5 to 4-6
 - target volume 4-5, 4-6

M

- mainframe systems
 - installation requirements 2-2
- MAX_ALIAS initialization parameter 3-23
- MAX_COMMANDQ initialization parameter 1-4, 3-23
- MAX_QUERY initialization parameter 3-24
- maximum cache percentage 5-81
- Maximum Invalid Tracks parameter 4-17, 4-20
- maximum number of alias statements 3-23
- maximum number of displayed lines 3-24
- maximum number of queued commands 3-23
- maximum throttle time 5-80
- message class
 - E (error) 2-18
 - I (informational) 2-18
 - R (reply) 2-18
 - W (Warning) 2-18
- message ID 2-18
- message log, clearing 5-129
- message number 2-18
- message processing, displaying status of 5-30
- MESSAGE_LABELS initialization parameter 3-24
- MESSAGE_PROCESSING initialization parameter 3-25
- messages, displaying 5-50
- minimum cycle time 5-79
- MNOTES 2-15
- monitor, SRDF asynchronous 4-23

- MSC 1-23
- MSC recovery scenario 6-52
- MSC, multi session control 5-82
- MSC_ACTIVATE initialization parameter 3-26
- MSC_ACTIVATE_MS initialization parameter 3-26
- MSC_ALLOW_INCONSISTENT initialization parameter 3-26
- MSC_CYCLE_TARGET initialization parameter 3-27
- MSC_GROUP_END initialization parameter 3-27
- MSC_GROUP_NAME parameter 3-28
- MSC_INCLUDE_SESSION initialization parameter 3-28
- MSC_STAR initialization parameter 3-29
- MSC_VALIDATION initialization parameter 3-30
- MSC_WEIGHT_FACTOR initialization parameter 3-29, 3-30, 3-31
- Multi Session mode 1-23
- multihop configurations 4-28
- Multi-Session Consistency 1-23
- Multi-Session Consistency window 5-82
- MVS_GROUPS 3-45

N

- NADCOPY action 5-148
- NCLUDE_RAG initialization parameter 3-20
- NDOMINO action 5-148
- NETVIEW command 1-3
- NITA action 5-148
- nonoperational site 6-3
- not ready state
 - source volumes 4-5, 4-6
 - target volumes 4-5, 4-7
- NRDY action 5-148

O

- operational modes 4-12
 - adaptive copy-disk 4-19
 - semi-synchronous 4-15, 4-16
 - synchronous mode 4-13 to 4-14
- operational modes, volumes 4-12
- operational site 6-3
- OPERATOR_VERIFY initialization parameter 3-31
- OPERATOR_VERIFY setting, displaying 5-30

P

parameter settings, displaying 5-30
 parameter statements 3-4
 parity device, displaying 5-55, 5-59
 parsing, by Host Component 1-4
 physical devices, displaying relationship with
 logical devices 5-41
 predetermined SRDF modes 4-12
 PREFRESH action 5-148
 PRE-RSUM action 5-149
 Prevent Auto Links Recovery attribute 4-32
 primary side 5-79
 primary volumes 1-10, 1-12, 1-13
 product enhancements C-1

Q

query commands

#SQ ADC command 5-4
 #SQ BCV command 5-9
 #SQ CNFG command 5-16
 #SQ GLOBAL command 5-30
 #SQ LINK command 5-34
 #SQ LINK E command 5-39
 #SQ MIRROR command 5-41
 #SQ MSG command 5-50
 #SQ RAID command 5-55, 5-59
 #SQ RAID10 command 5-63
 #SQ RDFGRP command 5-67
 #SQ SRDFA command 5-76
 #SQ SRDFA_VOL command 5-88
 #SQ SSID command 5-91
 #SQ STATE command 5-94
 #SQ VOL command 5-103

R

R/O action 5-150
 R/W action 5-150
 R1 volumes 1-10
 R1 volumes to semi-synchronous mode, setting
 5-150
 R1 volumes to synchronous mode
 setting 5-151
 R2 read / write testing 6-9
 R2 volumes 1-10

R2 volumes not ready, making 5-148
 R2 volumes read / write enabled, making 5-150
 R2 volumes read-only, making 5-150
 R2 volumes ready to the host, making 5-149
 RA boards 1-13
 RA Group, modifying the state of 5-130
 RA pair 1-14
 RA-1 boards 1-14
 RACF 1-3
 RACF ALTER authority 2-10
 RACF security package 1-3
 RAGROUPs configuration, displaying 5-67
 RAID configuration, displaying 5-55, 5-59
 RAID10 logical volume, displaying devices in
 5-63
 RDF_WR_ENABLE action 5-149
 RDFALLOG member 2-17
 RDFGroups 1-10
 RDFJCL member 2-8
 RDF-NRD action 5-149
 RDF-RDY action 5-149
 RDF-RSUM action 5-149
 RDF-SUSP action 5-149
 RDFWIN1 member 2-8
 RDY action 5-149
 read / write state
 source volumes 4-5
 target volumes 4-6
 read-only state, target volumes 4-5
 #05RECEV member 2-8, 2-14
 recovery procedures
 link status A-2
 testing 6-6
 volume status A-3
 REFCODE 5-51
 REFRESH action 5-150
 REGISTER_COMMAND_PREFIX initialization
 parameter 3-32
 REGISTER_COMMAND_PREFIX, interaction
 with COMMAND_PREFIX 3-9
 registering command prefixes 3-32
 remote adapter for fibre 1-14
 Remote Link Director (RLD) 4-14
 remote link director, modifying the status of
 5-128
 remote query and configuration 1-6
 remotely mirrored volumes 4-2

#03REPRO member 2-8
 requirements for
 concurrent RDF 4-25
 ISPF interface 7-2
 security products 1-3
 Symmetrix 2-2
 resynchronization 6-6
 REXX exec program 2-8, 2-11
 RLDs, displaying port connection status 5-34
 RNR 5-112
 RWD status, clearing 5-149

S

SAF class name 3-33
 SAF interface 3-36, B-2
 SAF validation calls 3-34
 SAF_CLASS initialization parameter 3-33
 SAF_PROFILE defaults 3-34
 SAF_PROFILE initialization parameter 3-34
 SAFMBR 2-15
 SAISRDF ISPF load module 2-19
 #SC BCV command 5-114
 #SC CNFG command 1-7, 5-121
 #SC GLOBAL command 3-14, 5-123
 #SC LINK command 5-128
 #SC MSG command 5-129
 #SC RDFGRP command 1-6, 5-130
 #SC SRDFA command 5-137
 SC VOL actions 5-145
 #SC VOL command 1-7, 3-14, 5-140, 5-155
 #SC VOL,cuu,RDF-RSUM command 1-7
 #SC VOL,cuu,RDF-SUSP command 1-7
 #SC VOL,cuu,SUSP-CGRP command 1-7
 SC_GROUP_END parameter 3-27
 SCF SAMPLIB dataset, allocating log files 2-17
 SCF SAMPLIB member 1-8
 SConfig commands 1-4
 secondary consistent 5-79
 secondary delay 5-81
 secondary volumes 1-10, 1-12, 1-13
 security
 SAF interface B-2
 supported products 1-3
 SECURITY_CONFIG initialization parameter 3-36
 SECURITY_QUERY initialization parameter 3-36
 SEMI-SYNC action 5-150
 SEMI-SYNC attribute 4-9
 semi-synchronous mode 1-16, 4-9, 4-12, 4-15, 4-16
 setting R1 volumes 5-150
 Service Information Messages (SIM) 3-25, 5-51
 setting the synchronization direction 1-6
 SHOW_COMMAND_SEQ# initialization
 parameter 3-37
 SINGLE_CONCURRENT initialization parameter 3-38
 skew parameter 4-10, 4-17, 4-20
 SMF records 3-38
 SMFREC initialization parameter 3-38
 SMP/E datasets 2-10
 SMP/E distribution library disk volumes 2-10
 #08SMPOP member 2-8, 2-14
 SORT_BY_COMMAND initialization parameter 3-39
 SORT_BY_MVSCUU initialization parameter 3-40
 SORT_BY_VOLSER initialization parameter 3-40
 source (R1) volumes 4-2
 source volumes 1-10, 1-12, 1-13, 4-2
 attributes 4-9 to 4-12
 host accessibility 4-7
 host view 4-6
 not ready state 4-5, 4-6
 read / write state 4-5
 states 4-5, 4-6
 write-disabled state 4-6
 write-enabled state 4-6
 #SQ ADC command 5-4
 #SQ ADC, #SQ CNFG command 1-7
 #SQ BCV command 5-9
 #SQ CNFG command 5-16
 #SQ GLOBAL command 3-14, 5-30
 #SQ LINK command 1-7, 5-34
 #SQ LINK E command 5-39
 #SQ MIRROR command 1-7, 3-24, 5-41
 #SQ MIRROR,cuu,CGROUP command 1-7
 #SQ MSG command 5-50
 #SQ RAID command 5-55, 5-59
 #SQ RAID10 command 5-63
 #SQ RDFGRP command 5-67
 #SQ SRDF_VOL command 5-88
 #SQ SRDFA command 5-76
 #SQ SRDFA_VOL command 5-88

- #SQ SSID command 5-91
 - #SQ STATE command 1-7, 3-22, 5-94
 - #SQ VOL command 1-7, 3-24, 5-103
 - #SQ VOL,cuu,CGROUP command 1-7
 - SQuery commands 1-4
 - SRDF
 - adaptive copy function 4-16 to 4-19
 - asynchronous monitor 4-23
 - configurations 1-10
 - displaying messages 5-50
 - features and benefits 1-10
 - Fibre Channel emulation 1-14
 - implementations 1-15
 - modifying status of volumes 5-140
 - overview 1-10 to 1-16
 - setting operational mode 5-140
 - SRDF asynchronous mode 4-12
 - SRDF asynchronous, attribute 4-10
 - SRDF operation
 - resuming on an RDF pair 5-149
 - suspending on a volume 5-149
 - SRDF/Star mode 1-26
 - defining 3-29
 - validating device protection level 3-30
 - STAR flag 5-153
 - SRDFDASD ISPF module 2-19
 - SRDFSMFR 3-38
 - SSID_REFRESH action 1-4
 - SSIDs
 - displaying 5-16, 5-91
 - STAR flag 5-153
 - starting command 3-3
 - #STOP command 5-114
 - SUBSYSTEM_NAME initialization parameter 2-16, 3-40
 - successful transfer
 - adaptive copy-write pending mode 4-17
 - semi-synchronous mode 4-15
 - synchronous mode 4-14
 - supported Symmetrix storage subsystems 2-2
 - SWAP
 - action 5-151
 - switched SRDF configurations 4-30
 - SYM_GROUPS 3-45
 - Symmetrix
 - displaying microcode level 5-16
 - displaying model number 5-16
 - displaying serial number 5-16
 - displaying status 5-16
 - displaying volume status 5-103
 - IML 4-13
 - setting operating state 5-121
 - Symmetrix devices, defining 1-7
 - Symmetrix requirements 2-2
 - Symmetrix volume status, displaying 5-94
 - SYNC action 5-151
 - SYNC attribute 4-9, 4-11
 - synch direction, displaying 5-30
 - SYNCH_DIRECTION setting 1-6
 - SYNCH_DIRECTION_ALLOWED initialization parameter 3-41
 - SYNCH_DIRECTION_INIT initialization parameter 3-42
 - synchronization, starting 5-150
 - synchronization direction, setting 1-6
 - synchronous mode 1-16, 4-12, 4-13, 4-21
 - definition 4-13
 - setting R1 volumes 5-151
 - syntax maps, how to read 5-2
 - SYSDA 2-11
 - SYSIN 1-8
 - SYSPRINT 1-8
- ## T
- target (R2) volumes 4-2
 - target volumes 1-10, 1-12, 1-13, 4-2
 - host accessibility 4-8
 - host view 4-6
 - not ready state 4-5, 4-7
 - read / write state 4-6
 - read-only state 4-5
 - states 4-5, 4-6
 - write-disabled state 4-7
 - technical support D-3
 - termination command 3-3
 - testing recovery procedures 6-6 to 6-43
 - performing R2 read / write testing 6-9 to 6-11
 - resynchronize R1 greater than R2 6-17 to 6-19, 6-35 to 6-36
 - resynchronize R1 less than R2 6-26 to 6-28, 6-41 to 6-43
 - selecting a synchronization method 6-14 to 6-16

#TF command 1-9, 5-154
 TimeFinder interface 1-9
 TimeFinder Security Interface 2-15
 TNR 5-112
 tolerance mode 5-80
 transfer error

- adaptive copy-disk mode 4-20
- adaptive copy-write pending mode 4-17
- semi-synchronous mode 4-16
- synchronous mode 4-14

transmit cycle size 5-80
 transmit tag 5-82
 TSO ISPF interface 1-3
 tunable cache 1-25

U

unidirectional configurations 1-12
 Unit Checks 4-14
 user defined groups, including only online
 devices 3-15
 USER_VERIFICATION initialization parameter
 3-43

USER_VERIFICATION_TIMEOUT initialization
 parameter 3-43

V

VALIDATE action 5-151
 VALIDATE_CRPAIR_NOCOPY_LEVEL
 initialization parameter 3-44
 version, determining 5-30
 virtual machine restriction 2-3
 volume operational modes 4-12
 volumes
 local 4-2
 source 4-2
 target 4-2
 volumes not ready to the host, setting 5-149
 volumes ready to the host, setting 5-149

W

World Wide Name (WWN) 4-30
 write-disabled state 4-6, 4-7
 write-enabled state 4-6

DRAFT
EMC CONFIDENTIAL