Chapter 4 Command Reference

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### Appendix A

**Director and Volume Status**

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As part of an effort to improve its product lines, Dell EMC periodically releases revisions of its software and hardware. Therefore, some functions described in this document might not be supported by all versions of the software or hardware currently in use. The Mainframe Enablers Release Notes provide the most up-to-date information about product features.

Contact your Dell EMC technical support professional if a product does not function properly or does not function as described in this document.

Note: This document was accurate at publication time. New versions of this document might be released at the Dell EMC Online Support website. Check Dell EMC Online Support to ensure that you are using the latest version of this document.

Purpose

This document describes how to configure and use Dell EMC SRDF Host Component for z/OS. The document is for use with the following products:

- SRDF/Synchronous (SRDF/S)
- SRDF/Asynchronous (SRDF/A)
- SRDF/Data Mobility (SRDF/DM)
- SRDF/Automated Replication (SRDF/AR)
- SRDF/Consistency Groups (SRDF/CG)
- SRDF/Star
- SRDF/SQAR

Audience

This document is intended for the host system administrator, system programmer, or operator who will be involved in managing SRDF Host Component.

Related documentation

To access related documentation, go to the PowerMax™ and VMAX™ All Flash Technical Documentation webpage at:


The following documents provide information about Mainframe Enablers:

- Mainframe Enablers Release Notes
- Mainframe Enablers Installation and Customization Guide
- Mainframe Enablers Message Guide
- ResourcePak™ Base for z/OS Product Guide
The following documents provide additional information:

- **PowerMax Family Product Guide**—Documents the features and functions of the PowerMax storage systems.
- **PowerMaxOS for PowerMax and VMAX All Flash Release Notes**—Describes new features and any known limitations.
- **VMAX All Flash Product Guide**—Documents the features and functions of the VMAX All Flash storage systems.
- **HYPERMAX OS for VMAX All Flash and VMAX3 Family Release Notes**—Describes new features and any known limitations.
- **VMAX3 Family Product Guide**—Documents the features and functions of the VMAX3 100K, 200K, and 400K storage systems.
- **VMAX Family Product Guide**—Documents the features and functions of the VMAX 10K, 20K, and 40K storage systems.
- **E-Lab™ Interoperability Navigator (ELN)**—Provides a web-based interoperability and solution search portal. You can find the ELN at [elabnavigator.EMC.com](http://elabnavigator.EMC.com).

**Conventions used in this document**

Dell EMC uses the following conventions for special notices:

![CAUTION](image)

**CAUTION**, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

---

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

---

**IMPORTANT**

An important notice contains information essential to software or hardware operation.
Preface

Typographical conventions

Dell EMC uses the following type style conventions in this document:

**Normal**

Used in running (nonprocedural) text for:
- Names of interface elements, such as names of windows, dialog boxes, buttons, fields, and menus
- Names of resources, attributes, pools, Boolean expressions, buttons, DQL statements, keywords, clauses, environment variables, functions, and utilities
- URLs, pathnames, filenames, directory names, computer names, links, groups, service keys, file systems, and notifications

**Bold**

Used in running (nonprocedural) text for names of commands, daemons, options, programs, processes, services, applications, utilities, kernels, notifications, system calls, and man pages

Used in procedures for:
- Names of interface elements, such as names of windows, dialog boxes, buttons, fields, and menus
- What the user specifically selects, clicks, presses, or types

**Italic**

Used in all text (including procedures) for:
- Full titles of publications referenced in text
- Emphasis, for example, a new term
- Variables

**Courier**

Used for:
- System output, such as an error message or script
- URLs, complete paths, filenames, prompts, and syntax when shown outside of running text

**Courier bold**

Used for specific user input, such as commands

**Courier italic**

Used in procedures for:
- Variables on the command line
- User input variables

< > Angle brackets enclose parameter or variable values specified by the user

[ ] Square brackets enclose optional values

| Vertical bar indicates alternate selections—the bar means “or”

{} Braces enclose content that the user must specify, such as x or y or z

... Ellipses indicate nonessential information omitted from the example

Where to get help

Dell EMC support, product, and licensing information can be obtained on the Dell EMC Online Support site as described next.

Note: To open a service request through the Dell EMC Online Support site, you must have a valid support agreement. Contact the Dell EMC sales representative for details about obtaining a valid support agreement or to answer any questions about your account.
Product information

For documentation, release notes, software updates, or for information about Dell EMC products, licensing, and service, go to the Dell EMC Online Support site (registration required) at:

\[support.EMC.com\]

Technical support

Dell EMC offers a variety of support options.

Support by Product—Dell EMC offers consolidated, product-specific information at:

\[support.EMC.com/products\]

The Support by Product web pages offer quick links to Documentation, White Papers, Advisories (such as frequently used Knowledgebase articles), and Downloads, as well as more dynamic content, such as presentations, discussion, relevant Customer Support Forum entries, and a link to Dell EMC Live Chat.

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- EMEA: +353 (0) 21 4879862 and follow the voice prompts.

Your comments

Your suggestions will help us continue to improve the accuracy, organization, and overall quality of the user publications. Send your opinions of this document to:

\[VMAXContentFeedback@emc.com\]
CHAPTER 1

Introduction

This chapter covers the following topics:

- Dell EMC Mainframe Enablers and SRDF Host Component ........................................... 20
- Symmetrix Remote Data Facility (SRDF) ........................................................................ 21
- SRDF documentation ..................................................................................................... 23
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- SRDF multisite implementation ..................................................................................... 31
- Consistency group support ........................................................................................... 48
Dell EMC Mainframe Enablers and SRDF Host Component

Dell EMC SRDF™ Host Component is packaged with the Dell EMC Mainframe Enablers. The Dell EMC Mainframe Enablers include the following components that you can use to monitor and manage your storage:

- ResourcePak™ Base for z/OS
- SRDF Host Component for z/OS
- AutoSwap™ for z/OS
- Consistency Groups for z/OS
- TimeFinder™ SnapVX
- Data Protector for z Systems (zDP™)¹
- TimeFinder/Clone Mainframe Snap Facility
- TimeFinder/Mirror for z/OS
- TimeFinder Utility

When you install the Mainframe Enablers kit, you install the software for all the components.

Licensing

See the following documents for information about licensing:

- Mainframe Enablers Installation and Customization Guide
- PowerMax Family Product Guide
- VMAX All Flash Product Guide
- VMAX3 Family Product Guide
- VMAX Family Product Guide

¹ zDP requires TimeFinder SnapVX but is a separately licensed product.
Symmetrix Remote Data Facility (SRDF)

Symmetrix™ Remote Data Facility (SRDF) is a business continuance solution that maintains a mirror image of data at the device level in storage systems located in physically separate sites. The SRDF product family provides a mirrored data storage solution that allows you to duplicate production site data on one or more local or remote target storage systems.

SRDF provides a recovery solution for component or site failures between remotely mirrored devices, as shown in Figure 1. SRDF mirroring reduces backup and recovery costs and significantly reduces recovery time after a disaster.

Figure 1 Basic SRDF configuration

IMPORTANT
Before using SRDF Host Component, you should have an understanding of basic SRDF features and operations. For an operational overview of SRDF concepts and the SRDF family products, see the PowerMax Family Product Guide, VMAX All Flash Product Guide, or VMAX3 Family Product Guide.
Introduction

SRDF Host Component

SRDF Host Component is a component of the Dell EMC Mainframe Enablers. SRDF Host Component is a z/OS subsystem for controlling SRDF processes and monitoring SRDF status by using commands executed from a host.

You can issue SRDF Host Component commands to both local and remote storage systems. Commands destined for remote storage systems are transmitted through local storage systems using SRDF links.

This manual describes SRDF Host Component support for the following SRDF family variants, as well as the TimeFinder option.

SRDF/Synchronous (SRDF/S)—SRDF/S is a disaster-restart solution that operates in synchronous mode and maintains a real-time (synchronous) mirrored copy of production data (R1 devices) in a physically separated storage system (R2 devices) within an SRDF configuration. Data must be successfully stored in storage system cache at both the primary and the secondary site before an acknowledgment is sent to the production host at the primary site. SRDF/S is a building block of several multisite disaster-restart options such as SRDF/Star and SRDF/AR.

SRDF/Asynchronous (SRDF/A)—SRDF/A is a disaster-restart solution that mirrors data from the R1 devices while maintaining a dependent-write consistent copy of the data on the R2 devices at all times. The dependent-write consistent copy of the data at the secondary site is typically only seconds behind the primary site. SRDF/A session data is transferred to the secondary storage system in cycles. SRDF/A provides a long-distance replication solution. This level of protection is intended for users who require a fast host response time while maintaining a dependent-write consistent, restartable image of data at the secondary site.

SRDF/Data Mobility (SRDF/DM)—SRDF/DM is a data migration/data mobility solution that enables fast data transfer from R1 to R2 devices over extended distances. SRDF/DM operates in only SRDF adaptive copy mode and is designed for data replication or migration between two or more storage systems. SRDF adaptive copy mode provides a fast application response time. SRDF/DM can be used for local or remote transfers.

SRDF/Automated Replication (SRDF/AR)—SRDF/AR provides a long-distance disaster restart solution. SRDF/AR can operate in two-site topologies that use SRDF/DM in combination with TimeFinder. SRDF/AR can operate in three-site topologies that use a combination of SRDF/S, SRDF/DM, and TimeFinder. These solutions operate in synchronous mode between storage system A and storage system B and in adaptive copy mode between storage system B and storage system C.

SRDF/Consistency Groups (SRDF/CG)—SRDF/CG ensures consistency of data spanning across multiple devices and storage systems located at multiple sites. Such data must be dependent-write consistent to guarantee a restartable copy of data at the remote site if the production site fails.

SRDF/Star—SRDF/Star (Symmetrix Triangular Asynchronous Replication) provides advanced three-site business continuity protection and a disaster-restart solution. It offers the ability to differentially establish and protect data amongst surviving sites in a multisite disaster recovery implementation. In the event of a primary site failure, SRDF/Star enables the surviving sites to quickly re-establish data, protect it by using remote mirroring, and then just as quickly restore the primary site when conditions
permit. SRDF/Star uses different modes of operation (SRDF/A, SRDF/S) between participating sites and resynchronizes SRDF/S and SRDF/A copies by replicating only the differences between the sessions. Therefore, SRDF/Star enables faster resumption of protected services after a primary site failure. Dell EMC GDDR is required to implement SRDF/Star.

**SRDF/SQAR**—SRDF/SQAR (Symmetrix Quadrilateral Asynchronous Replication) is a four-site implementation of SRDF/S and SRDF/A for mainframe host environments. SRDF/SQAR enables differential resynchronization between sites along the perimeter of a “square” multisite SRDF topology. Dell EMC GDDR is required to implement SRDF/SQAR.

### SRDF documentation

Table 1 lists SRDF documentation you should read before invoking any SRDF operations.

<table>
<thead>
<tr>
<th>For information about</th>
<th>See</th>
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<td>Technical concepts and operations of the</td>
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<td>Whether SRDF connectivity is supported between</td>
<td>SRDF Interfamily Connectivity</td>
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<td>two storage systems</td>
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</table>

### Where to find SRDF documentation

You can find the SRDF documentation on the Dell EMC Online Support website at [support.EMC.com](http://support.EMC.com).
SRDF Host Component interfaces

User interfaces to SRDF Host Component are provided through batch commands, as well as through the system console. An optional interface is provided for TimeFinder commands as well as SRDF Host Component commands to centralize commands for both replication products.

System console interface

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

Batch utility interface

SRDF Host Component provides the EMCSRDF batch utility to submit SRDF Host Component commands from a batch job environment. Commands are read from the SYSIN file and passed to the SRDF Host Component subsystem. Once a command has been processed, the resulting output is written to the SYSPRINT file. Sample JCL for the batch utility is provided in the SAMPLIB member, EMCSRDF.

Note: “Implementing command logging” on page 54 provides information about using the batch utility.

Dell EMC TimeFinder interface option

SRDF Host Component includes an interface to Dell EMC TimeFinder through the TF command. This command provides access to TimeFinder functionality through the native TimeFinder interface. The TF command supports single, non-queued TimeFinder commands and queries using native TimeFinder syntax.

Note: This option is configured by a Dell EMC Customer Support Engineer at installation or service time.

TimeFinder is a business continuance solution that allows you to use special devices that contain a copy of storage system devices from one or more attached hosts while the standard devices are online for regular I/O operation from their hosts. Uses for these copies can include:

- Backup
- Restore
- Decision support
- Applications testing

Note: The TimeFinder/Mirror for z/OS Product Guide describes the syntax and description of TimeFinder functions and commands.
SRDF device types and groups

This section describes device type and device group concepts that are specific to SRDF configurations.

SRDF devices

An SRDF device is a PowerMax/VMAX logical device paired with another PowerMax/VMAX logical device that resides in a remote storage system. The storage systems on both sites are connected to each other through SRDF links. An SRDF pair consists of the primary SRDF device (R1) residing on one storage system and the secondary SRDF device (R2) residing on another storage system.

The primary (R1) device contains production data that is actively mirrored across the SRDF links to the other member of the SRDF pair, the secondary (R2) device. Active mirroring indicates that the secondary device (R2) maintains a restartable, mirrored copy of the production data at the remote site while the production host is running I/Os to the R1 device.

In addition, SRDF differentiates between ordinary primary devices (R1) and concurrent primary SRDF devices (R11) typically used in three-site SRDF solutions. Concurrent R11 devices are configured with local mirrors and two unique R1 SRDF mirrors. R11 devices maintain mirrored copies of data across the SRDF links at two remote sites.

Cascaded SRDF devices (R21) are dual-role SRDF devices typically used in three-site solutions. An R21 device can simultaneously assume the roles of an R2 and an R1 device. R21 devices have an R1 SRDF and an R2 SRDF mirror.

SRDF configurations have at least one primary site (R1) device mirrored to one secondary site (R2) device. For concurrent SRDF configurations, there can be multiple R2 sites. Cascaded SRDF environments include R1>R21>R2 devices.

SRDF/Metro devices are introduced with the SRDF/Metro feature described in the PowerMax Family Product Guide, VMAX All Flash Product Guide, or VMAX3 Family Product Guide. SRDF/Metro is supported for FBA devices only. Any SRDF Host Component configuration (SC) command issued to an SRDF/Metro device will be blocked.

SRDF groups

An SRDF group is a configuration element defining a link between two storage systems through which SRDF pairs may be established. An SRDF group enables the grouping of SRDF devices for various purposes, such as the establishment of an SRDF/A session.

An SRDF group is identified by two numbers, one on each of the two linked storage systems. Note that the numbers on the two storage systems do not have to be the same. The values that may be used depend on the levels of the storage system operating environment (PowerMaxOS, HYPERMAX OS, Enginuity).

The following terminology is used when referring to SRDF groups on a storage system:

- **Local storage system** is the storage system under discussion.
- **SRDF group** is the configuration element under discussion.
Introduction

- **SRDF group number** is the number identifying an SRDF group on the local storage system.

- **SRDF group nn** indicates an SRDF group whose number identifies that SRDF group on the local storage system (for example, SRDF group 2C).

- **Remote storage system** is the storage system to which the local storage system is linked by the SRDF group.

- **Other-side SRDF group number** is the number identifying the SRDF group on the remote storage system.

- **In SRDF group nn** (applied to a device on the local storage system) means that the device is paired, by means of a remote mirror assigned to SRDF group nn, to a device on the remote storage system which has its own remote mirror assigned to the SRDF group but using the other-side SRDF group number.

SRDF groups are a prerequisite for storage remote mirroring functions. PowerMaxOS 5978, HYPERMAX OS 5977 and Enginuity 5876 allow up to 250 SRDF groups to be created, with a maximum of 250 (with PowerMaxOS 5978 and HYPERMAX OS 5977) or 64 (with Enginuity 5876) SRDF groups on any one SRDF director.

Once an SRDF group is created linking a pair of storage systems, devices in the linked storage systems may be paired by means of that SRDF group. SRDF groups play the following roles during device pair creation:

- A remote mirror of a device (the local device) on a storage system (the local storage system) is assigned the SRDF group number.

- Simultaneously, a remote mirror of the device with which the local device will be paired (the remote device) on the linked storage system (the remote storage system) is assigned the other-side SRDF group number.

- Each storage system updates its internal tables to indicate its device's new partner and the SRDF group within which the new device pair exists.

In a device pair, one of the groups is referred to as a source or R1 device. The device with which it is paired is referred to as a target or R2 device. Each device in the pair may be referred to as a remote mirror or a partner of the other device in the pair.

The following types of device pairings exist:

- An R1 device can be paired with an R2 device. In an SRDF configuration, if the source (R1) device fails, the data on its corresponding target (R2) device can be accessed.

- An R1 device may be paired with two R2 devices at once, an arrangement referred to as **concurrent SRDF**.

- An R2 device in one pairing may be simultaneously paired as an R1 device with a different remote (R2) device, an arrangement known as **cascaded SRDF**. The device that is performing both R1 and R2 functions is an R21 device. “**Cascaded SRDF**” on page 34 describes the use of R21 devices.

**Note:** With Enginuity 5874, in the SRDF/Extended Distance Protection (SRDF/EDP) environment, an R21 device can be designated as a diskless device (DL dev). The purpose of a diskless R21 device is to directly cascade data to the remote R2 disk device, streamlining the linkage and reducing the cost of storage at
the middle site. For information about SRDF/EDP, see “SRDF/Extended Distance Protection” on page 36.

- A device that can act as the target device for two distinct remote mirrors is an R22 device. R22 devices accept write operations from only one of the source R1 devices at a time. “SRDF/Star with an R22 site” on page 40 describes the use of R22 devices.

In normal SRDF operation, data written to an R1 device is replicated on the paired R2 device. However, SRDF data replication may be temporarily suspended to allow certain operational actions to be performed. Also, some recovery operations and operational procedures require data to be replicated from an R2 device to an R1 device. The direction of data replication is referred to as synchronization direction, described in the next section.

Performing synchronization

In a device pair, SRDF attempts to keep the R1 and R2 devices synchronized; that is, to maintain identical data on the paired devices. Synchronization is performed on a per-track basis. When corresponding tracks on an R1 device and its paired R2 device differ, you must determine whether the data from the track on the R1 device should be copied to the corresponding track on the R2 device or whether the data from the track on the R2 device should be copied to the corresponding track on the R1 device. This decision is based on the current synchronization direction that applies to the device pair as well as on the SRDF Host Component command currently being processed, if any.

Note: The synchronization direction setting permits SRDF Host Component “syncing” commands to act upon the appropriate device type. Note that the synchronization direction is solely a host concept, and has no direct effect on the storage system. The synchronization direction returns to default values specified in the initialization parameters at startup.

You can set the synchronization direction at the global level, at the storage system level, or at the SRDF group level.

Global level—Setting the direction at the global level affects all “syncing” commands entered through this instance of SRDF Host Component. “#SC GLOBAL” on page 269 describes how to set the direction at the global level. “#SQ GLOBAL” on page 164 describes how to display the current global setting for synchronization direction.

Storage system level—Setting the direction at the storage system level overrides the global synchronization direction setting for commands entered using a gatekeeper on that storage system. The gatekeeper device is the z/OS addressable device that is used to initiate the I/O. Note that when entering remote commands, synchronization direction is still controlled by the synchronization direction setting on the gatekeeper (local) storage system. For multihop commands, it is the gatekeeper storage system setting that governs synchronization direction for the command. “#SC CNFG” on page 266 describes how to set the direction at the storage system level. “#SQ CNFG” on page 145 describes how to display the current storage system level setting for
You can set synchronization direction to R1>R2, R1<R2, or NONE:

**R1>R2**—When corresponding tracks differ, data is copied from the track on the R1 device to the corresponding track on the R2 device. When this setting is in effect, commands that would cause data to be copied from an R2 to its partner R1 are not permitted.

**R1<R2**—When corresponding tracks differ, data is copied from the track on the R2 device to the corresponding track on the R1 device. When this setting is in effect, commands that would cause data to be copied from an R1 to its partner R2 are not permitted.

**NONE**—When this setting is in effect, you cannot issue synchronization direction commands.

To enhance multitasking support, SRDF Host Component allows you to set the synchronization direction separately for each storage system and/or SRDF group to:

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

When you start SRDF Host Component, it sets the synchronization direction to GLOBAL for each storage system. This action causes the value of the SYNCH_DIRECTION_INIT initialization parameter to be used for each system. Subsequently, you can reset the global synchronization direction with the #SC GLOBAL,SYNCH_DIRECTION command.

The default SYNCH_DIRECTION for SRDF groups that you do not explicitly set by the #SC RDFGRP command is the storage system’s synchronization direction (set using the #SC CNFG command), or if absent, the current global synchronization direction. The two storage systems in an SRDF relationship may have the system-level option set differently.

Associated SRDF groups always have the same synchronization direction when they are set at the SRDF group level. If CNFG is used, then each side must be set. Note that setting the synchronization direction for a storage system does not alter any synchronization direction for an SRDF group that has been set explicitly. Similarly, setting the global synchronization direction does not alter any synchronization direction for a storage system or an SRDF group that has been set explicitly.
Pairing unequal size R1 and R2 devices

SRDF Host Component supports the pairing of unequal size R1 and R2 devices, where the R1 device is smaller (fewer cylinders) than the R2 device. However, the devices must still be of the same emulation type. Resynchronization procedures are supported for a SYNCH_DIRECTION of R1>R2; a SYNCH_DIRECTION of R1<R2 is not supported. Note that the #SC VOL command with the CREATEPAIR action and the ADSRDF option allows you to create a dynamic SRDF pair when the R1 device is smaller than the R2 device. For details, see “ADSRDF” on page 354.

Restrictions

Static device pairing is supported between storage systems running Enginuity 5876 and earlier. For storage systems running PowerMaxOS 5978 and HYPERMAX OS 5977, only dynamic SRDF groups and devices are supported. Pairing of static SRDF groups/devices with dynamic SRDF groups/devices is not allowed.

For dynamic SRDF, the #SC VOL command CREATEPAIR and DELETEPAIR actions are supported. However, the SWAP and the KEEPR2 options of the CREATEPAIR action are not supported.

Using metadata

Since the metadata (VTOC, VTOC index, VVDS) 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 regained by running the ICKDSF utility using the 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.

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

Pairing unequal track sizes (FBA only)

SRDF Host Component takes into account the larger track size when creating a device pair. For a pair of devices where one is from a storage system with Enginuity 5876 and earlier and has a 64KB track size and the other is from a storage system that has a track size of 128KB (with PowerMaxOS 5978 and HYPERMAX OS 5977), SRDF Host Component considers them to have an equal capacity when the device with 128KB track size has half the number of tracks the 64KB device or one fourth the number of tracks that a device from a storage system with Enginuity 5772 and earlier.
Introduction

Using adaptive copy write-pending mode

Adaptive copy write pending is a replication mode where the storage system acknowledges writes to source (R1) volumes prior to confirming replication. The target (R2) volumes may have unsynchronized tracks up to the maximum skew value in effect. Use this replication mode to balance between cache resource usage, response time, and level of consistency.

The following constraints apply to adaptive copy write-pending mode:

- SRDF Host Component does not allow you to place a device that is in a consistency group into adaptive copy write-pending mode.
- Non-diskless R21 devices are blocked from being in adaptive copy write-pending mode (B-C leg).
- Adaptive copy write pending is not supported when the R1 mirror of the SRDF pair is on a storage system running PowerMaxOS 5978 or HYPERMAX OS 5977.
**SRDF multisite implementation**

Multisite SRDF topologies are configurable for both concurrent and cascaded environments. These two SRDF multisite topologies address different recovery and availability objectives.

- **Concurrent SRDF** positions the local site (B) or the remote site (C) as potential recovery sites. To achieve this positioning, some level of reconfiguration intervention is required to access point-of-disaster data.
- **Cascaded SRDF** is oriented toward recovery only at the remote site (C) with minimal intervention to access point-of-disaster data.

**Concurrent SRDF**

With concurrent SRDF, two recovery site (R2) devices are configured as mirrors of a single concurrent primary (R11) device. Using a concurrent SRDF pair allows the creation of two copies of the same data at two remote locations. When the two R2 devices are split from their concurrent primary R11 device, each recovery site copy of the application can be accessed independently.

The data from a primary site is synchronously replicated to a secondary site and asynchronously replicated to a tertiary site. SRDF/Star adds the ability to resynchronize the recovery site differentially.

With concurrent SRDF, site B serves as the secondary site and the target of the SRDF/S link from site A. Site C serves as the tertiary site and the target of the SRDF/A link from site A.
Figure 2 on page 32 shows the initial concurrent SRDF configuration.

**Figure 2** Initial concurrent SRDF configuration

Concurrent SRDF is valuable for duplicate restarts and disaster recovery, and provides increased flexibility for data mobility and application migrations.
Operating both mirrors in SRDF/A mode

PowerMaxOS 5978, HYPERMAX OS 5977, Enginuity 5875 and 5876 support Concurrent SRDF/A.

Prior to the introduction of concurrent SRDF/A, you could synchronously mirror to a recovery site near the production site while asynchronously mirroring to a recovery site far away from the production site. However, if a region-wide disaster occurred near the workload site, you would be at risk of losing both the production data and its synchronous recovery mirror, leaving only the asynchronous recovery mirror intact.

To avoid such a scenario, you can now configure concurrent SRDF/A to asynchronously mirror to recovery sites located at extended distances from the workload site. If the location of the workload site experiences a regional disaster, two copies of the production data are still available at the remote recovery sites, as shown in Figure 3. In this configuration, the Massachusetts workload site has two recovery sites that are at an extended distance from this site.

![Figure 3](image.jpg)

**Figure 3** Concurrent SRDF/A mirroring to distant recovery sites

To simultaneously operate both mirrors in SRDF/A mode, the concurrent R1 device must reside on a storage system running PowerMaxOS 5978, HYPERMAX OS 5977, Enginuity 5875 or 5876. The R2 devices can reside on any storage system supporting connections to a storage system running PowerMaxOS 5978, HYPERMAX OS 5977, Enginuity 5875 or 5876.
Cascaded SRDF

Cascaded SRDF is a three-way data mirroring and recovery solution that provides enhanced replication capabilities, greater interoperability, and multiple ease-of-use improvements. In cascaded SRDF, data from a primary site is synchronously replicated to a secondary site, and then asynchronously replicated to a tertiary site.

Cascaded SRDF provides replication among three sites without requiring the need for SRDF BCVs on the second storage system. Note that a cascaded SRDF configuration does not require three separate site locations, although that is the most common configuration for a disaster recovery solution.

The main benefit of configuring cascaded SRDF is the capability to continue replicating from the secondary site to the tertiary site if the primary site goes down. This enables a faster recovery at the tertiary site, provided that is where the data operation restarted.

As shown in Figure 4, site B serves as the secondary site and the target of the SRDF/S link from site A. Site C serves as the tertiary site and the target of the SRDF/A link from site B.

Figure 4 Cascaded SRDF configuration

Cascaded SRDF introduces the concept of a R1/R2 device referred to as an R21 dual-role device. The R21 device is both an R1 mirror and an R2 mirror, for use only in cascaded SRDF operations. When thinking of the R21 device, it is easier to understand the concept if you think of it as a mirror type, instead of a device. The controls for these devices are relationship-based.

Note: In an SRDF/Extended Distance Protection (SRDF/EDP) environment available with Enginuity 5874-5876, the R21 device can be designated as a diskless device. The purpose of a diskless R21 device is to directly cascade data to the remote R2 disk device, streamlining the linkage and reducing the cost of storage at the middle site. For information about SRDF/EDP, see “SRDF/Extended Distance Protection” on page 36.

The R21 device is the R2 mirror of the primary site R1 device, and the R1 mirror of the tertiary site R2 device. The site A and site B devices have an SRDF pair state, and the site B and site C devices have an SRDF pair state. These two pair states are separate from each other; however, when performing a control operation on one pair, the state of the other device pair must be known and considered. That is, the #SC VOL command CREATEPAIR and DELETEPAIR actions may be applied independently to the R1-R2 primary/secondary site pair and to the R1-R2 secondary/tertiary site pair.
Note that in Figure 4 on page 34 the data from site A to site B is synchronous and the data from site B to site C is asynchronous. These modes are the most common; however, other modes are allowed as shown in Table 2.

**Note:** The use of adaptive copy mode on the first leg causes loss of consistency for SRDF/A operating on the second leg.

**Table 2** Data modes allowed for cascaded SRDF

<table>
<thead>
<tr>
<th>Site A to Site B (R1 - R21)</th>
<th>Site B to Site C (R21 - R2)</th>
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<td>Adaptive copy write pending</td>
<td>Asynchronous</td>
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<td></td>
<td>Adaptive copy disk (non-diskless)</td>
</tr>
<tr>
<td></td>
<td>Adaptive write pending (diskless SRDF/EDP only)</td>
</tr>
<tr>
<td>Adaptive copy disk</td>
<td>Asynchronous</td>
</tr>
<tr>
<td></td>
<td>Adaptive copy disk (non-diskless)</td>
</tr>
<tr>
<td>Asynchronous (non-diskless)</td>
<td>Adaptive copy disk (non-diskless)</td>
</tr>
<tr>
<td>Semi-synchronous (Enginuity 5773 and later)</td>
<td>Adaptive copy write pending (diskless SRDF/EDP only)</td>
</tr>
<tr>
<td>Synchronous</td>
<td>Asynchronous</td>
</tr>
<tr>
<td></td>
<td>Adaptive copy disk (non-diskless)</td>
</tr>
<tr>
<td></td>
<td>Adaptive copy write pending (diskless SRDF/EDP only)</td>
</tr>
</tbody>
</table>

a. Adaptive copy write-pending mode is not supported when the R1 mirror of the SRDF pair is on a storage system running PowerMaxOS 5978 or HYPERMAX OS 5977. For this configuration, the #SC VOL command action used to set the SRDF mode will return an error if the mode is set to adaptive copy write pending. In this case, a different mode needs to be set. Instead of failing the action, the mode is converted to adaptive copy disk and the action processing continues.
SRDF/Extended Distance Protection

**Note:** With PowerMaxOS 5978 and HYPERMAX OS 5977, this feature is no longer supported.

SRDF/Extended Distance Protection (SRDF/EDP) allows you to streamline a cascaded SRDF linkage out to a remote site with a more direct (diskless) connection. Diskless cascaded SRDF support allows replication between the primary site A and remote tertiary site C without the need for SRDF BCVs or any replication at the middle site.

In a standard three-site cascaded environment, a regular R21 device has its own local mirrors so there are three full copies of data, one at each of the three sites. The R21 device assumes a dual role of both an R1 and an R2 simultaneously. However, in an SRDF/EDP cascaded environment, a diskless R21 device is in the middle storage system (site B) of the total SRDF link out to the remote target site. The diskless R21 device is a new type of device which does not have any local mirrors. The device has no local disk space allocated to store the user data; therefore it reduces the cost of having disk storage in the R21 site. This results in only two full copies of data, one on the source R1 disk device and one on the target R2 disk device as shown in Figure 5.

SRDF/EDP allows replication between the production and recovery sites without the need for SRDF BCVs or any replication at the middle site.

![Figure 5 SRDF/EDP configuration](image)

The purpose of a diskless R21 device is to cascade data directly to the remote R2 disk device. When using a diskless R21 device, the changed tracks received from the R1 mirror are saved in cache until these tracks are sent to the R2 disk device. Once the data is sent to the R2 device and the receipt is acknowledged, the cache slot is freed and the data no longer exists on the R21 site.

**Note:** Diskless SRDF is supported in conjunction with the SRDF/A Delta Set Extension feature.

Requirements

The SRDF/Extended Distance Protection feature requires Enginuity 5874 or later on the storage system on which a diskless device resides. A remote partner of a diskless device may reside on a storage system at Enginuity 5874 and later, or on a storage system at Enginuity 5773, provided an appropriate patch is applied.
Restrictions

- SRDF/EDP is not supported on the PowerMax/VMAX All Flash/VMAX3 platform.
- A diskless device cannot be mapped to the host. Therefore, no host is able to directly access a diskless device for I/O (read or write).
- Diskless SRDF devices are only supported on GigE and Fibre Channel directors.
- Diskless devices cannot perform dynamic sparing.
- Diskless devices cannot be SRDF paired with other diskless devices.
- When used for SRDF/A operations, all devices in the SRDF/A session must be diskless; non-diskless device types are not allowed.
- All PowerMax/VMAX replication technologies other than SRDF (TF, SNAP, and CLONE) does not work with diskless devices as the source or the target of the operation.

SRDF/Star support

The SRDF/Star disaster recovery solution provides advanced multisite business continuity protection for enterprise environments. It combines the power of SRDF synchronous and asynchronous replication, enabling the most advanced three-site business continuance solution available today.

**Note:** Automation for SRDF/Star configurations is provided by Dell EMC GDDR.

SRDF/Star enables SRDF/S and SRDF/A operations from the same source volumes with the ability to incrementally establish an SRDF/A session between the two remaining sites in the event of a primary site outage. This capability is only available through SRDF/Star.

SRDF/Star allows you to quickly re-establish protection between the two remote sites in the event of a primary site failure, and then, just as quickly, rejoin the primary site when conditions permit.

Three-site SRDF topologies are configurable in both concurrent and cascaded environments. You can use SRDF/Star with both of these three-site topologies. SRDF/Star adds the ability to resynchronize the recovery site differentially. With concurrent SRDF, the differential resynchronization is between the local site B and the remote site C. With cascaded SRDF, the differential resynchronization is between the primary site A and the remote site C. Concurrent and cascaded environments address different recovery and availability objectives:

- Concurrent SRDF/Star positions the local site (B) or the remote site (C) as potential recovery sites. To achieve this positioning, some level of reconfiguration intervention is required to access point-of-disaster data.
- Cascaded SRDF/Star is oriented toward recovery only at the remote site (C) with minimal intervention to access point-of-disaster data.
Concurrent SRDF/Star

In concurrent SRDF/Star, data from a primary site is synchronously replicated to a secondary site and asynchronously replicated to a tertiary site.

With concurrent SRDF/Star, site B serves as the secondary site and the target of the SRDF/S link from site A. Site C serves as the tertiary site and the target of the SRDF/A link from site A. The recovery link is between site C and site B over an SRDF/A link.

Figure 6 shows the initial concurrent SRDF/Star configuration.

Figure 6 Concurrent SRDF/Star configuration

Note: The concurrent SRDF/Star configuration requires PowerMaxOS 5978, HYPERMAX OS 5977 or Enginyuity 5771 and later at the three sites, and an SRDF/Star license.
Cascaded SRDF/Star

A cascaded SRDF configuration can be enhanced using SRDF/Star differential resynchronization functionality. SRDF/Star in a cascaded SRDF configuration offers the ability to differentially synchronize and protect the storage systems at the primary site and tertiary site (the long-distance asynchronous site) in the event the secondary site (the synchronous site) goes down.

Cascaded SRDF/Star has the ability to incrementally establish an SRDF/A session between the primary and the asynchronous site in the event of a synchronous target outage. With cascaded SRDF/Star, the synchronous target site is always more current than the asynchronous target site.

Figure 7 shows the initial cascaded SRDF/Star configuration. Site B serves as the secondary site and the target of the SRDF/S link from site A. Site C serves as the tertiary site and the target of the SRDF/A link from site B. The recovery link is between site C and site A over an SRDF/A link.

![Cascaded SRDF/Star configuration](image)

Figure 7 Cascaded SRDF/Star configuration

Cascaded SRDF uses a dual-role SRDF R21 device on the secondary site that acts as both an R2 to the primary site and an R1 to the tertiary site.

Cascaded SRDF/Star provides a mechanism to determine when current active R1 cycle (capture) contents reach the active R2 cycle (apply) on the long-distance SRDF/A link. This minimizes the amount of data that must be moved to fully synchronize site B and site C.

**Note:** The cascaded SRDF/Star configuration requires PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5773 and later on the workload site and its synchronous target site, and cascaded SRDF and SRDF/Star licenses.
SRDF/Star with an R22 site

SRDF/Star configurations with concurrent R2 SRDF sites are possible. Similar to concurrent R1 devices that are referred to as R11 devices, concurrent R2 devices are referred to as R22 devices.

As shown in Figure 8, this functionality is based on a concurrent R2 feature that allows an R2 device to have two SRDF mirrors. Each R2 mirror is paired with a different R1 mirror and only one of the R2 mirrors can be R/W on the link at a time.

The primary intended use for R22 devices is to simplify failover situations in SRDF/Star configurations and to improve the resiliency of the SRDF/Star application. The use of R22 devices in an SRDF/Star environment significantly reduces the amount of steps involved in some of the long running procedures (such as reconfigure, switch, connect), thus enabling the command sequences to finish quicker.

Note that each SRDF mirror of an R22 device must be related to the same source R11 device. In Figure 8 and Figure 9 on page 41, both R22 mirrors for a device on Site C must be related to the same R11 device on Site A - one R1(1) to R2(2) via A \(\rightarrow\) C and the other via A \(\rightarrow\) B \(\rightarrow\) C.

While designed primarily for SRDF/Star, R22 devices can be used for both concurrent and cascaded operations.

![Diagram of Concurrent R22 SRDF/Star environment](image_url)

**Figure 8** Concurrent R22 SRDF/Star environment

As shown in Figure 9 on page 41, you can also operate in cascaded SRDF R22 mode with a synchronous relationship between the workload source site and the short distance target site. There is also an asynchronous relationship to the long distance
target site from the synchronous target site. The workload site to long distance asynchronous site path is passive and is referred to as the recovery path if the workload and synchronous target sites lose connectivity.

**Figure 9** Cascaded R22 SRDF/Star environment

When creating a new SRDF/Star configuration with R22 devices:

- All devices at the workload site must be configured as concurrent (R11) devices with one mirror paired with the R2 mirror of the remote R21 device (synchronous target site) and the other mirror paired with the R2 mirror of the remote R22 device (asynchronous target site).

- All devices at the synchronous target site must be configured as R21 devices paired with an R1 remote partner at the workload site and R2 remote partner at the asynchronous target site.

- All devices at the asynchronous target site must be configured as R22 devices paired with an R21 remote partner at the synchronous target site and R11 remote partner at the workload site.
Extended Distance Protection (EDP) with SRDF/Star

With Enginuity 5876, SRDF/Extended Distance Protection (EDP) configurations that make up an SRDF/Star environment are possible.

**Note:** EDP is not supported with PowerMaxOS 5978 and HYPERMAX OS 5977.

SRDF/EDP is primarily intended for use with the cascaded SRDF/Star mode, as the concurrent SRDF/Star mode has limited functionality in this environment. Figure 10 on page 42 illustrates a cascaded SRDF/Star EDP diskless environment with an R2 device at the asynchronous remote target site. The diskless R21 device streamlines the linkage connections out to the remote R2 site in cascaded mode. No data copies are available at the diskless site B.

![Figure 10](image-url)

**Figure 10** Cascaded SRDF/Star EDP (diskless) environment with an R2 site

Figure 11 on page 43 illustrates a cascaded SRDF/Star EDP diskless environment with an R22 device at the asynchronous remote target site. The R22 device is based on a new concurrent R2 feature that allows an R2 device to have two SRDF mirrors. Each R2 mirror is paired with a different R1 mirror and only one of the R2 mirrors can be RW on the link at a time.

The primary intended use for R22 devices is to simplify failover situations in SRDF/Star configurations and to improve the SRDF/Star application's resiliency. The use of R22 devices and R21 diskless devices in an SRDF/Star environment significantly reduces the amount of steps involved in some of the long running commands (such as...
reconfigure, switch, connect) thus enabling the command sequences to finish quicker. The diskless R21 device streamlines the linkage connections out to the remote R22 site in cascaded mode. No data copies are available at the diskless site B.

![Cascaded SRDF/Star EDP (diskless) environment with an R22 site](image)

**General requirements**

The following are required to support an EDP (diskless) synchronous target site using SRDF/Star:

- Enginuity 5876 at the diskless target site (Site B).
- SRDF Host Component on all sites.
- All devices at the synchronous target site must be configured as diskless R21 devices with R2 mirror paired with the R1 mirror of the device at the workload site and the R1 mirror paired with the R2 mirror of the device at the asynchronous target site.

**Requirements when not using R22 devices**

- Enginuity 5773 or later at the workload site (Site A).
- If the recovery SRDF pairs are not configured (not using R22 devices), all devices at the workload site must be configured as R1 devices paired with the R2 mirror of the diskless R21 device at the synchronous target site.

- If the recovery SRDF pairs are not configured (not using R22 devices), all devices at the asynchronous target site must be configured as R2 devices paired with the R1 mirror of the diskless R21 device at the synchronous target site.
Requirements for using R22 devices

- Enginuity 5773.150 or later is required at all three sites.
- If the recovery SRDF pairs are configured (using R22 devices), all devices at the workload site must be configured as concurrent R11 devices with one mirror paired with the R2 mirror of the diskless R21 device at the synchronous target site and the other mirror paired with the R2 mirror of the R22 device at the asynchronous target site.
- If the recovery SRDF pairs are configured, all devices at the asynchronous target site must be configured as R22 devices with one mirror paired with the R1 mirror of the diskless R21 device at the synchronous target site and the other mirror paired with the R1 mirror of the R11 device at the workload site.

Asynchronous SRDF/Star (Star-A)

SRDF/Star-A provides support of replication for two asynchronous SRDF groups from an R11 source device.

The SRDF/Star-A configuration is similar to a three-sites SRDF/Star, but instead of an in-region synchronous site, both remote sites are out-of-region, configured as SRDF/A. Because there is no synchronous link, ConGroup is not involved.

Figure 12 illustrates an SRDF/Star-A configuration.
The definition for an SRDF/Star-A configuration includes two MSC groups, with one MSC group defining the MSC session(s) from DC1 to DC3 and a second MSC group for the DC1 to DC4 MSC session(s).

The two SRDF/Star-A MSC groups are loosely coupled and cycle-switch independently. SDDF sessions are managed on the opposite R2 devices when both SRDF/Star-A groups are active. A drop of any SRDF/Star-A group suspends SDDF session management.

Configure the R2 devices on DC3 and DC4 as related R21 and R22 devices, forming a triplet, R11 -> R21 -> R22, with the asynchronous R2 mirror of the R22 configured to the same R11 as the asynchronous mirror of the partner R21.

Requirements and restrictions

◆ SRDF/Star-A is available with PowerMaxOS 5978, HYPERMAX OS 5977 and Enginuity 5876.
◆ Dell EMC GDDR 5.2 is required to implement SRDF/Star-A.
◆ MSC High Availability (HA) is not supported for SRDF/Star-A.
◆ Only one set of SRDF/Star-A MSC groups is allowed.
◆ Only one Star/Star-A/SQAR configuration is allowed.
◆ Dynamic session add/delete is not supported.
◆ Auto Recovery is not supported.
SRDF/SQAR (Symmetrix Quadrilateral Asynchronous Replication) is a four-site implementation of SRDF/S and SRDF/A that enables differential resynchronization between sites along the perimeter of a square multisite SRDF topology.

**IMPORTANT**

Dell EMC GDDR is required to implement SRDF/SQAR functionality.

Dell EMC GDDR support for the SRDF/SQAR configuration provides the ability to recover from a single or dual unplanned site outage in one region, with local SRDF/S protection established differentially between the recovery sites in another region. This enables you to quickly resume a workload with SRDF/S and AutoSwap protection in another region. In certain failure scenarios, it also provides zero data loss disaster recovery across regions.

![Figure 13 SRDF/SQAR with AutoSwap environment](image-url)
Figure 13 on page 46 shows the four Dell EMC GDDR C-systems with their independent heartbeat communication paths, separate from the production disk and computer facilities. Each of the managed z/OS systems has Dell EMC AutoSwap and Dell EMC Consistency Groups (ConGroup) installed.

As Figure 13 on page 46 shows, each GDDR SRDF/SQAR environment manages two consistency groups and two Multi-Session Consistency (MSC) groups. A consistency group is a named group of source (R1) volumes managed by the Dell EMC Consistency Groups (ConGroup) application as a unit. An MSC group is a named group, consisting of multiple SRDF groups operating in SRDF/A mode, managed by the Dell EMC MSC control software feature as a single unit. The relationship between the Site A, DC1 and Site B, DC2 is maintained through SRDF/Synchronous replication of primary disk images at DC1 to DC2, while SRDF/Asynchronous replication maintains out of region mirrored data at Site C, DC3 and Site D, DC4.
Consistency group support

When running SRDF/S, Dell EMC Consistency Groups for z/OS (ConGroup) can be used with SRDF Host Component. ConGroup operates to preserve the integrity and dependent write consistency of a database distributed across multiple devices within a consistency group.

An SRDF consistency group is a set of SRDF devices which has been enabled for remote database consistency. The devices in a consistency group may reside on one or more storage systems and are required for SRDF/S operations. The consistency groups operate in unison to preserve the integrity and dependent write consistency of a database distributed across any devices within the consistency group.

Note: Operation and detailed features of consistency groups are described in the Consistency Groups for z/OS Product Guide.

SRDF Host Component provides the following support for consistency groups:

- 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 command with the SUSP_CGRP action trips a consistency group.
- The #SC VOL command with the RDF_SUSP or RDF_RSUM action is not allowed for a device in a consistency group.
- The #SC VOL command with the SUSP_CGRP action is not allowed for a device that is not in a consistency group.
- The #SQ VOL command with the CGROUP parameter and the #SQ MIRROR command with the CGROUP parameter display all devices that are in a consistency group for the selected storage system. The consistency group is detected by the mirror to support concurrent SRDF operations. Note that the consistency group does not need to be active to use these commands.
- The #SC VOL command with the SUSP_CGRP action should not be used on genned FBA devices.

In an SRDF/S environment, ConGroup protects against exposure to individual SRDF link failures that may compromise the dependent write consistency. If a link supporting an R1>R2 mirror pair belonging to the consistency group fails, the consistency group automatically trips, ensuring a consistent copy on the corresponding target (R2) devices.

In a consistency group trip, ConGroup suspends all SRDF transfers to the volumes defined for the consistency group before completing the intercepted I/O and returning control to the application. In this way, ConGroup prevents dependent I/O from reaching its remote mirror in the case where a previous I/O only gets as far as the local mirror. This ensures that all devices on the target (R2) side of SRDF/S relationships in this consistency group definition are dependent-write consistent. They can later be safely restarted from an operating system and DBMS perspective.
CHAPTER 2
Getting Started

This chapter covers the following topics:

- Post-installation .............................................................. 50
- Starting SRDF Host Component ....................................... 50
- Stopping SRDF Host Component ....................................... 51
- Batch interface .................................................................. 51
- Implementing command logging ....................................... 54
Post-installation

Figure 14 provides an overview of the SRDF Host Component installation and startup process.

Install Dell EMC Mainframe Enablers and enable the SRDF Host Component software, as described in the Mainframe Enablers Installation and Customization Guide.

After installation, create an SRDF Host Component configuration file. “Creating configuration file” on page 58 describes how to create the configuration file.

As part of the configuration definition process, you define groups of devices and or storage systems. You can later issue commands against these groups. “Using defined groups” on page 59 explains how to define groups.

Starting SRDF Host Component

**Note:** Run EMCSF (ResourcePak Base) before issuing the start command.

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

`S EMCRDF`

The EMCRDF started task initializes 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. It is recommended to leave the subsystem active at all times.
Stopping SRDF Host Component

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

P EMCRDF (or #STOP)

Note: The hash symbol (#) character is used as the SRDF Host Component command prefix throughout this guide. The command prefix you actually use when entering SRDF Host Component commands is the value you specify for the COMMAND_PREFIX initialization parameter.

Batch interface

The SRDF Host Component batch interface enables you to submit SRDF Host Component commands using a program executed within a batch job and to place the output from execution of those commands into a file.

The program, EMCSRDF, is provided with SRDF Host Component. EMCSRDF reads SRDF Host Component commands from SYSIN, submits each command to SRDF Host Component internally, and writes output from execution of each command to the SYSPRINT file. EMCSRDF is not required to be APF authorized.

Command format

You may include any number of commands and comments in the SYSIN file. Each command must start in column 1 and have exactly the same format as if entered at the console. The first byte(s) of the command must match the COMMAND_PREFIX setting for the SRDF Host Component running on the system that is to process the command.

You can continue a command to the next SYSIN file record by terminating a line with a hyphen (-). A command that ends with a hyphen (-) is treated as a continuation line and the next line in the SYSIN file is the continuation line and cannot be a comment. The continuation line should start in column 1 and consist of at least two characters, not including a continuation character. A line that starts with an asterisk (*) in column 1 is treated as a comment and is written to the SYSPRINT file.

Command verification

If the initialization parameters indicate that operator verification is required, messages may be issued to the operator console for some of the commands, requesting confirmation before the command can be executed. Operator verification is obtained separately for each command, as required.

Command execution

EMCSRDF submits all commands in the SYSIN file to SRDF Host Component before checking for command completion. Each submitted command runs in an SRDF Host Component command queue. As each one completes, its output is retrieved and written to the SYSPRINT file.
Since commands do not necessarily complete in the order in which they were submitted, command output does not necessarily appear in the SYSPRINT file in the order in which they were submitted. The command sequence number may be used to associate each command with its corresponding output. Note that command output is also echoed to the syslog, the job log, and the HCLOG file if active.

Command restrictions

The following restrictions apply to commands submitted through the batch interface:

- The #STOP command may not be submitted through the batch interface
- #SC GLOBAL actions PARM_REFRESH, SSID_REFRESH, and SWAPLOG are not supported through the batch interface.
- The SRDF Host Component alias feature cannot be used to create an alias for a command queue name in the batch interface.

JCL for executing EMCSRDF

The elements of a complete batch interface job are as follows. Sample JCL to run the batch utility is also found in the SAMPLIB member EMCSRDF.

```
//jobname JOB job-parameters
//stepname EXEC  PGM=EMCSRDF,PARM='cqname,queue-option'
//STEPLIB DD   DSN=load-library,DISP=SHR
//SYSIN DD   *                 .
//SYSPRINT DD   SYSOUT=*  
```

Note that the SYSIN input does not need to be within the job stream, but may instead be a sequential dataset or a member of a PDS or PDSE. In these cases, a maximum LRECL of 128 is allowed.

Passing parameters to EMCSRDF

EMCSRDF accepts the following parameters on the EXEC JCL statement:

- **cqname**
  
  This specifies a command queue name to be applied to any command in the SYSIN file that does not include the CQNAME parameter. If the *cqname* parameter is specified, it must be from 1 to 15 alphanumeric characters or use an asterisk (*) to indicate that the default queue name should be used. This default queue name has the value ECChmmststhaaa, where hhmmssth is the time of day that EMCSRDF was initiated and aaaa is the address space identifier of the job.

- **queue-option**
  
  This specifies a queue option to be applied to any command in the SYSIN file that does not include the CQNAME parameter.

  The following values may be specified:

  - P—If a command fails, purge remaining commands in the same command queue.
C—If a command fails, continue with the next command in the same command queue.

T—Parse, but do not execute, each command. This option provides the ability to syntax-check all commands in the SYSIN file in advance of actual execution.

For this option:
- If a command is valid, only the echo (EMCMN00I) message is issued for the command. If a command contains a syntax error, a parse error message is issued as well.
- If no syntax error is found for any command in the SYSIN file, the EMCSRDF job step return code is set to 0. If any syntax error is found for any command in the SYSIN file, the EMCSRDF job step return code is set to 8.

**Executing commands using z/OS MODIFY**

SRDF Host Component commands can be executed using the z/OS MODIFY command as follows:

/F taskname, command

Where:
- **taskname** is the name of the SRDF Host Component task.
- **command** is an SRDF Host Component command.

**IMPORTANT**

When executed using z/OS MODIFY, the **command** length cannot exceed 127 characters.

For example:

/F SRDFHC, SQ VOL,6200,1,0055
Implementing command logging

SRDF Host Component logs all commands presented to SRDF Host Component. Commands are logged by writing a copy of the associated EMCMN00E message with:

- The date and time of the command at the left.
- The console ID and userid appended on the right.

The data and time at the left of each log entry has the format:

\[ mm/dd/yyyy hh.mm.ss \]

Where:

- \[ mm/dd/yyyy \] indicates the month/day/year
- \[ hh.mm.ss \] indicates the hour.minute.second

If you add an HCLOG= initialization statement, you may request that the responses to those commands also be logged.

HCLOG1 and HCLOG2

To implement logging, add the following DD statement(s) to the SRDF Host Component startup JCL (EMCRDF):

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

or

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

**Note:** See member RDFALLOG in the Mainframe Enablers SAMPLIB for an example of JCL to allocate the log files.

SRDF Host Component also writes all initialization statements and any related messages to the log file. If you want an alternate log file, add either of the following DD statements to the startup JCL:

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

or

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

These datasets must be in fixed-length format with a record length of 121. Log records exceeding this length are truncated.

**Note:** The Mainframe Enablers Message Guide describes the SRDF Host Component message formats and meanings.

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

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

SRDF Host Component writes to DDname HCLOG1 until the logs are swapped. After swapping, commands are logged to DDname HCLOG2. When HCLOG2 is full, another swap is performed to start writing to HCLOG1, and so on.

**Note:** When a log is swapped, the existing contents of the new log file are overwritten.

To view the current DDname to which commands are logged, issue the #SQ GLOBAL command. The current log is displayed in the LOG_DDNAM field.

Swapping logs automatically

By default, logs are not swapped automatically. To enable automatic log swapping, set the AUTOSWAP_HCLOG initialization parameter to YES and ensure that both HCLOG1 and HCLOG2 DDnames are specified.

The logs swap automatically when full or when the #SC GLOBAL,SWAPLOG command is issued. In both cases, message EMCMN67I is issued to indicate the swap has occurred.

Swapping logs manually

SRDF Host Component writes to the current log until the #SC GLOBAL,SWAPLOG command is issued, at which time, commands are logged to the alternative log.

When a log is full, SRDF Host Component suspends command logging and issues message EMCMN75W. After the logs are swapped with the #SC GLOBAL,SWAPLOG command, SRDF Host Component resumes command logging to the alternative log and issues message EMCMNDBI.
CHAPTER 3
Configuration

This chapter covers the following topics:

◆ Creating configuration file ................................................................. 58
◆ Using defined groups ........................................................................ 59
◆ Initialization parameters .................................................................... 70
Creating configuration file

Before using SRDF Host Component, you need to create a configuration file.

1. Create a file containing customized initialization parameter settings.
2. Save the configuration file as a member of a parameter library.

   This parameter library member is identified to SRDF Host Component by the RDFPARM DD statement of the EMCRDF procedure. A sample configuration file is located in the SAMPLIB member RDFCFG0.

Specifying initialization parameters

Specify the SRDF Host Component initialization parameters as a series of parameter specifications in the following format:

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

- The keyword must begin in column 1.

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

- The first specification must be SUBSYSTEM_NAME. You can specify all other parameters (except the SRDF group parameters, which are order-dependent) in any order.

- Each individual parameter specification must begin on a separate line in the parameter file. However, you may continue parameter statements across multiple input lines. All leading blanks are honored. To continue a parameter statement, place a hyphen (-) as the last non-blank character on the line you want to continue. The second line is appended to the original line at the column where the hyphen was located. The character that is in column 1 on the second line overlays the hyphen. (This applies to a blank character as well.)

For example:

```
SUBSYSTEM_NAME=RA-H3
```

Results in SUBSYSTEM_NAME=RAH3 being processed.
Using defined groups

SRDF Host Component enables you to define groups of PowerMax/VMAX devices or systems, and then issue commands against these groups. To specify these defined groups, use initialization parameters that begin with 'GROUP_', 'EXCLUDE_', or 'INCLUDE_'. You can then use these defined groups in SRDF Host Component query (SQ) and configuration (SC) commands by using the 'G' keyword parameter.

Note: SRDF Host Component also supports SCF group syntax implemented through the SCF Group Name Service (GNS). To specify the use of GNS groups in SRDF Host Component commands, use the 'SCFG' keyword parameter. The ResourcePak Base for z/OS Product Guide describes the Group Name Service and SCF groups.

Defined groups can be used in the query commands #SQ ADC, #SQ CNFG, #SQ DSTAT, #SQ EPVOL, #SQ FAVOL, #SQ LINK, #SQ MIRROR, #SQ RDFGRP, #SQ SRDFA, #SQ SRDFA_DSE, #SQ SRDFA_VOL, #SQ SRDFA_WP_VOL, #SQ STATE, and #SQ VOL, and the configuration commands #SC CNFG and #SC VOL.

There are two types of defined groups:

PowerMax/VMAX device-defined groups—Definitions are performed based on PowerMax/VMAX device number.

z/OS device-defined groups—Definitions are performed based on the z/OS device number. A z/OS device-defined group requires the use of filters on group level query displays to limit the display to a storage system level attribute.

General group definition rules

The following rules apply to both PowerMax/VMAX device-defined groups and z/OS device-defined groups:

- You cannot mix PowerMax/VMAX device-defined groups and z/OS device-defined 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 EXCLUDEDEVICE_RANGE initialization statement, the device is excluded from the group definition.
PowerMax/VMAX device-defined group rules

The following rules apply to PowerMax/VMAX device-defined groups:

- 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 WTO Rs 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 storage system that is being referenced.

- PowerMax/VMAX device-defined groups include by SRDF group number and exclude by PowerMax/VMAX device number.

- PowerMax/VMAX device-defined groups must use the GROUP_NAME and GROUP_END statements. VMAX device-defined groups may use the INCLUDE_RAG, EXCLUDE_SYM, FILTER_R1, and FILTER_R2 statements.

- PowerMax/VMAX device-defined 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 PowerMax/VMAX device-defined group.

- PowerMax/VMAX device-defined groups include only SRDF devices, both R1 and or R2 devices.

- PowerMax/VMAX device-defined groups may use GROUP_SORT_BY_VOLSER and GROUP_SORT_BY_MVSCUU.

PowerMax/VMAX device-defined group examples

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

Example 1

GROUP_NAME=RAGRP00_98BOX
INCLUDE_RAG=9820,(00)
GROUP_END

#SQ VOL,G(RAGRP00_98BOX)

EMCQV001 SRDF-HC DISPLAY FOR (1) #SQ VOL,G(RAGRP00_98BOX)
SERIAL #:001903-0344/ MICROCODE LEVEL:5773-104
DV_ADDR | _SYM_ | TOTAL | DCB | CNTLUNIT | R1 | R2 | SY
SYS CH | DEV | RDEV | GP | VOLSER | CYLS | STAT | OPN | STATUS | MR | INVTRK | INVTRK | %
???? ?? 0008 0008 00 OFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 0009 0009 00 OFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 000A 000A 00 OFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 000B 000B 00 OFLINE 1113 N/A 0 R/O L2 0 0 **
???? ?? 0010 0010 00 OFLINE 1113 N/A 0 R/W-SY L1 0 0 **
???? ?? 0011 0011 00 OFLINE 1113 N/A 0 R/W-SY L1 0 0 **
???? ?? 0012 0012 00 OFLINE 1113 N/A 0 R/W-SY L1 0 0 **
???? ?? 0013 0013 00 OFLINE 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 **
### Example 2

```plaintext
GROUP_NAME=RAGRP00_98BOX_W02A2B
INCLUDE_RAG=9820,(00)
EXCLUDE_SYM=9820,(002A-002B)
GROUP_END
```

```
#SQ_VOL,G(RAGRP00_98BOX_W02A2B),
```

```
EMCQV01 SRDF-HC DISPLAY FOR (2) #SQ_VOL,G(RAGRP00_98BOX_W02A2B)
SERIAL #:001903-00344/ MICROCODE LEVEL:5773-104
```

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```
END OF DISPLAY
```
**Example 3**

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

#SQ VOL,G(RAGRP00_98BOX_R1)

EMCQV00I  SRDF-HC DISPLAY FOR (4) #SQ VOL,G(RAGRP00_98BOX_R1)
SERIAL #:0001903-00344/  MICROCODE LEVEL:5773-104

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END OF DISPLAY

**Example 4**

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

#SQ VOL,G(RAGRP00_98BOX_R2)

EMCQV00I  SRDF-HC DISPLAY FOR (5) #SQ VOL,G(RAGRP00_98BOX_R2)
SERIAL #:0001903-00344/  MICROCODE LEVEL:5773-104

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END OF DISPLAY
### Example 5

GROUP_NAME=KCH1

INCLUDE_RAG=LCL(6C00, 3F)

INCLUDE_RAG=LCL(A320, 05)

GROUP_END

#SQ VOL,G(KCH1)

EMCQV00I SRDF-HC DISPLAY FOR (1) #SQ_VOL,G(KCH1)

SERIAL #:0001903-00346/ MICROCODE LEVEL:5773-161

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END OF DISPLAY

### Example 6

GROUP_NAME=KCH2

INCLUDE_RAG=RMT(6C00, 3F, 05)

INCLUDE_RAG=RMT(A320, 05, 3F)

GROUP_END

#SQ VOL,G(KCH2)

EMCQV00I SRDF-HC DISPLAY FOR (2) #SQ_VOL,G(KCH2)

SERIAL #:0001903-00353/ MICROCODE LEVEL:5773-163

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END OF DISPLAY
### Example 7

**GROUP_NAME=KCH3**

**INCLUDE_RAG=RMT(6C00,3F,05)**

**GROUP_END**

### #SQ VOL,G(KCH3)

EMCQV001 SRDF-HC DISPLAY FOR (3) #SQ VOL,G(KCH3)

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END OF DISPLAY
z/OS device-defined group rules

The following rules apply to z/OS device-defined groups:

- z/OS device-defined groups include and exclude by z/OS CUU or VOLSER.
- z/OS device-defined groups must use the GROUP_NAME and GROUP_END statements. z/OS device-defined groups may use the INCLUDE_CUU, INCLUDE_VOL, EXCLUDE_CUU, EXCLUDE_VOL, FILTER_R1, FILTER_R2, FILTER_ONLINE, and, FILTERKNOWN statements.
- z/OS device-defined 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 z/OS device-defined groups.
- Some offline devices can be included into a z/OS device-defined group if the FILTERKNOWN statement is used. FILTERKNOWN includes devices known to the SRDF Host Component.
- Any device type (R1, R2, BCV, DR, and STD devices) can be included in a z/OS device-defined group.
- z/OS device-defined groups may use GROUP_SORT_BY_MVSCUU and GROUP_SORT_BY_VOLSER.

z/OS device-defined group examples

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

Example 1

GROUP_NAME=ALL
FILTERKNOWN
INCLUDE_CUU=9820-983F
INCLUDE_CUU=A020-A03F
GROUP_END

#SQ VOL,G(ALL)

EMCQV001 SRDF-HC DISPLAY FOR (2) #SQ VOL,G(ALL)
SERIAL #:0001903-00344/ MICROCODE LEVEL:5773-104
DV_ADDR|_SYM_|TOTAL|SYST|DCB|CUNIT|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 002B 00 UGG02B 1113 ONPV 0 R/O L2 0 0 **
9829 29 0029 002B 00 UGG029 1113 ONPV 0 R/O L2 0 0 **
982A 2A 002A 002B 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 **
### Example 2

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

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**END OF DISPLAY**

**Example 2**

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

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**Configuration**

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**END OF DISPLAY**
Example 3

GROUP_NAME=ALL_R2
FILTER_R2
INCLUDE_CUU=9820-983F
INCLUDE_CUU=A020-A03F

GROUP_END

#SQ VOL,G(ALL_R2)

Example 4

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

GROUP_END

#SQ VOL,G(ALL_ONLINE_RDF)
**Example 5**

```plaintext
GROUP_NAME=ALL_ONLINE_WO_UGH
INCLUDE_CUU=9820-983F,A020-A03F
EXCLUDE_VOL=UGH*
GROUP_END
```

```plaintext
#SQ VOL,G(ALL_ONLINE_WO_UGH)
```

```plaintext
EMCQV00I SRDF-HC DISPLAY FOR (6) #SQ VOL,G(ALL_ONLINE_WO_UGH)
SERIAL #:0001903-00344/6 MICROCODE LEVEL:5773-104
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
```

```plaintext
EMCQV00I SRDF-HC DISPLAY FOR (6) #SQ VOL,G(ALL_ONLINE_WO_UGH)
SERIAL #:0001903-00353/6 MICROCODE LEVEL:5773-163
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 6**

```plaintext
GROUP_NAME=ALL_ONLINE_UGG
INCLUDE_VOL=UGG*
GROUP_END
```

```plaintext
#SQ VOL,G(ALL_ONLINE_UGG)
```

```plaintext
EMCQV00I SRDF-HC DISPLAY FOR (7) #SQ VOL,G(ALL_ONLINE_UGG)
SERIAL #:0001903-00344/6 MICROCODE LEVEL:5773-104
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
```
### SQ VOL,G(ALL_ONLINE_UGG)

EMCQV001 SRDF-HC DISPLAY FOR (7) #SQ VOL,G(ALL_ONLINE_UGG)

SERIAL #:0001903-00353/ MICROCODE LEVEL:5773-163

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<td>003D</td>
<td>UGG03D</td>
<td>1113</td>
<td>ONPV</td>
<td>0 R/W</td>
<td>BC</td>
<td></td>
</tr>
<tr>
<td>A03E</td>
<td>3E</td>
<td>003E</td>
<td>UGG03E</td>
<td>1113</td>
<td>ONPV</td>
<td>0 R/W</td>
<td>BC</td>
<td></td>
</tr>
<tr>
<td>A03F</td>
<td>3F</td>
<td>003F</td>
<td>UGG03F</td>
<td>1113</td>
<td>ONPV</td>
<td>0 R/W</td>
<td>BC</td>
<td></td>
</tr>
</tbody>
</table>

END OF DISPLAY
## Initialization parameters

Table 3 lists the initialization parameters associated with SRDF Host Component.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Required/Optional</th>
<th>Default setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALIAS</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>ALLOW_CRPAIR_NOCOPY</td>
<td>Optional</td>
<td>NO</td>
</tr>
<tr>
<td>AUTOSWAP_HCLOG</td>
<td>Optional</td>
<td>NO</td>
</tr>
<tr>
<td>COMMAND_DETAILS</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>COMMAND_PREFIX</td>
<td>Required</td>
<td>N/A</td>
</tr>
<tr>
<td>DISCOVER_CAS_QRY</td>
<td>Optional</td>
<td>YES</td>
</tr>
<tr>
<td>DISPLAY_MODE</td>
<td>Optional</td>
<td>4BYTE_ON</td>
</tr>
<tr>
<td>EXCLUDE_CUU</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>EXCLUDEDEVICE_RANGE</td>
<td>Optional</td>
<td>No devices are excluded</td>
</tr>
<tr>
<td>EXCLUDE_SYM</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>EXCLUDE_VOL</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>FBA_ENABLE</td>
<td>Optional</td>
<td>NO</td>
</tr>
<tr>
<td>FILTER_KNOWN</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>FILTER_ONLINE</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>FILTER_R1</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>FILTER_R2</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>GROUP_END</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>GROUP_NAME</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>GROUP_SORT_BY_VOLSER</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>GROUP_SORT_BY_MVSCUU</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>HCLOG</td>
<td>Optional</td>
<td>COMMANDS</td>
</tr>
<tr>
<td>INCLUDE_CUU</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>INCLUDE_RAG</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>INCLUDE_VOL</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>INIT_VOLSER</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>LOGONLY_FOR_TRACKED_COMMANDS</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>MAX_COMMANDQ</td>
<td>Optional</td>
<td>500</td>
</tr>
<tr>
<td>MAX_QUERY</td>
<td>Optional</td>
<td>512</td>
</tr>
<tr>
<td>MAX_TRACK_CMDS</td>
<td>Optional</td>
<td>1024</td>
</tr>
<tr>
<td>MESSAGE_EMC9998W</td>
<td>Optional</td>
<td>YES</td>
</tr>
<tr>
<td>Parameter</td>
<td>Required/Optional</td>
<td>Default setting</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>-------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>MESSAGE_LABELS</td>
<td>Optional</td>
<td>NONE</td>
</tr>
<tr>
<td>MESSAGE_PROCESSING</td>
<td>Required</td>
<td>N/A</td>
</tr>
<tr>
<td>MSC_ACTIVATE_MS</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>MSC_ALLOW_INCONSISTENT</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>MSC_CYCLE_TARGET</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>MSC_GROUP_END</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>MSC_GROUP_NAME</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>MSC_INCLUDE_SESSION</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>MSC_MAX_SESSIONS</td>
<td>Optional</td>
<td>24</td>
</tr>
<tr>
<td>MSC_SESSION_LIMIT</td>
<td>Optional</td>
<td>The value of MSC_MAX_SESSIONS</td>
</tr>
<tr>
<td>MSC_SQAR</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>MSC_STAR</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>MSC_TAKEOVER_THRESHOLD</td>
<td>Optional</td>
<td>32</td>
</tr>
<tr>
<td>MSC_VALIDATION</td>
<td>Optional</td>
<td>WARN</td>
</tr>
<tr>
<td>MSC_WEIGHT_FACTOR</td>
<td>Optional</td>
<td>0</td>
</tr>
<tr>
<td>OPERATOR_VERIFY</td>
<td>Optional</td>
<td>ALL</td>
</tr>
<tr>
<td>REGISTER_COMMAND_PREFIX</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>SAF_CLASS</td>
<td>Optional</td>
<td>DATASET</td>
</tr>
<tr>
<td>SAF_PROFILE</td>
<td>Optional</td>
<td>EMC.VALIDATE.ACCESS</td>
</tr>
<tr>
<td>SECURITY_CONFIG</td>
<td>Required</td>
<td>N/A</td>
</tr>
<tr>
<td>SECURITY_QUERY</td>
<td>Required</td>
<td>N/A</td>
</tr>
<tr>
<td>SHOW_COMMAND_SEQ#</td>
<td>Optional</td>
<td>NO</td>
</tr>
<tr>
<td>SINGLE_CONCURRENT</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>SMFREC</td>
<td>Optional</td>
<td>SMF option is not active</td>
</tr>
<tr>
<td>SORT_BY_COMMAND</td>
<td>Optional</td>
<td>PowerMax/VMAX device number</td>
</tr>
<tr>
<td>SORT_BY_MVSCUU</td>
<td>Optional</td>
<td>PowerMax/VMAX device number</td>
</tr>
<tr>
<td>SORT_BY_VOLSER</td>
<td>Optional</td>
<td>PowerMax/VMAX device number</td>
</tr>
<tr>
<td>SRDFA_AUTO_RECOVER</td>
<td>Optional</td>
<td>NO</td>
</tr>
<tr>
<td>SRDFA_AUTO_RECOVER_BCV</td>
<td>Optional</td>
<td>ESTablish for startup_option, NONE for post_recovery_option</td>
</tr>
<tr>
<td>SRDFA_AUTO_RECOVER_ITRK</td>
<td>Optional</td>
<td>30</td>
</tr>
</tbody>
</table>
ALIAS

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 part of a command preceded and followed by one of these characters: a blank, open parenthesis, close parenthesis, or comma.

**Note:** The SRDF SAMPLIB library member RDFALIAS contains a set of alias assignments using the ALIAS initialization parameter.

An alias must be unique, and must not be the same as any SRDF Host Component command or action name. For example, VOL cannot be an alias because it is an existing command. You can assign multiple aliases to the same command parameter.

**Note:** Do not assign "C", "P", and "T" as aliases, since these assignments would conflict with possible values of the command queuing option described in “queue-option” on page 131.

**Syntax**

\[
\text{ALIAS=srdf-hc-command-portion, alias-name}
\]

Where:

- **alias-name**
  - The alias you want to assign.
- **srdf-hc-command-portion**
  - The portion of the command to which you want to assign an alias.

**Table 3** Initialization parameters (page 3 of 3)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Required/Optional</th>
<th>Default setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRDFA_AUTO_RECOVER_MINDIR</td>
<td>Optional</td>
<td>1</td>
</tr>
<tr>
<td>SRDFA_AUTO_RECOVER_PROC</td>
<td>Optional</td>
<td>EMCRCVRY</td>
</tr>
<tr>
<td>SUBSYSTEM_NAME</td>
<td>Required</td>
<td>N/A</td>
</tr>
<tr>
<td>SYNCH_DIRECTION_ALLOWED</td>
<td>Optional</td>
<td>R1&gt;R2</td>
</tr>
<tr>
<td>SYNCH_DIRECTION_INIT</td>
<td>Optional</td>
<td>NONE</td>
</tr>
<tr>
<td>USER_VERIFICATION</td>
<td>Optional</td>
<td>NO</td>
</tr>
<tr>
<td>USER_VERIFICATION_TIMEOUT</td>
<td>Optional</td>
<td>(5,0)</td>
</tr>
<tr>
<td>VONOFF_BLOCKED</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>VONOFF_OFF_ONLY</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>VONOFF_ON_ONLY</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>VONOFF_R1_ONLY</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>VONOFF_R2_ONLY</td>
<td>Optional</td>
<td>N/A</td>
</tr>
<tr>
<td>VONOFF_STATUS_WAIT</td>
<td>Optional</td>
<td>30</td>
</tr>
</tbody>
</table>
Examples

ALIAS=GLOBAL,G
ALIAS=SSID_REFRESH,S

- If ALIAS is set to the following:
  'VOL,LCL(9800,02),CREATEPAIR(KEEPR1,SYNC,RDY,LCLISR2)',CPR

  The #SC CPR,02-03,00 command expands to:
  #SC VOL,LCL(9800,02),CREATEPAIR(KEEPR1,SYNC,RDY,LCLISR2),02-03,00

- If ALIAS is set to the following:
  '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:
  'SQ VOL,G(GROUP_ONE)',CMD1

  The #CMD1 command expands to:
  #SQ VOL,G(GROUP_ONE)

ALLOW_CRPAIR_NOCOPY

The ALLOW_CRPAIR_NOCOPY parameter specifies whether the NOCOPY option is allowed with the #SC VOL CREATEPAIR action.

Syntax

ALLOW_CRPAIR_NOCOPY=NO | YES | STAR

Where:

NO
  Indicates NOCOPY is not allowed for any CREATEPAIR action. This is the default setting.

STAR
  Indicates NOCOPY is only allowed for CREATEPAIR actions to an SRDF/Star group.

YES
  Indicates NOCOPY is allowed for all CREATEPAIR actions.

Example

ALLOW_CRPAIR_NOCOPY=STAR
AUTOSWAP_HCLOG

Determines whether to swap (YES) or not (NO, default) the SRDF Host Component logs automatically when the currently used log file is full.

Note: “Implementing command logging” on page 54 describes SRDF Host Component logs.

Syntax

AUTOSWAP_HCLOG=YES | NO

COMMAND_DETAILS

Use the COMMAND_DETAILS initialization parameter with the #SC VOL command to cause informational messages EMCGM41I through EMCGM43I and EMCGM47I through EMCGM4AI to be issued.

The effect of the COMMAND_DETAILS initialization parameter may be overridden for individual commands as follows. When COMMAND_DETAILS is in effect, the NODETAIL option may be used to suppress device list detail messages for the entered command only. When COMMAND_DETAILS is not in effect, the DETAIL option may be used to generate device list detail messages for the entered command only.

Syntax

COMMAND_DETAILS

COMMAND_PREFIX

The required COMMAND_PREFIX parameter indicates the prefix for all SRDF Host Component commands. This command prefix should be unique to SRDF Host Component.

The specified command prefix can be registered with the sysplex by appending 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 an initial substring of an existing registered command prefix. Also, z/OS does not allow you to register a command prefix if an existing registered command prefix matches an initial substring of the command prefix you are trying to register. Any attempt to do so results in an error message and an initialization failure.

Selecting command prefix characters

Be careful when selecting characters for the command prefix.

◆ Choose characters that do not conflict with characters used in forming z/OS commands or with prefixes assigned to other subsystems.
- A command prefix which starts with a numeric value (0-9) is rejected as a valid prefix.
- The hyphen (-) is treated as a continuation character.
- The asterisk (*) works as expected when issued on the z/OS console. However, when it is used in a batch environment, the * is treated as a comment.
- Other characters which also are acceptable for z/OS console commands could cause unpredictable results in batch environments. For example, '/*' (forward slash and asterisk) is a valid command character for SRDF Host Component, but causes a JCL error in batch.

**Preceding COMMAND_PREFIX by REGISTER_COMMAND_PREFIX**

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 COMMAND_PREFIX 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.

**Syntax**

```COMMAND_PREFIX=prefix```

Where:

- **prefix**

  Is the one to eight-character command prefix you want to use for this SRDF Host Component subsystem.

**Example**

```
COMMAND_PREFIX=#
```
DISCOVER_CAS_QRY

Determines whether the discovery of remote cascaded storage systems takes place for the #SQ RDFGRP, #SQ SRDFA, and #SQ SRDFA_DSE commands.

The #SQ RDFGRP, #SQ SRDFA, and #SQ SRDFA_DSE commands carry out a discovery to see whether any of the remote storage systems are cascaded. This discovery can take a long time, causing a delay between the headings for the command output and the output details. In extreme cases, it can also cause a WTO timeout.

If you do not specify DISCOVER_CAS_QRY, its value defaults to YES.

The DISCOVER_CAS_QRY value can be overridden for a specific #SQ RDFGRP, #SQ SRDFA, or #SQ SRDFA_DSE command by specifying the CAS or NOCAS option on the command.

If DISCOVER_CAS_QRY=NO or NOCAS option is specified, the group is marked with “-?” (unknown) in the command output.

Syntax

DISCOVER_CAS_QRY=YES | NO

Where:

NO

Omits the attempt to discover remote cascaded storage systems. Use this value if the environment does not have a cascaded configuration, or you want to preserve the performance of the commands.

YES

(Defualt) Enables the attempted discovery of remote cascaded storage systems.

Example

DISCOVER_CAS_QRY=NO
DISPLAY_MODE

Command outputs can display 4-byte hexadecimal PowerMax/VMAX device numbers (values greater than x'FFFF'). This optional parameter specifies if 4-byte device number displays are enabled. The default setting is 4BYTE_ON.

You can overwrite this parameter setting by issuing the #SC GLOBAL command with the 4BYTE_ON or 4BYTE_OFF action.

Syntax

DISPLAY_MODE=4BYTE_ON | 4BYTE_OFF

Where:

4BYTE_OFF

Limits the device number display to 2 bytes. Note that if a device number greater than x'FFFF' is selected, an EMCQV9EW warning message indicates that the device field has been truncated.

4BYTE_ON

(Default) Enables the display of 4-byte device numbers in command output. This is the default setting.

Example

◆ With DISPLAY_MODE=4BYTE_ON, the display is similar to the following:

EMCMN001 SRDF-HC : (105) #SQ STATE,LCL(8A00,0C),2,3AA
EMCQV35I SRDF-HC DISPLAY FOR (105) #SQ STATE,LCL(8A00,0C),2,3AA
SERIAL #:0001926-04123/0HNXW MICROCODE LEVEL:5876-300

------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
CUU |LCL DEV |VOLSER|SYS |W |S |A |L |R |T |I |D |A |N |C|--|LCL INV|---------
--------------------|STAT|R N D|N N G|T|O|C /|X |M |R 1 |R 2 |S Y
LGRP|RMT DEV |RGRP  |    |T C|C|R|R|T|A|M|R |T |R |INVTRK|INVTRK |%
--------------------
???? 0003AA UTC3AA N/A W . . . . . . . . . . PL
OC  000154  16 . SY. . . T . . . . . . R1  0  0 **
???? 0003AB UTC3AB N/A W . . . . . . . . . . PL
OC  000155  16 . SY. . . T . . . . . . R1  0  0 **
END OF DISPLAY
Total devices displayed = 2

◆ With DISPLAY_MODE=4BYTE_OFF, the display is similar to the following:

EMCMN001 SRDF-HC : (107) #SQ STATE,LCL(8A00,0C),2,3AA
EMCQV01I SRDF-HC DISPLAY FOR (107) #SQ STATE,LCL(8A00,0C),2,3AA 114
SERIAL #:0001926-04123/0HNXW MICROCODE LEVEL:5876-300

DVA | _SYM_ | SY S | W |S |A |L |R |T |I |D |A |N |C | MR |INVTRK |INVTRK |%
SY S |DEV |RDEV | GP |VOLSER|STAT |R |N |D |N |N |G |T|O|C /|X |MR |INVTRK |INVTRK |%
--------------------|T C|C|R|R|T|A|M|R |T |R |INVTRK |INVTRK |%
???? 03AA 0154  0C UTC3AA N/A W SY. . . T . . . . . L1  0  0 **
???? 03AB 0155  0C UTC3AB N/A W SY. . . T . . . . . L1  0  0 **
END OF DISPLAY
Total devices displayed = 2
EXCLUDE_CUU

Use the EXCLUDE_CUU initialization parameter when defining a defined group. EXCLUDE_CUU allows you to exclude a list of devices from the defined group that would otherwise be included. You can use this statement parameter only after the GROUP_NAME parameter. EXCLUDE_CUU is valid only for z/OS device-defined groups.

Note: “Using defined groups” on page 59 describes creation of defined groups and provides examples.

Syntax

EXCLUDE_CUU=aaaa
EXCLUDE_CUU=bbbb,cccc,dddd
EXCLUDE_CUU=eeee-ffff,gggg-hhhh

Where:

aaaa
   A z/OS device number to be excluded from the group definition.

bbbb,cccc,dddd
   A comma-separated list of z/OS device numbers to be excluded from the group definition.

eeee-ffff,gggg-hhhh
   A comma-separated list of ranges of z/OS device numbers to be excluded from the group definition. Note that ffff must be greater than eeee and hhhh must be greater than gggg.
EXCLUDE_DEVICE_RANGE

The optional EXCLUDE_DEVICE_RANGE parameter statement specifies a z/OS device number, or range of z/OS device numbers, to be excluded from use in commands issued to SRDF Host Component.

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.

IMPORTANT
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 storage system.

Syntax

EXCLUDE_DEVICE_RANGE=scuu[-ecuu]

Where:

ecuu

Specifies the ending z/OS device number of a range of devices to be excluded from SRDF Host Component processing, if different from the starting device number.

If ecuu is omitted, the range consists only of the single device specified by scuu.

scuu

Specifies the starting z/OS device number of the range of devices to be excluded.

Example

To exclude a whole storage system from SRDF Host Component use, you have to include EXCLUDE_DEVICE_RANGE specifications for all device ranges in that storage system. For example:

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

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. Device 420 cannot be used in an SRDF Host Component command, but can still be included in the processing of other commands. That is, the command #SQ VOL,420,ALL would be prohibited. However, the command #SQ VOL,421,ALL would be allowed and would process device 420.
EXCLUDE_SYM

You can use the EXCLUDE_SYM initialization parameter when defining a defined group. EXCLUDE_SYM allows you to exclude a PowerMax/VMAX device or range of PowerMax/VMAX devices residing on a single storage system. You can only use EXCLUDE_SYM after the GROUP_NAME parameter. EXCLUDE_SYM is valid only for PowerMax/VMAX device-defined groups.

Specifying EXCLUDE statements in a group definition does not exclude devices when you are issuing query (SQ) commands unless you issue the query command with the "G(groupname)" syntax.

For example, for the command #SQ VOL,7A2D,RA(1A), no devices excluded in a group definition are excluded from the display. However, the command #SQ VOL,G(RMTRAG1) does exclude those devices from the display.

Syntax

EXCLUDE_SYM= cuu, (symdv#)

EXCLUDE_SYM= cuu, (lowsymdv#-highsymdv#)

EXCLUDE_SYM=RMT(cuu, srdfgrp), (lowsymdv#-highsymdv#)

Where:

`cuu, (symdv#)`

`cuu` is the z/OS device number of a device residing on the storage system on which the PowerMax/VMAX device number `symdv#` to be excluded from the group definition is located.

`cuu, (lowsymdv#-highsymdv#)`

`cuu` is the z/OS device number of a device residing on the storage system on which the PowerMax/VMAX device number range `lowsymdv#-highsymdv#` to be excluded from the group definition is located. For this format, `highsymdv#` must be greater than `lowsymdv#`.

`RMT(cuu, srdfgrp), (lowsymdv#-highsymdv#)`

`cuu` is the z/OS device number of a device residing on the local storage system, `srdfgrp` is an SRDF group on the local storage system whose partner SRDF group resides on the remote storage system, and `lowsymdv#-highsymdv#` identifies the PowerMax/VMAX device numbers on the remote storage system that are to be excluded from the group definition. Note that `highsymdv#` must be greater than `lowsymdv#`.

**Note:** If the EXCLUDE_SYM statement specifies RMT to indicate a remote storage system, the INCLUDE statements must also specify RMT.
EXCLUDE_VOL

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 z/OS device-defined groups.

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

Note: Only online volumes may be excluded with an EXCLUDE_VOL statement.

Using volser masks

When you use EXCLUDE_VOL, SRDF Host Component permits the use of patterns. For example:

◆ EXCLUDE_VOL=e*
  Where e* excludes all online mainframe volumes whose VOLSERs begin with the character e.

◆ EXCLUDE_VOL=fghij*
  Where fghij* excludes all online mainframe volumes whose VOLSERs begin with the characters fghij.

The following rules apply when using patterns:

◆ At least one significant character must be used; a pattern consisting of only of a single asterisk is not permitted.

◆ The only pattern character is an asterisk (*) and it can be used for any number of characters.

◆ An asterisk (*) is always an ending character.

◆ In order for the pattern to match, the device with the VOLSER 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.

Note: “Using defined groups” on page 59 provides more information.

Syntax

EXCLUDE_VOL=volser[,volser...]  
Where:

volser

A mainframe volume serial or pattern of volume serials of devices to be excluded from the group definition.
FBA_ENABLE

The optional FBA_ENABLE initialization parameter specifies whether 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.

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

Syntax

FBA_ENABLE=YES | NO

Where:

NO

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

YES

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

Example

FBA_ENABLE=YES

FILTER_KNOW

You can use the FILTER_KNOW initialization parameter when defining a Defined Group. You can only use FILTER_KNOW after the GROUP_NAME initialization parameter. FILTER_KNOW is an initialization parameter that, when used with an z/OS device-defined group, includes both online and offline devices known to SRDF Host Component.

A device is known to SRDF Host Component when it has been online or has been found while SRDF Host Component has been running. No keyword value is used with this initialization parameter.

Note: If the INCLUDE_VOL statement is used for group definition, then the FILTER_KNOW parameter is not applicable. "Using defined groups" on page 59 provides more information.

Syntax

FILTER_KNOW
FILTER_ONLINE

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 z/OS device-defined group, includes only online devices known to SRDF Host Component. No keyword value is used with this initialization parameter.

Note: “Using defined groups” on page 59 provides more information.

Syntax

FILTER_ONLINE

FILTER_R1

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 includes only R1(R11,R21) 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(R11,R21) 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 PowerMax/VMAX device-defined groups and z/OS device-defined groups.

Note: “Using defined groups” on page 59 provides more information.

Syntax

FILTER_R1

FILTER_R2

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 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 PowerMax/VMAX device-defined groups and z/OS device-defined groups.

Note: “Using defined groups” on page 59 provides more information.

Syntax

FILTER_R2
**GROUP_END**

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 required to complete the group definition. GROUP_END is valid for both PowerMax/VMAX device-defined groups and z/OS device-defined groups.

*Note:* “Using defined groups” on page 59 provides more information.

**Syntax**

GROUP_END

**GROUP_NAME**

Use the GROUP_NAME initialization parameter when defining a Defined Group. GROUP_NAME is required to start the definition of a group.

The group name you specify can be from 1 through 24 alphanumeric or national characters. The group name is delimited by the first blank encountered, and can therefore contain no embedded blanks. The GROUP_NAME parameter is valid for both PowerMax/VMAX device-defined groups and z/OS device-defined groups.

Both local and remote groups may be defined. Local and remote groups can be defined to operate upon only a single mirror of a concurrent SRDF relationship using the remote (RMT) form. If a Defined Group name is the same as a SMS Group name, the Defined Group is used for that name.

*Note:* “Using defined groups” on page 59 provides more information.

**Syntax**

GROUP_NAME=value

*Where:*

value

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

**Example**

GROUP_NAME=BOSTON1

**GROUP_SORT_BY_VOLSER**

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.

**Syntax**

GROUP_SORT_BY_VOLSER
GROUP_SORT_BY_MVSCUU

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.

Syntax

GROUP_SORT_BY_MVSCUU

HCLOG

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

Note: HCLOG is only effective if one or more HCLOGn DD statements are included in
the initialization JCL, as described in “Implementing command logging” on page 54.

Syntax

HCLOG=COMMANDS | ALL

Where:

ALL

Both commands and responses are to be logged.

COMMANDS

(Default) Only the commands are to be logged.

Example

HCLOG=ALL
INCLUDE_CUU

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 z/OS device numbers. INCLUDE_CUU is only valid for z/OS device-defined groups.

Note: “Using defined groups” on page 59 provides more information.

Syntax

INCLUDE_CUU=aaaa
INCLUDE_CUU=bbbb,cccc,dddd
INCLUDE_CUU=eeee-ffff,gggg-hhhh

Where:

aaaa
A z/OS device number to be included in the group definition.

bbbb,cccc,dddd
A comma-separated list of z/OS device numbers to be included in the group definition.

eeee-ffff,gggg-hhhh
A comma-separated list of ranges of z/OS device numbers to be included in the group definition. Note that ffff must be greater than eeee and hhhh must be greater than gggg.

Example

INCLUDE_CUU=9820-983F
**INCLUDE_RAG**

You can use the INCLUDE_RAG initialization parameter when defining a Defined Group. You can only use INCLUDE_RAG after the GROUP_NAME parameter. Use the INCLUDE_RAG parameter to include an entire SRDF group from a local or remote Dell EMC controller. INCLUDE_RAG is only valid for PowerMax/VMAX device-defined groups.

**Note:** "Using defined groups" on page 59 provides more information.

**Syntax**

```
INCLUDE_RAG= cuu, (srdfgrp)
INCLUDE_RAG= LCL (cuu, srdfgrp)
INCLUDE_RAG= RMT (cuu, hoplist), RA (srdfgrp)
```

Where:

- **cuu**
  Indicates the z/OS device number of the gatekeeper device in the control unit.

- **hoplist**
  Specifies the SRDF group number used to identify the remote storage system. For multihop remote configurations, *hoplist* can be a single SRDF group number or a list of up to four hops, separated by periods.

- **srdfgrp**
  Indicates the storage system SRDF group to be included.

**Example**

The following example defines a group consisting of devices in RA group 1C on the remote storage system accessed using gatekeeper 1870 and local RA group 1A.

```
GROUP_NAME=RMTRAG1
INCLUDE_RAG=RMT(1870, 1A), RA(1C)
GROUP_END
```
INCLUDE_VOL

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 z/OS device-defined groups.

INCLUDE_VOL is a dynamic include statement. The z/OS device number of the device to be included is obtained at the time the command is issued. The z/OS 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/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.

**Note:** “Using defined groups” on page 59 provides more information.

Using volser masks

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, a* matches every online volume serial starting with a).
- The only pattern character is * and it can be used for any number of characters.
- The asterisk (*) is always an ending character.
- 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.
Syntax

INCLUDE_VOL=aaaaaa
INCLUDE_VOL=bbbbbb,cccccc,dddddd

Where:

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

bbbbbb,cccccc,dddddd
A comma-separated list of mainframe volume serial names to be included in the group definition. Note that bbbbbbb, ccccccc, and ddddddd must be online to be included.

Example

INCLUDE_VOL=UGG*

INIT_VOLSER

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.

Syntax

INIT_VOLSER=’init-volser’

Where:

init-volser
Specifies the initial value for the VOLSER.

Example

INIT_VOLSER=’ABCDEF’

LOGONLY_FOR_TRACKED_COMMANDS

If you specify LOGONLY_FOR_TRACKED_COMMANDS, 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 appears in the SRDF Host Component log.

Syntax

LOGONLY_FOR_TRACKED_COMMANDS
**MAX_COMMANDQ**

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.

MAX_COMMANDQ prevents the scheduling of multiple commands on multiple command queues. For example, MAX_COMMANDQ=1 results in the commands being single-threaded on one queue, MAX_COMMANDQ =2 allows two task queues, and so forth.

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

If you omit this parameter, MAX_COMMANDQ defaults to 500.

**Syntax**

```
MAX_COMMANDQ=nnnn
```

Where:

- `nnnn` is a value from 1 through 4096. The default value is 500.

**Example**

```
MAX_COMMANDQ=4096
```

**MAX_QUERY**

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. This parameter affects only the console commands; it does not have any effect on commands issued during batch processing.

Commands that specify a statefilter value are exempt from the maximum MAX_QUERY limit.

If the storage system being displayed has more than 8192 devices, use command syntax specifying the starting PowerMax/VMAX device number.

**For example:** #SQ VOL, cuu, count, startingdev#

Console buffering should be considered when setting MAX_QUERY.

If you omit MAX_QUERY, it defaults to 512.

**Syntax**

```
MAX_QUERY=nnnn
```

Where:

- `nnnn` is a value from 1 through 8192. The default value is 512.

**Example**

```
MAX_QUERY=256
```
**MAX_TRACK_CMDS**

The optional MAX_TRACK_CMDS initialization parameter specifies the number of tracked commands that can be waiting or active in SRDF Host Component at any time.

**Syntax**

```
MAX_TRACK_CMDS=nnnn
```

Where:

```
nnnn
```

Is a value from 512 to 4096. The default value if this parameter is not specified is 1024.

**Example**

```
MAX_TRACK_CMDS=4096
```

**MESSAGE_EMC9998W**

Message EMC9998W is now issued from within the SRDF Host Component address space. This initialization parameter can be used to manage where the EMC9998W message appears.

**Syntax**

```
MESSAGE_EMC9998W=YES | NO | HCLOG
```

Where:

```
HCLOG
```

Enables message processing and sends the EMC9998W message to the HCLOG dataset. There is no WTO, so this option does not provide automation support.

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

**Note:** You must also set HCLOG=ALL to send the EMC9998W messages to the HCLOG dataset. “HCLOG” on page 85 and “Implementing command logging” on page 54 provide more information about the HCLOG dataset.

```
NO
```

Disables EMC9998W message processing. Automation is not supported as there is no WTO issued.

```
YES
```

*(Default)* Enables EMC9998W message processing. The message appears in the syslog, the SRDF Host Component job log, and in the HCLOG dataset. This setting is required to use automation with EMC9998W. This is the default setting.

**Example**

```
MESSAGE_EMC9998W=YES
```
MESSAGE_LABELS

The optional MESSAGE_LABELS initialization parameter specifies whether 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.

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

Syntax

MESSAGE_LABELS=NONE | SYMMETRIX_SERIAL | MVS_CUU | COMMAND_SEQ

Where:

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 which messages are associated with which commands.

Note: It is recommended that you use COMMAND_SEQ for issues that require contacting Dell EMC Customer Support.

MVS_CUU

Specifies the z/OS 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).”

NONE

(Default) Specifies that labels are not attached to messages.

SYMMETRIX_SERIAL

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

Example

MESSAGE_LABELS=SYMMETRIX_SERIAL
**MESSAGE_PROCESSING**

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.

**Syntax**

```
MESSAGE_PROCESSING=YES[, nnn] | LOG[, nnn] | NO
```

Where:

- **LOG[, nnn]**
  - Enables message processing and also sends the EMCQM84I 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. If the message table size is not specified, a default value of 512 is used.
  - The message log is displayed using the `#SQ MSG` command.

  **Note:** “HCLOG” on page 85 and “Implementing command logging” on page 54 provide more information about the HCLOG dataset.

- **NO**
  - Disables message processing.

- **YES[, nnn]**
  - (Default) Enables message processing. Optionally, uses `nnn` as the size of the message table. The value of `nnn` can range from 1 through 512. If the message table size is not specified, a default value of 512 is used.

**Example**

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

**MSC_ACTIVATE_MS**

MSC_ACTIVATE_MS tells Multi-Session Consistency (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.

**Note:** The MSC_ACTIVATE_MS parameter is no longer used and only provides downward compatibility for older environments.

**Syntax**

```
MSC_ACTIVATE_MS
```
MSC_ALLOW_INCONSISTENT

MSC_ALLOW_INCONSISTENT instructs the MSC to allow an SRDF/A group to join MSC, even if the SRDF/A session is inconsistent. This parameter is optional.

**Note:** The default is to not allow an SRDF/A group 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.

Syntax

```
MSC_ALLOW_INCONSISTENT
```

MSC_CYCLE_TARGET

The MSC_CYCLE_TARGET parameter sets the required 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 multiple MSC_CYCLE_TARGET statements in an MSC Group definition, the final statement is used.

The higher the cycle length value, the longer each cycle is and thus the further behind the 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:

- SRDF/A to drop
- The host I/O to be slowed down by the storage system

Syntax

```
MSC_CYCLE_TARGET=cycle_length
```

Where:

`cycle_length`

Is a value from 3 through 1800 seconds. The default value is 30.

Example

```
MSC_CYCLE_TARGET=30
```

MSC_GROUP_END

The MSC_GROUP_END parameter terminates the definition of an SRDF/A multisession 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.

Syntax

```
MSC_GROUP_END
```
MSC_GROUP_NAME

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

MSC allows up to eight MSC groups to be active concurrently. Use the MSC_GROUP_NAME parameter to define up to eight distinct group definitions. Note that if you define multiple MSC groups, none of them automatically starts. You start each group by issuing an #SC GLOBAL PARM_REFRESH, MSCGroup command.

Syntax

MSC_GROUP_NAME=groupname[,STAR-A]

Where:

groupname

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

The name must be unique for each:

- SRDF/A multisession group
- SRDF Host Component group
- SCFG group
- SMS group

Note: 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.

STAR-A

Indicates that the group is an SRDF/Star-A group.

Note: “Asynchronous SRDF/Star (Star-A)” on page 44 describes Asynchronous STAR.

Example

MSC_GROUP_NAME=MSCGROUP1
**MSC_INCLUDE_SESSION**

Use the `MSC_INCLUDE_SESSION` statement to include the SRDF/A group in the SRDF/A multisession group.

The `MSC_INCLUDE_SESSION` statement can only be used after the `MSC_GROUP_NAME` statement and before the `MSC_GROUP_END` statement. Multiple `MSC_INCLUDE_SESSION` parameters can be included in the MSC definition, or one `MSC.Include_SESSION` can incorporate multiple groups.

You must use the GNS format ("Syntax 2—BCV GNS groups" on page 98) of this parameter if a BCV GNS group is required for the SRDF Automated Recovery procedure.

**Syntax 1—MSC and SRDF/Star groups**

Use this syntax for MSC and SRDF/Star (or Star-A) groups.

```plaintext
MSC_INCLUDE_SESSION=ccuu,(nn[,xx)][,(mm)]
[,ITRK=aaaaaa]
[,MINDIR=bb]
[,BCV(startup_option,post_recovery_option)]
[,JOBNAME=jobname]
```

Where:

- **BCV(startup_option,post_recovery_option)**
  - This optional parameter specifies BCV gold copy management options for this session.

**IMPORTANT**

This parameter applies to the jobs submitted to recover the specific MSC group. It does not apply to the initial automated recovery job that is submitted to perform validation and cleanup.

Any BCV option specified in the `MSC_INCLUDE_SESSION` parameter overrides the global values specified by the `SRDFA_AUTO_RECOVER_BCV` parameter.

- **startup_option**
  - Defines the required behavior at the start of the gold copy management routine.
  - Valid states are:
    - **NONE**
      - BCV management is bypassed for this phase.
    - **ESTablish**
      - Results in a new PiT (point-in-time) copy on the BCVs. If a BCV is not attached to an R2, a BCV is established/re-established. If a relationship does not exist, the BCV GNS group (if specified) is used to choose a BCV. If a relationship does not exist and no BCV GNS group is specified, an error message is issued. After all the BCVs are attached, they will be split.
post_recovery_option

Defines the required state of the BCV relationships at the completion of the SRDF/A recovery operation. Valid states are:

NONE

BCV management is bypassed for this phase.

ESTablish

Results in a re-establish of all the BCVs to the R2s.

ccuu

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

JOBNAME=jobname

This optional parameter allows you to specify a jobname override to the SRDF Automated Recovery started task name. The JOBNAME parameter overrides the name of the started task for the group recovery tasks.

IMPORTANT

This parameter applies to the jobs submitted to recover the specific MSC group. It does not apply to the initial automated recovery job that is submitted to perform validation and cleanup.

Any jobname specified here in MSC_INCLUDE_SESSION overrides the JCL recovery procedure name specified by the SRDFA_AUTO_RECOVER_PROC parameter.

ITRK=aaaaaa

This optional parameter indicates the number of outstanding R2 invalid tracks on the R1 that the recovery automation uses as a trigger point for activating SRDF/A for this session, where the value of n is multiplied by 1,000. Allowable values for aaaaaa are 0 through 999999.

IMPORTANT

This parameter applies to the jobs submitted to recover the specific MSC group. It does not apply to the initial automated recovery job that is submitted to perform validation and cleanup.

Any ITRK value specified in the MSC_INCLUDE_SESSION parameter overrides the global value specified by the SRDFA_AUTO_RECOVER_ITRK parameter.

MINDIR=bb

This optional parameter indicates the number of directors that must be online for this session. Allowable values are 1-255.
IMPORTANT
This parameter applies to the jobs submitted to recover the specific MSC group. It does not apply to the initial automated recovery job that is submitted to perform validation and cleanup.

Any MINDIR value specified in the MSC_INCLUDE_SESSION parameter overrides the global value specified by the SRDFA_AUTO_RECOVER_MINDIR parameter.

**mm**
This optional parameter is only used for an SRDF/Star(-A) definition. To use this parameter, you also need to use the MSC_STAR or MSC_STAR-A statement.

- In an SRDF/Star definition, this is the SRDF group that goes from the SRDF/A secondary storage system to the non-SRDF/A secondary storage system that will be used for failover procedures.
- In an SRDF/Star-A definition, this is the SRDF group that goes between each of the SRDF/A secondary sides.
- In the SRDF/SQAR definitions, this is the SRDF/A group that goes from each of the secondary asynchronous sides.

**nn**
Specifies the SRDF group to include in the MSC group.

**xx**
This optional parameter is part of a cascaded SRDF environment, where xx is the SRDF group between site B and site C.

**Syntax 2—BCV GNS groups**
Use this syntax for a BCV GNS group.

**Note:** The ResourcePak Base for z/OS Product Guide provides information about GNS groups.

```
MSC_INCLUDE_SESSION=SCFG(msc_gk_grp, msc_ra_grp, msc_bcv_grp)
```

**Note:** SRDF Host Component does not allow spaces, parentheses, quotes or other special characters in GNS group names.

Where:

**msc_bcv_grp**
Specifies the GNS group containing BCVs to use to preserve a PiT copy as part of the SRDF Automated Recovery function.

**msc_gk_grp**
Specifies the GNS group containing gatekeeper devices for this storage system.

**msc_ra_grp**
Specifies the GNS group containing the SRDF/A groups to be included in this MSC group.
SCFG

Indicates that this a GNS-based MSC definition.

Example

Syntax 1—MSC and SRDF/Star groups

- MSC example:
  
  MSC_INCLUDE_SESSION=A100,(02)

- MSC example with ITRK and MINDIR values specified for the session:
  
  MSC_INCLUDE_SESSION=C400,(03),ITRK=997,MINDIR=01

- SRDF/Star example:
  
  MSC_INCLUDE_SESSION=A100,(02),(05)

- Cascaded SRDF example:
  
  MSC_INCLUDE_SESSION=C120,(63,06)

- Cascaded SRDF/Star example:
  
  MSC_INCLUDE_SESSION=8701,(21,F1),(1F)

Syntax 2—BCV GNS groups

MSC_INCLUDE_SESSION=SCFG(EMCARGK,EMCARMSC1,EMCARBCV1)

In this example:

- GNS group EMCARGK contains a grouping of valid MSC gatekeeper devices (non-SRDF or non-BCV devices that are addressed to the host):
  
  DEFINE GROUP 'EMCARGK' -
  INCLUDE DEVICE SYMM = 000187990175,(166-16F,170-177) -
  INCLUDE DEVICE SYMM = 000190300344,(040,048-04F) -
  INCLUDE DEVICE SYMM = 000190300351,(030-37) -
  INCLUDE DEVICE SYMM = 000190300097,(040,048-04F)

- GNS group EMCARMSC1 contains the GNS group by SRDF group:
  
  DEFINE GROUP 'EMCARMSC1' -
  INCLUDE RDF GROUP = 000187990175,(LCL=01)

- GNS group EMCARBCV1 contains valid BCV devices to pair up with the R2 devices:
  
  DEFINE GROUP 'EMCARBCV1' FOR GCOPYBCV -
  INCLUDE DEVICE SYMM = 000187900699,(A0-AF,B0-BF)

**Note:** If the device size or emulation does not match to the R2 devices, or there are not enough BCVs to match to the R2s, the recovery results in failure. A RAID 10 R2 may be paired with a RAID 5 BCV.
MSC_MAX_SESSIONS

Use this parameter to define the maximum number of MSC sessions for any MSC group. If you include this parameter, specify it before any MSC group statements in the SRDF Host Component configuration file.

Syntax

MSC_MAX_SESSIONS=nn

Where:

nn

Is the maximum number of MSC sessions. This is a number between 1 and 40, with a default value of 24.

Example

MSC_MAX_SESSIONS=30

MSC_SESSION_LIMIT

Use this parameter to define a custom limit to the number of sessions for a specific MSC group. If you include this parameter, specify it between the MSC_GROUP_NAME and MSC_GROUP_END statements in the MSC group definition.

Syntax

MSC_SESSION_LIMIT=nn

Where:

nn

Is the maximum number of sessions for a group. This number can range from 1 to the value of the MSC_MAX_SESSIONS parameter. The default is the value of the MSC_MAX_SESSIONS parameter.

Example

MSC_SESSION_LIMIT=16

MSC_SQAR

This parameter is used only when defining an SRDF/SQAR definition.

When you use MSC_SQAR, you must also use the optional part of the MSC_INCLUDE_SESSION statement. You must use the MSC_SQAR statements after the MSC_GROUP_NAME statement and before the MSC_GROUP_END statement. SRDF/SQAR is configured as two separate MSC groups, defined to the same instance of SCF.

IMPORTANT

Dell EMC GDDR is required to implement SRDF/SQAR functionality.

Syntax

MSC_SQAR=cgrpname,partnersqargrpname
Where:

\( cgrpname \)

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

**Note:** GDDR requires the ConGroup names to be unique for the two SQAR definitions.

\( partner\_sqargrppname \)

The MSC group name of the partner SQAR group.

**Example**

MSC\_GROUP\_NAME=MSCSQAR1,SQAR
MSC\_SQAR=MSCCGRP1,MSCSQAR2
MSC\_INCLUDE\_SESSION=3BBE,(58),(49)
...
MSC\_GROUP\_NAME=MSCSQAR2,SQAR
MSC\_SQAR=MSCCGRP2,MSCSQAR1 MSC\_INCLUDE\_SESSION=38BE,(59),(48)

**MSC\_STAR**

Specifies the consistency group name in an SRDF/Star configuration.

Specify the MSC\_STAR statement after the MSC\_GROUP\_NAME statement and before the MSC\_GROUP\_END statement.

When you use MSC\_STAR, you must also specify the optional \( mm \) parameter on the MSC\_INCLUDE\_SESSION statement.

**Syntax**

MSC\_STAR=\( cgrpname \)

Where:

\( cgrpname \)

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

**Example**

MSC\_STAR=STARCGRP
Configuration

**MSC_STAR-A**

Specifies the name of the partner MSC group in an SRDF/Star-A configuration.

Specify the MSC_STAR-A statement after the MSC_GROUP_NAME statement and before the MSC_GROUP_END statement.

When you use MSC_STAR-A, you must also specify the optional \( mm \) parameter on the MSC_INCLUDE_SESSION statement.

**Syntax**

\[
\text{MSC_STAR-A=} \text{mscgrp}
\]

Where:

- \( \text{mscgrp} \)
  - Is the name of the partner MSC group.

**Example**

\[
\text{MSC_STAR-A=} \text{SRDF_STAR_A}
\]

**MSC_TAKEOVER_THRESHOLD**

This parameter sets the number of cycle switches that must occur before issuing a message that you can respond to with an MSC,TAKEOVER command to initiate the takeover of the primary SRDF/Star MSC function by a secondary MSC server. The takeover operation allows SRDF/Star to operate in High Availability mode, ensuring the continuous operation of SRDF/Star in the event of loss or removal of the primary server, and eliminating MSC (and SCF) as a single point of failure.

Once the threshold cycle switch value has been reached, the secondary MSC server issues message SCF15C8W. This message indicates that the primary MSC server has likely failed and that a takeover of SRDF/Star control should be made by the secondary MSC server. After the SCF15C8W message is issued once, it continues to be issued at the same interval until a takeover is successfully completed (providing the threshold is still met).

**Note:** This parameter requires PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5771 and later.

**Syntax**

\[
\text{MSC_TAKEOVER_THRESHOLD=} \text{nn}
\]

Where:

- \( \text{nn} \)
  - Is the number of consecutive successful cycle switches that must be completed by a secondary server in a High Availability (HA) environment before issuing the SCF15C8W message. The default value is 32. The minimum value is zero and the maximum is 999. A value of zero disables the SCF15C8W takeover notification message. An invalid value results in using the default of 32.

**Example**

\[
\text{MSC_TAKEOVER_THRESHOLD=} \text{16}
\]
**MSC_VALIDATION**

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

Syntax

```
MSC_VALIDATION=WARN | FAIL | NONE
```

Where:

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

- **NONE**
  - Bypasses the protection check.

- **WARN**
  - *(Default)* Issues a warning message if devices are found that fail the protection check. This is the default setting.

**MSC_WEIGHT_FACTOR**

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

- Setting MSC_WEIGHT_FACTOR=0 causes the server to immediately attempt the MSC cycle switch process once all SRDF groups in the MSC group are ready to cycle switch.
  
  In an SRDF/Star configuration, the server running with a weight factor of zero performs the SDDF processing necessary for the differential resynchronization.

- Setting MSC_WEIGHT_FACTOR to a value greater than zero instructs the MSC server to weight the value (in seconds) after all SRDF groups are ready to cycle switch, before attempting to cycle switch.
  
  In an SRDF/Star configuration, the server running with a weight factor greater than zero only attempts to cycle switch. The SDDF processing is not done.

**Single MSC server**

If you are running a single MSC server, set MSC_WEIGHT_FACTOR=0.

**Multiple MSC servers**

If you are running multiple MSC servers for a single MSC group, 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.

If more than one MSC server is running an MSC group, each server has the MSC_WEIGHT_FACTOR. Regardless of the MSC_WEIGHT_FACTOR, all MSC servers running an MSC group verify and attempt to cycle switch. Each MSC server verifies
that all SRDF groups in the MSC group are ready to cycle switch. When all SRDF groups are ready to cycle switch, the MSC servers examine the MSC_WEIGHT_FACTOR.

- If the MSC_WEIGHT_FACTOR=0, the server immediately attempts to do the cycle switch. If more than one MSC server has MSC_WEIGHT_FACTOR=0, each one immediately attempts to perform the cycle switch.

- If the MSC_WEIGHT_FACTOR > 0, the MSC server waits the value of MSC_WEIGHT_FACTOR in seconds and then attempts to cycle switch.

Note that all MSC servers can tell if another device has already done the cycle switch and continue to the next step.

If multiple MSC servers are running an MSC group and one goes offline, then the others continue the process. There is no takeover required since all MSC servers are already doing the cycle switch process.

If the server running with MSC_WEIGHT_FACTOR=0 goes away and another MSC server with MSC_WEIGHT_FACTOR > 0 actually performs the cycle switch, then the target cycle time is elongated by the MSC_WEIGHT_FACTOR. For example, if a 15 second cycle target is required and a MSC server running with MSC_WEIGHT_FACTOR=2 is used, then a 17 second cycle target occurs.

Syntax

MSC_WEIGHT_FACTOR=n

Where:

n

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

Example

MSC_WEIGHT_FACTOR=0

OPERATOR_VERIFY

The optional OPERATOR_VERIFY initialization parameter specifies the level at which #SC command verification sets, and thus which SRDF Host Component command types and actions require operator verification. Operator verification is obtained by means of a message issued to the console which requires the reply CONTINUE in order for command processing to proceed.

Note: You can override the OPERATOR_VERIFY feature to suppress 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.

Syntax

OPERATOR_VERIFY=ALL | CRITICAL | NONE
Where:

**ALL**

*(Default)* Specifies that operator verification is required for all command types. If you do not specify the OPERATOR_VERIFY initialization parameter, the command verification level defaults to ALL, and each #SC command requires operator verification.

**CRITICAL**

Specifies that operator verification should be requested for the following commands:

- **#SC VOL command actions:**
  - CASCRE
  - CASDEL
  - CASSWAP
  - CREATEPAIR
  - DELETEPAIR
  - HDELETEPAIR
  - HMOVEPAIR
  - HSWAP
  - INVALIDATE
  - ITA
  - MOVEPAIR
  - NITA
  - OFFLINE
  - ONLINE
  - R/W
  - REFRESH
  - RNG_REFRESH
  - SWAP
  - VALIDATE

- **#SC RDFGRP command actions:**
  - ADD
  - DELETE
  - MODIFY
  - SYNCH_DIRECTION

- **#SC SRDFA command actions:**
  - DEACT_TO_ADCOPY
  - DEACT_TO_ADCOPY_DISK
  - DROP
  - DROP_SIDE
  - PEND_DEACT
  - PEND_DROP
  - TOL_ON
  - TOL_OFF

- **#SC SRDFA_DSE command actions:**
  - ACT
Configuration

AUTO_ACT
DEACT
A400_POOL
FBA_POOL
3380_POOL
3390_POOL
THRESHOLD

NONE

Specifies that no operator verification is required.

Example

OPERATOR_VERIFY=CRITICAL
**REGISTER_COMMAND_PREFIX**

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 cannot contain a comma.

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

**Syntax**

```
REGISTER_COMMAND_PREFIX=NO | YES | SYSPLEX | SYSTEM
```

*Where:*

**NO**

Indicates the command prefix is not to be registered.

**SYSPLEX**

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

**SYSTEM**

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

**YES**

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

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

**Example**

```
REGISTER_COMMAND_PREFIX=YES
COMMAND_PREFIX=@,REG
```

In this 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**

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 SRDF Host Component commands.

*Note:* 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.

**Syntax**

```
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.

**Example**

```
SAF_CLASS=HC#CLASS
```

---

**SAF_PROFILE**

The optional SAF_PROFILE initialization parameter specifies the resource name to use for SAF validation calls.

If this parameter is not specified, SAF_PROFILE defaults to a resource name of EMC.VALIDATE.ACCESS.

**Commands and suffixes**

Table 4 lists the 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 4** SRDF Host Component commands/suffixes (page 1 of 2)

<table>
<thead>
<tr>
<th>Command</th>
<th>Suffix</th>
</tr>
</thead>
<tbody>
<tr>
<td>SQ ADC</td>
<td>SQADC</td>
</tr>
<tr>
<td>SQ CNFG</td>
<td>SGCNFG</td>
</tr>
<tr>
<td>SQ DSTAT</td>
<td>SQDSTAT</td>
</tr>
<tr>
<td>SQ FAVOL</td>
<td>SQFAVOL</td>
</tr>
<tr>
<td>SQ EPVOL</td>
<td>SQEPVOL</td>
</tr>
<tr>
<td>SQ GLOBAL</td>
<td>SQGLOCAL</td>
</tr>
<tr>
<td>SQ LINK</td>
<td>SQLINK</td>
</tr>
<tr>
<td>SQ MIRROR</td>
<td>SQMIRROR</td>
</tr>
</tbody>
</table>
Table 4  SRDF Host Component commands/suffixes (page 2 of 2)

<table>
<thead>
<tr>
<th>Command</th>
<th>Suffix</th>
</tr>
</thead>
<tbody>
<tr>
<td>SQ MSG</td>
<td>SQMSG</td>
</tr>
<tr>
<td>SQ RAID</td>
<td>SQRAID</td>
</tr>
<tr>
<td>SQ RAID10</td>
<td>SQRAID10</td>
</tr>
<tr>
<td>SQ RAID5</td>
<td>SQRAID5</td>
</tr>
<tr>
<td>SQ RAID6</td>
<td>SQRAID6</td>
</tr>
<tr>
<td>SQ RDFGRP</td>
<td>SQRDFGRP</td>
</tr>
<tr>
<td>SQ SRDFA</td>
<td>SQSRDFA</td>
</tr>
<tr>
<td>SQ SRDFA_DSE</td>
<td>SQSRDFAD</td>
</tr>
<tr>
<td>SQ SRDFA_VOL</td>
<td>SQSRDFAV</td>
</tr>
<tr>
<td>SQ SRDFA_WP</td>
<td>SQSRDFAW</td>
</tr>
<tr>
<td>SQ SRDFA_WP_VOL</td>
<td>SQSRDFAW</td>
</tr>
<tr>
<td>SQ SSID</td>
<td>SQSSID</td>
</tr>
<tr>
<td>SQ STATE</td>
<td>SQSTATE</td>
</tr>
<tr>
<td>SQ VIEWRA</td>
<td>SQVIEWRA</td>
</tr>
<tr>
<td>SQ VOL</td>
<td>SQVOL</td>
</tr>
</tbody>
</table>

Configuration commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Suffix</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC CNFG</td>
<td>SCCNFG</td>
</tr>
<tr>
<td>SC FAVOL</td>
<td>SCFAVOL</td>
</tr>
<tr>
<td>SC GLOBAL</td>
<td>SCGLOBAL</td>
</tr>
<tr>
<td>SC LINK</td>
<td>SCLINK</td>
</tr>
<tr>
<td>SC MSG</td>
<td>SCMSG</td>
</tr>
<tr>
<td>SC RDFGRP</td>
<td>SCRDFFGRP</td>
</tr>
<tr>
<td>SC RECOVER</td>
<td>SCRECOVER</td>
</tr>
<tr>
<td>SC SRDF_CMPR</td>
<td>SCSRDFCM</td>
</tr>
<tr>
<td>SC SRDFA</td>
<td>SCSRDFA</td>
</tr>
<tr>
<td>SC SRDFA_DSE</td>
<td>SCSRDFAD</td>
</tr>
<tr>
<td>SC SRDFA_WP</td>
<td>SCSRDFAW</td>
</tr>
<tr>
<td>SC VOL</td>
<td>SCVOL</td>
</tr>
</tbody>
</table>

Miscellaneous commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Suffix</th>
</tr>
</thead>
<tbody>
<tr>
<td>HELP</td>
<td>HELP</td>
</tr>
<tr>
<td>STOP</td>
<td>STOP</td>
</tr>
</tbody>
</table>
Configuration

Syntax

SAF_PROFILE=profile_name[,APPEND_COMMAND=YES]

Where:

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.

profile_name

Specifies that access must be validated. The resource name can be from 1 through
44 characters.

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

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

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

Syntax

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

Where:

ANY

Allows you to issue #SC commands from any mainframe console.

MASTER

Allows you to issue #SC commands from the master console only.

SAF

The SAF interface is used to determine if you have authority to issue the #SC
command.
(SAF, ANY)
If the #SC command is entered at a mainframe console, it is allowed. Otherwise, the SAF interface is used to determine if you have authority to issue the #SC command.

(SAF, MASTER)
If the #SC command is entered at the master console, it is allowed. Otherwise, the SAF interface is used to determine if you have authority to issue the #SC command.

Example
SECURITY_CONFIG=MASTER

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

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

Where:

ANY
Allows you to issue #SQ commands from any mainframe console.

MASTER
Allows you to issue #SQ commands from the master console only.

SAF
The SAF interface is used to determine if you have authority to issue the #SQ command.

(SAF, ANY)
If the #SQ command is entered at a mainframe console, it is allowed. Otherwise, the SAF interface is used to determine if you have authority to issue the #SQ command.

(SAF, MASTER)
If the #SQ command is entered at the master console, it is allowed. Otherwise, the SAF interface is used to determine if you have authority to issue the #SQ command.

Example
SECURITY_QUERY=ANY
SHOW_COMMAND_SEQ#

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

**Note:** It is recommended that you enable this parameter for issues that require contacting Dell EMC Customer Support.

Syntax

```
SHOW_COMMAND_SEQ# = YES | NO
```

Where:

**NO**

(Defualt) 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.

**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.

Example

```
SHOW_COMMAND_SEQ# = YES
```

SINGLE_CONCURRENT

The SINGLE_CONCURRENT initialization parameter allows specific mirrors of an R11/R21/R22 device to be displayed based on the SRDF group number. For the following command formats, only the mirror belonging to SRDF group srdfgrp appears in the command output when a device selected for display has multiple remote mirrors and the SINGLE_CONCURRENT option is in effect:

- `#SQ VOL, cuu, RA(srdfgrp)`
- `#SQ STATE, cuu, RA(srdfgrp)`
- `#SQ VOL, LCL(cuu, srdfgrp)`
- `#SQ VOL, RMT(cuu, hoplist), RA(srdfgrp)`
- `#SQ VOL, RMT(cuu, hoplist)`
- `#SQ STATE, RMT(cuu, hoplist)`
- `#SQ VOL, RMT(cuu, hoplist, srdfgrp)`
- `#SQ STATE, RMT(cuu, hoplist, srdfgrp)`

If another command format is used, both mirrors of a concurrent device are displayed.

SINGLE_CONCURRENT does not apply to RMT(cuu, hoplist,*) and RMT(cuu, srdfgrp,*) formats, and to the #SQ ADC command.
The optional SMFREC initialization parameter is used to activate the z/OS Systems Management Facilities (SMF) recording by 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.

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

**Syntax**

```smfrec=nnn```

Where:

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

**Note:** Select an unassigned SMF record number in the range reserved for users (from 128 through 255).

**Example**

```smfrec=255```
SORT_BY_COMMAND

Use the SORT_BY_COMMAND initialization parameter to determine the display sort order.

SORT_BY_COMMAND allows you to set the primary sort order of the output for the #SQ VOL, #SQ STATE, and #SQ MIRROR commands. The display sort order depends on the actual query (SQ) command format you use, and can be a VOLSER, MVSCUU, or PowerMax/VMAX device number (SYMDEV), as follows:

<table>
<thead>
<tr>
<th>Command</th>
<th>Displays output by</th>
</tr>
</thead>
<tbody>
<tr>
<td>#SQ VOL</td>
<td>STATE</td>
</tr>
<tr>
<td>#SQ VOL</td>
<td>STATE</td>
</tr>
<tr>
<td>#SQ VOL</td>
<td>STATE</td>
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<tr>
<td>#SQ VOL</td>
<td>STATE</td>
</tr>
<tr>
<td>#SQ VOL</td>
<td>STATE</td>
</tr>
<tr>
<td>#SQ VOL</td>
<td>STATE</td>
</tr>
</tbody>
</table>

a. The behavior for the #SQ VOL|STATE|MIRROR commands with the cuu location parameter varies depending on the format used, as follows:

#SQ VOL, cuu

This format starts at the CUU specified in the command and returns only that device. This format behaves this way for all SORT_BY settings.

#SQ VOL, cuu, count

This format starts at the CUU specified in the command and returns the specified count in MVSCUU order.

#SQ VOL, cuu, ALL

This format starts at the lowest CUU defined on the storage system.

#SQ VOL, cuu, xxx, starting_cuu

This format starts at the CUU specified at starting_cuu and returns the specified count.

Syntax

SORT_BY_COMMAND
SORT_BY_MVSCUU

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 PowerMax/VMAX device number) to z/OS device address (CUU) as the primary sort order and PowerMax/VMAX device number as the secondary sort order.

The behavior for the #SQ VOL|STATE|MIRROR commands with the cuu location parameter varies depending on the format used, as follows:

- **#SQ VOL, cuu**
  This format starts at the CUU specified in the command and returns only that device. This format behaves this way for all SORT_BY settings.

- **#SQ VOL, cuu, count**
  This format starts at the CUU specified in the command and returns the specified count in CUU order.

- **#SQ VOL, cuu, ALL**
  This format starts at the lowest CUU defined on the storage system.

- **#SQ VOL, cuu, xxx, starting_cuu**
  This format starts at the CUU specified at starting_cuu and returns the specified count.

**Note:** All other command formats will default to the lowest CUU defined on the storage system.

When reaching the end of the devices and the count has not been reached, it loops back to the beginning of the device range on the storage system and continue in the device number order.

Devices that do not have a CUU are displayed by their PowerMax/VMAX device number. For #SQ VOL, #SQ STATE, #SQ RAID, #SQ MIRROR, and #SQ RAID10 commands, the startingdev# is a starting MVSCUU (or starting MVSCUU filter) if SORT_BY_MVSCUU is used.

**Syntax**

SORT_BY_MVSCUU
Example

EMCMNOI SRDF-HC : (1388) S8SQ STATE,A500,SELECT('TH&ALLT'),CQNAME=(EMCO9413040
EMCQV351 SRDF-HC DISPLAY FOR (1388) S8SQ STATE,A500,SELECT('TH&ALLT'),CQNAME=
SERIAL #:0001234-12345/GABCD MICROCODE LEVEL:586-286
--------------------------------------------------------------------
   CUU |LCL DEV |VOLSER|SYS |W S A L R T I D A N C|--|LCL INV|---------
|     |       |      |    |                  |--|       |---------
--------------------------------------------------------------------
A7EC 0007C1 INIVOL OFFL W . . . . . . . . . . TH
A848 00089D INIVOL OFFL W . . . . . . . . . . TH
A849 00089E INIVOL OFFL W . . . . . . . . . . TH
A84A 00089F INIVOL OFFL W . . . . . . . . . . TH
A84B 0008A0 INIVOL OFFL W . . . . . . . . . . TH
A84C 0008A1 INIVOL OFFL W . . . . . . . . . . TH
........
83BB 000570 INIVOL OFFL W . . . . . . . . . . TH
83BC 000571 INIVOL OFFL W . . . . . . . . . . TH
........
7500 001E03 INIVOL OFFL W . . . . . . . . . . TH
7501 001E04 INIVOL OFFL W . . . . . . . . . . TH
7502 001E05 INIVOL OFFL W . . . . . . . . . . TH
7503 001E06 INIVOL OFFL W . . . . . . . . . . TH
........
71FC 0021FF INIVOL OFFL W . . . . . . . . . . TH
71FD 002200 INIVOL OFFL W . . . . . . . . . . TH
........
73F6 0027C9 INIVOL OFFL W . . . . . . . . . . TH
73F7 0027CA INIVOL OFFL W . . . . . . . . . . TH
73F8 0027CB INIVOL OFFL W . . . . . . . . . . TH
........
END OF DISPLAY SORT_ORDER = MVSCUU
Total devices displayed = 1,767
SORT_BY_VOLSER

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 PowerMax/VMAX device number) to VOLSER as the primary sort order and PowerMax/VMAX device number as the secondary sort order. Devices that are offline, or do not have a VOLSER are at the end of the display in PowerMax/VMAX device number order. For #SQ VOL, #SQ STATE, #SQ RAID, #SQ MIRROR, and #SQ RAID10 commands, the startingdev# is a starting VOLSER (or VOLSER filter) when SORT_BY_VOLSER is used.

The behavior for the #SQ VOL|STATE|MIRROR commands with the cuu location parameter varies depending on the format used, as follows:

#SQ VOL, cuu
This format starts at the CUU specified in the command and returns only that device.

#SQ VOL, cuu, count
This format starts at the CUU specified in the command and returns the specified count in VOLSER order.

If the device specified by CUU is offline, this format starts at that CUU and returns the specified count of offline devices starting from the minimum PowerMax/VMAX device number.

#SQ VOL, cuu, ALL
This format starts at the lowest VOLSER defined on the storage system.

#SQ VOL, cuu, xxx, starting_volser
This format starts at the VOLSER specified at starting_volser and returns the specified count.

Syntax

SORT_BY_VOLSER

Example

EMCQV00I SRDF-HC DISPLAY FOR (18) L74SQ VOL,21C0,3,UOD2D3
SERIAL #:0001956-00057/0C2XY MICROCODE LEVEL:5876-51
DV_ADDR|SYM|TOTAL|DCB|CNTLUNIT|R1|R2|SY
SYS CH DEVCDEV GP VOLSER CYLS STAT|OPN|STATUS MR|INVTRK|INVTRK %
21C3 C3 02D3 UOD2D3 1113 ONPV 0 R/W PL
21C4 C4 02D4 UOD2D4 1113 ONPV 0 R/W PL
21C5 C5 02D5 UOD2D5 1113 ONPV 0 R/W PL
END OF DISPLAY
Total devices displayed = 3

EMCMN00I SRDF-HC : (20) L74SQ VOL,21C0,6,UOD2D
EMCQV00I SRDF-HC DISPLAY FOR (20) L74SQ VOL,21C0,6,UOD2D
SERIAL #:0001956-00057/0C2XY MICROCODE LEVEL:5876-51
DV_ADDR|SYM|TOTAL|DCB|CNTLUNIT|R1|R2|SY
SYS CH DEVCDEV GP VOLSER CYLS STAT|OPN|STATUS MR|INVTRK|INVTRK %
21C0 C0 02D0 UOD2D0 1113 ONPV 0 R/W PL
21C1 C1 02D1 UOD2D1 1113 ONPV 0 R/W PL
21C2 C2 02D2 UOD2D2 1113 ONPV 0 R/W PL
21C3 C3 02D3 UOD2D3 1113 ONPV 0 R/W PL
21C4 C4 02D4 UOD2D4 1113 ONPV 0 R/W PL
21C5 C5 02D5 UOD2D5 1113 ONPV 0 R/W PL
END OF DISPLAY
Total devices displayed = 6
SRDFA_AUTO_RECOVER

This parameter enables the SRDF Automated Recovery facility for SRDF/A environments.

**Note:** This parameter initiates SRDF Automated Recovery only if SRDF/A is not active for at least one of the SRDF groups in the MSC group.

Syntax

SRDFA_AUTO_RECOVER=YES | NO | PROMPT

Where:

**NO**

*(Default)* Indicates SRDF Automated Recovery is not invoked upon SRDF/A failures. This is the default setting.

**PROMPT**

Indicates SRDF Automated Recovery issues a message requiring operator confirmation before proceeding with recovery after SRDF/A failures.

**YES**

Indicates SRDF Automated Recovery executes following SRDF/A failures. SRDF/A drops initiated using SC SRDFA PEND_DROP does not invoke recovery automation.

Example

SRDFA_AUTO_RECOVER=YES

SRDFA_AUTO_RECOVER_BCV

This parameter specifies BCV gold copy management options.

The SRDFA_AUTO_RECOVER_BCV statement can be overridden by specifying BCV(*startup_option*, *post_recovery_option*) in the MSC_INCLUDE_SESSION statement.

Syntax

SRDFA_AUTO_RECOVER_BCV(*startup_option*, *post_recovery_option*)

Where:

**startup_option**

Defines the required behavior at the start of the gold copy management routine.

The valid states are:

**NONE**

BCV management is bypassed for this phase.
**ESTablish**

*(Default)* Results in a new PiT (point-in-time) copy on the BCVs. If a BCV is not attached to an R2, a BCV will be established/re-established. If a relationship does not exist, the BCV GNS group (if specified) will be used to choose a BCV. If a relationship does not exist and no BCV GNS group is specified, an error message will be issued. After all the BCVs are attached, they will be split. This is the default setting for `startup_option`.

**post_recovery_option**

Defines the required state of the BCV relationships at the completion of the SRDF/A recovery operation. The valid states are:

- **NONE**
  
  *(Default)* BCV management is bypassed for this phase. This is the default setting for `post_recovery_option`.

**ESTablish**

Results in a re-establish of all the BCVs to the R2s.

**Example**

```
SRDFA_AUTO_RECOVER_BCV (EST, NONE)
```

**SRDFA_AUTO_RECOVER_ITRK**

This parameter allows you to specify the number of outstanding R2 invalid tracks on the R1 side that the recovery automation uses as a trigger point for activating SRDF/A.

Ensure that the number of invalid tracks you specify considers the cache limit settings in the storage system. If SRDF/A is started, but reaches the cache limit, SRDF/A drops again.

The `SRDFA_AUTO_RECOVER_ITRK` statement can be overridden by specifying `ITRK=aaaaaaa` in each `MSC_INCLUDE_SESSION` statement.

**Syntax**

```
SRDFA_AUTO_RECOVER_ITRK=nnnnnnn
```

*Where:*

- `nnnnnnn` Indicates the number of outstanding R2 invalid tracks on the R1 side that the recovery automation uses as a trigger point for activating SRDF/A, where the value of `n` is multiplied by 1000. Allowable values for `nnnnnnn` are 0-999999. The default setting is 30 (which represents 30,000).

**Example**

```
SRDFA_AUTO_RECOVER_ITRK=100
```
**Configuration**

**SRDFA_AUTO_RECOVER_MINDIR**

This parameter allows you to specify a minimum number of directors that must be online for the automation to begin execution.

*Note:* The SRDFA_AUTO_RECOVER_MINDIR statement can be overridden by specifying MINDIR=bb in each MSC_INCLUDE_SESSION statement.

Syntax

SRDFA_AUTO_RECOVER_MINDIR=nn

Where:

nn

Indicates the number of directors that must be online. Valid values are 1 through 255. The default value is 1.

Example

SRDFA_AUTO_RECOVER_MINDIR=4

**SRDFA_AUTO_RECOVER_PROC**

This parameter allows you to change the name of the JCL recovery procedure.

The SRDFA_AUTO_RECOVER_PROC statement can be overridden by specifying jobname=jobname in each MSC_INCLUDE_SESSION statement.

Syntax

SRDFA_AUTO_RECOVER_PROC=procname

Where:

procname

Indicates the name of the JCL recovery procedure. An EBCDIC name from 1 to 8 characters is allowed. The default name is EMCRCVRY.

*Note:* A sample EMCRCVRY procedure is included in the SAMPLE file.

Example

SRDFA_AUTO_RECOVER_PROC=EMCRCV1
**SUBSYSTEM_NAME**

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 SRDF Host Component.

**Syntax**

```
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**

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.

**Note:** Chapter 6, “Recovery Procedures,” provides more information.

**Syntax**

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

Where:

- `NONE` Only allows the synchronization direction to be set to NONE.

  **Note:** When you specify NONE for SYNCH_DIRECTION_ALLOWED, the #SC VOL command VALIDATE, INVALIDATE, REFRESH, and RNG_REFRESH actions do not function.

- `R1>R2` (Default) Only allows the synchronization 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 synchronization direction to be set to target (R2)→source (R1) or NONE.
R1<>R2

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

Example

SYNCH_DIRECTION_ALLOWED=R1>R2

SYNCH_DIRECTION_INIT

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

When you start SRDF Host Component, it sets the synchronization direction to GLOBAL for each storage system. This action causes the value of the SYNCH_DIRECTION_INIT initialization parameter to be used for each system. Subsequently, global synchronization direction may be reset with the SC GLOBAL,SYNCH_DIRECTION command.

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

Syntax

SYNCH_DIRECTION_INIT=R1>R2 | R1<R2 | NONE

Where:

NONE

(Default) Specifies no synchronization direction.

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

R1>R2

Specifies that the REFRESH, RNG_REFRESH, and VALIDATE actions on the #SC VOL command can only be used on a target (R2) volume and INVALIDATE can only be used on a source (R1) volume.

R1<R2

Specifies that the REFRESH, RNG_REFRESH, and VALIDATE actions on the #SC VOL command can only be used on a source (R1) volume and INVALIDATE can only be used on a target (R2) volume.

Example

SYNCH_DIRECTION_INIT=R1<R2
**USER_VERIFICATION**

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

**Syntax**

`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 are bypassed and the user is prompted for permission to proceed.

**NO**

*(Default)* REXX users do not have the ability to respond to messages requesting permission to proceed.

**Examples**

```
USER_VERIFICATION=YES
USER_VERIFICATION=NO
```

**USER_VERIFICATION_TIMEOUT**

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

**Syntax**

`USER_VERIFICATION_TIMEOUT=minutes | (minutes, seconds)`

**Examples**

```
USER_VERIFICATION_TIMEOUT=5
USER_VERIFICATION_TIMEOUT=(2,30)
```

**VONOFF_BLOCKED**

If the VONOFF_BLOCKED initialization parameter is present, then the #SC VOL ONLINE and #SC VOL OFFLINE commands are blocked.

**Syntax**

`VONOFF_BLOCKED`
VONOFF_OFF_ONLY

If the VONOFF_OFF_ONLY initialization parameter is present, then the #SC VOL ONLINE command is blocked.

Syntax

VONOFF_OFF_ONLY

VONOFF_ON_ONLY

If the VONOFF_ON_ONLY initialization parameter is present, then the #SC VOL OFFLINE command is blocked.

Syntax

VONOFF_ON_ONLY

VONOFF_R1_ONLY

If the VONOFF_R1_ONLY initialization parameter is present, then the #SCVOL ONLINE and #SC VOL OFFLINE commands are performed only on R1 devices.

Syntax

VONOFF_R1_ONLY

VONOFF_R2_ONLY

If the VONOFF_R2_ONLY initialization parameter is present, then the #SC VOL ONLINE and #SC VOL OFFLINE commands are performed only on R2 devices.

Syntax

VONOFF_R2_ONLY

VONOFF_STATUS_WAIT

The VONOFF_STATUS_WAIT initialization parameter specifies the amount of time to let the #SC VOL ONLINE or #SC VOL OFFLINE command run before issuing a status. SRDF Host Component issues a preliminary status every xxx seconds until the command completes, at which time it issues a final status.

Syntax

VONOFF_STATUS_WAIT=xxx

Where:

xxx

Can be set from 10 to 120 seconds, where 30 seconds is the default.

Example

VONOFF_STATUS_WAIT=30
CHAPTER 4
Command Reference

This chapter covers the following topics:

- Introduction 
- Conventions
- Common parameters
- Query (SQ) commands
- Configuration (SC) commands
- Miscellaneous commands

Page references:
- Introduction: 126
- Conventions: 129
- Common parameters: 130
- Query (SQ) commands: 141
- Configuration (SC) commands: 266
- Miscellaneous commands: 379
Introduction

You can issue SRDF Host Component commands to both local and remote storage systems. Commands destined for remote storage systems are transmitted through local storage systems to remote storage systems using SRDF links.

The query (SQ) commands allow you to view various aspects of SRDF status.

The configuration (SC) commands allow you to manage the operation of the SRDF environment from a system console.

Multitasking and messages

SRDF Host Component multitasks SRDF commands to allow configuration, display, and recovery procedure testing to be performed on multiple storage systems at the same time. Two concurrent z/OS tasks are supported for each storage system, one dedicated to query (SQ) commands and one dedicated to configuration (SC) commands. In addition, a z/OS subtask known as the SRDF Host Component global task or main task is dedicated to running commands not specific to a single storage system.

Many of the SRDF Host Component displays are issued as multiline WTO (Write to Operator) messages. When two or more commands are running concurrently, the output of these commands can appear interspersed in the SRDF Host Component job log and in the HCLOG dataset. However, the command output displays appear separately in the z/OS SYSLOG.

When running multiple requests simultaneously, the MESSAGE_LABELS and SHOW_COMMAND_SEQ# initialization parameters can help you to associate messages with the commands that produced them.

Note: “MESSAGE_LABELS” on page 92 and “SHOW_COMMAND_SEQ#” on page 112 describe these initialization parameters.

Some actions that run under the global task may require an extended period of time to complete, for example, SSID_REFRESH, SRDF group commands, and SCF group name service (GNS) commands.

Command queuing

When you issue a command, SRDF Host Component places it on a command queue for parsing. Commands are parsed in the order entered and placed on a queue for the appropriate SRDF Host Component subtask. SRDF Host Component has the following subtask queues:

- One queue for global commands (not associated with a specific storage system)
- One queue for TimeFinder (TF) commands
- Two queues for each storage system in the configuration:
  - One queue for query (SQ) commands associated with that specific storage system
  - One queue for configuration (SC) commands associated with that specific storage system
The maximum number of commands that you can queue for parsing is controlled by the MAX_COMMANDQ initialization parameter. “MAX_COMMANDQ” on page 90 describes this parameter.

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 executed by queue name**

To ensure that mutually dependent commands are executed one at a time in the order in which you enter them, SRDF Host Component allows you to place most commands on designated named command queues. To designate the named command queue on which a command should be placed, append the following text to the end of the command:

```
, CQNAME=qname
```

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

SRDF Host Component individually moves commands queued on the same named command queue to the appropriate subtask queue. Note that there is no inherent relationship between named command queues and subtask queues. Thus, different commands on the same named command queue may be placed on the subtask queues for different storage systems, or on the global task queue. However, the commands are always scheduled in the order in which they appeared on the named command queue. A command on a named command queue is never scheduled until the command that preceded it on the named command queue completes execution. If a queued-by-name command fails, you can:

- Purge the remaining commands on the same named command queue.
  
  By specifying CQNAME=(qname,P), you request that in the event of a command failure, all subsequent commands on the same named command queue are to be purged.

- Continue executing those commands.
  
  By specifying CQNAME=(qname,C), you request that even though a command fails, processing continues with the next command queued on the same named command queue.

**Note:** The character C, P, or T that you may specify with the CQNAME keyword is referred to in this document as the queue option.

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

SRDF Host Component supports query and configuration commands to remote storage systems across the SRDF link. This provides control of systems which may or may not be accessible directly from any locally connected SRDF Host Component subsystem, providing control of recovery testing procedures from a single subsystem.

Note: “Recovery procedure concepts and testing” on page 469 describes remote query and configuration.

Remote query and configuration is provided using the `RMT (cuu [,hoplist][,srdfgrp])` command operand. For multihop remote configurations, `hoplist#` can be a single SRDF group number or a list of up to four SRDF group numbers, delimited by periods. Each SRDF group number in such a list is known as a hop. In a cascaded set, up to two hops are allowed.

Command completion status checking

When processing a command that changes the status of a link or device, SRDF Host Component checks to see whether the device or link has successfully changed status. If it has, the command terminates normally. However, if the device or link did not successfully change status, SRDF Host Component retries the command one or more times depending upon the particular command. If the device or link status has not been successfully changed after having been retried the requisite number of times, the command is regarded as failed, and an error message is issued.
Conventions

The following notes apply to the command examples:

- 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 have specified for the system using the COMMAND_PREFIX initialization parameter.
- All PowerMax/VMAX device numbers in display output and command response messages are in hex.
- All SSIDs are in hex.
- For query (SQ) command displays, when a storage system with PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5874 and later emulates an IBM 2107, it externally represents the serial number as an alphanumeric serial number to be compatible with IBM command output.

Command syntax conventions

In addition to the command example conventions described above, the following rules apply to the command syntax descriptions:

- Capitalization indicates the portions of keywords that must be typed (for example, ALL or MODify). They must be spelled exactly as shown.
- Variables appear in lowercase and italics (for example, cqname). They represent user-supplied names or values in the syntax.
- Default values are indicated by an underline. For example, if the parameter has the following option, (YES|NO), the underlined NO indicates the default value.
- Square brackets [ ] indicate an optional entry (for example, ,G(groupname)[,statefilter]).
- The vertical bar | indicates alternative argument values (for example, count|ALL).
- Curly brackets {} are used to group a series of alternative values that can be used with a single keyword, for example: #SC RDFGRP,RMT{(cuu,hoplist)|(cuu,hoplist,*)},srdfgrp,action.
- Aside from the square and curly brackets and the vertical bar characters, you must type all other characters that are shown in the syntax statements.
Common parameters

CAS

Enables the discovery of possible remote cascaded storage systems for the #SQ RDFGRP, #SQ SRDFA, and #SQ SRDFA_DSE commands.

The #SQ RDFGRP, #SQ SRDFA, and #SQ SRDFA_DSE commands carry out a discovery to see whether any of the remote storage systems are cascaded. This discovery can take a long time, causing a delay between the headings for the command output and the output details. In extreme cases, it can also cause a WTO timeout.

When present, the CAS parameter overrides the default behavior specified by the DISCOVER_CAS_QRY initialization parameter described in “DISCOVER_CAS_QRY” on page 76.

cqname

The name of a command queue from which SRDF Host Component commands are selected for processing.

Commands on the same queue are processed in the order in which they were placed on the queue, while commands on different queues are processed independently of each other. As a result of this, commands on different queues may be processed concurrently, and a command on a queue could even be processed ahead of another command that was entered earlier but placed on a different queue.

cuu

A z/OS device number.

Depending on a specific command, the cuu may be used as a gatekeeper that points to a particular storage system (for example, #SQ CNFG) or as a filter to display the device(s) addressed with this CUU(s) (#SQ ADC, #SQ EPVOL, #SQ RAID).

Note: The output from #SQ VOL, #SQ STATE, and #SQ MIRROR commands varies based on current sorting settings, as described in “SORT_BY_COMMAND” on page 114, “SORT_BY_MVSCUU” on page 115 and “SORT_BY_VOLSER” on page 117.

G(groupname)

This parameter specifies the name of the SMS or defined group whose devices are to be displayed or acted upon. Only online devices are selected for device level displays when defined by z/OS device.

A z/OS device-defined group requires the use of filters on group level query displays to limit the display to a storage system level attribute.

Note that both SMS and defined groups can span multiple storage systems. If this is the case, multiple display tasks are triggered, one for each storage system with volumes in the group.

If both an SMS group and a defined group are defined having the specified name, the command will apply to the defined group.
LCL
This parameter requires two subparameters, a z/OS device number and an SRDF group number. The operation is directed to the storage system on which the gatekeeper specified by the z/OS device number resides. The interpretation of the second subparameter is context-dependent.

- For device-oriented commands, the command is applied to devices having remote mirrors in the specified SRDF group or to the remote mirrors in the specified SRDF group.
- For SRDF/A-oriented commands, the command applies to the SRDF/A session on the specified SRDF group.

hoplist
This parameter specifies the path, or hop list, to use to reach the storage system on which the command is to be processed. hoplist can be a single SRDF group or a list of up to four SRDF group numbers separated by periods. In this context, each SRDF group is known as a hop.

For example, in the hop list 4.23.A2, the command would be routed via SRDF group 4 from the storage system on which the gatekeeper device resides to a second storage system, then via SRDF group 23 on the second storage system to a third storage system, then via SRDF group A2 on the third storage system to a fourth storage system on which the command would be processed.

For a hop list to be usable, each SRDF group in the hop list must be defined and online. In this context, “online” means that at least one remote link director associated with the SRDF group is currently communicating with the storage system of the SRDF group's other-side SRDF group, while “offline” means that no remote link director exists.

“Performing operations using hop list” on page 386 provides examples of using a hop list.

NOCAS
Prevents the attempted discovery of remote cascaded storage systems in the #SQ RDFGRP, #SQ SRDFA, and #SQ SRDFA_DSE commands.

The #SQ RDFGRP, #SQ SRDFA, and #SQ SRDFA_DSE commands carry out a discovery to see whether any of the remote storage systems are cascaded. This discovery can take a long time, causing a delay between the headings for the command output and the output details. In extreme cases, it can also cause a WTO timeout.

When present, this parameter overrides the default behavior specified by the DISCOVER_CAS_QRY initialization parameter described in “DISCOVER_CAS_QRY” on page 76.

If the NOCAS option is specified, the group is marked with “-?” (unknown) in the command output.

queue-option
This parameter takes effect when a command that is queued on a named command queue fails.
P

(Default) If the P (purge) option is specified, then in the event of a command failure, all subsequent commands in the same queue are purged.

C

If the C (continue) option is specified, then if a command fails, processing continues with the next command in the cqname queue.

T

If the T (parse) option is specified, parse but do not execute, each command. This option provides the ability to syntax-check all commands in the SYSIN file in advance of actual execution.

If you do not specify a queue option on the first command for a particular queue, the default for that queue is P (purge).

rdfcuu

This parameter specifies the z/OS device number of an SRDF device. Note that for the RMT command format, the rdfcuu parameter is no longer used; however, it is tolerated for existing code that uses it.

RMT

This parameter specifies that the command is to be directed to a remote storage system in an SRDF configuration. Up to three subparameters may be specified.

- If a single subparameter is specified, the parameter is the z/OS device number of an SRDF device.

- If two subparameters are specified, the second subparameter is a hop list. The command is directed to the storage system reached by traversing the hop list. For a device-oriented command, the command applies to the devices on that storage system having mirrors in the other-side SRDF group of the last SRDF group in the hop list.

- The third subparameter is disallowed for some command formats. However, if allowed and if three subparameters are specified, the third subparameter may be an SRDF group number. The command is directed to the storage system reached by traversing the hop list, and for a device-oriented command, applies to devices on that storage system which have mirrors in the SRDF group specified in this subparameter.

Note: For certain commands, the third subparameter may alternatively be specified as an asterisk (*). In that case, the command action then applies to all SRDF groups, and for device-oriented commands, the command operation is applied to both mirrors of concurrent SRDF devices.
SCFG (gnsgrp)

This parameter specifies a GNS group (also known as an SCF group) whose devices are to be displayed or processed, or on whose storage systems the command is to be processed.

*Note:* The *ResourcePak Base for z/OS Product Guide* describes GNS groups.

Note that a GNS group can span multiple storage systems. In that case, multiple tasks are triggered, one for each storage system that includes at least one device in the GNS group. Also, it is possible for the set of storage systems associated with a specific GNS group definition to differ for different commands, depending on device characteristics and attributes at the time the commands are executed.

GNS groups are defined using the Group Name Services feature of ResourcePak Base (SCF). The characters allowed in GNS group names are described in the *ResourcePak Base for z/OS Product Guide*.

Subject to the following guidelines, any valid GNS group name may be specified as the value of the SRDF Host Component SCFG keyword parameter:

When specifying a GNS group name to SRDF Host Component using the SCFG keyword parameter, you must enclose the name in apostrophes if it includes any character that is neither an uppercase letter nor a numeric digit. However, be aware that even if the GNS group name is enclosed in apostrophes, non-alphanumeric characters or lowercase alphabetic characters may be translated to blanks or converted to uppercase when presented as input to SRDF Host Component, possibly causing the GNS group not to be found or even possibly resulting in the processing of an unintended GNS group.

srdfgrp

This parameter specifies the SRDF group to which the entered command applies.

The SRDF group number is a one- or two-digit hex value. Valid values are 0 to F9 (hex).

The interpretation of the specified SRDF group is context-dependent:

- For device-oriented commands, use `srdfgrp` to select remote mirrors or remote devices to display or act on; this is of particular importance for SRDF configurations in which devices may simultaneously be paired with two remote devices.

- For SRDF/A-oriented commands, use `srdfgrp` to identify an SRDF/A session to display or act on.

For information about the use of the `srdfgrp` parameter with the LCL keyword, see “LCL” on page 131.

For information about the use of the `srdfgrp` parameter with the RMT keyword, see “RMT” on page 132.

SSID (ssid)

Indicates the subsystem ID and the ssid that identifies the devices to be included when processing the command.
This parameter specifies the first or only PowerMax/VMAX device number in a range of devices. A PowerMax/VMAX device number is always specified in hex.

VOL(volser)

This parameter identifies a specific device by its volume serial, or specifies a pattern that is used to include online devices whose volume serials match the pattern. A pattern must start with at least one alphanumeric value and end with an asterisk (*). The asterisk means that characters starting in this position are not considered when determining whether a VOLSER matches the mask.

For example, the #SQ VOL,VOL(UG*) command generates a list of all online volumes whose serials start with UG.

Device selection using SELECT

You can use the optional SELECT keyword parameter with the #SQ EPVOL, #SQ MIRROR, #SQ STATE, #SQ VOL, and #SC VOL commands to indicate device filtering that should be applied.

Note: When SELECT is used with the #SC VOL command, the SELECT keyword should be placed after all other command parameters except CQNAME.

If a device does not meet the filtering criteria, it is treated the same as if it had not been part of the command device range—it is not considered for processing and does not appear in the list of requested devices. However, the device will be included in a message that lists the devices not meeting the filtering criteria.

SELECT logical expression

The value specified by SELECT is a logical expression that is evaluated for each device in the range specified in the command to determine whether the device should be passed to the validation phase. Table 5 lists the Boolean symbols that are supported.

Table 5 Boolean symbols used with SELECT parameter

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>&amp;</td>
<td>AND</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>!</td>
<td>NOT</td>
</tr>
</tbody>
</table>

Any combination of a Boolean expression except NOT (!) with any state filters is allowed up to the command buffer limit of 256 bytes. Table 6 on page 136 lists all the valid filter values. The query returns up to the number of lines specified in the MAX_QUERY initialization parameter.

The logical expression specified with SELECT is evaluated as follows:

1. Each filter specified in the expression is evaluated for the device. The result for a filter preceded by ! is logically inverted.

2. Any expression enclosed in parentheses is evaluated by logically combining the logical values of the filters contained in the expression from left to right according
to the & (AND) and | (OR) operations that are specified. The parenthesized
expression is assigned the resulting value. If the left parenthesis is immediately
preceded by !, the value is logically inverted.

3. Evaluation continues with the evaluation of each parenthesized expression, all of
whose expression components have been already been evaluated. As with the
innermost parenthesized expressions, the expression components are combined
from left to right, and if the left parenthesis is immediately preceded by !, the
result value is logically inverted.

**Note:** If parentheses are not used on a binary operand, the statement will be processed
from left to right and any occurrence of the ! (NOT) operator will be applied to the
filter immediately following.

**SELECT examples**

The following examples illustrate the evaluation of a SELECT logical expression and
shows the sequence in which the evaluations of the expression components take place
to provide the intermediate results.

Note that at each point where a parenthesized expression is evaluated, all necessary
components have already been evaluated. The last expression listed is the expression
whose evaluation determines whether the device has met the filtering criteria or not.

**Examples for query (SQ) commands**

**Example 1**
SELECT (R/W & ((R1 | ML) & RAID5))

1. R1 or ML results in X
2. X and RAID5 results in Y
3. Y and R/W results in filter

**Example 2**
SELECT (R/W & R1 | ML & RAID5)

1. R/W and R1 results in X
2. X or ML results in Y
3. Y and RAID5 results in filter

**Examples for #SC VOL command**

**Example 3**
SELECT (AD & ((R1 | R11) & DL))

1. R1 or R11 results in X
2. X and DL results in Y
3. Y and AD results in filter

**Example 4**
SELECT (AD & R1 | R11 & DL)

1. AD and R1 results in X
2. X or R11 results in Y
3. Y and DL results in filter
Device filter values

Table 6 lists the values you may specify for statefilter and filter values in various commands.

**Note:** Table 18 on page 315 lists values available for the #SC VOL command.

### Table 6  Device filter values (page 1 of 5)

<table>
<thead>
<tr>
<th>Value</th>
<th>Device description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADCOPY</td>
<td>Control unit status of AW</td>
</tr>
<tr>
<td>ADCOPY_DISK</td>
<td>Control unit status of AD</td>
</tr>
<tr>
<td>ALL</td>
<td>All devices</td>
</tr>
<tr>
<td>ALLD</td>
<td>All diskless (equivalent to DL + D1 + D2)</td>
</tr>
<tr>
<td>ALLRAID</td>
<td>All RAID-S, RAID 5, RAID 6, or RAID 10</td>
</tr>
<tr>
<td>ALLT</td>
<td>PowerMaxOS 5978 and HYPERMAX OS 5977: All thin devices. To filter for thin data,</td>
</tr>
<tr>
<td></td>
<td>use the TD filter. Enginuity 5876: All thin or thin data devices</td>
</tr>
<tr>
<td>B1</td>
<td>Business continuance volumes source (R1 BCVs)</td>
</tr>
<tr>
<td>B2</td>
<td>Business continuance volumes target (R2 BCVs)</td>
</tr>
<tr>
<td>BCV</td>
<td>Standard business continuance volumes</td>
</tr>
<tr>
<td>BCVATT</td>
<td>Standard devices with an attached (established) BCV</td>
</tr>
<tr>
<td>CEXMPT</td>
<td>Device has the consistency exempt state</td>
</tr>
<tr>
<td>CGROUP</td>
<td>Device belongs to consistency groups</td>
</tr>
<tr>
<td>CKD</td>
<td>Logical devices that are emulating 3380s or 3390s</td>
</tr>
<tr>
<td>CMPA</td>
<td>Devices with hardware or software compression active</td>
</tr>
<tr>
<td>CMPE</td>
<td>Devices with hardware or software compression enabled</td>
</tr>
<tr>
<td>COVD</td>
<td>Cache-only virtual devices</td>
</tr>
<tr>
<td>D1</td>
<td>Diskless R1 (transient state)</td>
</tr>
<tr>
<td>D11</td>
<td>Diskless R11 (transient state)</td>
</tr>
<tr>
<td>D2</td>
<td>Diskless R2 (transient state)</td>
</tr>
<tr>
<td>D21</td>
<td>Diskless cascaded devices</td>
</tr>
<tr>
<td>D22</td>
<td>Diskless R22 (transient state)</td>
</tr>
<tr>
<td>DL</td>
<td>Diskless devices (DL-dev) that have not been paired with remote partners</td>
</tr>
<tr>
<td>DOMINO</td>
<td>Device has the Domino attribute</td>
</tr>
<tr>
<td>DPA</td>
<td>Device is in an SRDF group with device pacing armed</td>
</tr>
<tr>
<td>DPE</td>
<td>Device is in an SRDF group with device pacing enabled</td>
</tr>
<tr>
<td>DR</td>
<td>Dynamic reallocation volume (used by the Optimizer)</td>
</tr>
</tbody>
</table>
### Table 6  Device filter values (page 2 of 5)

<table>
<thead>
<tr>
<th>Value</th>
<th>Device description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DYNR1</td>
<td>Dynamic R1 capable</td>
</tr>
<tr>
<td>DYNR1_ONLY</td>
<td>Dynamic R1 capable but not dynamic R2 capable</td>
</tr>
<tr>
<td>DYNR2</td>
<td>Dynamic R2 capable</td>
</tr>
<tr>
<td>DYNR2_ONLY</td>
<td>Dynamic R2 capable but not dynamic R1 capable</td>
</tr>
<tr>
<td>DYNRDF</td>
<td>Device supports dynamic SRDF functions</td>
</tr>
<tr>
<td>EDISK</td>
<td>Selects any Federated Tiered Storage (FTS) device</td>
</tr>
<tr>
<td>EDISK-EXT</td>
<td>Selects any FTS device defined for external provisioning</td>
</tr>
<tr>
<td>EDISK-ENC</td>
<td>Selects any FTS device defined for encapsulation</td>
</tr>
<tr>
<td>EDISK-EDP</td>
<td>Selects any FTS device defined for encapsulation with disk provisioning</td>
</tr>
<tr>
<td>EDISK-EVP</td>
<td>Selects any FTS device defined for encapsulation with virtual provisioning</td>
</tr>
<tr>
<td>EDISK-ENCC</td>
<td>Selects any capacity-limited FTS device defined for encapsulation</td>
</tr>
<tr>
<td>EDISK-EDPC</td>
<td>Selects any capacity-limited FTS device defined for encapsulation with disk provisioning</td>
</tr>
<tr>
<td>EDISK-EVPC</td>
<td>Selects any capacity-limited FTS device defined for encapsulation with virtual provisioning</td>
</tr>
<tr>
<td>EAS</td>
<td>Extended Addressing Space volume; has more than 64K cylinders.</td>
</tr>
<tr>
<td>ESTBCV</td>
<td>Established BCV volume (actively being used as BCVs)</td>
</tr>
<tr>
<td>FBA</td>
<td>Fixed block architecture format</td>
</tr>
<tr>
<td>FBA_META</td>
<td>Fixed block architecture meta device</td>
</tr>
<tr>
<td>FMIRROR</td>
<td>Fast mirror device</td>
</tr>
<tr>
<td>FSD</td>
<td>File system device</td>
</tr>
<tr>
<td>FT</td>
<td>Thin space-efficient Flashcopy device</td>
</tr>
<tr>
<td>GCM</td>
<td>Device is in Geometry Compatible Mode</td>
</tr>
<tr>
<td>GPA</td>
<td>Device is in an SRDF group with group pacing armed</td>
</tr>
<tr>
<td>GPE</td>
<td>Device is in an SRDF group with group pacing enabled</td>
</tr>
<tr>
<td>GS</td>
<td>Quest OS device</td>
</tr>
<tr>
<td>HWCA</td>
<td>Device is in an SRDF group with HW compression active</td>
</tr>
<tr>
<td>HWCE</td>
<td>Device is in an SRDF group with HW compression enabled</td>
</tr>
<tr>
<td>IL</td>
<td>Link-blocked device</td>
</tr>
<tr>
<td>INV_TRKS</td>
<td>Device has a non-zero invalid track count</td>
</tr>
<tr>
<td>ITA</td>
<td>Device has the invalid track attribute</td>
</tr>
</tbody>
</table>
### Table 6: Device filter values (page 3 of 5)

<table>
<thead>
<tr>
<th>Value</th>
<th>Device description</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>R1 volumes that are also mirrored locally</td>
</tr>
<tr>
<td>L2</td>
<td>R2 volumes that are also mirrored locally</td>
</tr>
<tr>
<td>LD</td>
<td>XtremCache device</td>
</tr>
<tr>
<td>LDC</td>
<td>XtremCache device that is being actively cached</td>
</tr>
<tr>
<td>LNR</td>
<td>Control unit status of LNR</td>
</tr>
<tr>
<td>ML</td>
<td>Local mirror volume</td>
</tr>
<tr>
<td>MR5</td>
<td>Multi-RAID 5; device has two or more RAID 5 mirrors</td>
</tr>
<tr>
<td>MR6</td>
<td>Multi-RAID 6; device has two or more RAID 6 mirrors</td>
</tr>
<tr>
<td>MRG</td>
<td>Multi-RAID group; device has at least one RAID 5 or RAID 6 mirror and at least one other mirror position of RAID 0, RAID 1, RAID 5, or RAID 6 type</td>
</tr>
<tr>
<td>NGP</td>
<td>NOGPACE - Device is exempt from group pacing</td>
</tr>
<tr>
<td>NRDY</td>
<td>Control unit status of N/R</td>
</tr>
<tr>
<td>ONLINE</td>
<td>Device is online from the host on which SRDF Host Component is running</td>
</tr>
<tr>
<td>PP</td>
<td>PPRC primary device</td>
</tr>
<tr>
<td>PREFRESH</td>
<td>Device has the PREFRESH attribute</td>
</tr>
<tr>
<td>PS</td>
<td>PPRC secondary device</td>
</tr>
<tr>
<td>PVD</td>
<td>PowerVault volume</td>
</tr>
<tr>
<td>R/O</td>
<td>Control unit status of R/O</td>
</tr>
<tr>
<td>R/W</td>
<td>Control unit status of R/W</td>
</tr>
<tr>
<td>R1</td>
<td>Source SRDF remote device</td>
</tr>
<tr>
<td>R11</td>
<td>Concurrent source (R1/R1) device</td>
</tr>
<tr>
<td>R2</td>
<td>Target SRDF remote device</td>
</tr>
<tr>
<td>R21</td>
<td>Cascaded (R2/R1) device</td>
</tr>
<tr>
<td>R22</td>
<td>Concurrent target (R2/R2) device</td>
</tr>
<tr>
<td>RA(srdfgrp)</td>
<td>Device has a mirror in SRDF group srdfgrp</td>
</tr>
<tr>
<td>RAID</td>
<td>RAID-S volume</td>
</tr>
<tr>
<td>RAID_HEAD</td>
<td>Storage system device that is the head of a RAID volume</td>
</tr>
<tr>
<td>RAID0</td>
<td>Devices that are RAID 0 devices</td>
</tr>
<tr>
<td>RAID10</td>
<td>Striped CKD volume</td>
</tr>
<tr>
<td>RAID10_HEAD</td>
<td>Devices that are RAID 10 head devices</td>
</tr>
<tr>
<td>RAID5</td>
<td>RAID 5 volume</td>
</tr>
<tr>
<td>RAID6</td>
<td>RAID 6 volume</td>
</tr>
</tbody>
</table>
### Table 6 Device filter values (page 4 of 5)

<table>
<thead>
<tr>
<th>Value</th>
<th>Device description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDF_NRDY</td>
<td>Control unit status of RNR</td>
</tr>
<tr>
<td>RDF_WR_DISABLE</td>
<td>Control unit status of RWD</td>
</tr>
<tr>
<td>REFRESH</td>
<td>Device has the REFRESH attribute</td>
</tr>
<tr>
<td>RM</td>
<td>SRDF/Metro device</td>
</tr>
<tr>
<td>RP</td>
<td>RecoverPoint device</td>
</tr>
<tr>
<td>SEMI_SYNC</td>
<td>Control unit status of SS</td>
</tr>
<tr>
<td>SRDFA</td>
<td>SRDF/A device</td>
</tr>
<tr>
<td>SV</td>
<td>Saved device in a SNAP or DSE pool</td>
</tr>
<tr>
<td>SWCA</td>
<td>Device in an SRDF group with software compression active</td>
</tr>
<tr>
<td>SWCE</td>
<td>Device in an SRDF group that has software compression enabled</td>
</tr>
<tr>
<td>SYNC</td>
<td>Control unit status of SY</td>
</tr>
<tr>
<td>T</td>
<td>Thin device (host accessible and not SRDF or BCV).</td>
</tr>
<tr>
<td>T1</td>
<td>Thin R1 device</td>
</tr>
<tr>
<td>T11</td>
<td>Thin R11 device</td>
</tr>
<tr>
<td>T2</td>
<td>Thin R2 device</td>
</tr>
<tr>
<td>T21</td>
<td>Thin R21 device</td>
</tr>
<tr>
<td>T22</td>
<td>Thin R22 device</td>
</tr>
<tr>
<td>TB</td>
<td>Thin bound device</td>
</tr>
<tr>
<td>TBBC</td>
<td>Thin bound BCV device</td>
</tr>
<tr>
<td>TBCV</td>
<td>Thin BCV device</td>
</tr>
<tr>
<td>TD</td>
<td>Thin data device (not host-accessible)</td>
</tr>
<tr>
<td>TGT_NRDY</td>
<td>Control unit status of TNR</td>
</tr>
<tr>
<td>TH</td>
<td>Thin device (host accessible and not SRDF or BCV).</td>
</tr>
<tr>
<td>THIN</td>
<td>Thin device (host accessible and not SRDF or BCV).</td>
</tr>
<tr>
<td>TRANSMIT_IDLE</td>
<td>SRDF/A device whose SRDF/A session is in the transmit-idle state</td>
</tr>
<tr>
<td>TU</td>
<td>Thin unbound device</td>
</tr>
<tr>
<td>TUB</td>
<td>Thin unbound BCV device</td>
</tr>
<tr>
<td>UNR</td>
<td>Control unit status of UNR (user not ready). Established BCV are displayed as UNR.</td>
</tr>
</tbody>
</table>
**Table 6** Device filter values (page 5 of 5)

<table>
<thead>
<tr>
<th>Value</th>
<th>Device description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WPA</td>
<td>Device in an SRDF group with group pacing or device pacing armed</td>
</tr>
<tr>
<td>WPE</td>
<td>Device in an SRDF group with group pacing or device pacing enabled</td>
</tr>
<tr>
<td>WPND</td>
<td>Device with a non-zero write-pending count</td>
</tr>
<tr>
<td>VD</td>
<td>Virtual device</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> Virtual devices do not display in Symmetrix DMX systems. For these systems, use the TimeFinder/Snap query functions to display virtual devices.</td>
</tr>
<tr>
<td>ZHW</td>
<td>zHyperWrite device</td>
</tr>
</tbody>
</table>

a. For Enginuity 5771 and later, COVDs are not required.
b. This filter cannot be used with the SELECT(filter) parameter for #SQ EPVOL, #SQ MIRROR, #SQ STATE, or #SQ VOL commands.
Query (SQ) commands

#SQ ADC

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

Only the source (R1) volumes in adaptive copy mode are displayed. The display includes volumes in adaptive copy disk mode or adaptive copy write-pending mode.

Syntax

```
#SQ ADC, cuu
[, count[, startingdev#] | ALL[, startingdev#]]
[, CQNAME=(cqname[, queue-option])]

#SQ ADC, LCL(cuu, srdfgrp)
[, count[, startingdev#] | ALL[, startingdev#]]
[, CQNAME=(cqname[, queue-option])]

#SQ ADC, RMT{(cuu, hoplist) | (cuu, hoplist, srdfgrp) | (cuu, hoplist, *)}
[, count[, startingdev#] | ALL[, startingdev#]]
[, CQNAME=(cqname[, queue-option])]

#SQ ADC, VOL(volser)
[, CQNAME=(cqname[, queue-option])]

#SQ ADC, G(groupname)
[, CQNAME=(cqname[, queue-option])]

#SQ ADC, SCFG(gnsgrp)
[, CQNAME=(cqname[, queue-option])]
```

**Note:** For the RMT command format, the (rdfcuu) parameter is no longer used; however, it is tolerated for existing code that uses it.

Parameters

**ALL**

Indicates that all devices that have adaptive copy information are to be included up to the value of the MAX_QUERY initialization parameter.

**Note:** The maximum value for MAX_QUERY is 8192. If the storage system displaying has more than 8192 devices, use command syntax specifying the starting PowerMax/VMAX device number.

**For example:** #SQ ADC, cuu, count, startingdev#

When used on the RMT statement with two subparameters specified, the ALL parameter includes all devices on the other-side storage system. When used on the RMT statement that includes three subparameters, the ALL parameter includes all devices in a particular SRDF group.
count

Specifies the number of devices that have adaptive copy information, starting from the first, to be included.

Note: For R11s with both legs in adaptive copy mode, count is number of R2s which are paired with the R11s and will be displayed.

count can be specified as an integer from 1 through the value specified in the MAX_QUERY initialization parameter. If this parameter is not specified, count defaults to 1.

Note: The maximum value for MAX_QUERY is 8192. If the storage system displaying has more than 8192 devices, use command syntax specifying the starting PowerMax/VMAX device number. For example: #SQ ADC,cuu,count,startingdev#

cqname

See “cqname” on page 130.

cuu

See “cuu” on page 130.

G(groupname)

See “G(groupname)” on page 130.

hoplist

See “hoplist” on page 131.

LCL

See “LCL” on page 131.

queue-option

See “queue-option” on page 131.

RMT

See “RMT” on page 132.

Note: For this format, the third subparameter may alternatively be specified as an asterisk (*). In that case, the command action then applies to all SRDF groups.

SCFG(gnsgrp)

See “SCFG(gnsgrp)” on page 133.

srdfgrp

See “srdfgrp” on page 133.

startingdev#

Identifies the device at which to start the display.
If the sort order is set to (or allowed to default to) SORT_BY_SYMDEV with the #SC GLOBAL command, the value specified is treated as a PowerMax/VMAX device number.

If the sort order is set to SORT_BY_VOLSER with the #SC GLOBAL command, the value specified is treated as a starting volume serial.

If the sort order is set to SORT_BY_MVSCUU with the #SC GLOBAL command, the value specified is treated as a starting z/OS device address.

VOL(volser)

See “VOL(volser)” on page 134.

Example

The following example shows the output from an #SQ ADC command:

```
EMCMN001 SRDF-HC : (52) &SQ ADC,LCL(6200,67),5,D3
EMCGM82I SRDF-HC DISPLAY FOR (52) &SQ ADC,LCL(6200,67),5,D3
SERIAL #:0001967-01130/0KDLN MICROCODE LEVEL:5977-813
DV_ADDR | SYM  | SYM  | GP | ADC | ADC_CUR | ADC_MAX
CUU   CH | LCL_DEV | RMT_DEV | MODE | SKEW | SKEW
6293  93    0000D3    000193   67   AD         0     65535
6294  94    0000D4    000194   67   AD         0     65535
6295  95    0000D5    000195   67   AD      2192     65535
6296  96    0000D6    000196   67   AD         0     65535
6297  97    0000D7    000197   67   AD         0     65535
END OF DISPLAY SORT_ORDER = SYMDEV
Total devices displayed = 5
```

Output fields

**SERIAL #**

The storage system serial number.

**Note:** When a storage system with PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5874 and later emulates an IBM 2107, it externally represents the serial number as an alphanumeric serial number to be compatible with IBM command output.

**MICROCODE LEVEL**

The level of the storage system operating environment.

**DV_ADDR**

The device’s z/OS device number.

**DV_ADDR CUU**

The device’s z/OS device number.

**DV_ADDR CH**

The first device address (hex) on the channel as specified in the IOCP gen.

**SYM LCL_DV**

The device’s PowerMax/VMAX device number.

**SYM RMT_DEV**

The PowerMax/VMAX device number of the device’s remote mirror.

**GP**

The number of the SRDF group to which the device belongs.

**ADC MODE**

The adaptive copy mode in effect. Possible values are AW (adaptive copy write-pending) or AD (adaptive copy disk).

**ADC_CUR SKEW**

The current skew value. For adaptive copy write-pending mode, this is the number of invalid tracks for the target (R2) volume. For adaptive copy disk mode, this 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). This value may be set using the #SC VOL command with the ADC_MAX action.

Note: RAID 10 volumes will set this maximum value on each member in the RAID 10 group. Therefore, the RAID 10 display of the ADC_MAX value will be 4 times the individual member maximum value.
#SQ CNFG

The #SQ CNFG command displays the status of the storage system. It lists the following:

- The serial number of the storage system
- The amount of installed cache memory
- The storage system emulation type
- The storage system model number
- The operating environment level, the SSIDs
- Features supported and enabled on the storage system, such as concurrent SRDF or dynamic SRDF
- The LINK DOMINO status
- The local storage system-level synchronization direction

**Note:** The synchronization direction set at the CNFG level is controlled by the synchronization direction on the gatekeeper storage system. This applies to commands entered locally or remotely. “Performing synchronization” on page 27 provides more details.

- The link type
- The director type and layout
- The director ports

Issue #SQ CNFG to determine the location of the remote link directors in the storage system for the SRDF operations.

To correctly display the configuration information after an operating environment upgrade, you must shut down and restart SRDF Host Component.

When PORT is specified, a director list is generated with all mapped and active ports for each director. The PORT action is only allowed against a storage system running PowerMaxOS 5978 or HYPERMAX OS 5977.

**Syntax**

```
#SQ CNFG, cuu [, PORT]
[, CQNAME=(cqname [, queue-option])]

#SQ CNFG, RMT(cuu, hoplist) [, PORT]
[, CQNAME=(cqname [, queue-option])]

#SQ CNFG, G(groupname) [, PORT]
[, CQNAME=(cqname [, queue-option])]

#SQ CNFG, SCFG(gnsgrp) [, PORT]
[, CQNAME=(cqname [, queue-option])]
```

**Note:** The PORT keyword is available for PowerMaxOS 5978 and HYPERMAX OS 5977.

**Note:** For the RMT command format, the (rdfcuu) parameter is no longer used; however, it is tolerated for existing code that uses it.
Command Reference

Parameters

cqname
See “cqname” on page 130.

cuu
See “cuu” on page 130.

G(groupname)
See “G(groupname)” on page 130.

hoplist
See “hoplist” on page 131.

PORT
Lists director configured (mapped) and active ports.

Note: The PORT keyword is available for PowerMaxOS 5978 and HYPERMAX OS 5977.

queue-option
See “queue-option” on page 131.

RMT
See “RMT” on page 132.

Note: For this format, the third subparameter may alternatively be specified as an asterisk (*). In that case, the command action then applies to all SRDF groups.

SCFG(gnsgrp)
See “SCFG(gnsgrp)” on page 133.

Examples

Example 1: VMAX All Flash
The following example shows the output from an #SQ CNFG command on a VMAX All Flash system:

EMCGM11I SRDF-HC DISPLAY FOR (183) #SQ CNFG,2900,CQNAME=(EMC12430034
SERIAL #:0001970-00165/0NTZR MEM:918 GB TYPE:2107 MODEL:VMAX450F
CNTRL:
MICROCODE LEVEL: 5977-903 CONCURRENT-RDF
CONCURRENT DRDF: YES 3-DYN-MIRROR
SYMMETRIX DATA ENCRYPTION: DISABLED
ALL FLASH: YES
SWITCHED-RDF DYNAMIC-RDF NO-AUTO-LINKS RDFGRP LINKS-OFF-ON-POWERUP
LINKS-DOMINO: RDFGRP SYNCH_DIRECTION: GLOBAL LINK: LOCAL
SSID(S): 2403 24F3 25E3 26D3 27C3 28B3 29A3 2A93
   6103 61F3 50FF 51FF 52FF 53FF 54FF 55FF
   56FF 57FF 58FF 59FF 5AFF 5BFF
   5CFF 5DFF 5EFF 5FFF
FIBRE CHANNEL ADAPTER (FA) DIRECTORS:
   .057(07F) 058(08F) 059(09F) 05A(10F)
...
END OF DISPLAY
Output fields

SERIAL # The storage system serial number.

Note: When a storage system with PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5874 and later emulates an IBM 2107, it externally represents the serial number as an alphanumeric number to be compatible with IBM command output.

MEM The available cache size; if MB, the amount is the number of megabytes; if GB, the amount is the number of gigabytes.

TYPE The storage system emulation type.

MODEL The storage system model.

CNTRL If a storage system name has been defined, it displays here. If no name is defined, this field is blank.

MICROCODE LEVEL The level of the storage system operating environment.

CONCURRENT-RDF Indicates that concurrent SRDF is enabled on the storage system. This feature allows multiple remote mirrors for a single device to be configured.

CONCURRENT DRDF If YES, indicates that the concurrent dynamic SRDF feature is enabled. This feature allows you to define a second SRDF pair for a device already paired with a single remote mirror using the SC VOL CREATEPAIR action, thereby creating an R1 device with two R2 remote mirrors.

3-DYN-MIRROR Displays if this feature is enabled on the storage system.

DATA-MOBILITY Indicates that Data Mobility (SRDF/DM) is enabled on the storage system.

SYMMETRIX DATA ENCRYPTION Displays the DARE (Data at Rest Encryption) status for the storage system, ENABLED or DISABLED. The Data at Rest Encryption feature protects data confidentiality by adding backend encryption to the entire system. This field is displayed only with PowerMaxOS 5978, HYPERMAX OS 5977, Enginuity 5875 or 5876.

ALL FLASH Indicates a VMAX All Flash system.

SWITCHED-RDF Displays if this feature is enabled on the storage system.

DYNAMIC-RDF Displays if this feature is enabled on the storage system.

NO-AUTO-LINK-RECOVERY Displays if this feature is enabled on the storage system.

NO-AUTO-LINK RDFGRP Displays if this feature may be set at the SRDF group level. If not displayed, the NO-AUTO-LINK-RECOVERY feature is set at the storage system level.

LINKS-OFF-ON-POWERUP Displays if this feature is enabled on the storage system.

SSID(S) The SSIDs defined for this storage system are listed.

The number of SSIDs displayed with the #SQ CNFG command may differ from that returned by the SCF DEV,DISPLAY command (described in the ResourcePak Base for z/OS Product Guide). #SQ CNFG lists all of the SSIDs in the storage system as returned by the CONFIGGLOBAL API call. SCF displays only those SSIDs that are mapped to the LPAR.

LINKS DOMINO • LINKS-DOMINO: YES indicates the mode is in effect.
• LINKS-DOMINO: NO indicates the mode is not in effect.
SYNCH_DIRECTION  Storage system-level synchronization. Values that may appear are R1>R2, R1<R2, NONE, or GLOBAL.

**Note:** This field displays only if the storage system is configured with SRDF.

LINK  Implementation:

- **LOCAL**—SRDF campus solution
- **EXTENDED**—SRDF extended distance solution

**Note:** This field displays only if the storage system is configured with SRDF.

director_type  DIRECTORS  Storage system director types. As shown in the example on page 146, the director numbers are listed for each type in hex format for SRDF Host Component and for the SymmWin configuration program (in parentheses).

**Note:** Disabled directors will have an explanation point (!) following the director number. Directors that are offline will have a hyphen (-) following the director number.

The director types are as follows:

- DISK (DA) DIRECTORS
- DISK FIBRE (DF) DIRECTORS
- ENGINUITY DATA SERVICES (ED) DIRECTORS
- ESCON CHANNEL (EA) DIRECTORS
- EXTERNAL DISK (DX) DIRECTORS
- FAST-WIDE SCSI CHANNEL (SA) DIRECTORS
- FIBRE CHANNEL ADAPTER (SF) DIRECTORS
- FIBRE CHANNEL REMOTE (RF) DIRECTORS
- FIBRE SA (FA) HOST ADAPTER
- FOUR-PORT FIBRE SA (F2) HOST ADAPTER
- FIBRE CHANNEL OVER ETHERNET (FCOE) DIRECTORS
- FICON (EF) DIRECTORS
- GIGE OPEN SYSTEMS (SE) DIRECTORS
- GIGE REMOTE (RE) DIRECTORS
- INFRASTRUCTURE MANAGEMENT (IM) DIRECTORS
- NON-VOLATILE MEMORY EXPRESS (DN) DIRECTORS
- PARALLEL CHANNEL (CA) DIRECTORS
- REMOTE LINK (RA) DIRECTORS
- REMOTE LINK SOURCE (R1) DIRECTORS
- REMOTE LINK TARGET (R2) DIRECTORS
- SAS BACKEND (DS) DIRECTORS

1. Available starting with PowerMaxOS 5978.
**Example 2: VMAX 20K**

The following example shows the output from an #SQ CNFG command on a VMAX 20K system:

```
EMCGM11I SRDF-HC DISPLAY FOR (7) #SQ CNFG,9000
SERIAL #:001926-02840/OAKXM MEM:112 GB  TYPE:2107 MODEL:VMAX20K
CNTRL:UTD1
MICROCODE LEVEL: 5876-231  CONCURRENT-RDF  DATA-MOBILITY
CONCURRENT DRDF: YES  3-DYN-MIRROR
SYMMETRIX DATA ENCRYPTION: DISABLED
FICON ACCELERATOR: ENABLED
SWITCHED-RDF DYNAMIC-RDF NO-AUTO-LINKS RDFGRP LINKS-OFF-ON-POWERUP
LINKS-DOMINO: RDFGRP  SYNCH_DIRECTION: GLOBAL  LINK: LOCAL
SSID(S): 9000 0140 0001 0002 0144 9001 9002 0143
        0145 9003 0146 0147 0148 0003
DISK (DA) DIRECTORS:  
005(05A) 006(06A) 007(07A) 008(08A) 009(09A) 00A(10A)
00B(11A) 00C(12A) 015(05B) 016(06B) 017(07B) 018(08B)
019(09B) 01A(10B) 01B(11B) 01C(12B) 025(05C) 026(06C)
027(07C) 028(08C) 029(09C) 02A(10C) 02B(11C) 02C(12C)
035(05D) 036(06D) 037(07D) 038(08D) 039(09D) 03A(10D)
03B(11D) 03C(12D)
External DISK (DX) DIRECTORS:  
00D(13A) 00E(14A)
FICON (EF) DIRECTORS:  
065(05G) 066(06G) 067(07G) 068(08G) 069(09G) 06A(10G)
06B(11G) 06C(12G)
FIBRE CHANNEL ADAPTER (SF) DIRECTORS:  
045(05E) 046(06E) 047(07E) 048(08E) 049(09E) 04A(10E)
04B(11E) 04C(12E) 055(05F) 056(06F) 05B(11F) 05C(12F)
FIBRE CHANNEL REMOTE (RF) DIRECTORS:  
057(07F) 058(08F) 059(09F) 05A(10F)
END OF DISPLAY
```

**Output fields**

**Note:** The fields in Example 2 are same as in Example 1 except for the FICON ACCELERATOR field. For field description, see “Output fields” on page 147.

**FICON ACCELERATOR**

Displays the status of FICON Accelerator on the VMAX 20K system. Possible values are ENABLED, DISABLED, or UNAVAILABLE.

FICON Accelerator improves the maximum IOPS and reduces I/O response times in FICON environments. This field will only be displayed for storage systems running Enginuity 5876.
**Example 3: PORT option**

The following examples shows the output from an #SQ CNFG command with the PORT parameter:

```
EMCGM15I SRDF-HC DISPLAY FOR (3) #SQ CNFG,2A00,PORT
SERIAL #:0001972/00003 MICROCODE LEVEL:5977-159

<table>
<thead>
<tr>
<th>DIRECTOR</th>
<th>MAPPED PORTS (M)</th>
<th>ACTIVE PORTS (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FA - 041(01E)</td>
<td>M - 20,08,09</td>
<td>A - 20</td>
</tr>
<tr>
<td>FA - 042(02E)</td>
<td>M - 08,09</td>
<td>A - NONE</td>
</tr>
<tr>
<td>FA - 043(03E)</td>
<td>M - 08,09</td>
<td>A - NONE</td>
</tr>
<tr>
<td>FA - 044(04E)</td>
<td>M - 08,09,0C</td>
<td>A - 0C</td>
</tr>
<tr>
<td>RF - 051(01F)</td>
<td>M - 14</td>
<td>A - 14</td>
</tr>
<tr>
<td>RF - 052(02F)</td>
<td>M - 14</td>
<td>A - NONE</td>
</tr>
<tr>
<td>RF - 053(03F)</td>
<td>M - 14</td>
<td>A - 14</td>
</tr>
<tr>
<td>RF - 054(04F)</td>
<td>M - 14</td>
<td>A - NONE</td>
</tr>
<tr>
<td>EF - 071(01H)</td>
<td>M - 1C,1D</td>
<td>A - 1C,1D</td>
</tr>
<tr>
<td>EF - 072(02H)</td>
<td>M - 1C,1D</td>
<td>A - 1C,1D</td>
</tr>
<tr>
<td>EF - 073(03H)</td>
<td>M - 1C,1D</td>
<td>A - 1C,1D</td>
</tr>
<tr>
<td>EF - 074(04H)</td>
<td>M - 1C,1D</td>
<td>A - 1C,1D</td>
</tr>
<tr>
<td>DS - 021(01C)</td>
<td>M - 0C,0D,10,11</td>
<td>A - 0C,10</td>
</tr>
<tr>
<td>DS - 022(02C)</td>
<td>M - 0C,0D,10,11</td>
<td>A - 0C,10</td>
</tr>
<tr>
<td>DS - 023(03C)</td>
<td>M - 0C,0D,10,11</td>
<td>A - 0C,0D,10,11</td>
</tr>
<tr>
<td>DS - 024(04C)</td>
<td>M - 0C,0D,10,11</td>
<td>A - 0C,0D,10,11</td>
</tr>
</tbody>
</table>
```

**Output fields**

- **DIRECTOR**: The director type.
- **MAPPED PORTS (M)**: Configured ports available for the director.
- **ACTIVE PORTS (A)**: Ports that are currently being used by that director.
#SQ DSTAT

The #SQ DSTAT command displays director statistics.

When issued without director and/or port specification parameters, the #SQ DSTAT command displays all directors with all ports statistics.

When issued against Enginuity 5876 and open systems host directors, port statistics is displayed even when the PORT option is not specified.

Syntax

```plaintext
#SQ DSTAT, cuu[,dir#|,ALL][,PORT]
[,CQNAME=(cqname[,queue-option])]

#SQ DSTAT, RMT{(cuu,hoplist)|(cuu,hoplist,*))[,dir#|,ALL][PORT]
[,CQNAME=(cqname[,queue-option])]

#SQ DSTAT, VOL(volser)[,dir#|,ALL][,PORT]
[,CQNAME=(cqname[,queue-option])]

#SQ DSTAT, SSID(ssid)[,dir#|,ALL][,PORT]
[,CQNAME=(cqname[,queue-option])]

#SQ DSTAT, G(groupname)[,dir#|,ALL][,PORT]
[,CQNAME=(cqname[,queue-option])]

#SQ DSTAT, SCFG(gnsgrp)[,dir#|,ALL][,PORT]
[,CQNAME=(cqname[,queue-option])]
```

**Note:** The PORT keyword is valid for PowerMaxOS 5978 and HYPERMAX OS 5977.

**Note:** For the RMT command format, the (rdfcuu) parameter is no longer used; however, it is tolerated for existing code that uses it.

Parameters

- **cqname**
  
  See “cqname” on page 130.

- **cuu**
  
  See “cuu” on page 130.

- **dir#**
  
  Specifies the director number. Values that may appear are from 1 to 80 (hex) or ALL.

- **G(groupname)**
  
  See “G(groupname)” on page 130.

- **hoplist**
  
  See “hoplist” on page 131.
PORT
Displays port statistics.

Note: The PORT keyword is valid for PowerMaxOS 5978 and HYPERMAX OS 5977.

queue-option
See “queue-option” on page 131.

RMT
See “RMT” on page 132.

Note: For this format, the third subparameter may alternatively be specified as an asterisk (*). In that case, the command action then applies to all SRDF groups.

SCFG(gnsgrp)
See “startingdev#” on page 142.

SSID(ssid)
See “SSID(ssid)” on page 133.

VOL(volser)
See “VOL(volser)” on page 134.

Example
Example 1: PORT option
The following example shows the output from an #SQ DSTAT,PORT command:

Example 1: PORT option
The following example shows the output from an #SQ DSTAT,PORT command:
### Command Reference

#### Output fields

**Note:** Display units are explained in “Display units” on page 157.

**DIR** The director number.

**TYP** The type of director.

- **Mainframe host director types**
  - CA Parallel channel host adapter
  - EA ESCON channel host adapter
  - EF FICON channel host adapter
Open systems host director types

- F2 Four-port fibre SA host adapter
- FA Fibre SA host adapter
- FCOE Fiber Channel over Ethernet adapter
- SA SCSI host adapter
- SE GigE SA host adapter
- SF Fibre Channel adapter directors

The disk director types are:

- DA Disk director
- DF Disk Fibre director
- DN DN Non Volatile Memory Express (NVME) drive disk director
- DS Serial Attached SCSI (SAS)
- DX External disk director

Note: Disabled directors display the text ‘DISABLED DIRECTOR’ at the end of the statistics for that director. Offline directors display the text ‘OFFLINE DIRECTOR’ after the statistics.

The SRDF director types are:

- R1 ESCON SRDF director (RA1 mode)
- R2 ESCON SRDF director (RA2 mode)
- RE GigE SRDF director
- RF Fibre SRDF director

STATS Statistics for each host director.

The set of statistics shown depends upon the director type, and the descriptions for the fields may differ slightly depending upon the director type as well.

Mainframe director type

The format for a mainframe host director statistics display is as follows:

<table>
<thead>
<tr>
<th>4C</th>
<th>EF</th>
<th>WRT: 714 M</th>
<th>TIO: 4 G</th>
<th>HIT: 3 G</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>REQ: 3 G</td>
<td>MIS: 180 M</td>
<td>SWP: 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DWP: 0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The fields for a mainframe host director statistics display are:

- DWP Device write-pending events
- HIT Hits
- MIS Read misses
- REQ Requests
- SWP System write-pending events
- TIO Total I/Os
- WRT Number of writes
Open systems director type

The format for an open systems host director statistics display is as follows:

<table>
<thead>
<tr>
<th>PORT</th>
<th>STATS</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>TIO: 0 THU: 0</td>
</tr>
<tr>
<td>01</td>
<td>TIO: 0 THU: 0</td>
</tr>
</tbody>
</table>

The fields for an open systems host director statistics display are:

- **DWP**: Device write-pending events
- **HIT**: Hits
- **IO0**: I/Os port 0
- **IO1**: I/Os port 1
- **MIS**: Read misses
- **REQ**: Requests
- **SWP**: System write-pending events
- **TIO**: Total I/Os
- **TP0**: Throughput port 0
- **TP1**: Throughput port 1
- **WRT**: Number of writes

Disk director type

The format for a disk director statistics display is as follows:

<table>
<thead>
<tr>
<th>DF</th>
<th>TIO: 1 T</th>
<th>REQ: 635 G</th>
<th>REA: 57 G</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WRT: 577 G</td>
<td>PFT: 24 G</td>
<td>PTN: 10 M</td>
</tr>
<tr>
<td></td>
<td>PTU: 34 G</td>
<td>SMS: 9 M</td>
<td>LMS: 1,883 M</td>
</tr>
<tr>
<td></td>
<td>RES: 5 G</td>
<td>PMM: 31</td>
<td>PCR: 0</td>
</tr>
<tr>
<td></td>
<td>FTT: 18,570</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The fields for a disk director statistics display are:

- **FTT**: Fall through time
- **LMS**: Long misses
- **PCR**: Perma cache requests
- **PFT**: Prefetch tracks
- **PMM**: Prefetch mismatches
- **PTN**: Prefetch tracks not used
- **PTU**: Prefetch tracks used
- **REA**: Reads
- **REQ**: Requests
- **RES**: Prefetch restarts
- **SMS**: Short misses
- **TIO**: Total I/Os
- **WRT**: Writes
**SRDF director type**

The Fibre and GigE SRDF director statistics display as follows:

<table>
<thead>
<tr>
<th>PORT</th>
<th>STATS</th>
</tr>
</thead>
<tbody>
<tr>
<td>56 RF</td>
<td>TIO: 2 G LUC: 0 LUI: 0 LU2: 0 RCV: 1 PB SNT: 47 TB</td>
</tr>
<tr>
<td>77 RE</td>
<td>TIO: 0 LUC: 0 LUI: 0 LU2: 0 RCV: 0 SNT: 0</td>
</tr>
</tbody>
</table>

The fields for an SRDF director statistics display are:

- **LU1**  T1 link utilization counter
- **LU2**  T2 link utilization counter
- **LUC**  Link utilization counter
- **RCV**  Bytes received
- **SNT**  Bytes sent
- **TIO**  Total I/Os

**PORT**

The port number.

**STATS**

Statistics for each port.

The fields available for port statistics are:

- **TIO**  Total I/Os
- **THU**  Read+Write throughput blocks

**Example 2:**

*No port statistics*

When no port statistics is returned and only port speed is available, the output is as follows:

```
EMCNM001 SRDF-HC : (4) #SQ DSTAT,3800
EMCQT001 SRDF-HC DISPLAY FOR (4) #SQ DSTAT,3800 045
SERIAL #:0001957-00079/0GKHK MICROCODE LEVEL:5876-270
DIR TYP STATS
--- --- ---------------------------------------------------------
PTU: 5 G SMS: 1 M LMS: 37 M RES: 109 M PMM: 0 PCR: 0
FTT: 18,570
**** CONFIGURED PORT SPEED: 00: 4Gb/SEC
**** CONFIGURED PORT SPEED: 01: 4Gb/SEC
PTU: 36 G SMS: 9 M LMS: 1,488 M RES: 2 G PMM: 11 PCR: 0
FTT: 18,570
**** CONFIGURED PORT SPEED: 00: 4Gb/SEC
**** CONFIGURED PORT SPEED: 01: 4Gb/SEC
07 DF TIO: 1 T REQ: 635 G REA: 57 G WRT: 577 G PFT: 24 G PTN: 10 M
PTU: 34 G SMS: 9 M LMS: 1,883 M RES: 5 G PMM: 31 PCR: 0
FTT: 18,570
**** CONFIGURED PORT SPEED: 00: 4Gb/SEC
**** CONFIGURED PORT SPEED: 01: 4Gb/SEC
08 DF TIO: 3 T REQ: 1 T REA: 180 G WRT: 1 T PFT: 88 G PTN: 8 M
FTT: 18,570
**** CONFIGURED PORT SPEED: 00: 4Gb/SEC
**** CONFIGURED PORT SPEED: 01: 4Gb/SEC
PTU: 8 G SMS: 2 M LMS: 143 M RES: 457 M PMM: 0 PCR: 0
FTT: 18,570
**** CONFIGURED PORT SPEED: 00: 4Gb/SEC
**** CONFIGURED PORT SPEED: 01: 4Gb/SEC
```
Display units

- For all byte fields (such as SNT or RCV), the following display units are used:

  - **KB** Value is expressed in kilobytes. 1KB = 1024
  - **MB** Value is expressed in megabytes. 1MB = 1024 KB
  - **GB** Value is expressed in gigabytes. 1GB = 1024 MB
  - **TB** Value is expressed in terabytes. 1TB = 1024 GB
  - **PB** Value is expressed in petabytes. 1PB = 1024 TB

- Non-byte fields (such as counters, event hits, and so on) are displayed by magnitude, where:

  - **K = 1000**
  - **M = 1000 K**
  - **G = 1000 M**
  - **T = 1000 G**
  - **P = 1000 T**
**#SQ EPVOL**

The #SQ EPVOL command displays attributes that are unique to externally provisioned FTS volumes.

*Note:* The ResourcePak Base for z/OS Product Guide provides more information about Federated Tiered Storage (FTS) functionality.

### Syntax

```plaintext
#SQ EPVOL, cuu
[.SELECT(filter),[startingdev#]]|
[.count[,startingdev#]]|[[ALL[,startingdev#]]]|
[.statefilter[[startingdev#]]]
[.CQNAME=(cqname[,queue-option])]```

```plaintext
#SQ EPVOL, RMT(cuu, hoplist[, srdfgrp])
[.SELECT(filter),[startingdev#]]|
[.count[,startingdev#]]|[[ALL[,startingdev#]]]|
[.CQNAME=(cqname[,queue-option])]```

```plaintext
#SQ EPVOL, LCL(cuu, srdfgrp)
[.SELECT(filter),[startingdev#]]|
[.count[,startingdev#]]|[[ALL[,startingdev#]]]|
[.CQNAME=(cqname[,queue-option])]```

```plaintext
#SQ EPVOL, G(groupname)
[.SELECT(filter),statefilter]
[.CQNAME=(cqname[,queue-option])]```

```plaintext
#SQ EPVOL, SCFG(gnsgrp)
[.SELECT(filter),statefilter]
[.CQNAME=(cqname[,queue-option])]
```

### Parameters

**ALL**

Indicates that all devices that have adaptive copy information are to be included up to the value of the MAX_QUERY initialization parameter.

*Note:* The maximum value for MAX_QUERY is 8192. If the storage system displaying has more than 8192 devices, use command syntax specifying the starting PowerMax/VMAX device number.

For example: `#SQ EPVOL, cuu, count, startingdev#`

When used on the RMT statement with two subparameters specified, the ALL parameter includes all devices on the other-side storage system. When used on the RMT statement that includes three subparameters, the ALL parameter includes all devices in a particular SRDF group.

**count**

Specifies the number of devices that have adaptive copy information, starting from the first, to be included.
count can be specified as an integer from 1 through the value specified in the MAX_QUERY initialization parameter. If this parameter is not specified, count defaults to 1.

**Note:** The maximum value for MAX_QUERY is 8192. If the storage system displaying has more than 8192 devices, use command syntax specifying the starting PowerMax/VMAX device number.

For example: #SQ EPVOL, cuu, count, startingdev#

cqname
See “cqname” on page 130.

cuu
See “cuu” on page 130.

G(groupname)
See “G(groupname)” on page 130.

hoplist
See “hoplist” on page 131.

queue-option
See “queue-option” on page 131.

RMT
See “RMT” on page 132.

SCFG(gnsgrp)
See “SCFG(gnsgrp)” on page 133.

SELECT(filter)
Filters devices to be displayed by using one or more device filters that can be logically combined in various ways, as described in “Device selection using SELECT” on page 134.

Table 6 on page 136 lists the values you may specify for filter.

srdfgrp
See “queue-option” on page 131.

startingdev#
Identifies the device at which to start the display.

statefilter
Indicates that only devices whose state matches the statefilter value you specify are to be included in the display.

Table 6 on page 136 lists valid statefilter values. The following values are specific to FTS: EDISK, EDISK-EXT, EDISK-ENC, EDISK-EDP, EDISK-EVP, EDISK-ENCC, EDISK-EDPC, EDISK-EVPC.

If you specify ALL as the statefilter, only FTS devices are displayed.
Example

The following example shows the output from an #SQ EPVOL command:

```
EMCMN001 SRDF-HC : (766) S8SQ EPVOL,A500,ALL
EMCVV411 SRDF-HC DISPLAY FOR S8SQ EPVOL,A500,ALL
SERIAL #:0001926-01302/0ADPN MICROCODE LEVEL:5876-0286
---------------
host symm |-----------------------------------------------------
cuu dev | dx | type                  | blksz | blks alc |
         | wwid                                   |
         | group# | group name
-----------------------------------------------------
???? 003473  56 ENCAP-DP                      512        11520
       60000970000192601881533030303745
       512 DISK_GROUP_512
............
???? 0034FC  56 ENCAP-DP                      512        11520
       60000970000192601881533030303745
       512 DISK_GROUP_512
AA30 0034FD  56 ENCAP-DP                      512        11520
       60000970000192601881533030303745
       512 DISK_GROUP_512
AA31 0034FE  56 ENCAP-DP                      512        11520
       60000970000192601881533030303745
       512 DISK_GROUP_512
AA32 0034FF  56 ENCAP-DP                      512        11520
       60000970000192601881533030303745
---------------
```

Output fields

**host cuu**
This field is reserved for the z/OS device number. Since FTS only supports FBA
devices, this field may contain ????? because the external device is not
host-addressable.

**symm dev**
This field contains the PowerMax/VMAX device number.

**dx**
This field contains the DX director number that controls this device.

**type**
This field contains a description of the FTS model used for this device, as follows:

- **ENCAP-DP** Encapsulated Disk Provisioning
- **ENCAP-THIN-DATA** Encapsulated thin data device
- **ENCAP-VP** Encapsulated Virtual Provisioning
- **EXTERNAL** External provisioning
- **EXTERNAL-THIN-DATA** External provisioning thin data device

**blksz**
This field contains the FBA block size used for this device.

**blks alc**
This field contains the total number of blocks allocated for this device.

**wwid**
This field contains the WWID (World Wide ID) on the SAN.

**group#**
This field contains the disk group number defined at configuration time.

**group name**
This field contains the disk group name defined at configuration time.
#SQ FAVOL

The #SQ FAVOL command displays the status of FBA devices attached to the FA port that have at least one port that is write-prohibited.

**Note:** You can use the #SC FAVOL command to turn off the Write Prohibit bit for the devices. “Manipulating and displaying FBA device states” on page 411 provides an example illustrating the use of both the #SQ FAVOL and #SC FAVOL commands.

**Syntax**

```
#SQ FAVOL, cuu
[,count[,startingdev#]]|[,ALL[,startingdev#]]
[,CQNAME=(cqname[,queue-option])]  

#SQ FAVOL, RMT{(cuu, hoplist, srdfgrp) | (cuu, hoplist)}
[,count[,startingdev#]]|[,ALL[,startingdev#]]
[,CQNAME=(cqname[,queue-option])] 

#SQ FAVOL, LCL(cuu, srdfgrp)
[,count[,startingdev#]]|[,ALL[,startingdev#]]
[,CQNAME=(cqname[,queue-option])] 

#SQ FAVOL, G(groupname)
[,CQNAME=(cqname[,queue-option])] 

#SQ FAVOL, SCFG(gnsgrp)
[,CQNAME=(cqname[,queue-option])] 
```

**Parameters**

- **ALL**

  Indicates that all devices are to be included in the display up to the value of the MAX_QUERY initialization parameter.

  **Note:** The maximum value for MAX_QUERY is 8192. If the storage system displaying has more than 8192 devices, use command syntax specifying the starting PowerMax/VMAX device number. 

  For example: #SQ FAVOL, cuu, count, startingdev#

  The ALL parameter cannot be used with the SCFG(gnsgrp) or G(groupname) parameters.

  When used on the RMT statement with two subparameters specified, the ALL parameter includes all devices on the other-side storage system. When used on the RMT statement that includes three subparameters, the ALL parameter includes all devices in a particular SRDF group.
**count**

`count` specifies the number of devices, starting from the first, to be included in the display. It can be specified as an integer from 1 through the value specified in the MAX_QUERY initialization parameter. If this parameter is not specified, `count` defaults to 1.

**Note:** The maximum value for MAX_QUERY is 8192. If the storage system displaying has more than 8192 devices, use command syntax specifying the starting PowerMax/VMAX device number. For example: 

```
#SQ FAVOL, cuu, count, startingdev#
```

The `count` parameter cannot be used with the SCFG(gnsgrp) or G(groupname) parameters.

**cqname**

See “cqname” on page 130.

**cuu**

See “cuu” on page 130.

**G(groupname)**

See “G(groupname)” on page 130.

**hoplist**

See “hoplist” on page 131.

**RMT**

See “RMT” on page 132.

**queue-option**

See “queue-option” on page 131.

**SCFG(gnsgrp)**

See “SCFG(gnsgrp)” on page 133.

**srdfgrp**

See “srdfgrp” on page 133.

**startingdev#**

Identifies the device at which to start the display.
Example

**Example 1**
PowerMaxOS 5978 or HYPERMAX OS 5977

The following example shows the output from an #SQ FAVOL command under PowerMaxOS 5978 and HYPERMAX OS 5977.

EMCMN001 SRDF-HC : (4) MNSQ FAVOL,3800
EMCMQV42T SRDF-HC DISPLAY FOR MNSQ FAVOL,3800  592
SERIAL #:0001976-00210/0WCVY MICROCODE LEVEL:5978-0125

WRITE PROHIBITED DEVICES

<table>
<thead>
<tr>
<th>WRITE PROHIBITED DEVICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>000001</td>
</tr>
<tr>
<td>END OF DISPLAY</td>
</tr>
</tbody>
</table>

**Output fields**

WRITE PROHIBITED DEVICES

This field specifies the PowerMax/VMAX device numbers of FBA devices that have the Write Prohibit bit set to ON.

Example 2

Enginuity 5876

The following example shows the output from an #SQ FAVOL command under Enginuity 5876. The display only indicates FBA devices that have the Write Prohibit bit set to ON.

EMCMN001 SRDF-HC : (8) #SQ FAVOL,3C00,2
EMCMQV42T SRDF-HC DISPLAY FOR #SQ FAVOL,3C00,2  690
SERIAL #:0001957-00080/0GKHL MICROCODE LEVEL:5876-0245

<table>
<thead>
<tr>
<th>DEV</th>
<th>DRT-DRN</th>
<th>WRITE PROHIBITED PORTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>128D0 FCOE-08E (048)</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>FCOE-08F (058)</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>FCOE-07G (067)</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>FCOE-08G (068)</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>FCOE-07H (077)</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>FCOE-08H (078)</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>128D6 FCOE-08E (048)</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>FCOE-08F (058)</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>FCOE-07G (067)</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>FCOE-08G (068)</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>FCOE-07H (077)</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>FCOE-08H (078)</td>
<td>0,1</td>
<td></td>
</tr>
</tbody>
</table>

END OF DISPLAY       Total devices displayed = 2

**Output fields**

DEV

This field specifies the PowerMax/VMAX device number.

DRT

This field contains the storage system director type. Possible values are as follows:

| FA | Fibre SA host adapter |
| FCOE | Fiber Channel over Ethernet adapter |
| SA | SCSI host adapter |
| SE | GigE SA host adapter |

DRN

This field specifies the director number in SymmWin configuration format and SRDF Host Component format (in parentheses).

WRITE PROHIBITED PORTS

This field specifies the ports that are set to Write-Prohibit.
#SQ GLOBAL

The #SQ GLOBAL command displays the settings for 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 that determines which SRDF Host Component commands require operator confirmation, the ddname of the current log file, and whether or not status changes to FBA devices are allowed. Optionally, the MODLVL parameter can be used to display the SRDF Host Component module levels that are currently running. Both #SQ GLOBAL and #SQ GLOBAL,MODLVL are issued at startup.

Syntax

```
#SQ GLOBAL[,MODLVL]
[,CQNAME=(cqname[,queue-option])]
```

Parameters

cqname

See “cqname” on page 130.

MODLVL

Displays all base SRDF Host Component run modules and, for each module, displays the compilation date and time, software version number, the last PTF that has been applied, and the length.

MODLVL is a diagnostic aid for use when working with Dell EMC Customer Service. MODLVL also displays automatically at SRDF Host Component initialization.

queue-option

See “queue-option” on page 131.

Examples

**Example 1:**

Standard display

The following example shows the output from an #SQ GLOBAL command:

```
EMCQG00I SRDF-HC DISPLAY FOR (3) #SQ GLOBAL  804
VERSION:      8.3.0      SYNCH_DIR_CURR: R1>R2     MSG_PROC:  YES,512
OPER_VERIFY:  NONE      SYNCH_DIR_ALWD: R1<>R2    LOG_DDNAM: HCLOG1
CONFIG_PBA:   ENABLED    MAX_QUERY:      4096      MAX_CMDQ:  4096
SORT_ORDER:  SYMDEV     MAX_QUERY:      4096      MAX_CMDQ:  4096
HC-PTF:       0000       SCF-VERSION:    8.3.0  SCF-PTF:      0000
CRPAIR_NCPY:  STAR       DISP_MODE:      4BYTE_ON
```

**Output fields**

**VERSION**

Indicates the SRDF Host Component release version.

**SYNCH_DIR_CURR**

Indicates the current synchronization direction. This value is initially set by the SYNCH_DIRECTION_INIT parameter, and may be subsequently modified by the #SC GLOBAL,SYNCH_DIRECTION command.

**MSG_PROC**

Indicates the message processing option in effect. When YES is shown, the number following is the number of messages that can be held in the message table. When LOG is shown, the number following indicates the number of messages that can be held in the message table.
Note that all messages are also written to the HCLOGn file, provided a corresponding DD statement has been included in the JCL. The message processing option is set by the MESSAGE_PROCESSING initialization parameter.

**OPER_VERIFY**
Indicates the setting for operator verification of SRDF Host Component command specified by the OPERATOR_VERIFY initialization parameter. Possible values are:

- **ALL**
  Operator verification, consisting of a reply of CONTINUE to a WTOR identifying the command being requested, will be required prior to processing of any SC command.

- **CRITICAL**
  Operator verification, consisting of a reply of CONTINUE to a WTOR identifying the command being requested, will be required prior to processing of any SC command deemed critical to SRDF Host Component operation.

- **NONE**
  No operator verification of any command will be required.

**SYNCH_DIR_ALWD**
Indicates the allowable synchronization directions that may be specified in subsequent #SC GLOBAL,SYNCH_DIRECTION commands specified by the SYNCH_DIRECTION_ALLOWED initialization parameter. One of the values R1<R2, R1>R2, R1<>R2, or NONE is shown.

*Note: If SYNCH_DIRECTION is set to R1<R2, the synchronization direction can be changed to R1<R2 or NONE.*

**LOG_DDNAM**
Displays the ddname of the current log file if defined by HCLOGx DD statements in the execution JCL. A value is N/A indicates that commands are not being logged. This value may change when the #SC GLOBAL,SWAPLOG command is entered.

**SORT_ORDER**
Shows the order in which devices are displayed in the output from an #SQ VOL, #SQ STATE, or #SQ MIRROR command.

**CONFIG_FBA**
Indicates whether #SC VOL commands directed to FBA devices are processed by SRDF Host Component:

- **ENABLED**
  #SC VOL commands are processed for FBA devices.

- **DISABLED**
  FBA devices are skipped during processing of #SC VOL commands.

The setting can be changed with the #SC GLOBAL command by specifying FBA_ENABLE or FBA_DISABLE.

**MAX_QUERY**
Indicates the maximum number of lines that may be displayed by individual #SQ(uery) commands. This value is set by the MAX_QUERY initialization parameter.

**MAX_CMDQ**
Indicates the maximum number of SRDF Host Component commands that can be queued for parsing. This value is set by the MAX_COMMANDQ initialization parameter.

**HC-PTF**
Displays the highest level PTF applied to the running SRDF Host Component. For detailed PTF information, issue the #SQ GLOBAL,MODLVL command.

**SCF-VERSION**
Displays the running SCF (ResourcePak Base) version.

**SCF-PTF**
Displays the highest level PTF applied to SCF (ResourcePak Base).
CRPAIR_NCPY This field shows the permitted usage of the NOCOPY option on #SC VOL CREATEPAIR commands:

YES

'NOCOPY' may be used on any CREATEPAIR action.

NO

'NOCOPY' may not be used on any CREATEPAIR action.

SQAR|STAR

'NOCOPY' may be used only on CREATEPAIR actions on which the SRDF group specified is an SRDF/Star or SQAR group.

The value of this option is set using the ALLOW_CRPAIR_NOCOPY statement.

DISP_MODE Indicates how PowerMax/VMAX device numbers are displayed in SRDF Host Component command output:

4BYTE_ON 4-byte PowerMax/VMAX device numbers

4BYTE_OFF 2-byte PowerMax/VMAX device numbers

This setting is made using the DISPLAY_MODE initialization parameter described in “DISPLAY_MODE” on page 77.

Example 2: MODLVL option

The output from an #SQ GLOBAL,MODLVL command is similar to the following:

EMCLM001 SRDF-HC DISPLAY FOR (2) @#SQ GLOBAL,MODLVL
MODULE EP | NAME | COMPILE DATE-TIME | LEVEL | USECOUNT | PTF LVL | LEN
190EF108* SLDRANGE 02/05/18-18.05 8.3.0 BASECOD 001EF8
190F11D8* CHKPOIN1 02/05/18-18.05 8.3.0 BASECOD 0012C8
190F37B8* CUIUXXCL 02/05/18-18.05 8.3.0 BASECOD 003848
190F7108* DEBUGSM 02/05/18-18.05 8.3.0 BASECOD 000EF8
1910BB98* DUMPSYM 02/05/18-18.05 8.3.0 BASECOD 001468
19291E60* DYNAGRP 02/05/18-18.05 8.3.0 BASECOD 0091A0
16D9FA10* EHCMMN 02/05/18 18.05 8.3.0 BASECOD 00A5F0
191B320* EHCDEVT 02/05/18-18.05 8.3.0 BASECOD 01ACE0
192A94D8* EHCERRTR 02/05/18-18.05 8.3.0 BASECOD 00F2B8
1927FBD8* EHCGRM82 02/05/18-18.05 8.3.0 BASECOD 005430
191D57F8* EHCISSN 02/05/18-18.05 8.3.0 BASECOD 029BA0
191E3168* EHCNCKN 02/05/18-18.05 8.3.0 BASECOD 00C928
1411F6DD* EHCNCKR 02/05/18-18.05 8.3.0 BASECOD 00C928
1925B6E0* EHCQV00 02/05/18-18.05 8.3.0 BASECOD 008420
192A4348* EHCQV08E 02/05/18-18.06 8.3.0 BASECOD 01ACB8
191CB280* EHCQV32E 02/05/18-18.06 8.3.0 BASECOD 009D80
1926E628* EHCQV35 02/05/18-18.07 8.3.0 BASECOD 0089D8
19275750* EHCQV40 02/05/18-18.07 8.3.0 BASECOD 007AB0
1920F930* EHCQV41 02/05/18-18.07 8.3.0 BASECOD 0056D0
191EEA98* EHCQV41E 02/05/18-18.07 8.3.0 BASECOD 020568
19215E10* EHCQV42E 02/05/18-18.07 8.3.0 BASECOD 02E1F0
14112380* EHCNV301 02/05/18-18.07 8.3.0 BASECOD 00C7D0
19295950* EHCSCVOL 02/05/18-18.07 8.3.0 BASECOD 005430
1907F8B2* EHCSTBLS 02/05/18-18.07 8.3.0 BASECOD 0074D8
19244878* EHCVWRN 02/05/18-18.07 8.3.0 BASECOD 005788
14110F61* EHC0191 02/05/18-18.07 8.3.0 BASECOD 0029E8
190FA9D8* EHCQV42E 02/05/18-18.07 8.3.0 BASECOD 00000002 BASECOD 001628
1907C748* EMCCMDT 02/05/18-18.07 8.3.0 BASECOD 016888
190DEBE50* EMCHBT 02/05/18-18.07 8.3.0 BASECOD 00B470
00013CC0* EMCINIT 02/05/18-18.07 8.3.0 BASECOD 012B88
0003EC20* EMCNSG 02/05/18-18.08 8.3.0 BASECOD 00B3E0
19089590* EMCNSG02 02/05/18-18.08 8.3.0 BASECOD 03D870
16DA5850* EMCNSG02 02/05/18-17.18 8.3.0 BASECOD 0047B0
1620AA88* EMCPCL01 02/05/18-18.07 8.3.0 BASECOD 0455F8
16DA15F0* EMCSAPI 02/05/18-17.18 00000002 002798
1929BD0* EMCSRAPH 02/05/18-18.08 8.3.0 00000008 BASECOD 003280
19000A0F1 EMSCST 02/05/18-18.08 8.3.0 BASECOD 05B510
190FC0A8* HSCRATCH 02/05/18-18.08 8.3.0 BASECOD 00CF58
Output fields

**MODULE EP|NAME**
Indicates the name of each currently running base SRDF Host Component module.

**COMPILE DATE-TIME**
Displays the compilation date and time for the module.

**LEVEL**
Indicates the module software version number.

**USECOUNT**
Indicates the number of times the module has been accessed.

**PTF LVL**
Indicates the most current PTF applied to the module. BASECOD means base code (no PTF).

**LEN**
Indicates the length of the module.
#SQ LINK

The #SQ LINK command displays the port connection and online/offline status of individual remote link directors. It also displays the number of I/Os per second during a short interval and the total number of I/Os across the link since SRDF Host Component discovery of the storage system.

**Calculating #SQ LINK I/O statistics**

In this discussion, SRDF Host Component “discovery” of a storage system refers to the initial building of the SRDF Host Component control block structure for each storage system when it is first encountered. Each local storage system is discovered when the SRDF Host Component address space is started. Each remote storage system is discovered when the first remote SRDF Host Component command is issued to that storage system.

**Note:** The discovery process may take a while. Statistics for a storage system is displayed after that system has been discovered.

**Long-term statistics**—When each storage system is discovered, SRDF Host Component records an initial “Total I/O Count” and an initial time stamp for each SRDF director and port. When an #SQ LINK command is entered, SRDF Host Component collects the current “Total I/O Count” and the current timestamp for each SRDF director and port in the target storage system.

The long-term statistics for each SRDF director and port in the #SQ LINK display are then calculated as follows:

\[
\text{TOTAL-I/O} = \text{Current “Total I/O Count”} - \text{Initial “Total I/O Count”}
\]

\[
\text{DD:HH:MM:SS} = \text{Current timestamp} - \text{Initial timestamp}
\]

**Short-term statistics**—For each discovered storage system, SRDF Host Component collects an interval “Total I/O Count” and an interval timestamp for each SRDF director and port at three minute intervals. For each SRDF director and port, interval statistics for the four most recent intervals are retained.

When an #SQ LINK command is entered, SRDF Host Component collects the current “Total I/O Count” and the current timestamp for each SRDF director and port in the target storage system. SRDF Host Component also selects the interval timestamp which represents a time duration closest to but not more than ten minutes prior to the current timestamp. The short-term statistics in the #SQ LINK display are then calculated as follows:

\[
\text{M:SS} = \text{Current timestamp} - \text{Selected interval timestamp}
\]

\[
\text{RATE} = \left(\frac{\text{Current “Total I/O Count”} - \text{Selected interval “Total I/O Count”}}{\text{Current timestamp} - \text{Selected interval timestamp}}\right)
\]

---

1. Port statistics is available with PowerMaxOS 5978 and HYPERMAX OS 5977.
**Syntax**

```
#SQ LINK, cuu
[][,E], RA(srdfgrp)][,PORT]
[,,CQNAME=(cqname[,queue-option])]

#SQ LINK, RMT{,(cuu, hoplist)|,(cuu, hoplist,*)}
[][,E], RA(srdfgrp)][,PORT]
[,,CQNAME=(cqname[,queue-option])]

#SQ LINK, G(groupname)
[][,E], RA(srdfgrp)][,PORT]
[,,CQNAME=(cqname[,queue-option])]

#SQ LINK, SCFG(gnsgrp)
[][,E], RA(srdfgrp)][,PORT]
[,,CQNAME=(cqname[,queue-option])]
```

**Note:** For the RMT command format, the (rdfcuu) parameter is no longer used; however, it is tolerated for existing code that uses it.

**Parameters**

- **cqname**
  
  See “cqname” on page 130.

- **cuu**
  
  See “cuu” on page 130.

- **E**
  
  Produces the extended format display.

  **Note:** It is recommended that you use the extended format display (E) option with this command.

- **G(groupname)**
  
  See “G(groupname)” on page 130.

- **hoplist**
  
  See “hoplist” on page 131.

- **PORT**
  
  Displays active ports information.

  **Note:** The PORT keyword is valid for PowerMaxOS 5978 and HYPERMAX OS 5977.

- **queue-option**
  
  See “queue-option” on page 131.

- **RA(srdfgrp)**
  
  Displays only SRDF links supporting the specified SRDF group.
The display is identical to the display for the #SQ LINK,E command format. In addition to detailing the physical SRDF links, the display includes all logical paths for the selected SRDF group, immediately following the matching physical SRDF links. An asterisk (*) may be used for `rgrp#`; this displays all physical SRDF links and also displays all logical paths associated with all SRDF groups for each SRDF link.

RMT

See “RMT” on page 132.

Note: For this format, the third subparameter may alternatively be specified as an asterisk (*). In that case, the command action then applies to all SRDF groups.

SCFG(gnsgrp)

See “SCFG(gnsgrp)” on page 133.

Example

Example 1: Extended format

The following example shows the #SQ LINK extended format (E) command output:

```
EMCMN001I SRDF-HC : (57) &SQ LINK,6200,E
EMCQL01I SRDF-HC EXTENDED DISPLAY FOR &SQ LINK,6200,E  814
SERIAL #:0001967-01130/0KDLN  MICROCODE LEVEL:5977-0813
DR  GP _OTHER__S/N_ OD  OG RCS | %S M:SS RATE| %L DD:HH:MM:SS   TOTAL-I/O
61  SW ............ .. .. FYY | .. 8:03  185| .. 01:08:23:14    19836379
62  SW ............ .. .. FYY | .. 8:03  178| .. 01:08:23:14    52263439
63  SW ............ .. .. FYY | .. 8:03  177| .. 01:08:23:14    32120585
64  SW ............ .. .. FYY | .. 8:03   14| .. 01:08:23:14     2392215
END OF DISPLAY
```

Output fields

**DR**
Director number of the remote link director.

**GP**
This field shows the SRDF group number of the remote link director. For switched SRDF configurations, the field contains SW if more than one group is defined to the director or the director has a connection to at least two other-side directors. For concurrent SRDF, the field contains the SRDF group number. Asterisks appear in this field in lines for which the corresponding director has not been online since SRDF Host Component was started.

**Other S/N**
This field contains the serial number of the partner storage system. The serial number may show as asterisks (*) if you configured the director for switched SRDF. This could indicate that there is more than one remote serial number.

**OD**
This field shows the director number of the remote link director on the partner storage system. For switched SRDF configurations, “..” appears instead of a director number. If the link is not a static point-to-point link, there can be multiple other-side directors associated with the link. When this is the case, asterisks will show in this field with an asterisk in the last position of the serial number field as well.

**OG**
This field shows the SRDF group number of the remote link director on the partner storage system. For switched SRDF configurations, “..” appears instead of an SRDF group number. For concurrent SRDF, the SRDF group number of the target device is displayed.
If the link is not a static point-to-point link, there can be multiple other-side SRDF groups associated with the link. When this is the case, asterisks will show in this field with an asterisk in the last position of the serial number field as well.

**RCS**
This field consists of a three-character string indicating characteristics of the remote link director as follows:

- **Character 1** indicates the remote link director type. Values that may appear as character 1 are:
  - **E** GigE
  - **F** Fibre remote link director
  - **M** Source remote link director
  - **S** Target remote link director

- **Character 2** indicates the port connection status. Values that may appear as character 2 are:
  - **Y** Link path established
  - **N** No link path established

- **Character 3** indicates the link status of the remote link director. Values that may appear as character 3 are:
  - **Y** Link is online
  - **N** Link is not online

**%S**
This field shows the percentage of times that the remote link director has returned a status of 'busy' during a short time interval indicated by the value of the M:SS field.

**Note:** This field displays “..” for Fibre remote adapters.

**M:SS**
This field shows the short interval duration during which the average number of I/Os across the link are calculated as shown by the RATE field, and during which the percent busy is computed as shown by the %S field. This time duration varies between 0:01 and 9:59 (M:SS). This time duration is calculated by SRDF Host Component as described in “Calculating #SQ LINK I/O statistics” on page 168.

**RATE**
This field shows the average number of I/Os per second traversing the remote link director during the short time interval indicated by the value of field M:SS described above.

**%L**
This field shows the percentage of times that the remote link director has returned a busy status during a long time interval whose duration is given by the value of the DD:HH:MM:SS field.

**Note:** This field displays “..” for Fibre remote adapters.

**DD:HH:MM:SS**
This field shows the lowest of either the elapsed time since SRDF Host Component discovery of the storage system or the last utility reset command issued from the service processor.

**TOTAL-I/O**
The total number of I/Os across the link since SRDF Host Component discovery of the storage system or since the most recent utility reset command issued from the service processor.
Example 2: RA option

The following example shows the result of the RA(srdfgrp) command format. This example shows that SRDF group 2C is defined on SRDF directors 59 and 5A locally, and on 59 and 5A remotely.

```
EMCN001 SRDF-HC : (58) &SQ LINK,6200,RA(67)
EMCQL011 SRDF-HC EXTENDED DISPLAY FOR &SQ LINK,6200,RA(67)  270
SERIAL #:001967-01130/0KDLN  MICROCODE LEVEL:5977-0813
DR GP _OTHER__S/N_ OD OG RCS | %S M:SS RATE | %L DD:HH:MM:SS | TOTAL-I/O
61 SW ............ .. .. FYY | .. 9:45 190 | .. 01:08:24:56 | 19857871
   67 000195700086 59 60
62 SW ............ .. .. FYY | .. 9:45 192 | .. 01:08:24:56 | 52289683
   67 000195700086 59 60
63 SW ............ .. .. FYY | .. 9:45 183 | .. 01:08:24:56 | 32142612
   67 000195700086 59 60
64 SW ............ .. .. FYY | .. 9:45 14 | .. 01:08:24:56 | 2393877
   67 000195700086 59 60
END OF DISPLAY
```

Note: For field description, see “Output fields” on page 170.

Example 3: Non-extended format

The following example shows the standard (non-extended) #SQ LINK command output:

```
EMCQL001 SRDF-HC DISPLAY FOR (27) #SQ LINK,5100
SERIAL #:0001926-00143/0AAKN  MICROCODE LEVEL:5876-231
CUU_ DIR RA P CONN _STATUS_ MM:SS I/O-RATE DDD:HH:MM:SS _TOTAL-I/O_
5100 57 RF 1 Y ONLINE 09:09 60 000:00:49:29 177,179
5100 58 RF 1 Y ONLINE 09:09 52 000:00:49:29 158,049
END OF DISPLAY
```

Output fields

CUU This field indicates the z/OS device number.

DIR This field indicates the director number of the remote link director.

RA This field indicates the remote link director type. Values that may be shown and their meanings are:

R1 ESCON SRDF director (RA1 mode)
R2 ESCON SRDF director (RA2 mode)
RE GigE Remote
RF Fibre remote link director

P This field indicates the number of ports on the remote link director.

CONN This field indicates the port connection status:

Y A link path is established.
N No link path is established.

Note: Appendix 1, “Director and Volume Status,” provides more information about using this field for troubleshooting.
STATUS

This field indicates the link status:

ONLINE The port is online.
OFFLINE The port is offline.
PENDING The port was requested to be online but could not be brought online.
ERROR The port was not requested to be online but is actually online.

MM:SS

This field indicates the short interval duration during which the average number of I/Os across the link are calculated. This time duration varies between 00:01 and 09:59 (MM:SS). This time duration is calculated by SRDF Host Component as described in “Calculating #SQ LINK I/O statistics” on page 168.

I/O-RATE

This field shows the average I/Os per second over the short time interval. UNAVAIL means that the information is not available.

DDD:HH:MM:SS

This field shows the elapsed time since SRDF Host Component discovery of the storage system or since the last utility reset command issued from the service processor.

TOTAL I/O

This field shows the total number of I/Os across the link since SRDF Host Component discovery of the storage system or since the most recent utility reset command issued from the service processor.

Example 4:

PORT option

The following example shows information about the active ports:

EMCQL00I SRDF-HC DISPLAY FOR H3 SQ LINK,6200,PORT 655
SERIAL #:0001967-01130/0KDLN MICROCODE LEVEL:5977-0813
CUU_ DIR RA P CONN _STATUS_   MM:SS I/O-RATE   DDD:HH:MM:SS _TOTAL-I/O_

<table>
<thead>
<tr>
<th>CUU</th>
<th>DIR</th>
<th>RA</th>
<th>P</th>
<th>CONN</th>
<th>STATUS</th>
<th>MM:SS</th>
<th>I/O-RATE</th>
<th>DDD:HH:MM:SS</th>
<th>TOTAL-I/O</th>
</tr>
</thead>
<tbody>
<tr>
<td>6200</td>
<td>RF</td>
<td>2</td>
<td>Y</td>
<td>N</td>
<td>ONLINE</td>
<td>....</td>
<td>UNAVAIL</td>
<td>........</td>
<td>UNAVAIL</td>
</tr>
<tr>
<td>06</td>
<td>SW</td>
<td>N</td>
<td>PENDING</td>
<td>UNAVAIL</td>
<td>UNAVAIL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>07</td>
<td>SW</td>
<td>Y</td>
<td>ONLINE</td>
<td>UNAVAIL</td>
<td>UNAVAIL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04</td>
<td>SW</td>
<td>Y</td>
<td>ONLINE</td>
<td>UNAVAIL</td>
<td>UNAVAIL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05</td>
<td>SW</td>
<td>N</td>
<td>PENDING</td>
<td>UNAVAIL</td>
<td>UNAVAIL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6200</td>
<td>RF</td>
<td>2</td>
<td>Y</td>
<td>N</td>
<td>ONLINE</td>
<td>....</td>
<td>UNAVAIL</td>
<td>........</td>
<td>UNAVAIL</td>
</tr>
<tr>
<td>06</td>
<td>SW</td>
<td>N</td>
<td>PENDING</td>
<td>UNAVAIL</td>
<td>UNAVAIL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>07</td>
<td>SW</td>
<td>Y</td>
<td>ONLINE</td>
<td>UNAVAIL</td>
<td>UNAVAIL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04</td>
<td>SW</td>
<td>Y</td>
<td>ONLINE</td>
<td>UNAVAIL</td>
<td>UNAVAIL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05</td>
<td>SW</td>
<td>N</td>
<td>PENDING</td>
<td>UNAVAIL</td>
<td>UNAVAIL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

END OF DISPLAY

For each CUU, the first detail row shows director information, and the following rows show port information. For field description, see “Output fields” on page 172. In addition, the following values are displayed:

RA

In port detail rows, the RA column shows port topology values as follows:

AL Private arbitrated loop
IP IP topology
P2P Point to point
PAL Public arbitrated loop
SW Switched fabric
#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.

**Note:** The #SQ MIRROR command is not supported under PowerMaxOS 5978 and HYPERMAX OS 5977. You can use the #SQ VOL command to display the information.

**Note:** For RAID 10 devices, the storage system devices that make up the logical volume are listed individually in the command response display.

**Syntax**

```
#SQ MIRROR, cuu
[ ,SELECT(filter)[,startingdev#]]
[ ,statefilter[,startingdev#]]
[,CQNAME=(cqname[,queue-option])]  
#SQ MIRROR, RMT( (cuu, hoplist)| (cuu, hoplist, *))  
[ ,SELECT(filter)[,startingdev#]]
[ ,statefilter[,startingdev#]]
[,CQNAME=(cqname[,queue-option])]  
#SQ MIRROR,RMT( cuu, hoplist, srdfgrp)  
[ ,SELECT(filter)[,startingdev#]]
[ ,statefilter[,startingdev#]]
[,CQNAME=(cqname[,queue-option])]  
#SQ MIRROR,LCL( cuu, srdfgrp)  
[ ,SELECT(filter)[,startingdev#]]
[ ,statefilter[,startingdev#]]
[,CQNAME=(cqname[,queue-option])]  
#SQ MIRROR,VOL( volser)  
[ ,SELECT(filter)][,statefilter]
[,CQNAME=(cqname[,queue-option])]  
#SQ MIRROR, SSID( ssid)  
[ ,SELECT(filter)[,startingdev#]]
[ ,statefilter[,startingdev#]]
[,CQNAME=(cqname[,queue-option])]  
#SQ MIRROR, G( groupname)  
[ ,SELECT(filter)][,statefilter]
[,CQNAME=(cqname[,queue-option])]  
#SQ MIRROR, SCFG( gnsgrp)  
[ ,SELECT(filter)][,statefilter]
[,CQNAME=(cqname[,queue-option])]  
```

**Note:** For the RMT command format, the (rdfcuu) parameter is no longer used; however, it is tolerated for existing code that uses it.
Parameters

ALL
Indicates that all eligible devices are to be included up to the value of the MAX_QUERY initialization parameter.

Note: The maximum value for MAX_QUERY is 8,192. If the storage system has more than 8,192 devices, use the command syntax specifying the starting PowerMax/VMAX device number.
For example: #SQ MIRROR, cuu, count, startingdev#

When used on the RMT statement with two subparameters specified, the ALL parameter includes all devices on the other-side storage system. When used on the RMT statement that includes three subparameters, the ALL parameter includes all devices in a particular SRDF group.

count
Specifies the number of eligible devices to be included.

count can be specified as an integer from one through the value specified in the MAX_QUERY initialization parameter. If this parameter is not specified, count defaults to one.

Note: The maximum value for MAX_QUERY is 8192. If the storage system has more than 8,192 devices, use the command syntax specifying the starting PowerMax/VMAX device number.
For example: #SQ MIRROR, cuu, count, startingdev#

cqname
See “cqname” on page 130.

cuu
See “cuu” on page 130.

Note that the output may vary. See the SORT_BY_COMMAND, SORT_BY_MVSCUU and SORT_BY_VOLSER parameter descriptions for more information.

G(groupname)
See “G(groupname)” on page 130.

hoplist
See “hoplist” on page 131.

LCL
See “LCL” on page 131.

queue-option
See “queue-option” on page 131.
RMT

See “RMT” on page 142.

**Note:** For this format, the third subparameter may alternatively be specified as an asterisk (*). In that case, the command action then applies to all SRDF groups.

SCFG(gnsgrp)

See “SCFG(gnsgrp)” on page 133.

SELECT(filter)

Filters devices to be displayed by using one or more device filters that can be logically combined in various ways, as described in “Device selection using SELECT” on page 134.

Table 6 on page 136 lists the values you may specify for `filter`.

You can use any filter in the table with the exception of the RA(srdfgrp) filter.

srdfgrp

See “srdfgrp” on page 133.

SSID(ssid)

See “SSID(ssid)” on page 133.

startingdev#

Identifies the device at which to start the display.

- If the sort order is set to (or allowed to default to) SORT_BY_SYMDEV with the #SC GLOBAL command, the value specified is treated as a PowerMax/VMAX device number.
- If the sort order is set to SORT_BY_VOLSER with the #SC GLOBAL command, the value specified is treated as a starting volume serial.
- If the sort order is set to SORT_BY_MVSCUU with the #SC GLOBAL command, the value specified is treated as a starting z/OS device address.

statefilter

Indicates that only devices whose state matches the `statefilter` value you specify are to be included in the display.

Table 6 on page 136 lists valid `statefilter` values.

VOL(volser)

See “VOL(volser)” on page 134.
Examples

**Example 1:** Standard display

The following example shows the protection types for device 8530:

```sql
EMCQV15I SRDF-HC DISPLAY FOR #SQ MIRROR,3A18,4,0108
SERIAL #:0001957-00086/0GKHV MICROCODE LEVEL:5876-286

---MIRROR 1--- ---MIRROR 2--- ---MIRROR 3--- ---MIRROR 4---

<table>
<thead>
<tr>
<th>HOST</th>
<th>SYMM</th>
<th>CUU</th>
<th>DEV</th>
<th>DA-IF</th>
<th>ITRKS</th>
<th>RD</th>
<th>DA-IF</th>
<th>ITRKS</th>
<th>RD</th>
<th>DA-IF</th>
<th>ITRKS</th>
<th>RD</th>
<th>DA-IF</th>
<th>ITRKS</th>
<th>RD</th>
</tr>
</thead>
<tbody>
<tr>
<td>3A18</td>
<td>0108</td>
<td><em>RAID0</em></td>
<td>0108</td>
<td>16-C02</td>
<td>0 ..</td>
<td>. .</td>
<td>0 ..</td>
<td>. .</td>
<td>0 ..</td>
<td>. .</td>
<td>. ..</td>
<td>. ..</td>
<td>. ..</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3A19</td>
<td>0109</td>
<td><em>RAID0</em></td>
<td>0109</td>
<td>18-C02</td>
<td>0 ..</td>
<td><em>S0B</em></td>
<td>0 ..</td>
<td>B0760</td>
<td>.</td>
<td>XX</td>
<td>. ..</td>
<td>. ..</td>
<td>. ..</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3A1A</td>
<td>010A</td>
<td><em>RAID0</em></td>
<td>010A</td>
<td>1A-C02</td>
<td>0 ..</td>
<td><em>T42</em></td>
<td>0 ..</td>
<td>. . . .</td>
<td>. ..</td>
<td>. ..</td>
<td>. ..</td>
<td>. ..</td>
<td>. ..</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3A1B</td>
<td>010B</td>
<td><em>RAID0</em></td>
<td>010B</td>
<td>1C-C02</td>
<td>0 ..</td>
<td><em>S16</em></td>
<td>0 ..</td>
<td>U.</td>
<td>..</td>
<td>. ..</td>
<td>. ..</td>
<td>. ..</td>
<td>. ..</td>
<td>. ..</td>
<td></td>
</tr>
</tbody>
</table>
```

END OF DISPLAY

```
SORT_ORDER = SYMDEV
Total devices displayed = 4
```

**Output fields**

- **HOST CUU**
  - Specifies the z/OS device number.

- **SYMM DEV**
  - Specifies the PowerMax/VMAX device number.

- **MIRROR 1-4**
  - Each of these columns describes a mirror.

  - For Enginuity 5874 and later, the RAID types display for the storage system logical volumes as the first line in the mirror columns pertaining to the device. The types are:
    - *RAID0*
    - *RAID1*
    - *RAID5 (3+1)*
    - *RAID5 (7+1)*
    - *RAID6 (6+2)*
    - *RAID6 (14+2)*

  - With Enginuity 5874 and later, the RAID 1 and RAID 5 implementations abstract each local RAID group to a single mirror position.

SRDF Host Component checks all the mirror positions for a device to determine whether it gets included in the #SQ MIRROR display. For example, if a device is multi-RAID and is RAID 5 in mirror position 1 and RAID 6 in another mirror position, the device would get included in an #SQ MIRROR command display that used the RAID 6 filter.

**Note:** When the mirror is an FTS external device, the initial DA-IF column displays *RAID0*, as VMAX RAID mechanisms are not supported for FTS devices.

The MIRROR columns are further subdivided into the following fields: DA-IF, ITRKS, NR, WD.
DA-IF：标识物理地址（磁盘适配器和SCSI接口）。

*Bbnnn* 显示为与BCV相连的设备，其中bnnn是PowerMax/VMAX设备号。

*Snn* 显示为SRDF设备，当本地设备为目标（R2）且远程伙伴为源（R1）设备。n是SRDF组号，表示镜像位置代表SRDF伙伴设备在远程存储系统。

*Tn* 显示为SRDF设备，当本地设备为源（R1）且远程伙伴为目标（R2）设备。n是SRDF组号，表示镜像位置代表SRDF伙伴设备在远程存储系统。

Bnnn

出现在第一个可用镜像位置，如果设备是标准设备且有本地复制。

Snnn

出现在第一个可用镜像位置，如果设备是BCV设备且有本地复制。

**Note:** If the device is a diskless device, a placeholder subfield DA-IF displays in the MIRROR1 field.

ITRKS：显示镜像的无效道轨计数。所报告的数字显示为K或M，当1K = 1024且1M = 1024*1024。

指示镜像状态：

X：镜像不可用。

U：镜像不可用。

一个X在此列中表示镜像为只读。

**Total devices displayed**：此行指示显示的逻辑设备数量。

此行可以由Max_query_reached标记，表示MAX_QUERY限制已达到。

**Example 2:**

RAID 0 FBA meta device

This example shows two devices, starting at PowerMax/VMAX device number 980. The display shows an unprotected (RAID 0) FBA meta device.

**Note:** For field description, see “Output fields” on page 177.
Example 3: RAID6 option

The following is a display resulting from an #SQ MIRROR command specifying the RAID6 attribute.

<table>
<thead>
<tr>
<th>HOST</th>
<th>SYMM</th>
<th>DEV</th>
<th>DA-IF ITRKS</th>
<th>DA-IF ITRKS</th>
<th>DA-IF ITRKS</th>
<th>DA-IF ITRKS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>RD</td>
<td>RD</td>
<td>RD</td>
<td>RD</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: For field description, see “Output fields” on page 177.
**Example 4: MRG option**

The following is a display resulting from an #SQ MIRROR command specifying the MRG filter. This filter limits the output display to devices with least one RAID 5 or RAID 6 mirror and at least one other mirror position of RAID 0, RAID 1, RAID 5, or RAID 6 type.

```plaintext
EMCMN001I SRDF-HC : (36) #SQ MIRROR,5100,MRG
EMCQV15I SRDF-HC DISPLAY FOR (36) #SQ MIRROR,5100,MRG
SERIAL #:0001926-00143/0AAKN MICROCODE LEVEL:5876-231
---MIRROR 1--- ---MIRROR 2--- ---MIRROR 3--- ---MIRROR 4---

<table>
<thead>
<tr>
<th>HOST SYMM</th>
<th>NW</th>
<th>NW</th>
<th>NW</th>
<th>NW</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUU</td>
<td>DEV</td>
<td>DA-IF ITRKS RD</td>
<td>DA-IF ITRKS RD</td>
<td>DA-IF ITRKS RD</td>
</tr>
<tr>
<td>5228</td>
<td>0150</td>
<td><em>RAID6 (6+2)</em></td>
<td><em>RAID5 (3+1)</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0150</td>
<td>38-D05</td>
<td>37-C07</td>
<td>07-D07</td>
</tr>
<tr>
<td></td>
<td>5229</td>
<td>0151</td>
<td><em>RAID6 (6+2)</em></td>
<td><em>RAID5 (7+1)</em></td>
</tr>
<tr>
<td></td>
<td>0151</td>
<td>38-D07</td>
<td>28-C07</td>
<td>07-D07</td>
</tr>
<tr>
<td></td>
<td>522A</td>
<td>0152</td>
<td><em>RAID6 (6+2)</em></td>
<td><em>RAID6 (14+2)</em></td>
</tr>
<tr>
<td></td>
<td>0152</td>
<td>27-C04</td>
<td>37-D04</td>
<td>08-D04</td>
</tr>
</tbody>
</table>
```

**Note:** For field description, see “Output fields” on page 177.

---

**Example 5: Thin devices**

The following is a display resulting from an #SQ MIRROR command for a thin or virtual device. When the mirror is a thin or virtual device, the initial DA-IF column displays a series of periods.

```plaintext
EMCMN001I SRDF-HC : (53) #SQ MIRROR,845C,4,1744
EMCQV15I SRDF-HC DISPLAY FOR (53) #SQ MIRROR,845C,4,1744 995
SERIAL #:0001957-00225/0GKVB MICROCODE LEVEL:5876-25
---MIRROR 1--- ---MIRROR 2--- ---MIRROR 3--- ---MIRROR 4---

<table>
<thead>
<tr>
<th>HOST SYMM</th>
<th>NW</th>
<th>NW</th>
<th>NW</th>
<th>NW</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUU</td>
<td>DEV</td>
<td>DA-IF ITRKS RD</td>
<td>DA-IF ITRKS RD</td>
<td>DA-IF ITRKS RD</td>
</tr>
<tr>
<td>84EC</td>
<td>1744</td>
<td>......</td>
<td><em>TF0</em></td>
<td>0</td>
</tr>
<tr>
<td>84ED</td>
<td>1745</td>
<td>......</td>
<td><em>TF0</em></td>
<td>0</td>
</tr>
<tr>
<td>84EE</td>
<td>1746</td>
<td>......</td>
<td><em>TF0</em></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>1747</td>
<td>......</td>
<td><em>TF0</em></td>
<td>0</td>
</tr>
</tbody>
</table>
```

**Note:** For field description, see “Output fields” on page 177.
Example 6: External FTS device

The following is a display resulting from an #SQ MIRROR command for an external FTS device. When the mirror is an FTS device, the initial DA-IF column displays *RAID0*.

EMCQV15I SRDF-HC DISPLAY FOR (10) #SQ MIRROR,5100,4,C4 283
SERIAL #:0001926-00143/0A4K MICROCODE LEVEL:5876-25

---MIRROR 1--- ---MIRROR 2--- ---MIRROR 3--- ---MIRROR 4---

<table>
<thead>
<tr>
<th>HOST SYMM</th>
<th>NW</th>
<th>NW</th>
<th>NW</th>
<th>NW</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUU DEV</td>
<td>DA-IF ITRKS RD</td>
<td>DA-IF ITRKS RD</td>
<td>DA-IF ITRKS RD</td>
<td>DA-IF ITRKS RD</td>
</tr>
<tr>
<td>519C 00C4</td>
<td><em>RAID0</em></td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>00C4 OD-EXT</td>
<td>0 .. <em>S12</em></td>
<td>0 .. ....</td>
<td>....</td>
</tr>
<tr>
<td>519D 00C5</td>
<td><em>RAID0</em></td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>00C5 OD-EXT</td>
<td>0 .. <em>S12</em></td>
<td>0 .. ....</td>
<td>....</td>
</tr>
<tr>
<td>519E 00C6</td>
<td><em>RAID0</em></td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>00C6 OD-EXT</td>
<td>0 .. <em>S12</em></td>
<td>0 .. ....</td>
<td>....</td>
</tr>
<tr>
<td>519F 00C7</td>
<td><em>RAID0</em></td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>00C7 OD-EXT</td>
<td>0 .. <em>S12</em></td>
<td>0 .. ....</td>
<td>....</td>
</tr>
</tbody>
</table>

Note: For field description, see “Output fields” on page 177.
The #SQ MSG command displays any SRDF error or informational messages presented to the host console if the SRDF Host Component `MESSAGE_PROCESSING` initialization parameter is set to YES or LOG. These messages can be generated by any storage system in the SRDF configuration.

This command, when issued with the `ALL` parameter, displays all messages held in the message log. The newest messages appear at the top of the display and the oldest messages at the bottom.

**Service Information Messages**

SIMs (Service Information Messages) are produced by storage systems to report events. The SIM notification 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 notification, an IEA480E message is generated.

The SIM contains a description of the abnormal condition in the REFCODE. This is a hex code identifying the event and the device(s) with which the event was associated. SRDF Host Component detects the event and issues an EMC9998W message in an attempt to more clearly interpret the SIM notification.

The format for SIM IEA480E is as follows:

```
IEA480E rptdv#,SCU,SERVICE ALERT,MT=ctltype,SER=ctlser,REFCODE=xxxx-yyyy-zzzz
```

Where:
- `rptdv#` The reporting device number.
- `ctltype` The storage system type (for example, 3990-3).
- `ctlser` The storage system serial number.
- `xxxx` The exception code.
- `yyyy` Additional information about the event.
- `zzzz` Additional information about the event.

**Note:** The MVS/ESA system messages manual for your release of z/OS provides further details about the IEA480E message.

The format of the EMC9998W message varies depending on the exception code. The *Mainframe Enablers Message Guide* contains details about the EMC9998W message.

Depending on the `MESSAGE_PROCESSING` initialization parameter, the SIM message may be saved by SRDF Host Component for later display using the #SQ MSG command.

**Syntax**

```
#SQ MSG[,count|,ALL]
[,CQNAME=(cqname[,queue-option])]
```

**Parameters**

- `ALL`
Displays all messages.

**count**

Specifies the number of messages to be displayed.

You can set this value from 1 to the size of the message log specified in the `MESSAGE_PROCESSING` initialization parameter.

If you do not specify this parameter, `count` defaults to 1. The maximum `count` value is 512.

**cqname**

See “cqname” on page 130.

**queue-option**

See “queue-option” on page 131.

### Example

This example shows the output from an `#SQ MSG, ALL` command:

```
EMCQM83I SRDF-HC_DISPLAY FOR (7) #SQ MSG,ALL  203
__DATE__ __TIME__ CUU ___DV___ SSID __________MESSAGE_______ NNNN RCUU
01/25/16 13:17:36 N/A  00000144 8F00 R2 VOL IN NOT RDY STATE  0072 8F00
01/25/16 13:05:16 N/A  00000144 8F00 R2 VOL IN NOT RDY STATE  0071 8F00
01/25/16 12:43:05 N/A  GRP(22)  4405 ALL RDF LINKS ONLINE     0070 4501
01/25/16 12:42:56 N/A  GRP(1D)  5804 ALL RDF LINKS ONLINE     0069 5800
01/25/16 12:42:55 N/A  GRP(2D)  7404 ALL RDF LINKS ONLINE     0068 7400
01/25/16 12:42:35 N/A  GRP(2C)  4405 ALL RDF LINKS ONLINE     0067 4501
01/25/16 12:41:09 N/A  GRP(2C)  5804 ALL RDF LINKS OFFLINE    0065 5800
```

**Output fields**

- **DATE** Date of the event.
- **TIME** Time of the event.
- **CUU** z/OS device number.
- **DV** PowerMax/VMAX device number or remote link director number.

The following SRDF/A drop reason codes may appear beneath this column:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>The system write-pending limit was reached and the allowed SRDF/A cache usage is exhausted.</td>
</tr>
<tr>
<td>11</td>
<td>The system write-pending limit was reached and has throttled the host for the maximum time allowed.</td>
</tr>
<tr>
<td>20</td>
<td>A device was made not ready and tolerance mode is off.</td>
</tr>
<tr>
<td>30</td>
<td>A device was made not ready through consistency groups and tolerance mode is off.</td>
</tr>
<tr>
<td>40</td>
<td>A total link loss dropped SRDF/A with tolerance on or off (transmit idle was off).</td>
</tr>
<tr>
<td>41</td>
<td>A total link loss exceeded the SRDF/A transmit idle time.</td>
</tr>
</tbody>
</table>
### Table 7  SRDF/A drop reason codes (page 2 of 2)

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>The SRDF/A window timed out in multibox mode.</td>
</tr>
<tr>
<td>60</td>
<td>Timed out waiting for a host adapter to report about old I/Os.</td>
</tr>
<tr>
<td>62</td>
<td>The R1/R2 activation sequence was violated; R1 commit found R1 inactive.</td>
</tr>
<tr>
<td>64</td>
<td>The R1 side was deactivated during config compare, because the R2 side is inactive.</td>
</tr>
<tr>
<td>70</td>
<td>SRDF/A was dropped because a power down occurred.</td>
</tr>
<tr>
<td>71</td>
<td>SRDF/A was dropped because there were no online SRDF adapters.</td>
</tr>
</tbody>
</table>

**SSID**  
Subsystem ID of the reporting device.

**MESSAGE**  
PowerMax/VMAX message. The following messages may appear in this column:

-  DYNAMIC SPARING INVOKED
-  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 OPERATIONAL
-  RDF ADAPTER LINK PROBLEM
-  RDF-ECA CGRP TRIP EVENT
-  RESYNC PROCESS HAS BEGUN
-  SOURCE VOLUME RESYNC W/TARGET
-  SRDF/A SESSION DROP
-  TARG VOLUME RESYNC W/SOURCE

**NNNN**  
A number associated with an event, allowing different messages that may result from a single event to be tied to that event. Some IDs of messages that may be linked to an event in this way are EMCQM81I, EMCQM84I in HCLOG, and EMC9998W.

**RCUU**  
Reporting device address.
#SQ RAID

The #SQ RAID command displays the storage system RAID-S configuration. The z/OS device number displays, as well as the PowerMax/VMAX device number and the physical device numbers. The parity device also appears.

**Note:** The #SQ RAID command is not supported under PowerMaxOS 5978 and HYPERMAX OS 5977.

## Syntax

```
#SQ_RAID, cuu
[,count[,startingdev#]|,ALL[,startingdev#]]
[,CQNAME=(cqname[,queue-option])]
```

```
#SQ_RAID,
RMT((cuu,hoplist) |(cuu,hoplist,srdfgrp) |(cuu,hoplist,*))
[,(count[,startingdev#]|,ALL[,startingdev#]]
[,CQNAME=(cqname[,queue-option])]
```

```
#SQ_RAID,LCL(cuu,srdfgrp)
[,(count[,startingdev#]|,ALL[,startingdev#]]
[,CQNAME=(cqname[,queue-option])]
```

**Note:** For the RMT command format, the *(rdfcuu)* parameter is no longer used; however, it is tolerated for existing code that uses it.

## Parameters

**ALL**

Indicates that all eligible devices are to be included up to the value of the MAX_QUERY initialization parameter.

**Note:** The maximum value for MAX_QUERY is 8192. If the storage system displaying has more than 8192 devices, use command syntax specifying the starting PowerMax/VMAX device number.  
**For example:** #SQ_RAID, cuu, count, startingdev#

When used on the RMT statement with two subparameters specified, the ALL parameter includes all devices on the other-side storage system. When used on the RMT statement that includes three subparameters, the ALL parameter includes all devices in a particular SRDF group.

**count**

Specifies the number of eligible devices to be included.

`count` can be specified as an integer from 1 through the value specified in the MAX_QUERY initialization parameter. If this parameter is not specified, `count` defaults to 1.

**Note:** The maximum value for MAX_QUERY is 8192. If the storage system displaying has more than 8192 devices, use command syntax specifying the starting PowerMax/VMAX device number.  
**For example:** #SQ_RAID, cuu, count, startingdev#
cqname
   See “cqname” on page 130.

cuu
   See “cuu” on page 130.

hoplist
   See “hoplist” on page 131.

LCL
   See “LCL” on page 131.

queue-option
   See “queue-option” on page 131.

RMT
   See “RMT” on page 132.

   **Note:** For this format, the third subparameter may alternatively be specified as an asterisk (*). In that case, the command action then applies to all SRDF groups.

srdfgrp
   See “srdfgrp” on page 133.

startingdev#
   Identifies the device at which to start the display.
   - If the sort order is set to (or allowed to default to) SORT_BY_SYMDEV with the #SC GLOBAL command, the value specified is treated as a PowerMax/VMAX device number.
   - If the sort order is set to SORT_BY_VOLSER with the #SC GLOBAL command, the value specified is treated as a starting volume serial.
   - If the sort order is set to SORT_BY_MVSCUU with the #SC GLOBAL command, the value specified is treated as a starting z/OS device address.
Example

The following is an example of the #SQ RAID command output:

EMCMN001I SRDF-HC : (47) #SQ RAID,2800,2
EMCQV17I SRDF-HC DISPLAY FOR (47) #SQ RAID,2800,2

<table>
<thead>
<tr>
<th>RAID GROUP</th>
<th>CUU_ DEV_ DA-IF</th>
<th>CUU_ DEV_ DA-IF</th>
<th>CUU_ DEV_ DA-IF</th>
<th>DA-IF</th>
<th>PTY DA-IF</th>
</tr>
</thead>
<tbody>
<tr>
<td>8004</td>
<td>???? 0309 21-C04</td>
<td>???? 030B 31-D04</td>
<td>???? 030D 30-D04</td>
<td>01-C4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>???? 030F 20-C04</td>
<td>???? 0311 11-D04</td>
<td>???? 0313 10-D04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8005</td>
<td>???? 030A 20-D05</td>
<td>???? 030C 01-D05</td>
<td>???? 030E 10-C05</td>
<td>30-C5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>???? 0310 31-C05</td>
<td>???? 0312 40-D05</td>
<td>???? 0314 21-D05</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>???? 0316 11-C05</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

END OF DISPLAY

Output fields

RAID GROUP
RAID group number.

CUU
z/OS device number.

Note: This field displays “????” for devices specified in the SCF exclude list.

DEV
PowerMax/VMAX device number.

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.
The #SQ RAID5 command displays the storage system RAID 5 configuration. The z/OS device number displays, as well as the PowerMax/VMAX device number and the physical device numbers. The parity device also appears.

**Note:** The #SQ RAID5 command is not supported under PowerMaxOS 5978 and HYPERMAX OS 5977.

### Syntax

```
#SQ RAID5, cuu
[,count[,startingdev#]],ALL[,startingdev#]
[,CQNAME=(cqname[,queue-option])]
#SQ RAID5,
RMT{(cuu,hoplist)|(cuu,hoplist,srdfgrp)|(cuu,hoplist,*)}
[,count[,startingdev#]],ALL[,startingdev#]
[,CQNAME=(cqname[,queue-option])]
#SQ RAID5,LCL(cuu,srdfgrp)
[,count[,startingdev#]],ALL[,startingdev#]
[,CQNAME=(cqname[,queue-option])]
```

**Note:** For the RMT command format, the (rdfcuu) parameter is no longer used; however, it is tolerated for existing code that uses it.

### Parameters

- **ALL**
  - Indicates that all eligible devices are to be included up to the value of the MAX_QUERY initialization parameter.
  
  **Note:** The maximum value for MAX_QUERY is 8192. If the storage system displaying has more than 8192 devices, use command syntax specifying the starting PowerMax/VMAX device number. For example: `#SQ RAID5,cuu,count,startingdev#`

- **count**
  - Specifies the number of eligible devices to be included.
count can be specified as an integer from 1 through the value specified in the MAX_QUERY initialization parameter. If this parameter is not specified, count defaults to 1.

**Note:** The maximum value for MAX_QUERY is 8192. If the storage system displaying has more than 8192 devices, use command syntax specifying the starting PowerMax/VMAX device number.

For example: #SQ RaIDS, cuu, count, startingdev#

cqname
See “cqname” on page 130.

cuu
See “cuu” on page 130.

hoplist
See “hoplist” on page 131.

LCL
See “LCL” on page 131.

queue-option
See “queue-option” on page 131.

RMT
See “RMT” on page 132.

**Note:** For this format, the third subparameter may alternatively be specified as an asterisk (*). In that case, the command action then applies to all SRDF groups.

srdfgrp
See “srdfgrp” on page 133.

startingdev#
Identifies the device at which to start the display.

- If the sort order is set to (or allowed to default to) SORT_BY_SYMDEV with the #SC GLOBAL command, the value specified is treated as a PowerMax/VMAX device number.
- If the sort order is set to SORT_BY_VOLSER with the #SC GLOBAL command, the value specified is treated as a starting volume serial.
- If the sort order is set to SORT_BY_MVSCUU with the #SC GLOBAL command, the value specified is treated as a starting z/OS device address.

**Example**

The following example shows information about spares that were invoked for a member. In the example, a spare disk was invoked for member 4. The physical address of the spare displays.
One member is reported per line. Not ready (NR) and write-disabled (WD) information displays 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 #SQ RAID5,3A1B
SERIAL #:0001957-00086/0GKHV MICROCODE LEVEL:5876-286

<table>
<thead>
<tr>
<th>DEV</th>
<th></th>
<th></th>
<th>MEMBER</th>
<th>SPARE</th>
</tr>
</thead>
<tbody>
<tr>
<td>stripe</td>
<td>N W</td>
<td>SPARE</td>
<td>MBR</td>
<td></td>
</tr>
<tr>
<td>CUU</td>
<td>DEV</td>
<td>WIDTH</td>
<td>R D</td>
<td>MEM</td>
</tr>
<tr>
<td>0120</td>
<td>0004</td>
<td>. . . .</td>
<td>0</td>
<td>0B-C04</td>
</tr>
<tr>
<td>02</td>
<td>07-C04</td>
<td>.</td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>09-C04</td>
<td>.</td>
<td>X X</td>
<td></td>
</tr>
</tbody>
</table>

END OF DISPLAY
sort_order = SYMDEV
Total devices displayed = 1

Output fields

CUU  z/OS device number.
DEV  PowerMax/VMAX device number.

STRIPE WIDTH  The number of tracks in a single stripe.

DEV NR  An X appears in this column if the device is not ready.
DEV WD  An X appears in this column if the device is write-disabled (read-only).

SPARE MEM  Identifies the member for which the spare is invoked.
SPARE DA-IF  Identifies the physical address (disk adapter and SCSI interface) for the spare device.

MBR #  Indicates the member number described by the DA-IF field to the right. Note that this number can be used to tie back to the SPARE MEM column if a spare is invoked for that member. The number of members displayed is 4 (for RAID5 3+1) or 8 (for RAID5 7+1).

DA-IF  Identifies the physical address (disk adapter and SCSI interface) for the member device.

MEMBER NR  An X appears in this column if the member device is not ready.
MEMBER WD  An X appears in this column if the spare device is write-disabled (read-only).

< or >  A < or > indicates the direction of data flow (to or from the spare). In the example, a spare was invoked for member 4 and the data is flowing from the member to the spare.

SPARE NR  An X appears in this column if the spare device is not ready.
SPARE WD  An X appears in this column if the spare device is write-disabled (read-only).
#SQ RAID6

The #SQ RAID6 command displays the storage system RAID 6 configuration. The z/OS device number displays, as well as the PowerMax/VMAX device number and the physical device numbers. The parity device also appears.

Note: The #SQ RAID6 command is not supported under PowerMaxOS 5978 and HYPERMAX OS 5977.

Syntax

```
#SQ RAID6, cuu
[,count[,startingdev#]|,ALL[,startingdev#]]
[,CQNAME=(cqname[,queue-option])]

#SQ RAID6,
RMT{(cuu,hoplist)|(cuu,hoplist,srdfgrp)|(cuu,hoplist,*)}
[,count[,startingdev#]|,ALL[,startingdev#]]
[,CQNAME=(cqname[,queue-option])]

#SQ RAID6,LCL(cuu,srdfgrp)
[,count[,startingdev#]|,ALL[,startingdev#]]
[,CQNAME=(cqname[,queue-option])]
```

Note: For the RMT command format, the (rdfcuu) parameter is no longer used; however, it is tolerated for existing code that uses it.

Parameters

ALL

Indicates that all eligible devices are to be included up to the value of the MAX_QUERY initialization parameter.

Note: The maximum value for MAX_QUERY is 8192. If the storage system displaying has more than 8192 devices, use command syntax specifying the starting PowerMax/VMAX device number.
For example: #SQ RAID6, cuu, count, startingdev#

When used on the RMT statement with two subparameters specified, the ALL parameter includes all devices on the other-side storage system. When used on the RMT statement that includes three subparameters, the ALL parameter includes all devices in a particular SRDF group.

count

Specifies the number of eligible devices to be included.
count can be specified as an integer from 1 through the value specified in the MAX_QUERY initialization parameter. If this parameter is not specified, count defaults to 1.

**Note:** The maximum value for MAX_QUERY is 8192. If the storage system displaying has more than 8192 devices, use command syntax specifying the starting PowerMax/VMAX device number.  
For example: 

```
#SQ RAID6, cuu, count, startingdev#
```

cqname
See “cqname” on page 130.

cuu
See “cuu” on page 130.

hoplist
See “hoplist” on page 131.

LCL
See “LCL” on page 131.

queue-option
See “queue-option” on page 131.

RMT
See “RMT” on page 132.

**Note:** For this format, the third subparameter may alternatively be specified as an asterisk (*). In that case, the command action then applies to all SRDF groups.

srdfgrp
See “srdfgrp” on page 133.

startingdev#
Identifies the device at which to start the display.

- If the sort order is set to (or allowed to default to) SORT_BY_SYMDEV with the #SC GLOBAL command, the value specified is treated as a PowerMax/VMAX device number.
- If the sort order is set to SORT_BY_VOLSER with the #SC GLOBAL command, the value specified is treated as a starting volume serial.
- If the sort order is set to SORT_BY_MVSCUU with the #SC GLOBAL command, the value specified is treated as a starting z/OS device address.
Example

The following example shows the output from an #SQ RAID6 command:

EMCQV20I SRDF-HC DISPLAY FOR #SQ RAID6,3A18
SERIAL #:0001957-00086/GKHV MICROCODE LEVEL:5876-286

<table>
<thead>
<tr>
<th>STRIPE</th>
<th>N</th>
<th>W</th>
<th>MBR</th>
<th>MEMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEV NR</td>
<td>R</td>
<td>D</td>
<td>#</td>
<td>DA-IF</td>
</tr>
<tr>
<td>DEV WD</td>
<td></td>
<td></td>
<td></td>
<td>MBR #</td>
</tr>
<tr>
<td></td>
<td>END OF DISPLAY SORT_ORDER = SYMDEV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total devices displayed = 1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Output fields

- **CUU**: z/OS device number.
- **DEV**: PowerMax/VMAX device number.
- **STRIPE WIDTH**: The number of tracks in a single stripe.
- **DEV NR**: An X appears in this column if the device is not ready.
- **DEV WD**: An X appears in this column if the device is write-disabled (read-only).
- **MBR #**: Indicates the member number described by the DA-IF field to the right. The number of members displayed will be 8 or 16.
- **DA-IF**: Identifies the physical address (disk adapter and SCSI interface).
- **MEMBER NR**: An X appears in this column if the device is not ready.
- **MEMBER WD**: An X appears in this column if the device is write-disabled (read-only).
#SQ RAID10

The #SQ RAID10 command displays the storage system devices making up a RAID 10 logical volume. The z/OS device number displays, as well as the PowerMax/VMAX device numbers.

**Note:** The #SQ RAID10 command is not supported under PowerMaxOS 5978 and HYPERMAX OS 5977.

**Syntax**

```
#SQ RAID10, cuu
[, count[, startingdev#]|, ALL[, startingdev#]]
[, CQNAME=(cqname[, queue-option])]
```

```
#SQ RAID10, RMT{(cuu, hoplist)|{(cuu, hoplist, srdfgrp)|(cuu, hoplist, *)}}
[, count[, startingdev#]|, ALL[, startingdev#]]
[, CQNAME=(cqname[, queue-option])]
```

```
#SQ RAID10, LCL{(cuu, srdfgrp)}
[, count[, startingdev#]|, ALL[, startingdev#]]
[, CQNAME=(cqname[, queue-option])]
```

**Note:** For the RMT command format, the (rdfcuu) parameter is no longer used; however, it is tolerated for existing code that uses it.

**Parameters**

**ALL**

Indicates that all eligible devices are to be included up to the value of the MAX_QUERY initialization parameter.

**Note:** The maximum value for MAX_QUERY is 8192. If the storage system displaying has more than 8192 devices, use command syntax specifying the starting PowerMax/VMAX device number.

For example: #SQ RAID10, cuu, count, startingdev#

When used on the RMT statement with two subparameters specified, the ALL parameter includes all devices on the other-side storage system. When used on the RMT statement that includes three subparameters, the ALL parameter includes all devices in a particular SRDF group.

**count**

Specifies the number of eligible devices to be included.
count can be specified as an integer from 1 through the value specified in the MAX_QUERY initialization parameter. If this parameter is not specified, count defaults to 1.

**Note:** The maximum value for MAX_QUERY is 8192. If the storage system displaying has more than 8192 devices, use command syntax specifying the starting PowerMax/VMAX device number. For example: 

```
#SQ RAID10, cuu, count, startingdev#
```

cqname

See “cqname” on page 130.

cuu

See “cuu” on page 130.

hoplist

See “hoplist” on page 131.

LCL

See “LCL” on page 131.

queue-option

See “queue-option” on page 131.

RMT

See “RMT” on page 132.

**Note:** For this format, the third subparameter may alternatively be specified as an asterisk (*). In that case, the command action then applies to all SRDF groups.

srdfgrp

See “srdfgrp” on page 133.

startingdev#

Identifies the device at which to start the display.

- If the sort order is set to (or allowed to default to) SORT_BY_SYMDEV with the #SC GLOBAL command, the value specified is treated as a PowerMax/VMAX device number.
- If the sort order is set to SORT_BY_VOLSER with the #SC GLOBAL command, the value specified is treated as a starting volume serial.
- If the sort order is set to SORT_BY_MVSCUU with the #SC GLOBAL command, the value specified is treated as a starting z/OS device address.
Example

The following example shows the output from an #SQ RAID10 command:

EMCMN00I SRDF-HC : (42) #SQ RAID10,5100,4
EMCQV18I SRDF-HC DISPLAY FOR (42) #SQ RAID10,5100,4
SERIAL #:0001926-00143/0AAKN MICROCODE LEVEL:5876-231
CUU_ | DEV_ DEV_ DEV_ DEV_
5240  0168 01E8 0268 02E8
5241  0169 01E9 0269 02E9
5242  016A 01EA 026A 02EA
5243  016B 01EB 026B 02EB
END OF DISPLAY

Output fields

CUU z/OS device number.
DEV PowerMax/VMAX device number.
#SQ RDFGRP

The #SQ RDFGRP command displays the SRDF group configuration.

Syntax

```
#SQ RDFGRP [(CAS|NOCAS)], cuu
[,,DIR(dir#)]|,LABEL(label-mask)|,RSER(value)|
,,ONLINE|,OFFLINE][,ALL][,RA(srdfgrp)]
[,,CQNAME=cqname](cqname,P)|(cqname,C)]
```

```
#SQ RDFGRP [(CAS|NOCAS)]
,,RMT{(cuu,hoplist)|(cuu,hoplist,*)}
[,,DIR(dir#)]|,LABEL(label-mask)|,RSER(value)|
,,ONLINE|,OFFLINE][,ALL][,RA(srdfgrp)]
[,,CQNAME=cqname](cqname,P)|(cqname,C)]
```

```
#SQ RDFGRP [(CAS|NOCAS)], LCL(cuu, srdfgrp)
,,DIR(dir#)|,LABEL(label-mask)|,RSER(value)|
,,ONLINE|,OFFLINE][,ALL][,RA(srdfgrp)]
[,,CQNAME=cqname](cqname,P)|(cqname,C)]
```

```
#SQ RDFGRP [(CAS|NOCAS)], G(groupname)
,,DIR(dir#)|,LABEL(label-mask)|,RSER(value)|
,,ONLINE|,OFFLINE][,ALL][,RA(srdfgrp)]
[,,CQNAME=cqname](cqname,P)|(cqname,C)]
```

```
#SQ RDFGRP [(CAS|NOCAS)], SCFG(gnsgrp)
,,DIR(dir#)|,LABEL(label-mask)|,RSER(value)|
,,ONLINE|,OFFLINE][,ALL][,RA(srdfgrp)]
[,,CQNAME=cqname](cqname,P)|(cqname,C)]
```

**Note:** For the RMT command format, the (rdfcuu) parameter is no longer used; however, it is tolerated for existing code that uses it.

Parameters

**ALL**

Displays complete details for every SRDF group in the storage system.

**CAS**

See “CAS” on page 130.

**cqname**

See “cqname” on page 130.

**cuu**

See “cuu” on page 130.

**DIR(dir#)**

Displays all SRDF groups associated with the specified director. Valid values are 01 to 80 (hex).

**G(groupname)**

See “G(groupname)” on page 130.
hoplist

See “hoplist” on page 131.

LABEL(value)

The value specified for LABEL must be a string of up to ten characters. When this parameter is used, an SRDF group is included in the display if each character of the specified value other than '*' matches the corresponding character of the SRDF group.

An asterisk (*) in the specified value is considered to match any label character in the corresponding position. A pattern must start with at least one alphanumeric value and end with an asterisk. Label characters beyond the length of the specified string are not considered in determining a match.

If ALL is specified, the SRDF group display includes all details; otherwise, only a short display is shown for each SRDF group.

LCL

See “LCL” on page 131.

NOCAS

See “NOCAS” on page 131.

OFFLINE

When this parameter is used, an SRDF group is included in the display if SRDF group is marked offline.

ONLINE

When this parameter is used, an SRDF group is included in the display if SRDF group is marked online.

queue-option

See “queue-option” on page 131.

RA(srdfgrp)

Specifies the SRDF group for which you want to display complete details.

RMT

See “RMT” on page 132.

Note: For this format, the third subparameter may alternatively be specified as an asterisk (*). In that case, the command action then applies to all SRDF groups.

RSER(value)

When RSER is specified, an SRDF group is included in the display if the trailing digits of the serial number of the other-side storage system of the SRDF group match this RSER value. For example, RSER(00341) lists all SRDF groups for which the trailing digits of the serial number of the other-side storage system of the SRDF group are 00341.

The value specified for RSER must be a numeric string of 1 to 12 digits.
If ALL is specified, the SRDF group display includes all details; otherwise, only a short display is shown for each SRDF group.

**SCFG(gnsgrp)**

See “SCFG(gnsgrp)” on page 133.

**srdfgrp**

See “srdfgrp” on page 133.

**Examples**

The following examples show the output from #SQ RDFGRP commands:

```
Example 1: ALL option

EMCQR00I SRDF-HC DISPLAY FOR (7) ROH6 SQ RDFGRP,2800,ALL
  MY SERIAL #     MY MICROCODE
  -------------------   ------------
  0001967-00263/0KBAY     5977-148

  MY GRP ONL PC OS GRP  OS SERIAL   OS MICROCODE SYNCHDIR FEATURE
  ------ --- -- ------ ------------ ------------ -------- ------------

  LABEL       TYPE    AUTO-LINKS-RECOVERY    LINKS_DOMINO   MSC_GROUP
  ---------- ------- ---------------------- ----------------- 
  04    Y   U   04   0001957-00196  5876-280   G(R1>R2)

  RAO0404    DYNAMIC    AUTO-LINKS-RECOVERY   LINKS-DOMINO:NO
             ( SW,HW ) CMPR ENABLED = ( ?,?)

  MY DIR# OS RA# ST -----MY WWN-----
  ------- ------ -- ----------------
  62(1D) zz57zz 00 5000097350041C5D
```

**Output fields**

**MY SERIAL #**  The complete 12-digit serial number of the storage system to which the command was issued.

**Note:** When a storage system with PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5874 and later emulates an IBM 2107, it externally represents the serial number as an alphanumeric serial number to be compatible with IBM command output.

**MY MICROCODE**  The major-minor level of the operating environment running on the storage system to which the command was issued.

**MY GRP**  The SRDF group in the storage system to which the command was issued.

If this is part of a cascaded SRDF/A configuration, the group number has a -C suffix. If a -? suffix appears, the group may have no devices.

**Note:** “-?” is displayed for any SRDF/A groups when the NOCAS option is specified or the DISCOVER_CAS_QRY initialization parameter is set to NO.

**ONL**  Indicates whether the SRDF group is online:

Y  The SRDF group is online.

N  The SRDF group is offline.
PC  The protocol of the SRDF group:
   E   ESCON
   F   Fibre
   I   IP
   U   The protocol is unknown and the group is likely offline.

OS GRP  The number of the associated SRDF group on the remote storage system.

OS SERIAL  The complete 12-digit serial number of the remote storage system.

OS MICROCODE  The major-minor level of the operating environment on the remote storage system.

SYNCHDIR  The current synchronization direction for the SRDF group:
   G   The setting displayed in brackets is at the global level.
   C   The setting displayed in brackets is at the storage system level.
   R1>R2  The R1>R2 synchronization direction.
   R1<R2  The R1<R2 synchronization direction.
   NONE  No synchronization direction.

FEATURE  Indicates which feature(s) are currently enabled:
   (Blank)  Not SRDF/A at this time.
   R/M ACTIVE  The group is operating in SRDF/Metro mode.
   R/M CONFIGURED  The group is configured and reserved for running in SRDF/Metro mode.
   R/M QUORUM  The group is used as Witness in the SRDF/Metro configuration.
   R/M STALLED  SRDF/Metro mode has been suspended, no syncing is performed.
   R/M SYNCING  The SRDF/Metro group is syncing data between the R1 and R2, and SCSI State transfer has been initiated.
   SQAR  An SRDF group is defined to an SRDF/SQAR definition that is not running SRDF/A.
   SRDFA A MSC  An active SRDF/A group is running in MSC.
   SRDFA A SQAR  An active SRDF/A group is running in both MSC and SRDF/SQAR.
   SRDFA A STAR  An active SRDF/A group is running in both MSC and SRDF/Star.
   SRDFA A STAR-A  An active SRDF/A group is running in both MSC and SRDF/Star-A.
   SRDFA ACTIVE  SRDF/A is active on the SRDF group.
   SRDFA I MSC  An inactive SRDF/A group was running in MSC.
   SRDFA I SQAR  An inactive SRDF/A group was running in MSC and SRDF/SQAR.
   SRDFA I STAR  An inactive SRDF/A group was running in MSC and SRDF/Star.
   SRDFA I STAR-A  An inactive SRDF/A group was running in MSC and SRDF/Star-A.
   SRDFA INACT  SRDF/A is in a transitional state. Once cleanup is done, it will no longer be SRDF/A active.
   SRDFA T MSC  An active SRDF/A group is running in MSC mode in Transmit Idle
   STAR  An SRDF group is defined to an SRDF/Star definition that is not running SRDF/A.
   STAR-A  An SRDF group is defined to an SRDF/Star-A definition that is not running SRDF/A.
   STAR RECOVERY  A group in a STAR or SQAR configuration that is used for recovery in case of a failure. During normal operations, this group is inactive.
   STAR-A RECOVERY  A group in an SRDF/Star-A configuration that is used for recovery in case of a failure. During normal operations, this group is inactive.

LABEL  The label assigned to the SRDF group when it was created with the LABEL parameter.
**TYPE**

The group type, STATIC or DYNAMIC.

*Note:* For storage systems running PowerMaxOS 5978 and HYPERMAX OS 5977, only dynamic SRDF groups are supported. For storage systems running Enginuity 5876 and earlier, static or dynamic groups are supported.

**AUTO-LINKS-RECOVERY**

Indicates whether the Auto Links Recovery mode is in effect:

- **AUTO-LINKS-RECOVERY** indicates the mode is in effect (all devices will become ready on the link when it is recovered)
- **NO-AUTO-LINKS-RECOVERY** indicates the mode is not in effect (which will leave the devices TNR when the link is restored).

**LINKS-DOMINO**

Indicates the Links Domino mode state:

- **YES** Indicates the mode is in effect.
- **NO** Indicates the mode is not in effect.
- **RDFGRP** Indicates the feature is in effect by SRDF group.

*Note:* “LINKS DOMINO mode” on page 329 describes the Links Domino mode.

**MSC_GROUP**

If an SRDF group is running MSC or SRDF/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.

**(SW,HW) CMPR**

This field indicates the status of SRDF software and hardware compression:

- **ENABLED**
  - **Y**Compression is active.
  - **N**Compression is not active.

**MY DIR#**

The RA director that supports the SRDF group in the storage system to which the command was issued. Under PowerMaxOS 5978 and HYPERMAX OS 5977, the director number is followed by the port number in brackets. With Enginuity 5876 and earlier, the port number is not displayed.

**OS RA#**

The RA director on the remote storage system supporting the SRDF group. Under PowerMaxOS 5978 and HYPERMAX OS 5977, the director number is followed by the port number in brackets. With Enginuity 5876 and earlier, the port number is not displayed unless connected to PowerMaxOS 5978 or HYPERMAX OS 5977, in which case the remote port number is displayed.

**ST**

The state of the port on the remote storage system supporting the SRDF group. The value shown is a hex sum of the following:

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>The remote system is in IML (initial load of the operating environment).</td>
</tr>
<tr>
<td>02</td>
<td>The physical link on the remote system has been brought up.</td>
</tr>
<tr>
<td>04</td>
<td>The physical link supports HW compression.</td>
</tr>
</tbody>
</table>
-----MY WWN-----

The World Wide Name (WWN) of the RA in the storage system to which the command was issued.

**Example 2:**

**LABEL option**

The following display illustrates the use of the LABEL command parameter. This example lists all SRDF groups with labels beginning with MSF:

```
EMCMN001 SRDF-HC : (39) #SQ RDFGRP,5100,LABEL(MSF*)
EMCQR001 SRDF-HC DISPLAY FOR (39) #SQ RDFGRP,5100,LABEL(MSF*)

MY SERIAL #        MY MICROCODE
-------------------   ------------
0001926-00143/0AAPH     5876-231

MY GRP ONL PC OS GRP  OS SERIAL   OS MICROCODE SYNCHDIR FEATURE
-------------------   ---   ---   ---   ---   ---
LABEL      TYPE    AUTO-LINKS-RECOVERY    LINKS_DOMINO   MSC_GROUP
---------- ------- ---------------------- ---------------- ----------
D7    Y   F   D0   0001926-00262   5874-226   G(R1>R2) SRDFA ACTIVE
MSFTHIN1   DYNAMIC    AUTO-LINKS-RECOVERY LINKS-DOMINO:NO
F7    Y   F   F7   0001926-00261   5874-226   G(R1>R2)
MSFGRPF7   DYNAMIC    AUTO-LINKS-RECOVERY LINKS-DOMINO:NO

END OF DISPLAY
```

**Note:** For field description, see “Output fields” on page 199.

---

**Example 3:**

**ONLINE option**

The following display illustrates the use of the ONLINE command parameter.

```
EMCMN001 SRDF-HC : (3) #SQ RDFGRP,831F,ONLINE
EMCQR001 SRDF-HC DISPLAY FOR (3) #SQ RDFGRP,831F,ONLINE

MY SERIAL #        MY MICROCODE
-------------------   ------------
0001926-00215/0AAPH     5876-231

MY GRP ONL PC OS GRP  OS SERIAL   OS MICROCODE SYNCHDIR FEATURE
-------------------   ---   ---   ---   ---   ---
LABEL      TYPE    AUTO-LINKS-RECOVERY    LINKS_DOMINO   MSC_GROUP
---------- ------- ---------------------- ---------------- ----------
04    Y   F   04   0001926-00290  5875-100   G(NONE)
TVGRP04    DYNAMIC    AUTO-LINKS-RECOVERY LINKS-DOMINO:NO
{ SW,HW } CMPR ENABLED = ( N,N )

05    Y   F   05   0001926-00262  5874-240   G(NONE)
TVGRP05    DYNAMIC    AUTO-LINKS-RECOVERY LINKS-DOMINO:NO
{ SW,HW } CMPR ENABLED = ( N,N )

08    Y   F   80   0001926-00290  5875-100   G(NONE)
LRGRP08    DYNAMIC    AUTO-LINKS-RECOVERY LINKS-DOMINO:NO
{ SW,HW } CMPR ENABLED = ( N,N )
```

---

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>08</td>
<td>The physical link supports SW compression.</td>
</tr>
<tr>
<td>10</td>
<td>The physical link serves legacy connection (N-X).</td>
</tr>
<tr>
<td>20</td>
<td>The physical link is a control path (the remote side is running PowerMaxOS 5978 or HYPERMAX OS 5977 and only control traffic is passed through this connection while user I/O is restricted).</td>
</tr>
</tbody>
</table>

A value of ‘00’ indicates the absence of the other states.
09 Y F 90 0001926-00261 5874-240 G(NONE)
LRGP09  DYNAMIC  AUTO-LINKS-RECOVERY  LINKS-DOMINO:NO
  ( SW, HW ) CMPR ENABLED = ( N, N )

0D Y F D0 0001926-00290 5875-100 G(NONE)
LVGRP0D  DYNAMIC-AUTO-LINKS-RECOVERY  LINKS-DOMINO:NO (LVMSC8 )
  ( SW, HW ) CMPR ENABLED = ( N, N )

1D Y F D1 0001926-00290 5875-100 G(NONE)
LVGRP1D  DYNAMIC-AUTO-LINKS-RECOVERY  LINKS-DOMINO:NO
  ( SW, HW ) CMPR ENABLED = ( N, N )

20 Y F 60 0001926-00290 5875-100 G(NONE)
LRGRP20  DYNAMIC-AUTO-LINKS-RECOVERY  LINKS-DOMINO:NO
  ( SW, HW ) CMPR ENABLED = ( N, N )

30 Y F 30 0001926-00290 5875-100 G(NONE)
TVGRP30  DYNAMIC  AUTO-LINKS-RECOVERY  LINKS-DOMINO:NO
  ( SW, HW ) CMPR ENABLED = ( N, N )

41 Y F 14 0001926-00209 5875-100 G(NONE)
WJ_UT66_UT  DYNAMIC  AUTO-LINKS-RECOVERY  LINKS-DOMINO:NO
  ( SW, HW ) CMPR ENABLED = ( N, N )

---

**Example 5:** ALL option

The following display illustrates the use of the ALL command parameter.

EMCQR001  SRDF-HC  DISPLAY  FOR (7)  ROH6  SQ  RDFGRP,2800,ALL
MY SERIAL #        MY MICROCODE
-------------------   ------------
0001967-00263/0KBAY     5977-148
MY GRP ONL PC OS GRP  OS SERIAL   OS MICROCODE SYNCHDIR FEATURE
------ --- -- ------ ------------ ------------ -------- ------------
LABEL      TYPE    AUTO-LINKS-RECOVERY    LINKS_DOMINO   MSC_GROUP
---------- ------- ---------------------- ---------------- ----------
04 Y U 04 0001957-00196 5876-280 G(R1>R2)
RAO0404  DYNAMIC  AUTO-LINKS-RECOVERY  LINKS-DOMINO:NO
  ( SW, HW ) CMPR ENABLED = ( ?, ? )
MY DIR# OS RA# ST -----MY WWN-----
------- ------ -- ----------------
62 (1D)  57  00 5000097350041C5D

---

**Note:** For field description, see “Output fields” on page 199.
The #SQ SRDFA command displays information about the SRDF/A groups in the storage system.

**Note:** After an SRDF/A group status is changed, the volume status may take a few seconds to refresh. Devices may not report the new device status for a few seconds.

Note that the device used in the command does not have to be an SRDF/A device. The device is used as a gatekeeper and identifies the storage system on which the SRDF group or groups with SRDF/A in the system may be found.

The #SQ SRDFA, cuu command format displays data about the entire SRDF/A configuration in the storage system (that is, the display will be for all SRDF groups found with SRDF/A). Use the command format #SQ SRDFA,LCL or #SQ SRDFA,RMT to display data about a single SRDF group.

**Syntax**

```
#SQ SRDFA [(CAS|NOCAS)], cuu[, CYCLETOD]
[ , CQNAME=(cqname[,queue-option])] 

#SQ SRDFA [(CAS|NOCAS)],
RMT((cuu, hoplist)|(cuu, hoplist, srdfgrp)|(cuu, hoplist,*))
[ , CYCLETOD]
[ , CQNAME=(cqname[,queue-option])] 

#SQ SRDFA [(CAS|NOCAS)],LCL(cuu, srdfgrp)[, CYCLETOD]
[ , CQNAME=(cqname[,queue-option])] 

#SQ SRDFA [(CAS|NOCAS)],G(groupname)[, CYCLETOD]
[ , CQNAME=(cqname[,queue-option])] 

#SQ SRDFA [(CAS|NOCAS)],SCFG(gnsgrp)[, CYCLETOD]
[ , CQNAME=(cqname[,queue-option])] 
```

**Note:** For the RMT command format, the (rdfcuu) parameter is no longer used; however, it is tolerated for existing code that uses it.

**Parameters**

**CAS**

See “CAS” on page 130.

**cqname**

See “cqname” on page 130.

**cuu**

See “cuu” on page 130.

**CYCLETOD**

Provides an approximation of the time of day (TOD) that the data on the SRDF/A R2 represents.

**G(groupname)**

See “G(groupname)” on page 130.
Examples

Example 1: #SQ SRDFA command issued to the primary side

The following example shows output generated by an #SQ SRDFA command issued to the primary side:

```
EMCMN001 SRDF-HC : (6) #DG2 SQ_SRDFA,LCL(6200,8C)
EMCQR001 SRDF-HC DISPLAY FOR (6) #DG2 SQ_SRDFA,LCL(6200,8C)  307
-------------------   ------------
MY SERIAL #        MY MICROCODE
-------------------   ------------
0001967-01130/0KDLN     5977-813

MY GRP ONL PC OS GRP  OS SERIAL   OS MICROCODE SYNCHDIR FEATURE
------ --- -- ------ ------------ ------------ -------- -------------
LABEL      TYPE    AUTO-LINKS-RECOVERY    LINKS_DOMINO   MSC_GROUP
---------- ------- ---------------------- --------------------------
8C-C  Y   F   8C   0001967-01170  5977-813   G(R1>R2) SRDFA A STAR
DJGSITEB1  DYNAMIC    AUTO-LINKS-RECOVERY   LINKS-DOMINO:NO (DJGSRCS)
( SW,HW ) CMPR ENABLED = ( N,N )
```

Figure 15 #SQ SRDFA command issued to the primary side
Note: The WRITE PACING and WP fields display starting with Enginuity 5874. The GPACING, DPACING, and NOGPACE fields display starting with Enginuity 5875.

**Output fields**

The fields that can appear in the #SQ SRDFA primary side display have the following meanings:

**MY SERIAL #**

The complete 12-digit serial number of the storage system to which the command was issued.

**Note:** When a storage system with PowerMaxOS 5978, HYPERMAX OS 5977 or Enginuity 5874 and later emulates an IBM 2107, it externally represents the serial number as an alphanumeric number to be compatible with IBM command output.

**MY MICROCODE**

The major-minor level of the operating environment running on the storage system to which the command was issued.

**MY GRP**

The SRDF/A group number. If this is part of a cascaded SRDF/A configuration, the group number has a -C suffix. If a -? suffix appears, the group may have no devices.

**ONL**

Indicates whether the SRDF group is online:

- **Y** The SRDF group is online.
- **N** The SRDF group is offline.

**PC**

The protocol of the SRDF group:

- **E** ESCON
- **F** Fibre
- **I** IP
- **U** The protocol is unknown and the group is likely offline.

**OS GRP**

The number of the associated SRDF group on the remote storage system.

**OS SERIAL**

The complete 12-digit serial number of the remote storage system.

**OS MICROCODE**

The major-minor level of the operating environment on the remote storage system.

**SYNCHDIR**

The current synchronization direction for the SRDF group:

- **G** The setting displayed in brackets is at the global level.
- **C** The setting displayed in brackets is at the storage system level.
- **R1>R2** The R1>R2 synchronization direction.
- **R1<R2** The R1<R2 synchronization direction.
- **NONE** No synchronization direction.

**FEATURE**

Indicates which feature(s) are currently enabled:

- **(Blank)** Not SRDF/A at this time.
- **R/M ACTIVE** The group is operating in SRDF/Metro mode.
- **R/M CONFIGURED** The group is configured and reserved for running in SRDF/Metro mode.
- **R/M QUORUM** The group is used as Witness in the SRDF/Metro configuration.
- **R/M STALLED** SRDF/Metro mode has been suspended, no syncing is performed.
- **R/M SYNCING** The SRDF/Metro group is syncing data between the R1 and R2, and SCSI State transfer has been initiated.
SRDFA ACTIVE  SRDF/A is active on the SRDF group.
SRDFA INACT   SRDF/A is in a transitional state. Once cleanup is done, it will no longer be SRDF/A active.
SRDFA A MSC   An active SRDF/A group is running in MSC.
SRDFA I MSC   An inactive SRDF/A group was running in MSC.
SRDFA T MSC   An active SRDF/A group is running in MSC mode in Transmit Idle
SRDFA A STAR  An active SRDF/A group is running in both MSC and SRDF/Star.
SRDFA A STAR-A An active SRDF/A group is running in both MSC and SRDF/Star-A.
SRDFA I STAR  An inactive SRDF/A group was running in MSC and SRDF/Star.
SRDFA I STAR-A An inactive SRDF/A group was running in MSC and SRDF/Star-A.
STAR         An SRDF group is defined to an SRDF/Star definition that is not running SRDF/A.
STAR-A       An SRDF group is defined to an SRDF/Star-A definition that is not running SRDF/A.
SRDFA A SQAR  An active SRDF/A group is running in both MSC and SRDF/SQAR.
SRDFA I SQAR  An inactive SRDF/A group was running in MSC and SRDF/SQAR.
SQAR         An SRDF group is defined to an SRDF/SQAR definition that is not running SRDF/A.

LABEL        An alphanumeric group label (up to 10 characters).
TYPE         The group type, STATIC or DYNAMIC.

Note: For storage systems running PowerMaxOS 5978 or HYPERMAX OS 5977, only dynamic SRDF groups are supported. For storage systems running Enginuity 5876 and earlier, static or dynamic groups are supported.

AUTO-LINKS-RECOVERY Indicates whether the Auto Links Recovery mode is in effect:
AUTO-LINKS-RECOVERY indicates the mode is in effect (all devices will become ready on the link when it is recovered)
NO-AUTO-LINKS-RECOVERY Indicates the mode is not in effect (which will leave the devices TNR when the link is restored).

LINKS-DOMINO Indicates the Links Domino mode state:
YES           Indicates the mode is in effect.
NO            Indicates the mode is not in effect.
RDFGRP        Indicates the feature is in effect by SRDF group.

Note: “LINKS DOMINO mode” on page 329 describes the Links Domino mode.

(SW, HW) CMPR ENABLED This field indicates the status of SRDF software and hardware compression:
Y             Compression is active.
N             Compression is not active.

MSC_GROUP     If an SRDF group is running MSC or SRDF/Star, this field displays the first eight bytes of the MSC group that was specified on the MSC_GROUP_NAME initialization statement that defined the MSC group.

PRIMARY SIDE  The query was done on the primary side of the SRDF configuration.

CYCLE#        A number indicating the cycle that SRDF/A is on. This number will continue to increase each time a cycle switch occurs.
### Command Reference

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MIN CYCLE TIME</strong></td>
<td>The interval time that SRDF/A is targeting for cycle switches. When running without MSC, this is the time the storage system will try to cycle switch. When running with MSC active, this time is not used.</td>
</tr>
<tr>
<td><strong>SECONDARY CONSISTENT</strong></td>
<td>This field indicates whether the secondary side is consistent:</td>
</tr>
<tr>
<td><strong>TOLERANCE</strong></td>
<td>The Tolerance field indicates if Tolerance mode is on or off:</td>
</tr>
<tr>
<td><strong>CAPTURE CYCLE SIZE</strong></td>
<td>For a group running in Legacy mode, the field shows the number of cache slots currently in the active cycle. For a group running in MCM mode, it indicates the number of cache slots currently in the active and in the queue(s).</td>
</tr>
<tr>
<td><strong>TRANSMIT CYCLE SIZE</strong></td>
<td>The number of slots left in the cycle being sent to the secondary side.</td>
</tr>
<tr>
<td><strong>AVERAGE CYCLE TIME</strong></td>
<td>The average time each cycle is taking over the past sixteen cycles.</td>
</tr>
<tr>
<td><strong>AVERAGE CYCLE SIZE</strong></td>
<td>The average number of slots in the past sixteen cycles.</td>
</tr>
<tr>
<td><strong>TIME SINCE LAST SWITCH</strong></td>
<td>The number of seconds since the last time SRDF/A has cycle switched.</td>
</tr>
<tr>
<td><strong>DURATION OF LAST CYCLE</strong></td>
<td>The number of seconds the last cycle lasted.</td>
</tr>
<tr>
<td><strong>MAX THROTTLE TIME</strong></td>
<td>This field indicates how long SRDF/A will slow the host adapters once cache limits are reached.</td>
</tr>
<tr>
<td></td>
<td>◆ If the value is 0, then once cache limits are reached, SRDF/A is dropped.</td>
</tr>
<tr>
<td></td>
<td>◆ If the value is 65535, then the host adapters will work at write-pending limits indefinitely.</td>
</tr>
<tr>
<td></td>
<td>◆ Any other value represents the number of seconds the host adapters will work at write-pending limits before SRDF/A will be dropped.</td>
</tr>
<tr>
<td><strong>MAX CACHE PERCENTAGE</strong></td>
<td>The percentage of cache that SRDF/A will be allowed to use. When SRDF/A processing would cause more than this percentage of cache to be used, SRDF/A is dropped for SRDF groups in accordance with their Drop Priority settings.</td>
</tr>
<tr>
<td><strong>HA WRITES</strong></td>
<td>The number of tracks written by the host adapters.</td>
</tr>
<tr>
<td><strong>RPTD HA WRITES</strong></td>
<td>The total number of tracks written multiple times in a cycle by the host adapters.</td>
</tr>
<tr>
<td><strong>HA DUP. SLOTS</strong></td>
<td>The number of times a slot had to be duplicated because it was written to in multiple cycles.</td>
</tr>
<tr>
<td><strong>SECONDARY DELAY</strong></td>
<td>The approximate time that the SRDF/A-managed data on the secondary side is behind that on the primary side.</td>
</tr>
<tr>
<td><strong>LAST CYCLE SIZE</strong></td>
<td>The size of the complete previous cycle.</td>
</tr>
</tbody>
</table>
DROP PRIORITY

The relative priority of this SRDF/A session with regard to the dropping of SRDF/A sessions. If the maximum percentage of cache SRDF/A may use is exceeded, the Drop Priority determines the order in which SRDF/A sessions are dropped in this storage system to relieve the condition. The highest priority is 1; the lowest is 64.

Note: The Drop Priority set in the remote side SRDF group has no effect on the Drop Priority in this SRDF group.

CLEANUP RUNNING

This field indicates the cleanup status as follows:

Y Indicates 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 active to inactive. Cleanup prevents RDF_RSUM, REFRESH RFR_RSUM, RNG_REFRESH, RNG_RSUM, or VALIDATE/INVALIDATE from being run on the SRDF/A devices. After the cleanup is finished, these 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.

SRDF/A TRANSMIT IDLE

This field indicates the Transmit Idle state:

Y Transmit Idle is enabled for the SRDF group.

N Transmit Idle is not enabled for the SRDF group.

In addition, a “T” in the FEATURE field of the display indicates that an SRDF/A group is currently in the Transmit Idle state. “FEATURE” on page 206 lists the possible values for this field.

Note: Transmit Idle requires both sides of the SRDF/A relationship to be available on the link and the #SC SRDF.A command action TRANSMIT_IDLE to be set to ON for both sides. Use the #SC SRDF.A command actions to turn on/off the Transmit Idle state.

MSC will not initialize or refresh if the Transmit Idle state exists for one or more SRDF groups in the MSC group. If the Transmit Idle state exists when initializing MSC, message SCF1587R is issued to provide retry or cancel options:

08.31.07 S0041602 *nn SCF1587R MSC - GROUP=AGROUP WAIT FOR SRDFA TRANSMIT IDLE  - RETRY OR CANCEL

If the Transmit Idle state occurs while MSC is active and cycle switching, the following messages are generated.

08.23.17 S0041602 SCF1586I MSC - GROUP=AGROUP (07FB,16) SER= 00000006134 IN SRDFA TRANSMIT IDLE
08.23.17 S0041602 SCF1562I MSC - GROUP=AGROUP (07FB,16) SER= 00000006134 CYCLE SWITCH DELAY - TRANSMIT
08.23.17 S0041602 SCF1563I MSC - GROUP=AGROUP (07FB,16) SER= 00000006143 CYCLE SWITCH DELAY - RESTORE

The following message is issued when the Transmit Idle state no longer exists:

08.24.44 S0041602 SCF1588I MSC - GROUP=AGROUP (07FB,16) SER= 00000006134 NO LONGER IN SRDFA TRANSMIT IDLE
08.24.45 S0041602 SCF1343I MSC - GROUP=AGROUP PROCESS_FC04-TIME FOR SWITCH
SRDF/A DSE ACTIVE
This field indicates whether Delta Set Extension (DSE) mode is active:

Y  The SRDF/A group is running in DSE mode.
N  SRDF/A is not running in DSE mode.

MSC ACTIVE
This field indicates whether the SRDF/A group is part of an MSC group:

Y  The SRDF/A group is part of an MSC group. The MSC group is one of a set
    of SRDF/A groups whose cycle switching is controlled by the host and not the
    storage system. When SRDF/A is not active and MSC Active = "Y", it indicates that
    SRDF/A was deactivated or dropped while MSC was active.
N  SRDF/A is not part of an MSC group.

ACTIVE SINCE
The date and time that the SRDF/A session joined MSC.

CAPTURE TAG
The tag for the data in the capture cycle. This tag verifies that the multiple SRDF/A
groups 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.

The cycle tag is composed of several parts, as follows:

- Byte 1 is a flag byte:
  x'80' = Consistent first cycle
  x'40' = Consistent second cycle
  x'20' = SRDF/Star mode
  x'10' = Site B is not consistent
  x'02' = SRDF/SQAR mode
  x'01' = SRDF/Star-A mode

  These flags are maintained by the host software. The first two bits report the
  consistency of the R2 side as follows:
  - A value of x'C0' indicates a consistent first and second cycle for MSC mode
    (x'80' + x'40').
  - A value of x'E0' indicates a consistent first and second cycle for Star mode
    (x'80' + x'40' + x'20').
- Bytes 2-3 are reserved.
- Byte 4 contains the "Star ahead counter" which indicates the number of cycles
  Site C is ahead of Site B.
- Bytes 5-8 contain the cycle number.

TRANSMIT TAG
The tag for the data in the transmit cycle. Transmit Tag verifies that the multiple
SRDF/A groups 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. The
Capture Tag description on page 210 provides information about the contents of data in
this tag.

GLOBAL CONSISTENCY
Global Consistency indicates the status of dependent write consistency as follows:

Y  Dependent write consistency has been achieved at the remote site across all SRDF
    groups 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 SRDF groups in the MSC group.
**STAR RECOVERY AVAILABLE**

Star Recovery Available indicates the status of MSC and SRDF/Star mode as follows:

- **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 not running in SRDF/Star mode or has not yet achieved the ability to provide differential resynchronization between the two remote sites.

**SQAR RECOVERY AVAILABLE**

Indicates the status of MSC and SRDF/SQAR mode as follows:

- **Y**: MSC is running in SRDF/SQAR mode and the SRDF/SQAR environment is now able to provide a differential resynchronization between the two remote sites.
- **N**: MSC is not running in SRDF/SQAR mode or has not yet achieved the ability to provide differential resynchronization between the two remote sites.

**SQAR SRDF/A AHEAD**

This field indicates the following:

- **Y**: MSC is running in SRDF/SQAR mode and the data on the SRDF/A secondary device is more current than that on the non-SRDF/A secondary device.
- **N**: MSC is not running in SRDF/SQAR mode or the SRDF/A secondary device does not contain more current data than the non-SRDF/A secondary device.

**SQAR/S TARGET INCONSISTENT**

This field indicates the following:

- **Y**: Synchronous secondary data should be considered as inconsistent.
- **N**: Synchronous secondary data is considered consistent if you are running SRDF/SQAR and SQAR recovery is available.

**WRITE PACING ACTIVE**

This field indicates the status of write pacing functionality as follows.

- **Y**: Write pacing is enabled for this SRDF group. If the threshold criteria are met, then write pacing will occur.
- **N**: Write pacing is disabled for this SRDF group and will not occur even if the criteria are met.
- **D**: Write pacing is configurationally disabled. Write pacing was turned on, but SRDF Host Component has detected a change in the configuration that will prevent write pacing from activating.

**WRITE PACING STATS ON**

This field indicates if write pacing statistics collection is enabled as follows:

- **Y**: Statistics collection is enabled.
- **N**: Statistics collection is not enabled. This is the default setting.

**GPACING ACTIVE**

This field indicates if group-level write pacing is active.

**DPACING ACTIVE**

This field indicates if device-level write pacing is active.

---

**Note:** "#SC SRDFA_WP" on page 303 provides more information about using the write pacing operations described in this section.

**Note:** "#SQ SRDFA_WP" on page 232 describes how to display the write pacing statistics.
WP THRESHOLD

This field indicates the percentage of cache usage level at which write pacing will be armed.

**Note:** This is the percentage of system write pacing used by all active SRDF/A sessions.

WP DSE THRESHOLD

This field indicates the percentage of DSE pool usage at which write pacing will be armed.

WP MAXDELAY

This field indicates the maximum I/O delay, in microseconds, that will be applied to each host write I/O when write pacing occurs.

WP (GRP,DEV) AUTO ACTIVATE

This field indicates if group-level and/or device-level write pacing is automatically activated:

Y  Write pacing is automatically activated for the SRDF group when SRDF/A devices are activated for the group. Once auto activate is set, it continues to apply even if SRDF/A drops and resumes.

N  The auto activate feature for write pacing is not enabled.

CYCLE MODE

This field indicates the group is running in Legacy (L) or MCM (M) mode.

CEXMPT

This field indicates the number of consistency exempt devices in the SRDF group. Consistency exempt is activated on a group basis.

**Note:** “CEXMPT” on page 354 provides more information about consistency exempt operations.

TRANSMIT CYCLE NUMBER

The transmit cycle number.

TRANSMIT QUEUE DEPTH

The number of cycles that have not yet been committed to R2.

LAST TRANSMIT TIME

The time the last transfer cycle took.

AVG TRANSMIT TIME

A windowed average of LAST TRANSMIT TIME.

**Example 2:**

Secondary side

An #SQ SRDFA command issued to the secondary side generates output similar to the following:

```
EMCQR00I SRDF-HC DISPLAY FOR (12) SQ SRDFA,RMT(6306,75,75)
  MY SERIAL #    MY MICROCODE
  ----------------   ------------
0001967-01175/0KDNY     5977-0

MY GRP ONL PC OS GRP OS SERIAL OS MICROCODE SYNCHDIR FEATURE
  ------ --- -- ------ ------------ ------------------ ------------
LABEL        TYPE AUTO-LINKS-RECOVERY LINKS_DOMINO MSC_GROUP
---------- ------- ---------------------- ---------------- ----------
75    Y   F   75   0001967-01130  5977-0     G(R1>R2) SRDFA ACTIVE
GGYE2YG75  DYNAMIC AUTO-LINKS-RECOVERY LINKS-DOMINO:NO
( SW,HW ) CMPR ENABLED = ( N,N )

----------------------------------------------------------------------
SECONDARY SIDE: CYCLE# 15,723 CYCLE TOD 07/13/2015 01:46:31
SECONDARY CONSISTENT ( Y )
CYCLE SUSPENDED ( N ) RESTORE DONE ( Y )
RECEIVE CYCLE SIZE 0 APPLY CYCLE SIZE 0
AVERAGE CYCLE TIME 15 AVERAGE CYCLE SIZE 0
TIME SINCE LAST SWITCH 9 DURATION OF LAST CYCLE 15
```
MAX THROTTLE TIME 0 MAX CACHE PERCENTAGE 75
TOTAL RESTORES 0 TOTAL MERGES 0
SECONDARY DELAY 24 DROP PRIORITY 33
CLEANUP RUNNING (N) HOST INTERRUPTION REQUIRED (N)
SRDF/A TRANSMIT IDLE (N) SRDF/A DSE ACTIVE (Y)
MSC ACTIVE (N) WRITE PACING ACTIVE (N)
WRITE PACING ACTIVE (N) WRITE PACING STATS ON (N)
GPACING ACTIVE (N) DPACE ACTIVE (N)
WP THRESHOLD 60 WP DSE THRESHOLD 90
WP MAXDELAY 50,000 WP (GRP, DEV) AUTO ACTIVATE (N, N)
CYCLE MODE (M) CEXMPT 0
RECEIVE CYCLE NUMBER 15,254
LAST TRANSMIT TIME 0 AVG TRANSMIT TIME 0
---------------------------------------------------------------------
END OF DISPLAY

Figure 16 #SQ SRDFA command issued to the secondary side

Note: The write pacing (WP) and CMPR ENABLED fields only display when using PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5874 and later.

Output fields

The fields which differ from the primary side display (listed in “Output fields” on page 206) are the following:

- GPACING will never display as active on the secondary side, although it actually may be active. This is because the R2-side storage system has no need to know whether group-level pacing is active or not, since group pacing is handled entirely by the R1-side storage system.

- DPACING will display as active if there has been at least one I/O that has been paced at the device level for the group.

- WRITE PACING STATS ON will always display as N on the secondary side, because statistics collection is done by the R1-side storage system.

- WP (GRP, DEV) AUTO ACTIVATE, WP THRESHOLD, WP DSE THRESHOLD, and WP MAXDELAY all reflect the settings that would be used if there was a personality swap and the R2-side became the primary side. All of these settings can be configured on the R2-side by the #SC SRDFA_WP command by directing it to the R2-side. These settings are not used for the active current configuration, and only become the active settings when there is a personality swap.

Additional fields that are unique to the #SQ SRDFA secondary side display have the following meanings:

SECONDARY SIDE
This field indicates that the query was done on the secondary side of the SRDF configuration.

CYCLE TOD
This field indicates the approximate time of day (TOD) that the data on the SRDF/A R2 represents. The CYCLE TOD value is provided as a convenience when an approximate time of day value for an SRDF/A R2 would be useful for operational purposes.
SRDF/A provides a consistent but slightly older copy of the data at the R2 (recovery) site. There is a time lag between the R2 and R1 (primary) SRDF/A data. SRDF Host Component can retrieve the time lag of the SRDF/A R2 data through host software at the R2 site in the event of a source disaster where the primary site is unavailable.

**Note:** The R1 side must also support this feature. If the R1 side does not support this feature, the age will be reported as unavailable.

The timestamp is expressed in the time of the host issuing the #SQ SRDFA command. It is computed by subtracting the storage system-provided time lag (that is, the number of seconds elapsed since the apply cycle became a transmit cycle) from the current z/OS TOD.

If the TOD is not reported, the CYCLE TOD field will contain one of the following responses:

- **UNAVAILABLE R1<5773** indicates that the R1 source side is at an Enginuity level prior to 5773.
- **UNAVAILABLE R2<5773** indicates that the R2 target side is at an Enginuity level prior to 5773.

**IMPORTANT**

CYCLE TOD provides an approximate timestamp for the data in the 'apply' cycle of an SRDF/A configuration. It is based on the storage system timers and is accurate to within a few seconds. It does not represent z/OS system time and should not be used for any recovery operations that require accurate system time as input.

---

**CYCLE SUSPENDED**

This field indicates the status of cycle switching as follows:

- **Y** The cycle switching will be delayed by software to perform a consistent operation (TimeFinder Remote Consistent Split).
- **N** SRDF/A will operate in the normal cycle switching mechanism.

**RESTORE DONE**

This field indicates the status of the apply cycle as follows:

- **Y** The apply cycle is completely restored.
- **N** The apply cycle is not completely restored.

**RECEIVE CYCLE SIZE**

This field indicates the number of slots currently in the cycle actively being written to from the primary side.

**APPLY CYCLE SIZE**

This field indicates the number of slots currently in the cycle actively being restored to the secondary devices.

**TOTAL RESTORES**

This field indicates the total number of slots restored from all of the apply cycles up to the time the display was requested.

**TOTAL MERGES**

This field indicates the total number of slots merged in cache during the restore of all of the apply cycles up to the time the display was requested.
CLEANUP RUNNING  This field indicates the cleanup status as follows:

Y  Indicates 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 active to inactive. Cleanup prevents RDF_RSUM, REFRESH RFR_RSUM, RNG_REFRESH, RNG_RSUM, or VALIDATE/INVALIDATE from being run on the SRDF/A devices. After the cleanup is finished, these 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  This field indicates status as follows:

Y  When Cleanup Running is also Y, MSC must tell SRDF/A what to do with the complete receive cycle on.

Note: In an SRDF/Star environment, the SCFRDFME utility may be required to clear the intervention. “SRDF/A MSC and SRDF/Star recovery considerations” on page 489 provides more information.

N  Host intervention is not required.

RECEIVE TAG  This field is the tag for the data in the receive cycle. The tag is used to verify that the SRDF/A groups in the MSC group are in step. The tag when MSC is active is analogous to the cycle number used when SRDF/A is active and MSC is not active.

APPLY TAG  This field is the tag for the data in the apply cycle. The tag is used to verify that the SRDF/A groups in the MSC group are in step. When MSC is active, this tag is analogous to the cycle number used when SRDF/A is active and MSC is not active.

STAR SRDFA AHEAD  This field indicates the following:

Y  MSC is running in SRDF/Star mode and the data on the SRDF/A secondary device is more current than that on the non-SRDF/A secondary device.

N  MSC is 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.

STAR/S TARGET INCONSISTENT  This field indicates the following:

Y  Synchronous secondary data should be considered as inconsistent.

N  Synchronous secondary data should be considered as consistent. Synchronous secondary data is considered consistent if you are running SRDF/Star and Star recovery is available.

RECEIVE CYCLE NUMBER  This field indicates the receive cycle number.

Example 3: CYCLETOD option  This example illustrates use of the CYCLETOD parameter. The CYCLETOD parameter is used only for an SRDF/A query for all groups. It is ignored for an SRDF/A query for a specific group.

To query all local groups, use the following format:

#SQ SRDFA, cuu, CYCLETOD

To query all remote groups, use the following format:

#SQ SRDFA, RMT(cuu, hoplist, *), CYCLETOD

where * is a wildcard character that represents all SRDF groups.
For example, the #SQ SRDFA,6400,CYCLETOD command generates the following output:

```emcmn00i SRDF-HC : (1) #SQ SRDFA,6400,CYCLETOD
EMCQR00I SRDF-HC DISPLAY FOR (3) #DG2 SQ SRDFA,6400,CYCLETOD
    MY SERIAL #    MY MICROCODE
    ---------------   -------------
001967-01175/0KDNY     5977-1065
```

```igrp(02) UNKN SIDE: CYCLE# N/A CYCLE TOD = 0 (UNAVAILABLE)
igrp(07) UNKN SIDE: CYCLE# N/A CYCLE TOD = 0 (UNAVAILABLE)
igrp(09) UNKN SIDE: CYCLE# N/A CYCLE TOD = 0 (UNAVAILABLE)
igrp(0B) SCND SIDE: CYCLE# 6 CYCLE TOD 01/11/2017 11:02:22
igrp(0E) UNKN SIDE: CYCLE# N/A CYCLE TOD = 0 (UNAVAILABLE)
igrp(11) SCND SIDE: CYCLE# 380,869 CYCLE TOD 10/21/2016 21:28:23
END OF DISPLAY
```

**Note:** For a specific group query where SRDF/A is active, the full #SQ SRDFA display appears. If SRDF/A is inactive on that group, message EMCQR06I is issued to display any available CYCLE TOD information.

- **AGRP** indicates that SRDF/A is active on the SRDF group shown in parentheses.
- **IGRP** indicates that SRDF/A is inactive on the SRDF group shown in parentheses.

The line will have one of the following formats:

**Note:** If the local system is earlier than Enginuity 5773, then Format 7 will be automatically issued (only once as it applies to the entire system).

**Format 1**

`IGRP(nn) SECONDARY SIDE: CYCLE# <#> CYCLE TOD mm/dd/yyyy hh:mm:ss`

The command was issued to the secondary side and the primary side was at Enginuity 5773 or later. The reported CYCLE# is the last cycle that was completed at the date and time indicated in the message.

**Format 2**

`IGRP(nn) SECONDARY SIDE: CYCLE# N/A CYCLE TOD (UNAVAILABLE R1<5773)`

The command was issued to the secondary side and the cycle TOD is unavailable because the primary side has an operating environment earlier than Enginuity 5773.

**Format 3**

`AGRP(nn) SECONDARY SIDE: CYCLE# N/A CYCLE TOD UNAVAILABLE < 5773`

The command was issued to the secondary side and the cycle TOD is unavailable because the secondary side has an operating environment earlier than Enginuity 5773.

**Format 4**

`IGRP(nn) PRIMARY SIDE: CYCLE# N/A CYCLE TOD UNAVAILABLE ON PRIMARY`

The command was issued to the primary side and the cycle TOD is not available on the primary side.
Format 5
IGRP(nn) UNKNOWN SIDE: CYCLE# N/A CYCLE TOD = 0 (UNAVAILABLE)
The cycle age is zero.

Format 6
IGRP(nn) UNKNOWN SIDE: CYCLE# N/A CYCLE TOD = -1 (UNAVAILABLE)
The cycle age is -1.

Format 7
GRP(ALL) UNKNOWN SIDE: CYCLE# N/A CYCLE TOD UNAVAILABLE < 5773
The side to which the command was issued has an operating environment earlier than Enginuity 5773.
The #SQ SRDFA_DSE command displays Delta Set Extension (DSE) status and resource usage. The DSE feature extends the cache space available for an SRDF/A session by off-loading some or all of its cycle data from cache to preconfigured disk storage, or pools, which are similar to SAVE device pools. This extra space permits SRDF/A to keep running during transient problems such as temporary link loss.

**Note:** DSE pools are available under Enginuity 5772 to 5876. Starting with HYPERMAX OS 5977, DSE pools are no longer used. For more information about how PowerMaxOS 5978 and HYPERMAX OS 5977 handle DSE pools, see the PowerMax Family Product Guide, VMAX All Flash Product Guide, or VMAX3 Family Product Guide. Note that although DSE pools are not used, DSE is still supported in PowerMaxOS 5978 and HYPERMAX OS 5977.

### Syntax

```
#SQ SRDFA_DSE [(CAS|NOCAS)], cuu
[,CQNAME=(cqname[,queue-option])]

#SQ SRDFA_DSE [(CAS|NOCAS)],
RMT{(cuu,hoplist[,srdfgrp])|(cuu,hoplist,*))
[,CQNAME=(cqname[,queue-option])]

#SQ SRDFA_DSE [(CAS|NOCAS)],LCL(cuu, srdfgrp)
[,CQNAME=(cqname[,queue-option])]

#SQ SRDFA_DSE [(CAS|NOCAS)],G(groupname)
[,CQNAME=(cqname[,queue-option])]

#SQ SRDFA_DSE [(CAS|NOCAS)],SCFG(gnsgrp)
[,CQNAME=(cqname[,queue-option])]
```

**Note:** For the RMT command format, the (rdfcuu) parameter is no longer used; however, it is tolerated for existing code that uses it.

### Parameters

- **CAS**
  
  See “CAS” on page 130.

- **cqname**
  
  See “cqname” on page 130.

- **cuu**
  
  See “cuu” on page 130.

- **G(groupname)**
  
  See “G(groupname)” on page 130.

- **hoplist**
  
  See “hoplist” on page 131.

- **LCL**
  
  See “LCL” on page 131.
NO CAS

See “NO CAS” on page 131.

queue-option

See “queue-option” on page 131.

RMT

See “RMT” on page 132.

Note: For this format, the third subparameter may alternatively be specified as an asterisk (*). In that case, the command action then applies to all SRDF groups.

SC FG (gnsgrp)

See “SC FG (gnsgrp)” on page 133.

sr dfgrp

See “sr dfgrp” on page 133.

Examples

**Example 1:**

Primary side, PowerMaxOS 5978 and HYPERMAX OS 5977

Figure 17 displays the output generated by an #SQ SR DFA_DSE command issued to a storage system running PowerMaxOS 5978 or HYPERMAX OS 5977:

```
EMCQR001 SRDF-HC DISPLAY FOR (6) TAS1SQ SR DFA_DSE,LCL(6306,AB)
      MY SERIAL #   MY MICROCODE
               -----------------------
          0001967-01130/0KDLN  5977-0

      MY GRP ONL PC OS GRP OS SERIAL   OS MICROCODE SYNCHDIR FEATURE
      ------- ----------------------- ---------------------- ------ ----------
      AB    Y   F   AB  0001967-01170  5977-0     G(R1>R2)
      TSUZUKAB DYNAMIC AUTO-LINKS-RECOVERY LINKS-DOMINO:NO
                   ( SW,HW ) CMPR ENABLED = ( N,N )

      PRIMARY SIDE: CYCLE# 37 SRDF/A DSE ACTIVE ( Y )
      THRESHOLD PERCENTAGE 50 SRDF/A DSE AUTO ACTIVATE ( Y )
      CAPTURE CYCLE SIZE 17,876 TRANSMIT CYCLE SIZE 0
      DSE USED TRACKS 6,602 DSE USED TRACKS 0

      SRP SRP_1
      SRP ID 00000001 DSE MAX CAPACITY (GB) 4294967294

      END OF DISPLAY
```

Figure 17 #SQ SR DFA_DSE issued to a storage system running PowerMaxOS 5978 or HYPERMAX OS 5977

Output fields

**MY SERIAL #**

The complete 12-digit serial number of the storage system to which the command was issued.

Note: When a storage system with PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5874 and later emulates an IBM 2107, it externally represents the serial number as an alphanumeric serial number to be compatible with IBM command output.
MY MICROCODE  
The major-minor level of the operating environment running on the storage system to which the command was issued.

MY GRP  
The SRDF/A group number. If this is part of a cascaded SRDF/A configuration, the group number will have a -C suffix. If a -? suffix appears, the group may have no devices.

ONL  
Indicates whether the SRDF group is online:

Y   The SRDF group is online.
N   The SRDF group is offline.

PC  
The protocol of the SRDF group:

E   ESCON
F   Fibre
I   IP
U   The protocol is unknown and the group is likely offline.

OS GRP  
The number of the associated SRDF group on the remote storage system.

OS SERIAL  
The complete 12-digit serial number of the remote storage system.

OS MICROCODE  
The major-minor level of the operating environment on the remote storage system.

SYNCHDIR  
The current synchronization direction for the SRDF group:

G   The setting displayed in brackets is at the global level.
C   The setting displayed in brackets is at the storage system level.
R1>R2  The R1>R2 synchronization direction.
R1<R2  The R1>R2 synchronization direction.
NONE  No synchronization direction.

FEATURE  
Indicates which feature(s) are currently enabled:

(Blank)  Not SRDF/A at this time.
R/M ACTIVE  The group is operating in SRDF/Metro mode.
R/M CONFIGURED  The group is configured and reserved for running in SRDF/Metro mode.
R/M QUORUM  The group is used as Witness in the SRDF/Metro configuration.
R/M STALLED  SRDF/Metro mode has been suspended, no syncing is performed.
R/M SYNCING  The SRDF/Metro group is syncing data between the R1 and R2, and SCSI State transfer has been initiated.
SQAR  An SRDF group is defined to an SRDF/SQAR definition that is not running SRDF/A.
SRDFA A MSC  An active SRDF/A group is running in MSC.
SRDFA A SQAR  An active SRDF/A group is running in both MSC and SRDF/SQAR.
SRDFA A STAR  An active SRDF/A group is running in both MSC and SRDF/Star.
SRDFA ACTIVE  SRDF/A is active on the SRDF group.
SRDFA I MSC  An inactive SRDF/A group was running in MSC.
SRDFA I SQAR  An inactive SRDF/A group was running in MSC and SRDF/SQAR.
SRDFA I STAR  An inactive SRDF/A group was running in MSC and SRDF/Star.
SRDF/A INACT  SRDF/A is in a transitional state. Once cleanup is done, it will no longer be SRDF/A active.

SRDF/A T MSC  An active SRDF/A group is running in MSC mode in Transmit Idle

STAR  An SRDF group is defined to an SRDF/Star definition that is not running SRDF/A.

LABEL  An alphanumeric group label (up to 10 characters).

TYPE  The group type, STATIC or DYNAMIC.

**Note:** For storage systems running PowerMaxOS 5978 or HYPERMAX OS 5977, only dynamic SRDF groups are supported. For storage systems running Enginuity 5876 and earlier, static or dynamic groups are supported.

AUTO-LINKS-RECOVERY  Indicates whether the Auto Links Recovery mode is in effect:

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>Indicates the mode is in effect (all devices will become ready on the link when it is recovered)</td>
</tr>
<tr>
<td>NO</td>
<td>Indicates the mode is not in effect (which will leave the devices TNR when the link is restored).</td>
</tr>
</tbody>
</table>

LINKS_DOMINO  Indicates the Links Domino mode state:

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>Indicates the mode is in effect.</td>
</tr>
<tr>
<td>NO</td>
<td>Indicates the mode is not in effect.</td>
</tr>
<tr>
<td>RDFGRP</td>
<td>Indicates the feature is in effect by SRDF group.</td>
</tr>
</tbody>
</table>

**Note:** “LINKS DOMINO mode” on page 329 describes the Links Domino mode.

(SW, HW) CMPR ENABLED  This field indicates the status of SRDF software and hardware compression:

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>Compression is active.</td>
</tr>
<tr>
<td>N</td>
<td>Compression is not active.</td>
</tr>
</tbody>
</table>

MSC_GROUP  If an SRDF group is running MSC or SRDF/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.

PRIMARY SIDE  Indicates that the query was done on the R1 side of the SRDF/A group.

CYCLE#  The cycle number is a number representing the cycle that SRDF/A is on. This number will continue to increase each time a cycle switch occurs.

SRDF/A DSE ACTIVE  SRDF/A DSE Active indicates whether Delta Set Extension (DSE) mode is active:

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>The SRDF/A DSE feature is active for this SRDF group on this storage system.</td>
</tr>
<tr>
<td>N</td>
<td>The SRDF/A DSE feature is not active for this SRDF group on this storage system.</td>
</tr>
</tbody>
</table>

THRESHOLD PERCENTAGE  This is the percentage of the system write-pending limit which, when reached for an SRDF/A group in the system (or Cache Partition) causes SRDF/A Delta Set Extension to be invoked for that SRDF group.

SRDF/A DSE AUTO ACTIVATE  SRDF/A DSE Auto Activate indicates the status of the DSE auto-activate feature as follows:

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>The auto-activate feature of SRDF/A DSE is enabled for the SRDF group when SRDF/A is active. Once auto-activate is set, it continues to apply even if SRDF/A drops and resumes.</td>
</tr>
<tr>
<td>N</td>
<td>The auto-activate feature for DSE is not enabled.</td>
</tr>
</tbody>
</table>
**CAPTURE CYCLE SIZE**

The total number of tracks in the Capture cycle, including the delta set extension and metadata slots.

**TRANSMIT CYCLE SIZE**

The total number of tracks in the Transmit cycle, including the delta set extension and metadata slots.

**DSE USED TRACKS**

The number of tracks in the associated Capture, Transmit, Receive, or Apply cycle that have been spilled onto disk.

**SRP**

The name of the Storage Resource Pool (SRP) being used for DSE.

**SRP ID**

The ID of the SRP being used for DSE (in hex).

**DSE MAX CAPACITY (GB)**

The maximum SRP space DSE can use (in GB).

If the maximum SRP space DSE can use is not limited, the field shows NONE.

**Example 2: Primary side, Enginuity 5772-5876**

Figure 18 displays the output shown from the primary side when SRDF/A is active, with the storage system running Enginuity 5772 to 5876:

```
EMCMN001 SRDF-HC : (48) #SQ SRDFA_DSE,LCL(8A00,07)
EMCQR001 SRDF-HC DISPLAY FOR (48) #SQ SRDFA_DSE,LCL(8A00,07)
  MY SERIAL #  MY MICROCONE
-------------------   ------------
  001926-00291/0AAWH     5876-26

  MY GRP ONL PC OS GRP  OS SERIAL   OS MICROCONE SYNCHDIR FEATURE
  ------ --- -- ------ ------------ ------------ -------- ------------
  07    Y   F   07   0001926-00261  5874-240   G(NONE)  SRDFA ACTIVE
MFTC2TM07  DYNAMIC   AUTO-LINKS-RECOVERY LINKS-DOMINO:NO
  ( SW,HW ) CMPR ENABLED = ( N,N )
```

```
---------------------------------------------------------------------
PRIMARY SIDE: CYCLE#zzzzzzz 2,310 SRDF/A DSE ACTIVE          ( N )
THRESHOLD PERCENTAGE             50 SRDF/A DSE AUTO ACTIVATE   ( N )
CAPTURE CYCLE SIZE                0 TRANSMIT CYCLE SIZE              0
DSE USED TRACKS                 0   DSE USED TRACKS                0
DSE MDATA TRACKS                0   DSE MDATA TRACKS               0
---------------------------------------------------------------------
```

```
FBA POOL NAME                       3390 POOL NAME
AS400 POOL NAME                     3380 POOL NAME
```

**FBA POOL NAME**

The DSE pool name associated with the SRDF group for FBA(512) emulation.

**DSE MDATA TRACKS**

The number of metadata tracks used by associated Capture, Transmit, Receive, or Apply cycle. Metadata tracks are used approximately 1 for every 512 tracks of delta set extension tracks.

**Output fields**

Fields that are unique to the #SQ SRDFA_DSE primary side display for Enginuity 5772-5876 have the following meanings:

**Note:** For other field description, see “Output fields” on page 219.
The DSE pool name associated with the SRDF group for FBA(520) emulation.
The DSE pool name associated with the SRDF group for 3390 emulation.
The DSE pool name associated with the SRDF group for 3380 emulation.

**Example 3:**

**Pool draining, primary side,**

**Enginuity 5772-5876**

Figure 19 displays the output shown when DSE is engaged and one pool is draining from the primary side, with the storage system running Enginuity 5772 to 5876:

```
EMCMN001 SRDF-HC : (9) #SQ SRDFA_DSE,LCL(831F,E1)
EMCQR001 SRDF-HC DISPLAY FOR (9) #SQ SRDFA_DSE,LCL(831F,E1)
  MY SERIAL #   MY MICROCODE
  -------------------   ------------
  0001926-00215/0AAPH     5876-26
```

```
MY GRP ONL PC OS GRP OS SERIAL   OS MICROCODE SYNCHDIR FEATURE
-------------------   ------------   -------   -------   --------   ------------
LABEL      TYPE    AUTO-LINKS-RECOVERY    LINKS_DOMINO   MSC_GROUP
---------- ------- ---------------------- ---------------- ----------
E1    Y   F   E2   0001926-00290  5875-117   G(R1>R2) SRDFA ACTIVE
LVGRPE1    DYNAMIC NO-AUTO-LINKS-RECOVERY   LINKS-DOMINO:NO
( SW,HW ) CMPR ENABLED = ( Y,Y )
```

```
----------------------------------------------------------------------
PRIMARY SIDE: CYCLE#zzzzzzz 7,913 SRDF/A DSE ACTIVE          ( N )
THRESHOLD PERCENTAGE             20 SRDF/A DSE AUTO ACTIVATE   ( Y )
CAPTURE CYCLE SIZE           17,876 TRANSMIT CYCLE SIZE              0
DSE USED TRACKS               6,602 DSE USED TRACKS                0
DSE MDATA TRACKS               16   DSE MDATA TRACKS               0
----------------------------------------------------------------------
FBA POOL NAME                DSE_FBA2  3390 POOL NAME                DSE_3390
AS400 POOL NAME     3380 POOL NAME
----------------------------------------------------------------------
DRAINING POOL 0 DSE 3390 DRAINING POOL 1
----------------------------------------------------------------------
END OF DISPLAY
```

**Figure 19** #SQ SRDFA_DSE - one pool draining from primary side (Enginuity 5772-5876)

**Output fields**

The additional field in Figure 19 has the following meaning:

**Note:** For other field description, see “Output fields” on page 219.

**DRAINING POOL x**

\((x = 0 - 7)\). When a DSE pool associated with an SRDF group is disassociated from the SRDF group, the data naturally drains off of that pool after two SRDF/A cycles. While the SRDF group is still draining the data, up to eight of these pools can be displayed. When there are no pools draining, this field is blank.
Figure 20 displays the secondary side output with SRDF/A active, with the storage system running Enginuity 5772 to 5876:

```
EMCMN001I SRDF-HC : (12) #SQ SRDFA_DSE,RMT(831F,E1)
EMCQR001I SRDF-HC DISPLAY FOR (12) #SQ SRDFA_DSE,RMT(831F,E1)
--- SERIAL #    MY MICROCODE
-------------------   ------------
0001926-00290/0AAWG     5876-26

MY GRP ONL PC OS GRP OS SERIAL OS MICROCODE SYNCMDIR FEATURE
-------------------   -------------------   ------------
MY SERIAL #        MY MICROCODE
-------------------   ------------
0001926-00290/0AAWG     5876-26

LABEL TYPE AUTO-LINKS-RECOVERY LINKS_DOMINO MSC_GROUP
---------- ------- ---------------------- ---------------- ----------
E2 Y F E1 0001926-00215 5875-110 G(R1>R2) SRDFA ACTIVE
LVGRPE1 DYNAMIC NO-AUTO-LINKS-RECOVERY LINKS-DOMINO:NO
( SW, HW ) CMPR ENABLED = ( Y,Y )

SECONDARY SIDE: CYCLE# 7,917 SRDF/A DSE ACTIVE ( N )
THRESHOLD PERCENTAGE 20 SRDF/A DSE AUTO ACTIVATE ( N )
RECEIVE CYCLE SIZE 3,185 APPLY CYCLE SIZE 0
DSE USED TRACKS 0 DSE USED TRACKS 0
DSE MDATA TRACKS 0 DSE MDATA TRACKS 0

POOL NAME DSE_FBA2 3390 POOL NAME DSE_3390
AS400 POOL NAME 3380 POOL NAME

END OF DISPLAY
```

**Output fields**

The following additional secondary fields are displayed:

**Note:** For other field description, see “Output fields” on page 219 and “Output fields” on page 222.

**SECONDARY SIDE**

Indicates that the query was done on the R2 side of the SRDF/A group.

**RECEIVE CYCLE SIZE**

Total number of tracks in the Receive cycle, including the delta set extension and metadata slots.

**APPLY CYCLE SIZE**

Total number of tracks in the Apply cycle, including the delta set extension and metadata slots.
Example 5:
Secondary side, DSE and MSC, Enginuity 5772-5876

Figure 21 displays the secondary side output with the Delta Set Extension (DSE) active and MSC, when the storage system is running Enginuity 5772 to 5876:

```
EMCMN001 SRDF-HC : (12) #SQ SRDFA_DSE,RMT(831F,E1)
EMCQR001 SRDF-HC DISPLAY FOR (12) #SQ SRDFA_DSE,RMT(831F,E1)
MY SERIAL #       MY MICROCOCDE
------------------- ------------
0001926-00290/0AAWG 5876-26

MY GRP ONL PC OS GRP OS SERIAL OS MICROCOCDE SYNCHDIR FEATURE
------------------- ------------------- ------------------- ---------------
LVGRPE1 DYNAMIC NO-AUTO-LINKS-RECOVERY LINKS-DOMINO:NO (PRDMSC )
(SW, HW ) CMPR ENABLED = ( Y, Y )

------------------- ------------------- ------------------- -------------------
SECONDARY SIDE: CYCLE# 7,917 SRDF/A DSE ACTIVATE ( N )
THRESHOLD PERCENTAGE 20 SRDF/A DSE AUTO ACTIVATE ( N )
RECEIVE CYCLE SIZE 3,185 APPLY CYCLE SIZE 0
DSE USED TRACKS 0 DSE USED TRACKS 0
DSE MDATA TRACKS 0 DSE MDATA TRACKS 0

------------------- ------------------- ------------------- -------------------
POOL NAME DSE_FBA2 3390 POOL NAME DSE_3390
AS400 POOL NAME 3380 POOL NAME

END OF DISPLAY
```

Figure 21 #SQ SRDFA_DSE - secondary side with DSE active and MSC (Enginuity 5772-5876)

The #SQ SRDFA_VOL command displays volume information.

Note that the gatekeeper specified by cuu in the command does not have to be an SRDF/A device. It is used only to identify the storage system containing the SRDF group whose SRDF/A volume status is being determined.

Syntax

```bash
#SQ SRDFA_VOL, cuu
[,count[,startingdev#]],ALL[,startingdev#]
[,CQNAME=(cqname[,queue-option])]

#SQ SRDFA_VOL,
RMT((cuu, hoplist)|(cuu, hoplist,srdfgrp)|(cuu, hoplist,*))
[,count[,startingdev#]],ALL[,startingdev#]
[,CQNAME=(cqname[,queue-option])]

#SQ SRDFA_VOL,LCL(cuu,srdfgrp)
[,count[,startingdev#]],ALL[,startingdev#]
[,CQNAME=(cqname[,queue-option])]

#SQ SRDFA_VOL,VOL(volser)
[,CQNAME=(cqname[,queue-option])]

#SQ SRDFA_VOL,SSID(ssid)
[,count[,startingdev#]],ALL[,startingdev#]
[,CQNAME=(cqname[,queue-option])]

#SQ SRDFA_VOL,G(groupname)
[,CQNAME=(cqname[,queue-option])]

#SQ SRDFA_VOL,SCFG(gnsgrp)
[,CQNAME=(cqname[,queue-option])]
```

**Note:** For the RMT command format, the (rdfcuu) parameter is no longer used; however, it is tolerated for existing code that uses it.

**Note:** For the #SQ SRDFA_VOL,cuu format, when the command is issued without the keyword ALL or a starting device number, the device number associated with the first CUU equal to or greater than what was specified will be used as the starting device number.

Parameters

**ALL**

Indicates that all eligible devices are to be included up to the value of the MAX_QUERY initialization parameter.

**Note:** The maximum value for MAX_QUERY is 8192. If the storage system displaying has more than 8192 devices, use command syntax specifying the starting PowerMax/VMAX device number.

For example: #SQ SRDFA_VOL, cuu, count, startingdev#
When used on the RMT statement with two subparameters specified, the ALL parameter includes all devices on the other-side storage system. When used on the RMT statement that includes three subparameters, the ALL parameter includes all devices in a particular SRDF group.

**count**

Specifies the number of eligible devices to be included.

count can be specified as an integer from 1 through the value specified in the MAX_QUERY initialization parameter. If this parameter is not specified, count defaults to 1.

**Note:** The maximum value for MAX_QUERY is 8192. If the storage system displaying has more than 8192 devices, use command syntax specifying the starting PowerMax/VMAX device number.

For example: #SQ SRDFA_VOL, cuu, count, startingdev#

**cqname**

See “cqname” on page 130.

**cuu**

See “cuu” on page 130.

**G(groupname)**

See “G(groupname)” on page 130.

**LCL**

See “LCL” on page 131.

**queue-option**

See “queue-option” on page 131.

**RMT**

See “RMT” on page 132.

**SCFG(gnsgrp)**

See “SCFG(gnsgrp)” on page 133.

**srdfgrp**

See “srdfgrp” on page 133.

**SSID(ssid)**

See “SSID(ssid)” on page 133.

**startingdev#**

Identifies the device at which to start the display.

- If the sort order is set to (or allowed to default to) SORT_BY_SYMDEV with the #SC GLOBAL command, the value specified is treated as a PowerMax/VMAX device number.
If the sort order is set to SORT_BY_VOLSER with the #SC GLOBAL command, the value specified is treated as a starting volume serial.

If the sort order is set to SORT_BY_MVSCUU with the #SC GLOBAL command, the value specified is treated as a starting z/OS device address.

```
VOL(volser)
See “VOL(volser)” on page 134.
```

**Examples**

*Example 1: Primary side, PowerMaxOS 5978 and HYPERMAX OS 5977*

The following example shows the output from the command issued on the primary side with PowerMaxOS 5978 or HYPERMAX OS 5977:

```
EMCMN001 SRDF-HC : (3) #JBHSQ SRDFA_VOL,AA00,2,48
EMCQV40I SRDF-HC DISPLAY FOR (3) #JBHSQ SRDFA_VOL,AA00,2,48
SERIAL #:0001967-01170/0KDNR  MICROCODE LEVEL:5977-813
------------------------------------------------------------------
CUU   |CH|LCL DEV |VOLSER| APPLY | RECEIVE | PA |
------------------------|              |               | PA |
LGRP |RMT DEV | RGRP | CYCLE SIZE | CYCLE SIZE |    |
------------------------------------------------------------------
AA28  28   000048 UYF048
40 000078  04 N/A
AA90  90   0000B0 OFFLIN
97 0001A8  97 CONSISTENT
END OF DISPLAY SORT_ORDER = MVSCUU
Total devices displayed = 2
```

*Figure 22 #SQ SRDFA_VOL output for primary side with PowerMaxOS 5978 or HYPERMAX OS 5977*

**Output fields**

- **CUU** z/OS device number. This field displays “????” for devices specified in the SCF exclude list.
- **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.
- **LGRP** Local SRDF group number.
- **LCL DEV** PowerMax/VMAX device number.
- **RMT DEV** Remotely mirrored PowerMax/VMAX device number.
- **VOLSER** Device volume serial. If the device was online at SRDF Host Component startup or during an #SC GLOBAL,SSID_REFRESH command, the volume serial is from the UCB; otherwise, it is the volume serial assigned to the device when the storage system was installed, or the value set in the INIT_VOLSER parameter in the initialization parameters.

If the device is identified as a Fixed Block Architecture (FBA) device, it appears as follows:

*F128* FBA devices with 128KB track size available on systems with PowerMaxOS 5978 or HYPERMAX OS 5977.

*F64* FBA devices (that are not in an FBA meta group) on systems with Enginuity later than 5771.

*F64M* FBA meta head devices on all systems with Enginuity later than 5771.
**RGRP**  
Remote SRDF group number.

**CAPTURE CYCLE SIZE**  
With PowerMaxOS 5978 and HYPERMAX OS 5977, this field is always blank since these operating environments do not track cycle sizes on the device level.

*Note: For field meaning with Enginuity 5876 and earlier, see Example 2.*

**TRANSMIT CYCLE SIZE**  
With PowerMaxOS 5978 and HYPERMAX OS 5977, shows the status of the devices:

- **CONSISTENT**
- **INCONSISTENT**
- **CEXMIT_MODE**

Devices in tolerance mode are displayed as **CONSISTENT**.

*Note: For field meaning with Enginuity 5876 and earlier, see Example 2.*

**PA**  
The pacing armed state for the volume:

- **D**  Arm for device-level pacing
- **X**  Exempt from group-level pacing

---

*F64M$*  
FBA striped meta head devices on all systems with Enginuity later than 5771.

*FBA*  
FBA devices (that are not in an FBA meta group) on all systems with Enginuity 5771 or earlier.

*FBAM*  
FBA meta head devices on all systems with Enginuity 5771 or earlier.

*FBAM$*  
FBA striped meta head devices on all systems with Enginuity 5771 or earlier.

*FBE*  
FBA encapsulated devices (that are not in an FBA meta group).

*FBEM*  
FBA meta encapsulated devices.

*FBX*  
FBA externally provisioned devices (that are not in an FBA meta group).

*FBX$*  
FBA externally provisioned devices - striped (that are not in an FBA meta group).

*FBXM*  
FBA meta externally provisioned devices.

*FBXM$*  
FBA meta externally provisioned devices - striped.

*G128*  
devices that have the GCM attribute enabled

*164*  
XtremCache® devices that are actively caching

*L64*  
XtremCache devices that are not actively caching

---

a. XtremCache cards are installed on open systems hosts and can be configured to perform the caching duties for FBA devices that reside on a storage system running PowerMaxOS 5978, HYPERMAX OS 5977 or Enginuity 5876. When XtremCache devices are being actively cached, the only permitted command actions are CASDEL, CASUSP, RDF_SUSP, and DELETERPAIR. All other SRDF actions attempted against actively caching XtremCache devices are blocked and an appropriate error message is displayed indicating the reason.
The following example shows the output from the command issued on the primary side under Enginuity 5876:

```
EMCMN001 SRDF-HC : (15) # SQ SRDFA_VOL,3800,5,413
EMCQV401 SRDF-HC DISPLAY FOR (15) # SQ SRDFA_VOL,3800,5,413
SERIAL #:0001957-00079/0GKHK MICROCODE LEVEL:5876-270
```

```
CUU   CH|LCL DEV |VOLSER|    CAPTURE   |   TRANSMIT    |    |
------------------------|              |               | PA             |
LGRP |RMT DEV | RGRP |  CYCLE SIZE  |  CYCLE SIZE   |    |
--------------------------------------------------------------
38B1  B1   000411 UIH411 59 0002B9 58 0 0
38B2  B2   000412 UIH412 59 0002BA 58 0 0
38B3  B3   000413 UIH413 59 0002BB 58 0 0
38B5  B5   000415 UIH415 5B 0002BD 5A 0 0
38B6  B6   000416 UIH416 5B 0002BE 5A 0 0
END OF DISPLAY SORT_ORDER = MVSCUU
Total devices displayed = 5
```

Figure 23  #SQ SRDFA_VOL output for primary side with Enginuity 5876

**Output fields**

The fields which differ from the PowerMaxOS 5978 and HYPERMAX OS 5977 primary side display are the following:

**CAPTURE CYCLE SIZE**

With Enginuity 5876 and earlier, this field shows the current number of tracks in the cycle that is being created on the primary side of the SRDF/A session. This value is shown only on a display of the primary side of the SRDF/A session.

**TRANSMIT CYCLE SIZE**

With Enginuity 5876 and earlier, this field shows the number of tracks remaining to be transmitted in the cycle that is currently being transmitted to the secondary side of the SRDF/A session. This value is shown only on a display of the primary side of the SRDF/A session.

The following example shows the output from the command issued on the secondary side under PowerMaxOS 5978 and HYPERMAX OS 5977:

```
EMCMN001 SRDF-HC : # SQ SRDFA_VOL,6215
EMCQV401 SRDF-HC DISPLAY FOR # SQ SRDFA_VOL,6215
SERIAL #:0001967-01130/0KDLN MICROCODE LEVEL:5977-813
```

```
CUU   CH|LCL DEV |VOLSER|     APPLY    |    RECEIVE    |    |
------------------------|              |               | PA             |
LGRP |RMT DEV | RGRP |  CYCLE SIZE  |  CYCLE SIZE   |    |
--------------------------------------------------------------
6215  15   000055 UYE055 07 0000A0 07 N/A
END OF DISPLAY SORT_ORDER = MVSCUU
Total devices displayed = 1
```

Figure 24  #SQ SRDFA_VOL output for secondary side with PowerMaxOS 5978 and HYPERMAX OS 5977
Output fields

For field meaning, see Example 1 (PowerMaxOS 5978 and HYPERMAX OS 5977 primary side display). The fields which differ from Example 1 are the following:

**RECEIVE CYCLE SIZE**

With PowerMaxOS 5978 and HYPERMAX OS 5977, this field is always blank since these operating environments do not track cycle sizes on the device level.

**Note:** For field meaning with Enginuity 5876 and earlier, see Example 4.

**APPLY CYCLE SIZE**

With PowerMaxOS 5978 and HYPERMAX OS 5977, this field always shows N/A.

**Note:** For field meaning with Enginuity 5876 and earlier, see Example 4.

---

**Example 4: Secondary side, Enginuity 5876**

The following example shows the output from the command issued on the secondary side under Enginuity 5876:

```
EMCMN00I SRDF-HC : (15) #SQ SRDFA_VOL,3800,5,413
EMCQV40I SRDF-HC DISPLAY FOR (15) #SQ SRDFA_VOL,3800,5,413
SERIAL #:0001957-00079/0GKH  MICROCODE LEVEL:5876-270
--------------------------------------------------------------
CUU   CH|LCL DEV |VOLSER|    APPLY     |   RECEIVE     |    |
------------------------|              |               | PA |
LGRP |RMT DEV | RGRP |  CYCLE SIZE  |  CYCLE SIZE   |    |
--------------------------------------------------------------
38B1  B1   000411 UIH411
59     0002B9     58         0              0
END OF DISPLAY                   SORT_ORDER = MVSCUU
```

Figure 25 #SQ SRDFA_VOL output for secondary side with Enginuity 5876

Output fields

For field meaning, see Example 1 (PowerMaxOS 5978 and HYPERMAX OS 5977 primary side display). The fields which differ from Example 1 are the following:

**RECEIVE CYCLE SIZE**

Under Enginuity 5876 and earlier, this field shows the number of tracks in the cycle that is currently being transmitted from the primary side of the SRDF/A session. This value is shown only on a display of the secondary side of the SRDF/A session.

**APPLY CYCLE SIZE**

Under Enginuity 5876 and earlier, this field shows the number of tracks remaining to be applied to secondary-side devices in the cycle most recently received from the primary side of the SRDF/A session. This value is shown only on a display of the secondary side of the SRDF/A session.
SRDF/A write pacing extends the availability of SRDF/A by preventing conditions that result in cache overflow on both the R1 and R2 sides. SRDF Host Component provides two types of write pacing: group-level write pacing and device-level write pacing. Both types of write pacing can be active for an SRDF/A session at the same time. Because this feature is dynamic, it is unique from similar features, such as SRDF/A DSE.

**Note:** "#SC SRDFA_WP" on page 303 provides more information about write pacing operations.

The #SQ SRDFA_WP command displays SRDF/A write pacing dynamic parameters and statistics. The statistics provide the minimum, maximum, and average write pacing delay times, and an accumulated count of the number of I/O operations that have been paced for the indicated device or SRDF group for the duration of the SRDF/A session. These values will continue to be calculated until SRDF/A stops, write pacing is deactivated, or the #SC SRDFA_WP STATS_RESET command action is issued.

You can use this command to estimate the average host response time impact being delivered by the SRDF/A write pacing operation. You can then tune the dynamic parameters for DSE and write pacing using the #SC SRDFA_DSE and #SC SRDFA_WP commands to optimize cache usage.

**Note:** SRDF/A group-level write pacing requires that both the R1 and R2 storage systems must be running Enginuity 5874 or later. SRDF/A device-level write pacing requires that both the R1 and R2 storage systems must be running Enginuity 5875 or later.

### Syntax

```bash
#SQ SRDFA_WP,RMT(cuu,hoplist[,srdfgrp])
[,CQNAME=(cqname[,queue-option])]

#SQ SRDFA_WP,LCL(cuu,srdfgrp)
[,CQNAME=(cqname[,queue-option])]
```

### Parameters

- **cqname**
  
  See “cqname” on page 130.

- **cuu**
  
  See “cuu” on page 130.

- **hoplist**
  
  See “hoplist” on page 131.

- **LCL**
  
  See “LCL” on page 131.

- **queue-option**
  
  See “queue-option” on page 131.
**RMT**

See “RMT” on page 132.

**srdfgrp**

See “srdfgrp” on page 133.

### Examples

#### Example 1: Primary side

Figure 26 displays the output shown from the primary side when SRDF/A is active:

```
EMCMN001 SRDF-HC : (5) #SQ SRDFA_WP,LCL(2C00,ED)
EMCQR001 SRDF-HC DISPLAY FOR (5) #SQ SRDFA_WP,LCL(2C00,ED)
                  MY SERIAL #        MY MICROCODE
                   -------------------   ------------
0001926-00291/0AAWH     5876-270
```

| MY GRP ONL PC OS GRP OS SERIAL   OS MICROCODE SYNCHDIR FEATURE |
|-------------------|---------------|------------------|------------------|
| LABEL              | TYPE           | AUTO-LINKS-RECOVERY | LINKS_DOMINO | MSC_GROUP |
| ED                 | Y              | F                | DE              | 0001926-02840 5875-90 | G(R1>R2) SRDFA ACTIVE |
| DRWHOD             | DYNAMIC        | AUTO-LINKS-RECOVERY | LINKS-DOMINO:NO |
|                     |                | ( SW,HW ) CMPR ENABLED = ( N,N ) |
| PRIMARY SIDE: CYCLE# | 17,420 WRITE PACING ACTIVE ( Y ) |
| GPACING ACTIVE     | ( Y )          |
| DPACING ACTIVE     | ( Y )          |
| WRITE PACING STATS ON ( N ) | WP (GRP,DEV) AUTO ACTIVATE ( Y,Y ) |
| WP THRESHOLD       | 60             |
| WP MAXDELAY        | 50,000         |
| MIN PACING DELAY   | 0              |
| AVG PACING DELAY   | 0              |

---

**Figure 26 #SQ SRDFA_WP issued to the primary side**

#### Output fields

The fields in Figure 26 have the following meanings:

- **(SW,HW) CMPR ENABLED**
  This field indicates the status of SRDF software and hardware compression. If Y, compression is active. If N, compression is not active.

- **PRIMARY SIDE**
  This field indicates that the query was done on the R1 side of the SRDF/A group.

- **CYCLE#**
  This field indicates the SRDF/A cycle number. The cycle number will continue to increase each time a cycle switch occurs.

**Note:** The values returned in the MIN, MAX, AVERAGE PACING DELAY and I/O’S PACED fields are not necessarily related to the cycle number, and each #SQ SRDFA_WP does not reflect a delta in these numbers.

- **WRITE PACING ACTIVE**
  This field indicates if write pacing (WP) mode is active for the SRDF group on the storage system.

**Note:** Use the #SC SRDFA_WP command to configure the write pacing settings.
<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GPACING ACTIVE</strong></td>
<td>This field indicates if group-level write pacing is active for the SRDF group on the storage system.</td>
</tr>
<tr>
<td><strong>DPACING ACTIVE</strong></td>
<td>This field indicates if device-level write pacing is active for the SRDF group on the storage system.</td>
</tr>
<tr>
<td><strong>WRITE PACING STATS</strong></td>
<td>This field indicates if write pacing statistics collection on the storage system by SRDF group is active.</td>
</tr>
<tr>
<td><strong>WP (GRP,DEV) AUTO ACTIVATE</strong></td>
<td>This field indicates whether group-level and/or device-level write pacing is automatically activated for the SRDF group when SRDF/A is activated for storage system.</td>
</tr>
<tr>
<td><strong>WP THRESHOLD</strong></td>
<td>This field indicates the percentage of cache usage level at which write pacing will be armed.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> This is the percentage of system write pacing used by all active SRDF/A sessions.</td>
</tr>
<tr>
<td><strong>WP DSE THRESHOLD</strong></td>
<td>This field indicates the percentage of DSE pool usage at which write pacing will be armed.</td>
</tr>
<tr>
<td><strong>WP MAX DELAY</strong></td>
<td>This field indicates the maximum I/O delay, in microseconds, which is applied to each host write I/O when write pacing occurs.</td>
</tr>
<tr>
<td><strong>MIN PACING DELAY</strong></td>
<td>This field indicates the minimum write pacing delay, in microseconds, which is currently in use for the indicated SRDF group. This is the lowest value for which an I/O has been paced for the duration of the current SRDF/A session. This number resets if SRDF/A is stopped, if write pacing is deactivated, or the #SC SRDFA_WP STATS_RESET command action is issued.</td>
</tr>
<tr>
<td><strong>MAX PACING DELAY</strong></td>
<td>This field indicates the maximum estimated write pacing delay, in microseconds, that has occurred for the indicated SRDF group since the statistics were activated for the group. This is an estimate of the maximum value for which an I/O has been paced for the duration of the current SRDF/A session. This number resets if SRDF/A is stopped, if write pacing is deactivated, or the #SC SRDFA_WP STATS_RESET command is issued.</td>
</tr>
<tr>
<td><strong>AVG PACING DELAY</strong></td>
<td>This field indicates the average write pacing delay, in microseconds, which is currently in use for the indicated SRDF group. This is the average of the minimum pacing and the maximum pacing values for the duration of the current SRDF/A session. This number resets if SRDF/A is stopped, if write pacing is deactivated, or the #SC SRDFA_WP STATS_RESET command action is issued.</td>
</tr>
<tr>
<td><strong>I/O’S PACED</strong></td>
<td>This field indicates the number of I/O operations to which SRDF/A write pacing has been applied. This is an accumulated total for the duration of the current SRDF/A session. This number resets if SRDF/A is stopped, if write pacing is deactivated, or the #SC SRDFA_WP STATS_RESET command action is issued.</td>
</tr>
</tbody>
</table>
Example 2: Secondary side

Figure 27 displays the output shown from the secondary side when SRDF/A is active:

```
EMCMN00I SRDF-HC : (59) #SQ SRDFA_WP,RMT(9000,B0)
EMCQR00I SRDF-HC DISPLAY FOR (59) #SQ SRDFA_WP,RMT(9000,B0)
  MY SERIAL #   MY MICROCODE
  -------------------   ------------
  0001926-00291/0AAWH     5876-270
```

```
MY GRP ONL PC OS GRP  OS SERIAL   OS MICROCODE SYNCHDIR FEATURE
-----------------------  --------------  ------------------  -------------
```

```
  LABEL      TYPE    AUTO-LINKS-RECOVERY    LINKS_DOMINO   MSC_GROUP
  ---------- ------- ---------------------- --------------------------
  BF    Y   F   B0   0001926-02840  5875-132   G(R1>R2) SRDFA ACTIVE
  MFTD2TCB0  DYNAMIC    AUTO-LINKS-RECOVERY   LINKS-DOMINO:NO
          ( SW,HW ) CMPR ENABLED = ( Y,Y )
```

```
SECONDARY SIDE: CYCLE#zzzzzz 24,135 WRITE PACING ACTIVE        ( Y )
GPACING ACTIVE        ( N )
DPACING ACTIVE        ( Y )
WRITE PACING STATS ON ( N )       WP (GRP,DEV) AUTO ACTIVATE ( Y,Y )
WP THRESHOLD           60 WP DSE THRESHOLD                90
WP MAXDELAY            10,000
MIN PACING DELAY       0 MAX PACING DELAY                 0
AVG PACING DELAY       0 I/O'S PACED                     0
```

END OF DISPLAY

Figure 27 #SQ SRDFA_WP output issued to the secondary side

Output fields

The fields which differ from the primary side display are the following:

- **GPACING** will never display as active on the secondary side, although it actually may be active. This is because the R2 side storage system has no need to know whether group level pacing is active or not, since group pacing is handled entirely by the R1 side storage system.

- **DPACING** will display as active if there has been at least one I/O that has been paced at the device level for the group.

- **WRITE PACING STATS ON** will always display as N on the secondary side, because statistics collection is done by the R1 side storage system.

- **WP (GRP,DEV) AUTO ACTIVATE, WP THRESHOLD, WP DSE THRESHOLD, and WP MAXDELAY** all reflect the settings that would be used if there was a personality swap and the R2 side became the primary side. All of these settings can be configured on the R2 side by the #SC SRDFA_WP command by directing it to the R2 side. These settings are not used for the active current configuration, and only become the active settings when there is a personality swap.
#SQ SRDFA_WP_VOL

The #SQ SRDFA_WP_VOL command displays devices with non-zero total paced delay and non-zero total paced track count numbers.

Syntax

```
#SQ_SRDFA_WP_VOL, cuu
[,count[,startingdev#]], ALL[,startingdev#]
[,CQNAME=(cqname[,queue-option])]

#SQ_SRDFA_WP_VOL,
RMT{ (cuu,hoplist) | (cuu,hoplist,srdfgrp) | (cuu,hoplist,*)}
[,count[,startingdev#]], ALL[,startingdev#]
[,CQNAME=(cqname[,queue-option])]

#SQ_SRDFA_WP_VOL, LCL(cuu,srdfgrp)
[,count[,startingdev#]], ALL[,startingdev#]
[,CQNAME=(cqname[,queue-option])]

#SQ_SRDFA_WP_VOL, VOL(volser)
[,CQNAME=(cqname[,queue-option])]

#SQ_SRDFA_WP_VOL, SSID(ssid)
[,count[,startingdev#]], ALL[,startingdev#]
[,CQNAME=(cqname[,queue-option])]

#SQ_SRDFA_WP_VOL, G(groupname)
[,CQNAME=(cqname[,queue-option])]

#SQ_SRDFA_WP_VOL, SCFG(gnsgrp)
[,CQNAME=(cqname[,queue-option])]
```

**Note:** For the RMT command format, the (rdfcuu) parameter is no longer used; however, it is tolerated for existing code that uses it.

Parameters

**ALL**

Indicates that all eligible devices are to be included up to the value of the MAX_QUERY initialization parameter.

**Note:** The maximum value for MAX_QUERY is 8192. If the storage system displaying has more than 8192 devices, use command syntax specifying the starting PowerMax/VMAX device number.

For example: #SQ_SRDFA_WP_VOL, cuu, count, startingdev#

When used on the RMT statement with two subparameters specified, the ALL parameter includes all devices on the other-side storage system. When used on the RMT statement that includes three subparameters, the ALL parameter includes all devices in a particular SRDF group.

**count**

Specifies the number of eligible devices to be included.
count can be specified as an integer from 1 through the value specified in the MAX_QUERY initialization parameter. If this parameter is not specified, count defaults to 1.

**Note:** The maximum value for MAX_QUERY is 8192. If the storage system displaying has more than 8192 devices, use command syntax specifying the starting PowerMax/VMAX device number.

For example: `#SQ_SRDFA_WP_VOL,cuu,count,startingdev#`

cqname
  See “cqname” on page 130.

cuu
  See “cuu” on page 130.

G(groupname)
  See “G(groupname)” on page 130.

LCL
  See “LCL” on page 131.

queue-option
  See “queue-option” on page 131.

RMT
  See “RMT” on page 132.

**Note:** For this format, the third subparameter may alternatively be specified as an asterisk (*). In that case, the command action then applies to all SRDF groups.

SCFG(gnsgrp)
  See “SCFG(gnsgrp)” on page 133.

srdfgrp
  See “srdfgrp” on page 133.

SSID(ssid)
  See “SSID(ssid)” on page 133.

startingdev#
  Identifies the device at which to start the display.

  - If the sort order is set to (or allowed to default to) SORT_BY_SYMDEV with the #SC GLOBAL command, the value specified is treated as a PowerMax/VMAX device number.
  - If the sort order is set to SORT_BY_VOLSER with the #SC GLOBAL command, the value specified is treated as a starting volume serial.
  - If the sort order is set to SORT_BY_MVSCUU with the #SC GLOBAL command, the value specified is treated as a starting z/OS device address.
VOL(volser)

See “VOL(volser)” on page 134.

Example

The following example shows the output from an #SQ SRDFA_WP_VOL command:

#SQ SRDFA_WP_VOL,8A00,ALL
EMCMN001 SRDF-HC : (5) #SQ SRDFA_WP_VOL,8800,ALL
EMCQV311 SRDF-HC DISPLAY FOR (5) #SQ SRDFA_WP_VOL,8800,ALL
SERIAL #:0001957-00196/0GKR5 MICROCODE LEVEL:5876-65

<table>
<thead>
<tr>
<th>DV_ADDR</th>
<th>SYM_DEV</th>
<th><em>SYM</em></th>
<th>VOLSER</th>
<th>DELAY</th>
<th>TRACK COUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>8837 37</td>
<td>01DF</td>
<td>01DF</td>
<td>6F</td>
<td>UIA1DF</td>
<td>000000000AF2DA40 000000000004053E</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>01DF</td>
<td></td>
<td>000000000AF2DA40 000000000004053E</td>
</tr>
<tr>
<td>8848 48</td>
<td>05E2</td>
<td>05E2</td>
<td>6F</td>
<td>UIA5E2</td>
<td>0000000008958A80 00000000000362D0</td>
</tr>
<tr>
<td>05E2</td>
<td></td>
<td></td>
<td>72</td>
<td></td>
<td>0000000008958A80 00000000000362D0</td>
</tr>
<tr>
<td>8849 49</td>
<td>05E3</td>
<td>05E3</td>
<td>6F</td>
<td>UIA5E3</td>
<td>000000000773D4C0 0000000002E04A</td>
</tr>
<tr>
<td>05E3</td>
<td></td>
<td></td>
<td>72</td>
<td></td>
<td>000000000773D4C0 0000000002E04A</td>
</tr>
<tr>
<td>885C 5C</td>
<td>0744</td>
<td>0744</td>
<td>6F</td>
<td>......</td>
<td>0000000008BC4DA0 000000000038C56</td>
</tr>
<tr>
<td>0744</td>
<td></td>
<td></td>
<td>72</td>
<td></td>
<td>0000000008BC4DA0 000000000038C56</td>
</tr>
</tbody>
</table>

END OF DISPLAY

Output fields

The fields in this example have the following meanings:

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: PowerMax/VMAX device number.

SYM_RDEV: Remotely mirrored PowerMax/VMAX device number.

SYM_GP: SRDF group number.

VOLSER: Device volume serial. If the device was online at SRDF Host Component startup or during an #SC GLOBAL,SSID_REFRESH command, the volume serial is from the UCB; otherwise, it is the volume serial assigned to the device when the storage system was installed, or the value set in the INIT_VOLSER parameter in the initialization parameters.

If the device is identified as a Fixed Block Architecture (FBA) device, it appears as follows:

*F128* FBA devices with 128KB track size available on systems with PowerMaxOS 5978 or HYPERMAX OS 5977.

*F64* FBA devices (that are not in an FBA meta group) on systems with Enginuity later than 5771.

*F64M* FBA meta head devices on all systems with Enginuity later than 5771.

*F64M$ FBA striped meta head devices on all systems with Enginuity later than 5771.

*FBA* FBA devices (that are not in an FBA meta group) on all systems with Enginuity 5771 or earlier.

*FBAM* FBA meta head devices on all systems with Enginuity 5771 or earlier.

*FBAM$ FBA striped meta head devices on all systems with Enginuity 5771 or earlier.
TOTAL PACED DELAY
The total paced delay is a 16-digit hexadecimal value that represents microseconds.

TOTAL PACED TRACK COUNT
The total paced track count is a 16-digit hexadecimal value.

*FBE*
FBA encapsulated devices (that are not in an FBA meta group).

*FBEM*
FBA meta encapsulated devices.

*FBX*
FBA externally provisioned devices (that are not in an FBA meta group).

*FBX$
FBA externally provisioned devices - striped (that are not in an FBA meta group).

*FBXM*
FBA meta externally provisioned devices.

*FBXM$
FBA meta externally provisioned devices - striped.

*G128*
devices that have the GCM attribute enabled

*L64*
XtremCache® devices that are actively caching

*L64*
XtremCache devices that are not actively caching

---

a. XtremCache cards are installed on open systems hosts and can be configured to perform the caching duties for FBA devices that reside on a storage system running PowerMaxOS 5978, HYPERMAX OS 5977 or Enginuity 5876. When XtremCache devices are being actively cached, the only permitted command actions are CASDEL, CASSUSP, RDF_SUSP, and DELETEPAIR. All other SRDF actions attempted against actively caching XtremCache devices are blocked and an appropriate error message is displayed indicating the reason.
#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 execution of the most recent #SC GLOBAL,SSID_REFRESH command.

Setting the parameter value to ALL displays all SSIDs found with devices for the z/OS image.

Note: #SQ SSID only shows SSIDs that, during device discovery, have devices online to the LPAR. If the devices were varied online after SRDF Host Component, issue the #SC GLOBAL,SSID-REFRESH before querying SSIDs.

Syntax

#SQ SSID[,count|,ALL]
[,CQNAME=(cqname[,queue-option])]

Parameters

ALL

Indicates that all SSIDs are to be included.

count

Specifies the number of SSIDs to display. You can set this value from 1 to 64. If you do not specify this parameter, count defaults to 1.

cqname

See “cqname” on page 130.

queue-option

See “queue-option” on page 131.

Example

The following example shows the output from an #SQ SSID command:

EMCQS81I SRDF-HC DISPLAY FOR (4) #SQ SSID,ALL
SSID  #DEV  EMUL SYM CUU_ CH __DV__ CUU_ CH __DV__ ONLN SERIAL#
3A00  0100  2107  8  3A00  00  0000A0 3AFF FF 001467 0002 000195700086
3A01  00C0  2107  8  3B00  00  000E30 3BBF BF 00041F 0000 000195700086
3C00  00C0  2107  8  3C00  00  0000A0 3CBF BF 00020F 0000 000195700080
5500  00E0  2107  8  5500  00  000040 55FF FF 000591 0002 000192604124
5501  00C0  2107  8  5600  00  0003D0 56BF BF 00054F 0000 000192604124
8A00  0060  2107  8  8A00 A0 000B8C 8AFF FF 00054F 0000 000192604123
8A01  00B8  2107  8  8B00  00  000140 8BB7 B7 0003DF 0000 000192604123
AA00  00EF  2107  9  AA00  00  000020 AAEF EF 00010F 0000 000196701170
C400  00C9  2107  7  C400  00  000040 C400 00 000040 0000 000190300353
C401  00D8  2107  7  C500  00  000138 C500 00 000138 0000 000190300353
F80A  0100  2107  8  F800  00  000040 F8FF FF 000447 0000 000192604059
END OF DISPLAY

Output fields

SSID  Subsystem ID.

#DEV  Number of devices (in hex) that are known for this SSID.
EMUL  The emulation mode. If the storage system is marked 'invalid' internally, INV is shown here. Otherwise, the emulation mode can be 2105, 2107, or 3990. It can also be 'EMC' if the storage system flags indicate that none of the above emulation modes is in effect but that the controller is a Dell EMC controller.

SYM  The storage system model level, which is reflected in the 2nd digit of the major operating environment level (5277, 5876, and so on).

The values can be 9, 8, 7, or 6. If the model is none of these, an asterisk is shown.

CUU  The first z/OS device number found for this SSID.

CH  The first device address (hex) on the channel as listed in the IOCP gen.

DV  The first PowerMax/VMAX device number.

CUU  The last z/OS device number found for this SSID.

CH  The last device address on the channel as listed in the IOCP gen.

DV  The last PowerMax/VMAX device number.

ONLN  The number of devices (in hex) that are online (at this point in time) for this SSID.

SERIAL#  The storage system serial number.
#SQ STATE

The #SQ STATE command displays the status of individual storage system volumes including online, offline, synchronization state, write protection state, and SRDF mode of operation. All of the statuses that a volume has when the command is issued are shown; positions are provided on the display lines for all status indicators.

Displaying invalid tracks

Only SRDF volumes display INV_TRK values. 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 invalid. In the normal case, where the source (R1) and target (R2) volumes are in communication and staying synchronized, 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 example, if the SRDF links are disabled, the invalid tracks build up over time.

The R1 invalid track count can also increase if the local source (R1) mirrors are not ready while the link is operational and data is being written to the source (R1) volume. In this case the data would be sent across the link to the R2 devices. The invalid tracks may be cleared using the procedures outlined in Chapter 6, “Recovery Procedures.”

Syntax

```
#SQ STATE, cuu
[, SELECT(filter)[,startingdev#]]
[, count[,startingdev#]][,ALL[,startingdev#]]
[, statefilter[,startingdev#]]
[, CQNAME=(cqname[,queue-option])]  #SQ STATE,RMT{(cuu, hoplist)|(cuu, hoplist, *)}
[, SELECT(filter)[,startingdev#]]
[, count[,startingdev#]][,ALL[,startingdev#]]
[, statefilter[,startingdev#]]
[, CQNAME=(cqname[,queue-option])]  #SQ STATE,RMT(cuu, hoplist, srdfgrp)
[, SELECT(filter)[,startingdev#]]
[, count[,startingdev#]][,ALL[,startingdev#]]
[, CQNAME=(cqname[,queue-option])]  #SQ STATE,LCL(cuu, srdfgrp)
[, SELECT(filter)[,startingdev#]]
[, count[,startingdev#]][,ALL[,startingdev#]]
[, CQNAME=(cqname[,queue-option])]  #SQ STATE,VOL(volser)
[, SELECT(filter)][,statefilter]
[, CQNAME=(cqname[,queue-option])]  #SQ STATE,SSID(ssid)
[, SELECT(filter)[,startingdev#]]
[, count[,startingdev#]][,ALL[,startingdev#]]
[, statefilter[,startingdev#]]
[, CQNAME=(cqname[,queue-option])]
```
#SQ STATE,G(groupname)
[,SELECT(filter)],[,statefilter]
[,CQNAME=(cqname[,queue-option])]

#SQ STATE,SCFG(gnsgrp)
[,SELECT(filter)],[,statefilter]
[,CQNAME=(cqname[,queue-option])]

**Note:** For the RMT command format, the *(rducu)* parameter is no longer used; however, it is tolerated for existing code that uses it.

### Parameters

**ALL**

Indicates that all eligible devices are to be included up to the value of the MAX_QUERY initialization parameter.

**Note:** The maximum value for MAX_QUERY is 8192. If the storage system displaying has more than 8192 devices, use command syntax specifying the starting PowerMax/VMAX device number.

For example:  
```
#SQ STATE,cuu,count,startingdev#
```

When used on the RMT statement with two subparameters specified, the ALL parameter includes all devices on the other-side storage system. When used on the RMT statement that includes three subparameters, the ALL parameter includes all devices in a particular SRDF group.

**count**

Specifies the number of eligible devices to be included.  count can be specified as an integer from 1 through the value specified in the MAX_QUERY initialization parameter. If this parameter is not specified, count defaults to 1.

**Note:** The maximum value for MAX_QUERY is 8192. If the storage system displaying has more than 8192 devices, use command syntax specifying the starting PowerMax/VMAX device number.

For example:  
```
#SQ STATE,cuu,count,startingdev#
```

**cqname**

See “cqname” on page 130.

**cuu**

See “cuu” on page 130.

Note that the output may vary. See the “SORT_BY_COMMAND,” “SORT_BY_MVSCUU,” and “SORT_BY_VOLSER” parameter descriptions for more information.

**G(groupname)**

See “G(groupname)” on page 130.
hoplist
  See “hoplist” on page 131.

LCL
  See “LCL” on page 131.

queue-option
  See “queue-option” on page 131.

RMT
  See “RMT” on page 132.

**Note:** For this format, the third subparameter may alternatively be specified as an asterisk (*). In that case, the command action then applies to all SRDF groups.

SCFG(gnsgrp)
  See “SCFG(gnsgrp)” on page 133.

SELECT(filter)
  Filters devices to be displayed by using one or more device filters that can be logically combined in various ways, as described in “Device selection using SELECT” on page 134.
  Table 6 on page 136 lists the values you may specify for \textit{filter}.

You can use any filter in the table with the exception of the RA(srdfgrp) filter.

srdfgrp
  See “srdfgrp” on page 133.

SSID(ssid)
  See “SSID(ssid)” on page 133.

startingdev#
  Identifies the device at which to start the display.
  - If the sort order is set to (or allowed to default to) SORT\_BY\_SYMDEV with the \#SC GLOBAL command, the value specified is treated as a PowerMax/VMAX device number.
  - If the sort order is set to SORT\_BY\_VOLSER with the \#SC GLOBAL command, the value specified is treated as a starting volume serial.
  - If the sort order is set to SORT\_BY\_MVSCUU with the \#SC GLOBAL command, the value specified is treated as a starting z/OS device address.

statefilter
  Indicates that only devices whose state matches the \textit{statefilter} value you specify are to be included in the display.
  Table 6 on page 136 lists valid \textit{statefilter} values.

VOL(volser)
  See “VOL(volser)” on page 134.
The following example shows the output from an #SQ STATE command:

```
EMCQV351 SRDF-HC DISPLAY FOR (12) #SQ STATE,LCL(5100,44),ALL
SERIAL #:0001949-01172/0BZGL MICROCODE LEVEL:5876-268
--------------------------------------------------------------------
CUU | LCL DEV | VOLSER | LGRP | RMT DEV | RGRP | STAT | R | N | D | N | G | T | O | C | M | R1 | R2 | SY | LCL INV | INVTRK | INVTRK | %
---|--------|--------|------|---------|-----|------|---|---|---|---|---|---|----|---|---|---|-----|------|------|------|
51B8 000388 UHB388 OFFL W . . . . . . . . . . ML
  44 0003A8 44 . SY. . T . . . . . R1 0 0 **
51B9 000389 UHB389 OFFL W . . . . . . . . . . ML
  44 0003A9 44 . SY. . T . . . . . R1 0 0 **
51BA 00038A UHB38A OFFL W . . . . . . . . . . ML
  44 0003AA 44 . SY. . T . . . . . R1 0 0 **
51BB 00038B UHB38B OFFL W . . . . . . . . . . ML
  44 0003AB 44 . SY. . T . . . . . R1 0 0 **
51BC 00038C UHB38C OFFL W . . . . . . . . . . ML
  44 0003AC 44 . SY. . T . . . . . R1 0 0 **
51BD 00038D UHB38D OFFL W . . . . . . . . . . ML
  44 0003AD 44 . SY. . T . . . . . R1 0 0 **
51BE 00038E UHB38E OFFL W . . . . . . . . . . ML
  44 0003AE 44 . SY. . T . . . . . R1 0 0 **
51BF 00038F UHB38F OFFL W . . . . . . . . . . ML
  44 0003AF 44 . SY. . T . . . . . R1 0 0 **
END OF DISPLAY
Total devices displayed = 8
```

Output fields:

- **CUU**: z/OS device number. This field displays “????” for devices specified in the SCF exclude list.
- **LGRP**: Local SRDF group number.
- **LCL DEV**: PowerMax/VMAX device number.
- **RMT DEV**: Remotely mirrored PowerMax/VMAX device number.
- **RGRP**: Remote SRDF group number.
- **VOLSER**: Device volume serial. If the device was online at EMCRDF startup or during an #SC GLOBAL,SSID_REFRESH command, the volume serial is from the UCB; otherwise, it is the volume serial assigned to the device when the storage system was installed or the value set in the INIT_VOLSER parameter in the initialization parameters.

If the device is identified as a Fixed Block Architecture (FBA) device, it appears as follows:

- **F128**: FBA devices with 128KB track size available on systems with PowerMaxOS 5978 or HYPERMAX OS 5977.
- **F64**: FBA devices (that are not in an FBA meta group) on systems with Enginuity later than 5771.
- **F64M**: FBA meta head devices on all systems with Enginuity later than 5771.
- **F64M$: FBA striped meta head devices on all systems with Enginuity later than 5771.
- **FBA**: FBA devices (that are not in an FBA meta group) on all systems with Enginuity 5771 or earlier.
- **FBAM**: FBA meta head devices on all systems with Enginuity 5771 or earlier.
- **FBAM$: FBA striped meta head devices on all systems with Enginuity 5771 or earlier.
SYS STATUS

z/OS device status. Values that may appear are:

- HTIO  Device is in hot I/O status
- N/A   UCB was not available
- NOSC  No subchannel for device
- OAPB  Online allocated, mounted public
- OAPV  Online allocated, mounted private
- OAST  Online allocated, mounted storage
- OFFL  Device offline to z/OS
- ONPB  Online, mounted public
- ONPV  Online, mounted private
- ONST  Online, mounted storage
- PAPB  Pending offline, allocated, mounted public
- PAPV  Pending offline, allocated, mounted private
- PAST  Pending offline, allocated, mounted storage

WRT

Read/Write mode. Values that may appear are:

- W     Read/Write enabled
- .     Read/Write disabled

SNC

Synchronous mode. Values that may appear are:

- HW    This mirror has or once had zHyperWrite active on it
- SS    Semi-synchronous mode
- SY    Synchronous mode
- .     Neither

**Note:** Semi-synchronous mode is not supported on Symmetrix DMX-3 models or on any storage system model with FICON directors.
ADC  Adaptive copy mode. Values that may appear are:
   W  Adaptive copy write-pending mode
   D  Adaptive copy disk mode
   A  SRDF/A
      .  None

LNR  Link status. Values that may appear are:
   L  Links not ready
      .  Links ready

RNR  SRDF status. Values that may appear are:
   U  User not ready
   R  SRDF not ready
      .  SRDF ready

TGT  Target status. Values that may appear are:
   R  SRDF write disabled
   T  Target not ready
      .  Neither

ITA  Invalid track attribute status. Values that may appear are:
   I  Invalid track attribute enabled
      .  Invalid track attribute disabled

DOM  Domino mode. Values that may appear are:
   D  Domino mode enabled
      .  Domino mode disabled

ACT  Recovery action. Values that may appear are:
   R  Refresh
   V  Validate
      .  Neither

N/R  Not ready. Values that may appear are:
   N  Not ready
      .  Ready

CXT  Consistency exempt. Values that may appear are:
   X  Consistency exempt mode enabled for the device
      .  Consistency exempt mode disabled for the device
   M  Mixed - a logical device is a meta, and some of the meta members are consistency exempt and others are not

MR  Type of storage system device. Values that may appear are:
   blank  Denotes a standard, local, non-mirrored device
   5P  Volume with RAID 5 local protection
   6P  Volume with RAID 6 local protection
   A1  SRDF/A R1
   A2  SRDF/A R2
   AS  Asynchronous SRDF/A volume
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>Business continuance volume (BCV) source (R1)</td>
</tr>
<tr>
<td>B2</td>
<td>BCV target (R2)</td>
</tr>
<tr>
<td>BB</td>
<td>Thin bound BCV</td>
</tr>
<tr>
<td>BC</td>
<td>BCV</td>
</tr>
<tr>
<td>BO</td>
<td>Thin BCV (R1)</td>
</tr>
<tr>
<td>BT</td>
<td>Thin BCV (R2)</td>
</tr>
<tr>
<td>BU</td>
<td>Thin unbound BCV</td>
</tr>
<tr>
<td>C1</td>
<td>ConGroup R1</td>
</tr>
<tr>
<td>C2</td>
<td>ConGroup R2</td>
</tr>
<tr>
<td>CD</td>
<td>Cache only virtual device</td>
</tr>
<tr>
<td>D1</td>
<td>Diskless R1 (transient state)</td>
</tr>
<tr>
<td>D2</td>
<td>Diskless R2 (transient state)</td>
</tr>
<tr>
<td>DD</td>
<td>Diskless SRDF</td>
</tr>
<tr>
<td>DL</td>
<td>Diskless device that has not been paired with a remote partner</td>
</tr>
<tr>
<td>DP</td>
<td>Encapsulated disk provisioned device</td>
</tr>
<tr>
<td>DR</td>
<td>Dynamic reallocation volume (used by the zBoost PAV Optimizer)</td>
</tr>
<tr>
<td>ED</td>
<td>Encapsulated thin data device</td>
</tr>
<tr>
<td>FS</td>
<td>File system volume</td>
</tr>
<tr>
<td>FT</td>
<td>Thin space-efficient Flashcopy device</td>
</tr>
<tr>
<td>GS</td>
<td>Guest OS device</td>
</tr>
<tr>
<td>L1</td>
<td>Source (R1) volume that is locally protected by mirroring or striping. Applies to 4BYTE_OFF displays only.</td>
</tr>
<tr>
<td>L2</td>
<td>Target (R2) volume that is locally protected by mirroring or striping. Applies to 4BYTE_OFF displays only.</td>
</tr>
<tr>
<td>ML</td>
<td>Local mirror volume</td>
</tr>
<tr>
<td>P1</td>
<td>Encapsulated disk provisioned R1 device</td>
</tr>
<tr>
<td>P2</td>
<td>Encapsulated disk provisioned R2 device</td>
</tr>
<tr>
<td>PL</td>
<td>Volume protected locally. Displays for any non-SRDF RAID-S, RAID 5, or RAID 6 device. (Does not apply to RAID 10 devices.)</td>
</tr>
<tr>
<td>PM</td>
<td>PPRC primary device that is mirrored locally</td>
</tr>
<tr>
<td>PP</td>
<td>PPRC primary device</td>
</tr>
<tr>
<td>PS</td>
<td>PPRC secondary device</td>
</tr>
<tr>
<td>PV</td>
<td>PowerVault volume</td>
</tr>
<tr>
<td>R1</td>
<td>Source (R1) volume</td>
</tr>
<tr>
<td>R2</td>
<td>Target (R2) volume</td>
</tr>
<tr>
<td>RM</td>
<td>SRDF/Metro device</td>
</tr>
<tr>
<td>RS</td>
<td>RAID-S volume</td>
</tr>
<tr>
<td>SL</td>
<td>PPRC secondary device that is mirrored locally</td>
</tr>
<tr>
<td>SV</td>
<td>Saved device</td>
</tr>
<tr>
<td>T1</td>
<td>Thin R1 device</td>
</tr>
<tr>
<td>T2</td>
<td>Thin R2 device</td>
</tr>
<tr>
<td>TB</td>
<td>Thin bound device</td>
</tr>
<tr>
<td>TD</td>
<td>Thin data (not host accessible)</td>
</tr>
<tr>
<td>TH</td>
<td>Thin (bound and host accessible)</td>
</tr>
<tr>
<td>TU</td>
<td>Thin unbound</td>
</tr>
</tbody>
</table>
**LCL INV**  Local invalid track count.

**R1 INVTRK**  Source (R1) volume invalid track count. The numbers reported are displayed as K or M as appropriate, where 1K = 1024 and 1M = 1024*1024.

Note: Storage systems maintain their own invalid track tables that identify invalid tracks on both the source (R1) and target (R2) volumes.

**R2 INVTRK**  Target (R2) volume invalid track count. The numbers reported are displayed as K or M as appropriate, where 1K = 1024 and 1M = 1024*1024.

Storage systems maintain invalid track tables that identify invalid tracks on both the source (R1) and target (R2) volumes. The number of R2 invalid tracks displayed for an R2 volume indicates the number of tracks that the source system has accumulated to be sent to the target system, 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. ** denotes 100% synchronization.

**Total devices displayed**  This line indicates the number of logical devices that are displayed. This line can be preceded by Max_query reached, meaning that the MAX_QUERY limit was reached.
#SQ VIEWRA

The #SQ VIEWRA command displays information about what can be seen by the Active ports in the storage system, including directors other than RAs in the remote systems. Any director that exports its WWN (World Wide Name) appears in these displays.

The extended display option shows all of the directors and ports available for use between two specific systems.

**Note:** The #SQ VIEWRA command can be executed on storage systems running PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5876.

**IMPORTANT**
Specify the REFRESH option when you issue the #SQ VIEWRA command first time to a newly installed/VTOC’ed storage system or if there were changes in the SRDF network topology.

**Syntax**

```
#SQ VIEWRA, cuu, REFRESH[, CQNAME=(cqname[, queue-option])] 
#SQ VIEWRA, cuu 
{, CNTL[, E] |, PORT[, E[, RSER(value)]]}[, REFRESH] 
[,] CQNAME=(cqname[, queue-option]) 
#SQ VIEWRA, RMT(cuu, hoplist), 
REFRESH[, CQNAME=(cqname[, queue-option])] 
#SQ VIEWRA, RMT(cuu, hoplist) 
{, CNTL[, E] |, PORT[, E[, RSER(value)]]}[, REFRESH] 
[,] CQNAME=(cqname[, queue-option])
```

**Parameters**

- **CNTL**
  Displays RAs that have active ports.

- **cqname**
  See “cqname” on page 130.

- **cuu**
  See “cuu” on page 130.

- **E**
  Requests the extended format display.

- **hoplist**
  See “hoplist” on page 131.
PORT

Displays storage systems connected on active ports.

**Note:** Issue a REFRESH before using the PORT option to display the most current information.

queue-option

See “queue-option” on page 131.

REFRESH

Refreshes the status.

When the REFRESH option is specified with the CNTL or PORT options, the command refreshes the status before it displays information. Whether the RSER parameter is part of the command or not, the REFRESH parameter always refreshes connections to all storage systems.

**IMPORTANT**

Specify the REFRESH option when you issue the #SQ VIEWRA command first time to a newly installed/VTOC’ed storage system or if there were changes in the SRDF network topology.

RMT

See “RMT” on page 132.

RSER(value)

Limits command output to directors and ports of the remote storage system specified with its serial number.

When RSER is specified, a remote storage system is included in the display if the trailing digits of its serial number match this RSER value. For example, RSER(00341) lists all directors and ports of the remote storage system for which the trailing digits of its serial number are 00341.

The value specified for RSER must be a numeric string of 1 to 12 digits.
Example

**Example 1:** CNTL option

The following example shows all storage systems that can be seen by the active RAs.

**Note:** The local storage system may not be able to connect to each of the listed systems.

```emc
EMCQW001 SRDF-HC DISPLAY FOR (3) #GL3SQ VIEWRA,8000,CNTL
  MY SERIAL #       MY MICROCODE
---------------------------------------
  001977-00074/0TTLV  5978-124
  OTHER SERIAL (MCLV) OTHER SERIAL (MCLV)
  001903-00344(0000.0000)  001903-00346(0000.0000)
  001912-00353(5773.0198)  001926-04059(5875.0300)
  001949-01159(5876.0272)  001949-01172(5876.0288)
  001957-00080(5876.0309)  001957-00086(5876.0288)
  001968-01233(5977.1125)  001970-00823(5977.0952)
  001970-00824(5977.1125)  001970-00825(5977.0814)
  001977-00075(5978.0062)
END OF DISPLAY
```

**Output fields**

**MY SERIAL #**

The complete 12-digit serial number of the storage system to which the command was issued.

When a storage system with PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5874 and later emulates an IBM 2107, it externally represents the serial number as an alphanumeric serial number to be compatible with IBM command output.

**MY MICROCODE**

The major-minor level of the operating environment running on the storage system to which the command was issued.

**OTHER SERIAL (MCLV)**

The serial number and operating environment level of the remote storage system.

The level may be zeros if the remote system is running Enginuity 5773 and does not have patches installed.

**Example 2:** CNTL option, extended format

The following example shows the extended display for the CNTL option.

```emc
EMCQW001 SRDF-HC DISPLAY FOR (18) ROH6 SQ VIEWRA,2800,CNTL,E
  MY SERIAL #       MY MICROCODE
---------------------------------------
  001967-00263/0KBAY  5977-148
  OTHER SERIAL (MCLV-MINR) CONN-STATUS XX TYPE WWN
  -----------------------------------------------
  0000000-06185(0000-0000) DISCONNECTED 02 DMX 50:06:04:88:00:06:0A:52
  0001926-01076(5876-0280) CONNECTED 02 VMAX 50:00:09:72:08:10:01:58
  0001926-04059(0000-0000) DISCONNECTED 02 VMAX 50:00:09:72:08:3F:6D:60
  0001926-04123(5875-0300) UNAVAILABLE 05 VMAX 50:00:09:72:08:40:71:60
  0001926-04124(5875-0280) CONNECTED 02 VMAX 50:00:09:73:00:01:3D:54
  0001957-00079(5876-0280) CONNECTED 02 VMAX 50:00:09:73:00:01:3D:54
  0001957-00080(5876-0280) CONNECTED 02 VMAX 50:00:09:73:01:01:41:54
  0001957-00086(5876-0280) CONNECTED 02 VMAX 50:00:09:73:01:01:59:54
  0001957-00186(5876-0280) CONNECTED 02 VMAX 50:00:09:73:01:02:0E:58
  0001957-00196(5876-0280) CONNECTED 02 VMAX 50:00:09:73:01:02:11:58
  0001957-00256(5977-0148) CONNECTED 02 VMAX 50:00:09:73:05:04:04:C8
  0001968-00257(5977-0145) CONNECTED 02 VMAX 50:00:09:73:50:04:04:C8
  0001968-00096(5977-0146) CONNECTED 02 VMAX 50:00:09:73:58:01:80:05
  0001968-00106(5977-0146) CONNECTED 02 VMAX 50:00:09:73:58:01:81:1D
  0001971-00061(5977-0139) CONNECTED 02 VMAX 50:00:09:73:70:00:04:10B
  0001972-00003(5977-0150) CONNECTED 02 VMAX 50:00:09:73:78:00:0C:54
END OF DISPLAY
```
Output fields

**MY SERIAL #**  
The complete 12-digit serial number of the storage system to which the command was issued.

**Note:** When a storage system with PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5874 and later emulates an IBM 2107, it externally represents the serial number as an alphanumeric serial number to be compatible with IBM command output.

**MY MICROCODE**  
The major-minor level of the operating environment running on the storage system to which the command was issued.

**OTHER SERIAL (MCLV-MINR)**  
The serial number and major-minor operating environment level of the remote storage system.

The level may be zeros if the remote system is running Enginuity 5773 and does not have patches installed.

**CONN-STATUS**  
The connection status.

**XX**  
This field displays the following values:

- **01**: Connection status of a newly created link was queried.
- **02**: Connection status of a renewed link was queried.
- **03**: Remote storage system is older than VMAX3 and the topology is P2P.
- **04**: Configuration mismatch.
- **05**: The connection to the remote system is blocked because of an old operating environment level on the remote system.
- **06**: Indicates that the other storage system is missing a feature.
- **07**: Storage system connection not allowed.
- **08**: Established path to the target and all the feature info is locally available.
- **09**: Remote storage system is missing a patch or a feature used in the communication.
- **0A**: With PowerMaxOS 5978 and HYPERMAX OS 5977, this value is not used.  
  With Enginuity 5876 and earlier, 0A means that the target is not part of the local RMT and supports only static groups.
- **0B**: Link busy, connection establishment in progress.
- **0C**: The remote side does not have this target IP in its RMT table.
- **0D**: IML in progress.

**TYPE**  
The remote storage system type.

**WWN**  
The remote storage system WWN (World Wide Name).

**Example 3:**  
**PORT option**

```
EMCMN001 SRDF-HC : (19) ROH6 SQ VIEWRA,2800,PORT
EMCW001 SRDF-HC DISPLAY FOR (19) ROH6 SQ VIEWRA,2800,PORT
MY SERIAL #         MY MICROCODE
-------------------   ------------
0001967-00263/0KBAY     5977-148
DIRECTOR:(PORT)
-------------------
062(02G):(1D)
064(04G):(1D)
END OF DISPLAY
```
The following example shows the extended version of the port display.

```emc
EMCQW001I SRDF-HC DISPLAY FOR (4) #GL3SQ VIEWRA,8000,PORT,E
MY SERIAL #     MY MICROCODE

<table>
<thead>
<tr>
<th>DIRECTOR: (PORT)</th>
<th>(PORT):DIRECTOR</th>
<th>OTHER SERIAL (MCLV)</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0001977-00074/0TTLV</td>
<td>5978-124</td>
<td></td>
<td></td>
</tr>
<tr>
<td>041(01E):(06)</td>
<td>- (00):000(16A)</td>
<td>- 0001903-00344(0000.0000)</td>
<td>DISCONNECT</td>
</tr>
<tr>
<td>041(01E):(06)</td>
<td>- (00):000(16A)</td>
<td>- 0001903-00344(0000.0000)</td>
<td>DISCONNECT</td>
</tr>
<tr>
<td>041(01E):(06)</td>
<td>- (00):031(01D)</td>
<td>- 0001903-00346(0000.0000)</td>
<td>CONNECTED</td>
</tr>
<tr>
<td>041(01E):(06)</td>
<td>- (00):040(16D)</td>
<td>- 0001903-00346(0000.0000)</td>
<td>CONNECTED</td>
</tr>
<tr>
<td>041(01E):(06)</td>
<td>- (00):031(01D)</td>
<td>- 0001903-00353(5773.0198)</td>
<td>CONNECTED</td>
</tr>
<tr>
<td>041(01E):(06)</td>
<td>- (00):040(16D)</td>
<td>- 0001903-00353(5773.0198)</td>
<td>CONNECTED</td>
</tr>
<tr>
<td>041(01E):(06)</td>
<td>- (00):059(09F)</td>
<td>- 0001926-04059(5875.0300)</td>
<td>CONNECTED</td>
</tr>
<tr>
<td>041(01E):(06)</td>
<td>- (00):05A(10F)</td>
<td>- 0001926-04123(5876.0272)</td>
<td>UNAVAILABL</td>
</tr>
<tr>
<td>041(01E):(06)</td>
<td>- (00):05A(10F)</td>
<td>- 0001926-04123(5876.0272)</td>
<td>UNAVAILABL</td>
</tr>
<tr>
<td>041(01E):(06)</td>
<td>- (00):059(09F)</td>
<td>- 0001926-04124(5876.0288)</td>
<td>CONNECTED</td>
</tr>
<tr>
<td>041(01E):(06)</td>
<td>- (00):057(07F)</td>
<td>- 0001949-01159(5876.0272)</td>
<td>UNAVAILABL</td>
</tr>
<tr>
<td>041(01E):(06)</td>
<td>- (00):058(08F)</td>
<td>- 0001949-01159(5876.0272)</td>
<td>UNAVAILABL</td>
</tr>
<tr>
<td>041(01E):(06)</td>
<td>- (00):057(07F)</td>
<td>- 0001949-01172(5876.0288)</td>
<td>CONNECTED</td>
</tr>
</tbody>
</table>
```

**Output fields**

The extended port display lists the remote ports that the active RA can see.

When there are links on the local side but the remote side is unavailable, the following line is displayed instead of remote port listing: **NO CONNECTIONS DETECTED**

**STATUS**

The **STATUS** column can contain one of the following values:

- **CONNECTED**
  - This director is available to be used as the remote target of an add group.
  - The local RA was able to establish a connection to the remote director/port. The definition of an SRDF group between the directors may not be allowed if there is an operating environment level restriction on defining a group between the environment versions.

- **DISCONNECT**
  - This remote director cannot be used to define a group; the connection attempt failed.

- **INCOMPLETE**
  - The storage system is in the process of attempting to connect to the remote director/port. The status of the connection has not yet been determined and may appear after a recent REFRESH command. When you see this status wait a few seconds and retry the command.

- **UNAVAILABL**
  - This director type is not an SRDF type, it cannot be used in the definition of an SRDF group.
#SQ VOL

The #SQ VOL command displays the status of individual storage system volumes including online, offline, synchronization state, write protection state, and SRDF mode of operation. One line per remote mirror, or exactly one line for volumes that are not SRDF volumes, displays.

Displaying invalid tracks

Only SRDF volumes display INV_TRK values. 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 invalid. In the normal case, where the source (R1) and target (R2) volumes are in communication and staying synchronized, 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 example, if the SRDF links are disabled, the invalid tracks build up over time.

The R1 invalid track count can also increase if the local source (R1) mirrors are not ready while the link is operational and data is being written to the source (R1) volume. In this case the data would be sent across the link to the R2 devices. The invalid tracks may be cleared using the procedures outlined in Chapter 6, “Recovery Procedures.”

Syntax

```
#SQ VOL, cuu
[,SELECT(filter)][,startingdev#]]|
[,count[,startingdev#]]|[,ALL[,startingdev#]]|
[,statefilter[,startingdev#]]
[,CQNAME=(cqname[,queue-option])]  
#SQ VOL, RMT((cuu, hoplist) | (cuu, hoplist, *))
[,SELECT(filter)][,startingdev#]]|
[,count[,startingdev#]]|[,ALL[,startingdev#]]|
[,statefilter[,startingdev#]]
[,CQNAME=(cqname[,queue-option])]  
#SQ VOL, RMT(cuu, hoplist, srdfgrp)
[,SELECT(filter)][,startingdev#]]|
[,count[,startingdev#]]|[,ALL[,startingdev#]]|
[,CQNAME=(cqname[,queue-option])]  
#SQ VOL, LCL(cuu, srdfgrp)
[,SELECT(filter)][,startingdev#]]|
[,count[,startingdev#]]|[,ALL[,startingdev#]]|
[,CQNAME=(cqname[,queue-option])]  
#SQ VOL, VOL(volser)
[,SELECT(filter)]|[,statefilter]
[,CQNAME=(cqname[,queue-option])]  
#SQ VOL, SSID(ssid)
[,SELECT(filter)][,startingdev#]]|
[,count[,startingdev#]]|[,ALL[,startingdev#]]|
[,statefilter[,startingdev#]]
[,CQNAME=(cqname[,queue-option])]
```
#SQ VOL,G(groupname)
[,SELECT(filter)|,statefilter]
[,CQNAME=(cqname[,queue-option])]

#SQ VOL,SCFG(gnsgrp)
[,SELECT(filter)|,statefilter]
[,CQNAME=(cqname[,queue-option])]

**Note:** For the RMT command format, the (rdfcuu) parameter is no longer used; however, it is tolerated for existing code that uses it.

**Note:** 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.

### Parameters

**ALL**

Indicates that all eligible devices are to be included up to the value of the MAX_QUERY initialization parameter.

**Note:** The maximum value for MAX_QUERY is 8192. If the storage system displaying has more than 8192 devices, use command syntax specifying the starting PowerMax/VMAX device number.

For example: #SQ VOL,cuu,count,startingdev#

When used on the RMT statement with two subparameters specified, the ALL parameter includes all devices on the other-side storage system. When used on the RMT statement that includes three subparameters, the ALL parameter includes all devices in a particular SRDF group.

**count**

Specifies the number of eligible devices to be included.

**Note:** The maximum value for MAX_QUERY is 8192. If the storage system displaying has more than 8192 devices, use command syntax specifying the starting PowerMax/VMAX device number.

For example: #SQ VOL,cuu,count,startingdev#

**cqname**

See “cqname” on page 130.

**cuu**

See “cuu” on page 130.

Note that the output may vary. See the “SORT_BY_COMMAND,” “SORT_BY_MVSCUU,” and “SORT_BY_VOLSER” parameter descriptions for more information.
G(groupname)
   See “G(groupname)” on page 130.

hoplist
   See “hoplist” on page 131.

LCL
   See “LCL” on page 131.

queue-option
   See “queue-option” on page 131.

RMT
   See “RMT” on page 132.

Note: For this format, the third subparameter may alternatively be specified as an asterisk (*). In that case, the command action then applies to all SRDF groups.

SCFG(gnsgrp)
   See “SCFG(gnsgrp)” on page 133.

SELECT(filter)
   Filters devices to be displayed by using one or more device filters that can be logically combined in various ways, as described in “Device selection using SELECT” on page 134.

   Table 6 on page 136 lists the values you may specify for filter.
   You can use any filter in the table with the exception of the RA(srdfgrp) filter.

srdfgrp
   See “srdfgrp” on page 133.

SSID(ssid)
   See “SSID(ssid)” on page 133.

startingdev#
   Identifies the device at which to start the display.
   - If the sort order is set to (or allowed to default to) SORT_BY_SYMDEV with the #SC GLOBAL command, the value specified is treated as a PowerMax/VMAX device number.
   - If the sort order is set to SORT_BY_VOLSER with the #SC GLOBAL command, the value specified is treated as a starting volume serial.
   - If the sort order is set to SORT_BY_MVSCUU with the #SC GLOBAL command, the value specified is treated as a starting z/OS device address.

   Note: This parameter cannot be used with the statefilter parameter.

statefilter
   Indicates that only devices whose state matches the statefilter value you specify are to be included in the display.
Table 6 on page 136 lists valid `statefilter` values.

**VOL(volser)**

See “VOL(volser)” on page 134.

### Examples

**Example 1: Standard display**

The following example shows the output from an #SQ VOL command:

```
EMCMN001I SRDF-HC : (17) #SQ VOL,3C00,16,120
EMCQV34I SRDF-HC DISPLAY FOR (17) #SQ VOL,3C00,16,120
SERIAL #:0001957-00080/0GKHL MICROCODE LEVEL:5876-268
```

<table>
<thead>
<tr>
<th>CUU</th>
<th>CH</th>
<th>LCL_DEV</th>
<th>VOLSER</th>
<th>TOTAL</th>
<th>SYS</th>
<th>DCB</th>
<th>_CNTLUNIT</th>
<th>MR</th>
<th>INVTRK</th>
<th>INVTRK</th>
<th>SY</th>
</tr>
</thead>
<tbody>
<tr>
<td>E0</td>
<td>00</td>
<td>000120 <em>P64</em></td>
<td>958</td>
<td>R/O</td>
<td>PL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E0</td>
<td>00</td>
<td>000121 <em>P64</em></td>
<td>958</td>
<td>R/O</td>
<td>R2</td>
<td>0</td>
<td>**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E0</td>
<td>00</td>
<td>000122 <em>P64</em></td>
<td>958</td>
<td>R/O</td>
<td>R2</td>
<td>0</td>
<td>**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E0</td>
<td>00</td>
<td>000123 <em>P64</em></td>
<td>958</td>
<td>R/O</td>
<td>R2</td>
<td>0</td>
<td>**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E0</td>
<td>00</td>
<td>000124 <em>P64</em></td>
<td>958</td>
<td>R/O</td>
<td>R2</td>
<td>0</td>
<td>**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E0</td>
<td>00</td>
<td>000125 <em>P64</em></td>
<td>958</td>
<td>R/O</td>
<td>R2</td>
<td>0</td>
<td>**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E0</td>
<td>00</td>
<td>000126 <em>P64</em></td>
<td>958</td>
<td>R/O</td>
<td>R2</td>
<td>0</td>
<td>**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E0</td>
<td>00</td>
<td>000127 <em>P64</em></td>
<td>958</td>
<td>R/O</td>
<td>R2</td>
<td>0</td>
<td>**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Output fields**

The fields in the previous example have the following meanings:

- **SERIAL #** Indicates the serial number of the storage system.
- **MICROCODE LEVEL** Indicates the level of the storage system operating environment.
- **CUU** z/OS device number. If the device was in the SCF exclude list or was not defined to the system, "????" appears in this field.
- **CH** First device address on the channel, in hex, as specified in the IOCP gen. For devices not online during startup and devices varied online after the last #SC GLOBAL,SSID_REFRESH command, "??" appears in this field.
- **LGRP** Local SRDF group number.
- **LCL_DEV** PowerMax/VMAX device number.
- **RMT_DEV** Remotely mirrored PowerMax/VMAX device number.
VOLSER  Device volume serial. If the device was online at EMCRDF startup or during an #SC GLOBAL,SSID_REFRESH command, the volume serial is from the UCB; otherwise, it is the volume serial assigned to the device when the storage system was installed, or the value set in the INIT_VOLSER parameter in the initialization parameters.

If the device is identified as a Fixed Block Architecture (FBA) device, it appears as follows:

*F128*  FBA devices with 128KB track size available on systems with PowerMaxOS 5978 or HYPERMAX OS 5977.
*F64*  FBA devices (that are not in an FBA meta group) on systems with Enginuity later than 5771.
*F64M*  FBA meta head devices on all systems with Enginuity later than 5771.
*F64M$  FBA striped meta head devices on all systems with Enginuity later than 5771.
*FBA*  FBA devices (that are not in an FBA meta group) on all systems with Enginuity 5771 or earlier.
*FBAM*  FBA meta head devices on all systems with Enginuity 5771 or earlier.
*FBAM$  FBA striped meta head devices on all systems with Enginuity 5771 or earlier.
*FBE*  FBA encapsulated devices (that are not in an FBA meta group).
*FREM*  FBA meta encapsulated devices.
*FBX*  FBA externally provisioned devices (that are not in an FBA meta group).
*FBX$  FBA externally provisioned devices - striped (that are not in an FBA meta group).
*FBXM*  FBA meta externally provisioned devices.
*FBXM$  FBA meta externally provisioned devices - striped.
*G128*  devices that have the GCM attribute enabled
*164*  XtremCache® devices that are actively caching
*L64*  XtremCache devices that are not actively caching

a. XtremCache cards are installed on open systems hosts and can be configured to perform the caching duties for FBA devices that reside on a storage system running PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5876. When XtremCache devices are being actively cached, the only permitted command actions are CASDEL, CASSUSP, RDF_SUSP, and DELETENPAIR. All other SRDF actions attempted against actively caching XtremCache devices are blocked and an appropriate error message is displayed indicating the reason.

RGRP  Remote SRDF group number.

TOTAL CYLS  Total number of cylinders on a volume.

Note: When the cylinder count exceeds 99999, the count will display in kilobytes (1K = 1024).

SYS STATUS  z/OS device status. Values that may appear 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
DCB OPN  Number of open DCBs.

CNTLUNIT STATUS  Control Unit status.

When DISPLAY_MODE is set to 4BYTE_ON, the CNTLUNIT STATUS is displayed on multiple rows. The first row is the device level view. Subsequent rows are the mirror level view and are displayed for each SRDF mirror.

A device-level CNTLUNIT STATUS value has the format xxx. Table 8 lists values that may display.

Table 8  4BYTE_ON, device level CNTLUNIT STATUS values

<table>
<thead>
<tr>
<th>Format</th>
<th>Possible values</th>
</tr>
</thead>
<tbody>
<tr>
<td>xxx</td>
<td></td>
</tr>
</tbody>
</table>

- **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

- R/W—Read/write mode. The device is read/write-enabled to the local host.
- R/O—Read-only mode. The device is read-enabled but write-disabled to the local host.
- N/R—Not Ready mode. The device is not ready to the local host.
- RNR—SRDF devices globally not ready. The device is not accessible to the local host.
- UNR—User Not Ready.
- W/D—Write-disabled on any FA.
A mirror-level CNTLUNIT STATUS value has the format xxx-yy-z. Table 9 lists values that may display.

### Table 9 4BYTE_ON, mirror level CNTLUNIT STATUS values

<table>
<thead>
<tr>
<th>Format</th>
<th>Possible values</th>
</tr>
</thead>
</table>
| xxx    | R/W—Read/Write mode. The R1 mirror is ready on the link.  
        | IL—Inactive link in an R22 environment. The R2 mirror is inactive.  
        | TNR—Target Not Ready. The R1 mirror is not ready on the link.  
        | LNR—Link Not Ready. The R1 mirror is not ready on the link due to the link being unavailable.  
        | CAS—Cascading mode. Displayed on the R1 mirror of an R21 device.  
        | ??0 - ??F—FBA meta mismatch as shown in Table 11 on page 263. |
| yy     | AD—Adaptive copy disk mode  
        | AS—Asynchronous mode.  
        | AW—Adaptive copy write-pending mode.  
        | AX—Asynchronous mode with CEXMPT.  
        | DX—Adaptive copy disk mode with CEXMPT.  
        | EX—The device is in the process of Dynamic Volume Expansion (DVE).  
        | HW—This mirror has or once had zHyperWrite active on it.  
        | SS—Semi-synchronous mode.  
        | SX—Synchronous mode with CEXMPT.  
        | SY—Synchronous mode.  
        | WX—Adaptive copy write-pending mode with CEXMPT.  
        | ??—Not found. If an SRDF device is an Established BCV, SRDF Host Component clears the SRDF flags. Therefore, any filtering by SRDF group will not find these devices as SRDF devices while the BCV is still Established.  
        | ??0 - ??9—FBA meta mismatch as shown in Table 11 on page 263. |
| z      | I—Invalid track attribute. The target (R2) volume will go not ready if the source (R1) volume (its mirrored device) has invalid tracks on the target (R2) volume and a state of change has been requested on the target (R2) volume.  
        | D—Domino attribute. The source (R1) volume will go not ready if the target (R2) volume is not ready or links are down.  
        | R—Refresh command has been issued for this mirror.  
        | P—A PREFRESH command has been issued for this mirror.  
        | V—A VALIDATE command has been issued for this mirror.  
        | ??0 - ??9—FBA meta mismatch as shown in Table 11 on page 263. |
When DISPLAY_MODE is set to 4BYTE_OFF, the CNTLUNIT STATUS is displayed in a single row, in format xxx-yy-z. Table 10 lists values that may display.

**Table 10**

<table>
<thead>
<tr>
<th>Format</th>
<th>Possible values</th>
</tr>
</thead>
<tbody>
<tr>
<td>xxx</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AS—Asynchronous mode.</td>
</tr>
<tr>
<td></td>
<td>R/W—Read/Write mode.</td>
</tr>
<tr>
<td></td>
<td>R/O—Read-only mode.</td>
</tr>
<tr>
<td></td>
<td>N/R—Not Ready mode.</td>
</tr>
<tr>
<td></td>
<td>CAS—Cascading mode.</td>
</tr>
<tr>
<td></td>
<td>IL—Inactive link in an R22 environment.</td>
</tr>
<tr>
<td></td>
<td>RNR—SRDF devices globally not ready. This status indicates a status of RDF_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.</td>
</tr>
<tr>
<td></td>
<td>TNR—Target (R2) not ready. This status indicates that communication between the SRDF pair is currently inactive because the SRDF pair is SRDF-suspended.</td>
</tr>
<tr>
<td></td>
<td>RWD—SRDF write-disabled. 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.</td>
</tr>
<tr>
<td></td>
<td>LNR—Link not ready. This status indicates that communication between the SRDF pair is currently inactive because the link is offline or the link path is physically unavailable.</td>
</tr>
<tr>
<td></td>
<td>UNR—User not ready.</td>
</tr>
<tr>
<td></td>
<td>??0 - ??F—FBA meta mismatch as shown in Table 11 on page 263.</td>
</tr>
<tr>
<td>yy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AD—Adaptive copy disk mode.</td>
</tr>
<tr>
<td></td>
<td>AS—Asynchronous mode.</td>
</tr>
<tr>
<td></td>
<td>AW—Adaptive copy write-pending mode.</td>
</tr>
<tr>
<td></td>
<td>AX—Asynchronous mode with CEXMPT.</td>
</tr>
<tr>
<td></td>
<td>DX—Adaptive copy disk mode with CEXMPT.</td>
</tr>
<tr>
<td></td>
<td>EX—The device is in the process of Dynamic Volume Expansion (DVE).</td>
</tr>
<tr>
<td></td>
<td>HW—This mirror has or once had zHyperWrite active on it.</td>
</tr>
<tr>
<td></td>
<td>SS—Semi-synchronous mode.</td>
</tr>
<tr>
<td></td>
<td>Note: Semi-synchronous mode is not supported on Symmetrix DMX-3 models or on any VMAX model with FICON directors.</td>
</tr>
<tr>
<td></td>
<td>SX—Synchronous mode with CEXMPT.</td>
</tr>
<tr>
<td></td>
<td>SY—Synchronous mode.</td>
</tr>
<tr>
<td></td>
<td>WX—Adaptive copy write-pending mode with CEXMPT.</td>
</tr>
<tr>
<td></td>
<td>??—Not found. If an SRDF device has an Established BCV, SRDF Host Component clears the SRDF flags. Therefore, any filtering by SRDF group will not find these devices as SRDF devices while the BCV is still Established.</td>
</tr>
<tr>
<td></td>
<td>?0 - ?9—FBA meta mismatch as shown in Table 11 on page 263.</td>
</tr>
<tr>
<td>z</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I—Invalid track attribute. The target (R2) volume will go not ready if the source (R1) volume (its mirrored device) has invalid tracks on the target (R2) volume and a state of change has been requested on the target (R2) volume.</td>
</tr>
<tr>
<td></td>
<td>D—Domino attribute. The source (R1) volume will go not ready if the target (R2) volume is not ready or links are down.</td>
</tr>
<tr>
<td></td>
<td>R—Refresh command has been issued for this device.</td>
</tr>
<tr>
<td></td>
<td>P—A PREFRESH command has been issued for this device.</td>
</tr>
<tr>
<td></td>
<td>V—A VALIDATE command has been issued for this device.</td>
</tr>
<tr>
<td></td>
<td>?0 - ?9—FBA meta mismatch as shown in Table 11 on page 263.</td>
</tr>
</tbody>
</table>
Table 11 indicates the returned CNTLUNIT STATUS values for FBA meta devices when the state of the meta head does not match the state of the meta members.

**Table 11** CNTLUNIT STATUS values for FBA meta mismatches (page 1 of 2)

<table>
<thead>
<tr>
<th>Format</th>
<th>Head status</th>
<th>Not all members</th>
<th>Some members</th>
</tr>
</thead>
<tbody>
<tr>
<td>xxx</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>??0</td>
<td>N/R</td>
<td>N/R</td>
<td></td>
</tr>
<tr>
<td>??1</td>
<td>NOT N/R</td>
<td>N/R</td>
<td></td>
</tr>
<tr>
<td>??2</td>
<td>RNR</td>
<td>RNR</td>
<td></td>
</tr>
<tr>
<td>??3</td>
<td>NOT RNR</td>
<td>RNR</td>
<td></td>
</tr>
<tr>
<td>??4</td>
<td>UNR</td>
<td>UNR</td>
<td></td>
</tr>
<tr>
<td>??5</td>
<td>NOT UNR</td>
<td>UNR</td>
<td></td>
</tr>
<tr>
<td>??6</td>
<td>LNR</td>
<td>LNR</td>
<td></td>
</tr>
<tr>
<td>??7</td>
<td>NOT LNR</td>
<td>LNR</td>
<td></td>
</tr>
<tr>
<td>??8</td>
<td>TNR</td>
<td>TNR</td>
<td></td>
</tr>
<tr>
<td>??9</td>
<td>NOT TNR</td>
<td>TNR</td>
<td></td>
</tr>
<tr>
<td>??A</td>
<td>RWD</td>
<td>RWD</td>
<td></td>
</tr>
<tr>
<td>??B</td>
<td>NOT RWD</td>
<td>RWD</td>
<td></td>
</tr>
<tr>
<td>??C</td>
<td>R/W</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td>??D</td>
<td>NOT R/W</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td>??E</td>
<td>R/O</td>
<td>R/O</td>
<td></td>
</tr>
<tr>
<td>??F</td>
<td>NOT R/O</td>
<td>R/O</td>
<td></td>
</tr>
<tr>
<td>yy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>?0</td>
<td>SRDF/A</td>
<td>SRDF/A</td>
<td></td>
</tr>
<tr>
<td>?1</td>
<td>NOT SRDF/A</td>
<td>SRDF/A</td>
<td></td>
</tr>
<tr>
<td>?2</td>
<td>ADCOPY_DISK</td>
<td>ADCOPY_DISK</td>
<td></td>
</tr>
<tr>
<td>?3</td>
<td>NOT ADCOPY_DISK</td>
<td>ADCOPY_DISK</td>
<td></td>
</tr>
<tr>
<td>?4</td>
<td>ADCOPY</td>
<td>ADCOPY</td>
<td></td>
</tr>
<tr>
<td>?5</td>
<td>NOT ADCOPY</td>
<td>ADCOPY</td>
<td></td>
</tr>
<tr>
<td>?6</td>
<td>SYNC</td>
<td>SYNC</td>
<td></td>
</tr>
<tr>
<td>?7</td>
<td>NOT SYNC</td>
<td>SYNC</td>
<td></td>
</tr>
<tr>
<td>?8</td>
<td>SEMI-SYNC</td>
<td>SEMI-SYNC</td>
<td></td>
</tr>
<tr>
<td>?9</td>
<td>NOT SEMI-SYNC</td>
<td>SEMI-SYNC</td>
<td></td>
</tr>
<tr>
<td>z</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>?0</td>
<td>PREFRESH</td>
<td>PREFRESH</td>
<td></td>
</tr>
<tr>
<td>?1</td>
<td>NOT PREFRESH</td>
<td>PREFRESH</td>
<td></td>
</tr>
</tbody>
</table>
**Table 11** CNTLUNIT STATUS values for FBA meta mismatches (page 2 of 2)

<table>
<thead>
<tr>
<th>Format</th>
<th>Head status</th>
<th>Not all members</th>
<th>Some members</th>
</tr>
</thead>
<tbody>
<tr>
<td>?2</td>
<td>REFRESH</td>
<td>REFRESH</td>
<td></td>
</tr>
<tr>
<td>?3</td>
<td>NOT REFRESH</td>
<td>REFRESH</td>
<td></td>
</tr>
<tr>
<td>?4</td>
<td>VALIDATE</td>
<td>VALIDATE</td>
<td></td>
</tr>
<tr>
<td>?5</td>
<td>NOT VALIDATE</td>
<td>VALIDATE</td>
<td></td>
</tr>
<tr>
<td>?6</td>
<td>INVALIDATE</td>
<td>INVALIDATE</td>
<td></td>
</tr>
<tr>
<td>?7</td>
<td>NOT INVALIDATE</td>
<td>INVALIDATE</td>
<td></td>
</tr>
<tr>
<td>?8</td>
<td>DOMINO</td>
<td>DOMINO</td>
<td></td>
</tr>
<tr>
<td>?9</td>
<td>NOT DOMINO</td>
<td>DOMINO</td>
<td></td>
</tr>
</tbody>
</table>

**MR** Type of storage system device. “MR” on page 247 lists the values that may appear in this field.

**LCL INV** Local invalid track count.

**R1 INVTRK** Source (R1) volume invalid track count. The numbers reported are displayed as K or M as appropriate, where 1K = 1024 and 1M = 1024^*1024. Storage systems maintain their own invalid track tables that identify invalid tracks on both the source (R1) and target (R2) volumes.

**R2 INVTRK** Target (R2) volume invalid track count. The numbers reported are displayed as K or M as appropriate, where 1K = 1024 and 1M = 1024^*1024. Storage systems maintain invalid track tables that identify invalid tracks on both the source (R1) and target (R2) volumes. The number of R2 invalid tracks displayed for an R2 volume indicates the number of tracks that the source storage system has accumulated to be sent to the target storage system, as a result of adaptive copy mode or when the R1 source volumes have been updated while SRDF is suspended (TNR status). This value indicates 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. ** denotes 100% synchronization.

**Total devices displayed** This line indicates the number of logical devices that are displayed. This line can be preceded by **Max_query reached**, meaning that the MAX_QUERY limit was reached.
Example 2: INV_TRKS option

The following example #SQ VOL command specifies the INV_TRKS state filter.

Note: The example shows the default display mode. To use legacy display mode, set DISPLAY_MODE=4BYTE_OFF.

Message EMCQV33I is appended to the output:

EMCMN001I SRDF-HC : (56) #SQ VOL,6400,INV_TRKS
EMCQV34I SRDF-HC DISPLAY FOR (56) #SQ VOL,6400,INV_TRKS
SERIAL #:0001967-01175/0KDNY MICROCODE LEVEL:5977-737

----------------------------------------------------------------------
 CUU   CH|LCL DEV |VOLSER|---------------------------|LCL INV|---------
     LGRP |RMT DEV | RGRP | CYLS |STAT|OPN|STATUS   |MR|INVTRK|INVTRK|%
----------------------------------------------------------------------
 6450  50  000070 MF6450   1113 ONPV   0 R/W       TH
 F0     0000C0     F0                 R/W-SY    C1      0      0 **
 F1     000060     F1                 TNR-SY    R1      0    452 97
 6452  52  000072 MF6452   1113 OAPV   1 R/W       TH
 F0     0000C2     F0                 R/W-SY    C1      0      0 **
 F1     000062     F1                 TNR-SY    R1      0   1711 89
----------------------------------------------------------------------

END OF DISPLAY                       SORT_ORDER = SYMDEV
Total devices displayed = 2
EMCQV33I SRDF-HC Invalid Track Counts by RDF Group  848

<table>
<thead>
<tr>
<th>RDF Group</th>
<th>Devices</th>
<th>R1 INVTRK</th>
<th>R2 INVTRK</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>2</td>
<td>0</td>
<td>2,163</td>
</tr>
<tr>
<td>ALL</td>
<td>2</td>
<td>0</td>
<td>2,163</td>
</tr>
</tbody>
</table>

End of display

Output fields

Message EMCQV33I summarizes invalid track counts by SRDF group and includes the following fields:

RDF GROUP
The SRDF group number for which the following counts have been tallied. The final entry for SRDF group "All" reports total counts for all previously reported SRDF groups.

DEVICES
The number of devices within the specified SRDF group that report non-zero invalid tracks.

R1 INVTRK
The number of R1 invalid tracks reported for devices within the specified SRDF group.

R2 INVTRK
The number of R2 invalid tracks reported for devices within the specified SRDF group.

Note: With PowerMaxOS 5978 and HYPERMAX OS 5977, local invalid tracks are displayed at the local mirror line.
Configuration (SC) commands

#SC CNFG

The #SC CNFG command sets the operating state for an entire storage system.

Syntax

```
#SC CNFG, cuu,
SYNCH_DIRECTION, {R1>R2 | R1<R2 | NONE | GLOBAL}
[, CQNAME=(cqname[, queue-option])]

#SC CNFG, G(groupname),
SYNCH_DIRECTION, {R1>R2 | R1<R2 | NONE | GLOBAL}
[, CQNAME=(cqname[, queue-option])]

#SC CNFG, SCFG(gnsgrp),
SYNCH_DIRECTION, {R1>R2 | R1<R2 | NONE | GLOBAL}
[, CQNAME=(cqname[, queue-option])]
```

Parameters

- **cqname**
  See “cqname” on page 130.

- **cuu**
  See “cuu” on page 130.

- **G(groupname)**
  See “G(groupname)” on page 130.

- **queue-option**
  See “queue-option” on page 131.

- **SYNCH_DIRECTION, {R1>R2 | R1<R2 | NONE | GLOBAL}**
  Sets synchronization direction for an individual storage system.

  A setting of GLOBAL causes the global SYNCH_DIRECTION value to be used for this storage system. “SYNCH_DIRECTION” on page 274 presents further information about each setting.

  SYNCH_DIRECTION represents the required synchronization direction for recovery procedures.

  The SYNCH_DIRECTION set at the CNFG level is controlled by the synchronization direction on the gatekeeper storage system. This applies to commands entered locally or remotely. “Performing synchronization” on page 27 provides more details.

  Also note that SYNCH_DIRECTION set at the CNFG level does not change the SYNCH_DIRECTION set at the SRDF group level. Attempting to do so results in an EMCCC30W warning message.

Example

To set the synchronization direction to NONE, so that synchronization direction commands cannot be issued:

```
#SC CNFG, cuu, SYNCH_DIRECTION, NONE
```
#SC FAVOL

The #SC FAVOL command turns OFF the Write Prohibit bit for FBA devices attached to the FA port.

**Note:** The #SQ FAVOL command displays FBA devices that have the Write Prohibit bit set to ON. “Manipulating and displaying FBA device states” on page 411 provides an example illustrating the use of both the #SQ FAVOL and #SC FAVOL commands.

**Syntax**

```plaintext
#SC FAVOL, cuu,
WriteEnable, symdv#|symdv#-symdv#|ALL
[,,CQNAME=(cqname[,queue-option])]

#SC FAVOL, RMT{(cuu, hoplist, srdfgrp)|} (cuu, hoplist),
WriteEnable, symdv#|symdv#-symdv#|ALL
[,,CQNAME=(cqname[,queue-option])]

#SC FAVOL, LCL(cuu, srdfgrp),
WriteEnable, symdv#|symdv#-symdv#|ALL
[,,CQNAME=(cqname[,queue-option])]

#SC FAVOL, G(groupname),
WriteEnable,
[,,CQNAME=(cqname[,queue-option])]

#SC FAVOL, SCFG(gnsgrp),
WriteEnable,
[,,CQNAME=(cqname[,queue-option])]
```

**Parameters**

- **cqname**
  
  See “cqname” on page 130.

- **cuu**
  
  See “cuu” on page 130.

- **G(groupname)**
  
  See “G(groupname)” on page 130.

- **queue-option**
  
  See “queue-option” on page 131.

- **LCL**
  
  See “LCL” on page 131.

- **hoplist**
  
  See “hoplist” on page 131.

- **RMT**
  
  See “RMT” on page 132.

- **SCFG(gnsgrp)**
  
  See “SCFG(gnsgrp)” on page 133.
srdfgrp

See “srdfgrp” on page 133.

symdv#

Specifies a PowerMax/VMAX device number or a range of PowerMax/VMAX device numbers in the form of dev1-dev2 where dev1 is the starting PowerMax/VMAX device number and dev2 is the ending PowerMax/VMAX device number. If ALL is specified, all devices on the storage system that are eligible for the specified action are affected.

**Note:** If no dev1-dev2 parameter is specified, SRDF Host Component attempts to use the cuu range to determine the PowerMax/VMAX device number on which to perform the action. If you choose to specify a range of devices, you may specify a range of z/OS device numbers or a range of PowerMax/VMAX device numbers, but not both.

WriteEnable

Turns off the Write Prohibit bit for the specified devices.

Example

To write-enable the specified devices:

```
#SC FAVOL,3A00,WRITEENABLE,F2-F4
```
#SC GLOBAL

The #SC GLOBAL command sets the operating state for the overall function of the SRDF Host Component subsystem.

For example, this command, when used with the SSID_REFRESH parameter, causes SRDF Host Component to “refresh” its internal control blocks with information regarding any SSIDs, devices, and VOLSERs that have been brought online since SRDF Host Component was started or the last refresh command was issued. This command may also be used to reset the current SYNCH_DIRECTION, to change how FBA devices are affected by the #SC VOL command, and to specify the sort order for various query commands.

Note: Devices that have been taken offline are not deleted from the SRDF Host Component internal control blocks during refresh processing. This condition allows SRDF Host Component to maintain the z/OS device number to PowerMax/VMAX device number mapping to simplify the entry of #SC VOL commands.

**Syntax**

```plaintext
#SC GLOBAL, action[, action-option] [, CQNAME=(cqname[, queue-option])]```

**Parameters**

action

action can be one of the following:

- `4BYTE_ON`
- `4BYTE_OFF`
- `FBA_DISABLE`
- `FBA_ENABLE`
- `PARM_REFRESH`
- `SORT_BY_COMMAND`
- `SORT_BY_MVSCUU`
- `SORT_BY_SYMDEV`
- `SORT_BY_VOLSER`
- `SSID_REFRESH`
- `SWAPLOG`
- `SYNCH_DIRECTION`

Note: Table 12 summarizes #SC GLOBAL command actions.

action-option

Action options are specific to a command action. For a list and explanation of options available for a particular action, see the description of that action.

cqname

See “cqname” on page 130. Note that this optional parameter is not valid with the PARM_REFRESH, SSID_REFRESH, or SWAPLOG command actions.

queue-option

See “queue-option” on page 131.
Command actions

Table 12 summarizes #SC GLOBAL command actions.

<table>
<thead>
<tr>
<th>P</th>
<th>Action</th>
<th>Values</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>270</td>
<td>4BYTE_ON</td>
<td>N/A</td>
<td>Display 4-byte device numbers</td>
</tr>
<tr>
<td>270</td>
<td>4BYTE_OFF</td>
<td>N/A</td>
<td>Display 2-byte device numbers</td>
</tr>
<tr>
<td>270</td>
<td>FBA_DISABLE</td>
<td>N/A</td>
<td>Prevent #SC VOL from changing FBA device parameters</td>
</tr>
<tr>
<td>270</td>
<td>FBA_ENABLE</td>
<td>N/A</td>
<td>Allow #SC VOL to change FBA device parameters</td>
</tr>
<tr>
<td>270</td>
<td>PARM_REFRESH</td>
<td>[,MSCGroup(msc_group</td>
<td>*)</td>
</tr>
<tr>
<td>272</td>
<td>SORT_BY_COMMAND</td>
<td>N/A</td>
<td>Sort #SQ VOL output depending on command</td>
</tr>
<tr>
<td>273</td>
<td>SORT_BY_MVSCUU</td>
<td>N/A</td>
<td>Sort #SQ VOL output by CUU</td>
</tr>
<tr>
<td>273</td>
<td>SORT_BY_SYMDEV</td>
<td>N/A</td>
<td>Sort #SQ VOL output by PowerMax/VMAX device number</td>
</tr>
<tr>
<td>273</td>
<td>SORT_BY_VOLSER</td>
<td>N/A</td>
<td>Sort #SQ VOL output by volser</td>
</tr>
<tr>
<td>273</td>
<td>SSID_REFRESH</td>
<td>N/A</td>
<td>Refresh SSIDs, devices, and volsers</td>
</tr>
<tr>
<td>273</td>
<td>SWAPLOG</td>
<td>N/A</td>
<td>Close the current log file and opens the alternate log file</td>
</tr>
<tr>
<td>274</td>
<td>SYNCH_DIRECTION</td>
<td>R1&gt;R2, R1&lt;R2, NONE</td>
<td>Set current synchronization direction</td>
</tr>
</tbody>
</table>

4BYTE_ON

Dynamically overrides the DISPLAY_MODE initialization parameter setting and sets SRDF Host Component command output to display 4-byte device numbers.

4BYTE_OFF

Dynamically overrides the DISPLAY_MODE initialization parameter setting and sets SRDF Host Component command output to display 2-byte device numbers.

FBA_DISABLE

Prevents the #SC VOL command from being used to change operating parameters for FBA devices.

FBA_ENABLE

Allows the #SC VOL command to be used to change the operating parameters for FBA devices.

PARM_REFRESH

Refreshes the SRDF Host Component initialization parameters.
Parameter refresh sequence

When a PARM_REFRESH is issued, SRDF Host Component rereads the initialization parameter file and performs the following actions:

1. Makes any necessary changes to the following parameters:
   
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISPLAY_MODE</td>
<td>FBA_ENABLE</td>
</tr>
<tr>
<td>ALIAS</td>
<td>LOGONLY_FOR_TRACKED_COMMANDS</td>
</tr>
<tr>
<td>ALLOW_CRPAIR_NOCOPY</td>
<td>MAX_QUERY</td>
</tr>
<tr>
<td>COMMANDDETAILS</td>
<td>MAX_COMMANDQ</td>
</tr>
<tr>
<td>EXCLUDE_DEVICE_RANGE</td>
<td>DISCOVER_CAS_QRY</td>
</tr>
</tbody>
</table>
   
   MSC statements:
   
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSC_ACTIVATE_MS</td>
<td>MSC_SQAR</td>
</tr>
<tr>
<td>MSC_CYCLE_TARGET</td>
<td>MSC_STAR</td>
</tr>
<tr>
<td>MSC_GROUP_END</td>
<td>MSC_STAR-A</td>
</tr>
<tr>
<td>MSC_GROUP_NAME</td>
<td>MSC_TAKEOVER_THRESHOLD</td>
</tr>
<tr>
<td>MSC_INCLUDE_SESSION</td>
<td>MAX_TRACK_CMDS</td>
</tr>
<tr>
<td>MSC_ALLOW_INCONSISTENT</td>
<td>MSC_VALIDATION</td>
</tr>
<tr>
<td></td>
<td>MSC_WEIGHT_FACTOR</td>
</tr>
</tbody>
</table>
   
   SINGLE_CONCURRENT

   SRDF GROUP statements:
   
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXCLUDE_CUU</td>
<td>INCLUDE_CUU</td>
</tr>
<tr>
<td>EXCLUDE_VOL</td>
<td>INCLUDE_RAG</td>
</tr>
<tr>
<td>EXCLUDE_SYM</td>
<td>INCLUDE_VOL</td>
</tr>
<tr>
<td>FILTER_KNOWN</td>
<td>SRDFA_AUTO_RECOVER</td>
</tr>
<tr>
<td>FILTER_ONLINE</td>
<td>SRDFA_AUTO_RECOVER_BCV</td>
</tr>
<tr>
<td>FILTER_R1</td>
<td>SRDFA_AUTO_RECOVER_ITRK</td>
</tr>
<tr>
<td>FILTER_R2</td>
<td>SRDFA_AUTO_RECOVER_MINDIR</td>
</tr>
<tr>
<td>GROUP_END</td>
<td>SRDFA_AUTO_RECOVER_PROC</td>
</tr>
<tr>
<td>GROUP_NAME</td>
<td>SYNCH_DIRECTION_INIT</td>
</tr>
<tr>
<td>GROUP_SORT_BY_MVSCUU</td>
<td>USER_VERIFICATION</td>
</tr>
<tr>
<td>GROUP_SORT_BY_VOLSER</td>
<td>USER_VERIFICATION_TIMEOUT</td>
</tr>
</tbody>
</table>
   
   VONOFF statements:
   
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>VONOFF_BLOCKED</td>
<td>VONOFF_R1_ONLY</td>
</tr>
<tr>
<td>VONOFF_OFF_ONLY</td>
<td>VONOFF_R2_ONLY</td>
</tr>
<tr>
<td>VONOFF_ON_ONLY</td>
<td>VONOFF_STATUS_WAIT</td>
</tr>
</tbody>
</table>
   
   SHOW_COMMAND_SEQ#

   OPERATOR_VERIFY

   SYNCH_DIRECTION_ALLOWED

   MESSAGE_LABELS

   MESSAGE_EMCF9998W

2. Deletes the SSID tables.
3. Performs an SSID_REFRESH.

**Note:** Once MSC is running (as noted by the “time of cycle switch” messages in the ResourcePak Base job log), the specified parameters will remain in effect until an MSC,REFRESH or MSC,DISABLE command is issued. The #SC GLOBAL,PARM_REFRESH command will *not* post any new parameters to be run.

**Syntax and options**

**Action options are as follows:**

[,MSC]

Refreshes only MSC configuration. Instead of performing a full refresh, SRDF Host Component will process only the MSC statements found in the SRDF Host Component configuration file.

[,MSCGroup(msc_group|*)]

Specifies the MSC group to start. When MSCGroup is specified, no refresh processing is performed; the only action is to start the MSC group in the associated SCF address space.

This optional parameter is not required if there is only one MSC group. However, if you have defined multiple MSC groups with the MSC_GROUP_NAME parameter, use the MSCGroup parameter to start each MSC group. You can specify a single group name with *msc_group* or start all defined groups using the asterisk (*).

[,MSCGroup(msc_group),{ADD|DELETE}]

The ADD and DELETE keywords add or delete an SRDF/A group to or from the specified MSC group. When adding or deleting a group, only session INCLUDE statements are processed.

“Dynamically adding and deleting groups in MSC” on page 458 provides more information about this command option.

**SORT_BY_COMMAND**

Determines the display sort order by the type of #SQ VOL query request as follows:

<table>
<thead>
<tr>
<th>Command</th>
<th>Displays output according to</th>
</tr>
</thead>
<tbody>
<tr>
<td>#SQ VOL, cuu</td>
<td>MVSCUU</td>
</tr>
<tr>
<td>#SQ VOL,LCL(cuu)</td>
<td>SYMDEV</td>
</tr>
<tr>
<td>#SQ VOL,RMT(cuu)</td>
<td>SYMDEV</td>
</tr>
<tr>
<td>#SQ VOL,V(volser)</td>
<td>VOLSER</td>
</tr>
<tr>
<td>#SQ VOL,SSID(ssid)</td>
<td>SYMDEV</td>
</tr>
<tr>
<td>#SQ VOL,G(groupname)</td>
<td>See SORT_BY_MVSCUU and “SORT_BY_VOLSER” on page 273.</td>
</tr>
</tbody>
</table>

“SORT_BY_COMMAND” on page 114 provides more information about sort behavior with the *cuu* location parameter.
SORT_BY_MVSCUU

Shows devices in the order of their z/OS device addresses when presenting displays resulting from #SQ MIRROR, #SQ VOL, #SQ STATE, #SQ RAID, #SQ RAID5, #SQ RAID6, and #SQ RAID10 commands. Devices without cuus appear at the end in PowerMax/VMAX device number order. “SORT_BY_MVSCUU” on page 115 provides more information about sort behavior with the cuu location parameter.

SORT_BY_SYMDEV

Shows devices in the order of PowerMax/VMAX device number when presenting displays resulting from #SQ MIRROR, #SQ VOL, #SQ STATE, #SQ RAID, #SQ RAID5, #SQ RAID6, and #SQ RAID10 commands. When SORT_BY_SYMDEV is specified, the behavior for the #SQ VOL|STATE|MIRROR commands with the cuu location parameter varies depending on the format used, as follows:

- #SQ VOL,cuu
  This format starts at the CUU specified in the command and returns only that device.

- #SQ VOL,cuu,count
  This format starts at the CUU specified in the command and returns the specified count in PowerMax/VMAX device number order.

- #SQ VOL,cuu,ALL
  This format starts at the lowest PowerMax/VMAX device number defined on the storage system.

- #SQ VOL,cuu,xxx,starting_device
  This format starts at the PowerMax/VMAX device number specified at starting_device and returns the specified count.

SORT_BY_VOLSER

Shows devices in the order of volume serial numbers when presenting displays resulting from #SQ MIRROR, #SQ VOL, #SQ STATE, #SQ RAID, #SQ RAID5, #SQ RAID6, and #SQ RAID10 commands. Devices without a volume serial appear at the end of the display, presented in PowerMax/VMAX device number order. “SORT_BY_VOLSER” on page 117 provides more information about sort behavior with the cuu location parameter.

SSID_REFRESH

Refreshes SRDF Host Component internal control blocks with the latest information about SSIDs, devices, and volsers.

SWAPLOG

Closes the current log file and opens the alternate log file. DDnames for the log files are HCLOG1 and HCLOG2.
SYNCH_DIRECTION

Sets current synchronization direction. Values that may appear, and their meanings, are subject to restrictions set by the SYNCH_DIRECTION_ALLOWED initialization parameter.

Note: This parameter identifies the intended resynchronization command sequence so that SRDF Host Component can validate the sequence. This parameter has no effect on storage systems.

Syntax and options

Action options are as follows:

NONE

NONE specifies no synchronization direction.

R1>R2

R1>R2 only allows synchronization commands (REFRESH, RNG_REFRESH, VALIDATE, and INVALIDATE) to cause synchronization from source (R1) → target (R2). The REFRESH, RNG_REFRESH, and VALIDATE actions 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

R1<R2 only allows synchronization commands (REFRESH, RNG_REFRESH, VALIDATE, and INVALIDATE) to cause synchronization from target (R2) → source (R1). The REFRESH, RNG_REFRESH, and VALIDATE actions 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.
#SC LINK

The #SC LINK command modifies the status of a remote link director.

When ALL is specified as the dir# parameter value, the requested status change is applied to all remote link directors.

When ALL is specified as the port# parameter value, the requested status change is applied to all ports on the specified remote link director.

When ALL is used for the dir# and port# parameter value, the requested state change is applied to all ports on all remote link directors.

Syntax

```
#SC LINK, cuu, dir#, ALL[(port#)] | ALL, ONLINE | OFFLINE [, CQNAME= (cqname[, queue-option])]
```

Parameters

`cqname`

See “cqname” on page 130.

`cuu`

See “cuu” on page 130.

`dir#`

Specifies the remote link director number. Values that may appear are from 1 to 80 (hex) or ALL.

The director number specified must be a remote link director. If necessary, issue the #SQ LINK command to determine the remote link director numbers and/or ports.

`ONLINE | OFFLINE`

Specifies the states of the specified remote link director(s).

When OFFLINE is specified, any SRDF/A session will drop, even if Transmit Idle is enabled.

`port#`

Specifies the remote link director port number. Values that may appear are from 1 to 1F (hex) or ALL.

**Note:** The `port#` parameter is supported with PowerMaxOS 5978 and HYPERMAX OS 5977.

With PowerMaxOS 5978 and HYPERMAX OS 5977, when the `port#` parameter is NOT specified, the command changes the state of the RA director/s. If the `port#` parameter is specified, the command changes the state of the specified port(s).

`queue-option`

See “queue-option” on page 131.
The #SC MSG command, when used with the RESET parameter, clears the message log.

Syntax

```
#SC MSG,RESET
[,CQNAME=(cqname[,queue-option])]
```

Parameters

- **cqname**
  
  See “cqname” on page 130.

- **queue-option**

  See “queue-option” on page 131.

- **RESET**

  Clears the message log of all entries.
#SC RDFGRP

The #SC RDFGRP command modifies the state of an SRDF group.

The #SC RDFGRP command prompts you to confirm the action you have specified, unless you have disabled the prompt by specifying the value NO for the OPERATOR_VERIFY initialization parameter.

**Dynamic SRDF groups**

Using dynamic SRDF groups, you can create, modify, and remove SRDF groups. You can establish SRDF device pairs only within the context of an SRDF group by using the #SC VOL command CREATEPAIR and CASCRE actions. You can perform a wide variety of device actions on all devices paired within a specific SRDF group, and control device pair synchronization in a number of ways at the SRDF group level.

A group is defined with a group number and a list of directors for each side of the SRDF relationship. In addition, you can set options at group creation time to enable the Links Domino and Prevent Auto Links Recovery attributes. When dynamic groups are added, you can assign 10-character alphanumeric labels to them. For storage systems running Enginuity 5876 and earlier, you can also assign labels to static groups as part of the storage system configuration activity.

Once you define a dynamic group, you can add, remove, or move devices with the #SC VOL command CREATEPAIR, DELETESPAIR, and MOVEPAIR actions. Definitions for dynamic groups are persistent across IMLs.

**Restrictions**

The following restrictions apply to adding and creating SRDF groups:

- Storage systems running PowerMaxOS 5978 and HYPERMAX OS 5977 can connect to other systems running PowerMaxOS 5978 and HYPERMAX OS 5977 or to older storage systems running Enginuity 5876.
- With PowerMaxOS 5978 and HYPERMAX OS 5977, up to 32 remote storage systems can be connected to a local storage system. For Enginuity 5876 and earlier, up to 16 remote storage systems can be connected to a local storage system.
- Only GigE and switched Fibre Channel directors are supported.

  **Note:** GigE directors are required at both sides of the SRDF group to be successfully created.

- Point-to-point Fibre Channel configurations are not supported.
- PPRC is supported for dynamic SRDF groups.
- ESCON directors are not supported.
- With PowerMaxOS 5978 and HYPERMAX OS 5977, static SRDF groups and devices are not supported. All devices are dynamically-capable upon their creation and only dynamic SRDF groups are allowed to be created.
- Dynamic SRDF group operations applied to static groups are not supported.
◆ When an SRDF group is initially created, it is assigned a unique label that is applied to both sides of the group. Note that this label must not already exist as a label on either side before the group is created. 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.

◆ Each 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.

◆ #SC RDFGRP MODIFY actions can only add or remove directors, not change option settings or labels. These actions cannot delete all directors from the group on one side while leaving one or more directors on the other side.

◆ Only one dynamic group operation is allowed at a time.

◆ Dynamic group operations are not allowed during IML.

Syntax

#SC RDFGRP, cuu, srdfgrp,
action, action-option
[,CQNAME=(cqname[,queue-option])]

#SC RDFGRP,RMT(cuu, hoplist),srdfgrp,
action, action-option
[,CQNAME=(cqname[,queue-option])]

Note: For the RMT command format, the (rdfcuu) parameter is no longer used; however, it is tolerated for existing code that uses it.

Parameters

action

Action can be one of the following:

- ADD[[DOM][,NO-AUTO-RCVRY]]
- DELETE[[STAR][STAR-A][SQAR]]
- MODify[[STAR][STAR-A][SQAR]]
- SYNCH_DIRECTION

Note: Table 13 on page 279 summarizes #SC RDFGRP command actions.

action-option

Action options are specific to a command action. For a list and explanation of options available for a particular action, see the description of that action.

cqname

See “cqname” on page 130.

cuu

See “cuu” on page 130.

hoplist

See “hoplist” on page 131.
queue-option

See “queue-option” on page 131.

RMT

See “RMT” on page 132.

Note: For this item, you can specify the third subparameter as an asterisk (*). In that case, the command action then applies to all SRDF groups.

srdfgrp

See “srdfgrp” on page 133.

Command actions

Table 13 summarizes #SC RDFGRP command actions.

<table>
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<tr>
<th>P</th>
<th>Action</th>
<th>Values</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>279</td>
<td>ADD[[DOM] [NO-AUTO-RCVRY]]</td>
<td>LDIR(dir#(port#[-port#][,port#[-port#]]...) [,dir#(port#[-port#][,port#[-port#]]...] RDIR(dir#(port#[-port#][,port#[-port#]]...) [,dir#(port#[-port#][,port#[-port#]]...) LABEL(label) RGRP(srdfgrp) RSER(symmetric#)</td>
<td>Define a new SRDF group</td>
</tr>
<tr>
<td>281</td>
<td>DELETE or DELETE(STAR</td>
<td>STAR-A</td>
<td>SQAR)</td>
</tr>
<tr>
<td>281</td>
<td>MODify or MODify(STAR</td>
<td>STAR-A</td>
<td>SQAR)</td>
</tr>
<tr>
<td>282</td>
<td>SYNCH_DIRECTION</td>
<td>R1&gt;R2, R1&lt;R2, NONE, CNFG</td>
<td>Set synchronization direction for an SRDF group</td>
</tr>
</tbody>
</table>

ADD[[DOM] [NO-AUTO-RCVRY]]]

Defines a new SRDF group spanning two storage systems.

You must specify at least one local director (LDIR) and one remote director (RDIR), the SRDF group label (LABEL), the remote storage system (RSER) and the number of the SRDF group on the remote side (RGRP).

Syntax and options

You can also optionally set the Links Domino (DOM) and/or Prevent Auto Links Recovery (NO-AUTO-RCVRY) options for the SRDF group:

◆ DOM

Sets the LINKS-DOMINO mode. LINKS-DOMINO is a mode of operation in which all R1 devices go RDF-NOT READY if all links are dropped.
NO-AUTO-RCVRY

During normal SRDF operations, when all links between an R1 and R2 go down, the devices become not ready on the link (TNR/LNR). When the links come back up, the devices automatically recover back to a “Ready on the link” state (R/W). With the NO-AUTO-RCVRY option set, when the link comes back up, the devices will stay TNR until you explicitly RDF_RSUM the devices. This provides protection to preserve consistency.

Action options are as follows:

LABEL(label)

LABEL specifies an alphanumeric label of up to ten alphanumeric characters to serve as a mnemonic group identifier. This value may be useful when displaying groups with the #SQ RDFGRP command.

LDIR(dir# (port#[,-port#][,port#[,-port#]][,...])

LDIR identifies the link directors on the local storage system which are used for communication between the local and remote sides of the SRDF group.

You must specify at least one local director.

dir#

Specifies a director number in hex. The range is x’01’ to x’80’ (up to 128 directors).

port#

Specifies the port or range of ports to use with the indicated director. The range is x’00’ to x’1F’ for a maximum of 32 ports.

Note: SRDF Host Component allows connections between PowerMaxOS 5978 or HYPERMAX OS 5977 and Enginuity 5876. When one or more storage systems is running PowerMaxOS 5978 or HYPERMAX OS 5977, you must specify port#. For connections between Enginuity 5876 and earlier, only dir# is required.

RDIR(dir# (port#[,-port#][,port#[,-port#]][,...])

RDIR identifies the link directors on the remote storage system which are used for communication between the local and remote sides of the SRDF group.

You must specify at least one remote director.

dir#

Specifies a director number in hex. The range is x’01’ to x’80’ (up to 128 directors).

port#

Specifies the port or range of ports to use with the indicated director. The range is x’00’ to x’1F’ for a maximum of 32 ports.

Note: SRDF Host Component allows connections between PowerMaxOS 5978 or HYPERMAX OS 5977 and Enginuity 5876. When one or more storage systems is running PowerMaxOS 5978 or HYPERMAX OS 5977, you must specify port#. For connections between Enginuity 5876 and earlier, only dir# is required.
RGRP(srdgrp)

RGRP supplies the SRDF group number for the remote side. The maximum SRDF group number on either side is 250.

RSER(symmetric#)

RSER specifies the full 12-digit serial number of the remote storage system.

Example

Consider the following example:

```
#SC RDFGRP,6F60,12,ADD,LDIR(1(6-8),2(7-a),3(b)),
   RDIR(2(1-3),4(2-5),8(a)),RSER(771877900065),LABEL(TEST),RGRP(21)
```

This command adds SRDF group 12 on the local storage system and SRDF group 21 on the remote storage system as related SRDF groups. (Each SRDF group is the other-side SRDF group of the other.) Local directors 1, 2, and 3 are included in the group as well as remote directors 2, 4, and 8, with the specified ports for each director. All director and port number specifications are in hex. The Label “TEST” is assigned to this group, and RSER specifies the full 12-digit serial number of the remote storage system.

DELETE[(STAR|STAR-A|SQAR)]

Deletes the identified SRDF group.

The group must be empty for this command to work. In other words, all device pairs must have been deleted from the SRDF group to be deleted.

Syntax and options

Specify STAR, STAR-A or SQAR to delete an SRDF group with the SQAR, STAR, STAR-A, STAR RECOVERY, or STAR-A RECOVERY attribute. No director may be specified with the DELETE action.

Example

To delete SRDF group 08:

```
#SC RDFGRP,6F60,08,DELETE
```

MODify[(STAR|STAR-A|SQAR)]

Adds or removes the directors identified in the LDIR or RDIR parameter to or from the identified SRDF group.

An attempt to remove the last director/port with a valid connection to the other storage system causes error message EMCCR60E followed by EMCCR6AI TIMEOUT ON CONNECTION ATTEMPT. To determine if the director/port combination being removed is the last one, issue the #SQ VIEWRA command with the PORT,E and REFRESH options.

Syntax and options

You can specify STAR, STAR-A or SQAR to allow the set of directors assigned to the SRDF group to be changed when the group already has the SQAR, STAR, STAR-A, STAR RECOVERY, or STAR-A RECOVERY attribute.

Action options are as follows:

```
LDIR([modify-action]dir#(port#|port#-port#))
RDIR([modify-action]dir#(port#|port#-port#))
```
Where:

LDIR

Identifies the link director(s) on the local storage system.

RDIR

Identifies the link director(s) on the remote storage system.

modify-action

The modify-action can be “+” to add or “-” to remove a director. If no action is specified, the default action is add.

IMPORTANT

At least one local or remote director must be specified for add (no prefix or +) or remove (-).

dir#

dir# specifies a director number to be added or removed from the local (LDIR) or remote (RDIR) group. For PowerMaxOS 5978 and HYPERMAX OS 5977, the range is x’01’ to x’10’ (up to 16 directors). For Enginuity 5876 and earlier, the range is x’01’ to x’80’ (up to 128 directors).

Note: SRDF Host Component allows connections between PowerMaxOS 5978 or HYPERMAX OS 5977 and Enginuity 5876. When one or more storage systems is running PowerMaxOS 5978 or HYPERMAX OS 5977, you must specify port#. For connections between Enginuity 5876 and earlier, only dir# is required.

port#

port# specifies the port or range of ports to use with the indicated director. The range is x’00’ to x’1F’ for a maximum of 32 ports.

Note: SRDF Host Component allows connections between PowerMaxOS 5978 or HYPERMAX OS 5977 and Enginuity 5876. When one or more storage systems is running PowerMaxOS 5978 or HYPERMAX OS 5977, you must specify port#. For connections between Enginuity 5876 and earlier, only dir# is required.

Example 4

To remove director 1 from and add directors 2 and 3 to the local side of SRDF group 08:

```
#SC RDFGRP,6F60,08,MOD,LDIR(+2(3-5),+3(8-a),-1(4))
```

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 '-'.

SYNCH_DIRECTION

Sets synchronization direction for an individual SRDF group.

Setting the direction at this level overrides the storage system synchronization direction specified with the #SC CNFG command.
This action resets the synchronization direction for the other-side SRDF group of the SRDF group specified in the command as well. Connection to the remote storage system for the specified SRDF group is required; the command fails if remote access is unavailable.

**Note:** "Performing synchronization" on page 27 provides more information about synchronization directions.

**Syntax and options**

Action options are as follows:

- **CNFG**
  
  CNFG causes the #SC CNFG synchronization direction value to be used for this SRDF group.

- **NONE**
  
  NONE specifies no synchronization direction.

- **R1>R2**
  
  R1>R2 allows synchronization commands (REFRESH, RNG_REFRESH, VALIDATE, and INVALIDATE) to cause synchronization from source (R1) to target (R2). The REFRESH, RNG_REFRESH, and VALIDATE actions on the SC VOL command may only be used on a target volume and INVALIDATE may only be used on a source volume.

- **R1<R2**
  
  R1<R2 allows synchronization commands (REFRESH, RNG_REFRESH, VALIDATE, and INVALIDATE) to cause synchronization from target (R2) to source (R1). The REFRESH, RNG_REFRESH, and VALIDATE actions on the #SC VOL command may only be used on a source volume and INVALIDATE may only be used on a target volume.

**Example**

To set the synchronization direction to R1>R2 for the specified SRDF group and its other-side SRDF group:

```
#SC RDFGRP,3004,04,SYNCH_DIRECTION,R1>R2
```

**Note:** Messages indicate if a REFRESH, RNG_REFRESH, VALIDATE, or INVALIDATE command is issued that would select both R1 and R2 devices because the synchronization directions are set differently.
#SC RECOVER

The #SC RECOVER command initiates SRDF Automated Recovery for MSC or non-MSC environments. SRDF Automated Recovery is a utility to monitor and perform automated recovery of SRDF/A environments. It eliminates the need for external automation or manual intervention by automatically restoring SRDF/A to operational status following a planned or unplanned outage. You can configure the software to prompt you for authorization before proceeding with automated recovery.

**Note:** “SRDF Automated Recovery” on page 498 describes this feature and lists operating restrictions.

You can enable automatic recovery for SRDF/A single sessions without MSC. You define SRDF/A Single Session Auto Recovery settings in the SCF initialization parameters and control the process with the SRDF/A Monitor. The *ResourcePak Base for z/OS Product Guide* describes these parameters and their usage. You can also use this SC RECOVER command to initiate recovery.

**Syntax**

- `#SC RECOVER,MSC(group_name) [,NOBCV]`
- `#SC RECOVER,SRDFA(cuu, srdfgrp) [,NOBCV]`

**Parameters**

- **cuu**
  - The z/OS device number.

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

- **MSC**
  - Specifies that the recovery operation is for an MSC environment.

- **NOBCV**
  - Disables BCV management for this recovery event only.

- **SRDFA**
  - Specifies that the recovery operation is for a non-MSC SRDF/A environment.

  **Note:** The #SC RECOVER, SRDFA output will be displayed in SCF.

- **srdfgrp**
  - The SRDF group number through which you want to perform an operation. This must be a 1- or 2-digit (hex) value representing the SRDF group number.
#SC SRDF_CMPR

SRDF Host Component provides SRDF software and hardware compression for devices operating in asynchronous and adaptive copy modes. Compression minimizes the amount of data to be transmitted over an SRDF link. You enable and report on software and hardware compression at the group level. Both software and hardware compression require storage systems running Enginuity 5875 or 5876.

For software compression, only the R1-side settings are active on the SRDF session. If a personality swap occurs, the former R2-side settings become the active settings for the session.

SC SRDF_CMPR provides SRDF group-level compression. Note that compression can only be activated on SRDF groups over links between storage systems that are both at Enginuity 5874 and later. However, you can enable compression on SRDF groups between a storage system with Enginuity 5874 or later and a storage system that is at a lower level. This allows you to make the SRDF group on the storage system with Enginuity 5874 or later “compression-ready”, so if you later upgrade the storage system that is at a lower level to Enginuity 5874 or later, compression will automatically become active.

Syntax

```plaintext
#SC SRDF_CMPR,LCL{(cuu,srdfgrp)|(cuu,*)},
action[(action-option)]
[,CQNAME=(cqname[,queue-option])]
#SC SRDF_CMPR,RMT{(cuu,hoplist,srdfgrp)|(cuu,hoplist,*)},
action[(action-option)]
[,CQNAME=(cqname[,queue-option])]
```

Parameters

**action**

- **action** can be one of the following:
  - ACT
  - DEACT

**action-option**

Action options are specific to a command action. For a list and explanation of options available for a particular action, see the description of that action.

**cqname**

- See “cqname” on page 130.

**cuu**

- See “cuu” on page 130.

**hoplist**

- See “hoplist” on page 131.

**LCL**

- See “LCL” on page 131.

**Note:** For this format, the second subparameter may alternatively be specified as an asterisk (*). In that case, the command action then applies to all SRDF groups.
queue-option

See “queue-option” on page 131.

RMT

See “RMT” on page 132.

Note: For this format, the third subparameter may alternatively be specified as an asterisk (*). In that case, the command action then applies to all SRDF groups.

srdfgrp

See “srdfgrp” on page 133.

Command actions

ACT

Activates SRDF compression.

Syntax and options

ACT (SW, HW, ALL)

Action options specify the type of compression to activate:

SW

(Default) Activates software compression.

HW

Activates hardware compression.

ALL

Activates both software and hardware compression.

Note: You can also specify (SW,HW) or (HW,SW) to activate both types of compression.

DEACT

Deactivates SRDF compression.

Syntax and options

DEACT (SW, HW, ALL)

Action options specify the type of compression to deactivate:

SW

Deactivates software compression.

HW

Deactivates hardware compression.

ALL

(Default) Deactivates both software and hardware compression.

Note: You can also specify (SW,HW) or (HW,SW) to deactivate both types of compression.
#SC SRDFA

The #SC SRDFA command sets SRDF/A configuration options.

**Device types**

The devices in an SRDF/A session must be all diskless or all standard. Mixed device types are not allowed.

**SRDF/A cycle switching**

When SRDF/A stops cycle switching due to a PEND_DROP, PEND_DEACT, or some other event, the devices will return to either:

- The state in which they were originally configured in the storage system (for static devices)
- Synchronous state (for dynamic devices)

Cascaded devices will return to their required state (ADCOPY-DISK for non-diskless devices, and ADCOPY for diskless devices). For non-cascaded devices, if it is required that the devices be in ADCOPY-DISK mode before the devices are made ready on the link, issue the SC VOL,LCL(cuu, srdfgrp),ADCOPY_DISK,ALL command.

**SRDF/S – SRDF/A mode change**

SRDF/S – SRDF/A mode change functionality enables you to switch between asynchronous mode and synchronous mode while maintaining dependent write consistency on the remote R2 side throughout the process. This functionality only applies to a single SRDF/A group.

For example, this feature could be used during processing where transactions are so numerous that the application might not tolerate the latency involved with handling the transaction load while in synchronous mode. With the mode change 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. Once the overload situation has passed, you can switch from SRDF/A back to SRDF/S mode (and catch up tracks owed) before reverting to SRDF/A again if necessary.

To switch between SRDF/S and SRDF/A mode, use the SC SRDFA command with the ACT or CONS_DEACT action. Use ACT to switch to SRDF/A mode. Use CONS_DEACT to switch to SRDF/S mode.

**Note:** SRDF/S to SRDF/A mode change requires PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5771 and later.

**MCM/Legacy mode**

An SRDF/A group can run in MCM (Multi Cycle Mode) mode or in Legacy mode.

MCM mode is a feature of PowerMaxOS 5978 or HYPERMAX OS 5977 that allows multiple cycles on the R1 side to provide incremental updates to the R2. This improves the RPO (Recovery Point Objective) and have beneficial effects on spillover, since it is no longer be necessary to spill over on the R2 side.

**IMPORTANT**

MCM is only available when SRDF/A is operational between storage systems running PowerMaxOS 5978 or HYPERMAX OS 5977.
MCM is supported when all SRDF/A groups are under PowerMaxOS 5978 or HYPERMAX OS 5977 and are running in MCM. The presence of a non-5977/5978 group or a 5977/5978 group running in Legacy mode will force a transition of any MCM group into Legacy mode.

When a dynamic add of a MSC session is executed, the following occurs. If the session to be added is MCM, all groups must be running MCM. Otherwise, the MSC session will be transitioned to Legacy mode before the addition can complete.

**Syntax**

```
#SC SRDFA, cuu,
action
[,CQNAME=(cqname[,queue-option])]  
#SC SRDFA, LCL(cuu,srdfgrp),
action
[,CQNAME=(cqname[,queue-option])]  
#SC SRDFA, RMT(cuu,hoplist,srdfgrp),
action
[,CQNAME=(cqname[,queue-option])]
```

**Note:** The #SC SRDFA, cuu, action format works only with Enginuity 5x70, which allows only one SRDF/A group. With PowerMaxOS 5978, HYPERMAX OS 5977, and Enginuity 5771 or later, multiple SRDF/A sessions may be active simultaneously, each on a different SRDF group, and you should specify the LCL(cuu,srdfgrp) format. For some actions, you may use the RMT(cuu,hoplist,srdfgrp) format.

**Parameters**

**action**

- **ACT[(LEGACY)]**
- **CONS_DEACT**
- **DEACT_TO_ADCOPY**
- **DEACT_TO_ADCOPY_DISK**
- **DROP**
- **DROP_SIDE**
- **PEND_DEACT**
- **PEND_DROP**
- **SET_CACHE_LIMIT**
- **SET_DROP_PRIORITY**
- **SET_HOST_THROTTLE**
- **SET_MIN_CYCLE_TIME**
- **TOL_ON**
- **TOL_OFF**
- **TRANSMIT_IDLE,[ON|OFF]**

**Note:** Table 14 on page 289 summarizes #SC SRDFA command actions.
cqname
See “cqname” on page 130.

cuu
See “cuu” on page 130.

LCL
See “LCL” on page 131.

queue-option
See “queue-option” on page 131.

RMT
See “RMT” on page 132.

Command actions

Table 14 summarizes #SC SRDFA command actions.

<table>
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<th>P</th>
<th>Action</th>
<th>Description</th>
<th>Must be issued to...</th>
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</thead>
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<td>290</td>
<td>ACT[(LEGACY)]</td>
<td>Activate the SRDF/A session</td>
<td>Primary side</td>
</tr>
<tr>
<td>290</td>
<td>CONS_DEACT</td>
<td>Change an SRDF/A group from SRDF/A active mode to SRDF/S mode while maintaining consistency</td>
<td>Primary side</td>
</tr>
<tr>
<td>290</td>
<td>DEACT_TO_ADCOPY</td>
<td>Take an SRDF/A group from SRDF/A active to ADCOPY</td>
<td>Primary side</td>
</tr>
<tr>
<td>291</td>
<td>DEACT_TO_ADCOPY_DISK</td>
<td>Takes an SRDF/A group from SRDF/A active to ADCOPY_DISK</td>
<td>Primary side</td>
</tr>
<tr>
<td>291</td>
<td>DROP</td>
<td>Deactivates the SRDF/A session and make all devices TNR</td>
<td>Either side</td>
</tr>
<tr>
<td>292</td>
<td>DROP_SIDE</td>
<td>Drop if SRDF/A is in the Transmit Idle state</td>
<td>The side where MSC is running</td>
</tr>
<tr>
<td>292</td>
<td>PEND_DEACT</td>
<td>Wait until the end of the SRDF/A cycle, and then deactivates the SRDF/A session, but leave all devices ready on the link</td>
<td>Primary side</td>
</tr>
<tr>
<td>292</td>
<td>PEND_DROP</td>
<td>Wait until the end of the SRDF/A cycle and then perform a drop</td>
<td>Primary side</td>
</tr>
<tr>
<td>292</td>
<td>SET_CACHE_LIMIT</td>
<td>Set the cache limit</td>
<td>Both sides</td>
</tr>
<tr>
<td>293</td>
<td>SET_DROP_PRIORITY</td>
<td>Set the drop priority</td>
<td>Primary side</td>
</tr>
<tr>
<td>293</td>
<td>SET_HOST_THROTTLE</td>
<td>Set the I/O delay for writes to SRDF/A devices when cache resources for SRDF/A exceed preset limits</td>
<td>Primary side</td>
</tr>
<tr>
<td>294</td>
<td>SET_MIN_CYCLE_TIME</td>
<td>Set the minimum cycle time</td>
<td>Primary side</td>
</tr>
<tr>
<td>294</td>
<td>TOL_ON</td>
<td>Turn Tolerance mode on</td>
<td>Primary side</td>
</tr>
<tr>
<td>295</td>
<td>TOL_OFF</td>
<td>Turn Tolerance mode off</td>
<td>Primary side</td>
</tr>
<tr>
<td>295</td>
<td>TRANSMIT_IDLE,[ON</td>
<td>OFF]</td>
<td>Turn the Transmit Idle state on or off</td>
</tr>
</tbody>
</table>

a. For this action, a hyphen (-) or an underscore (_) is a valid character in the name.
b. If issued to only one side and the SRDF link cannot transmit data, then the side that does not have Transmit Idle set will appear to drop and the side that has Transmit Idle set will display in the idle state. In an MSC or SRDF/Star environment, if this condition is met, then the MSC/STAR transmission will also drop.
ACT[(LEGACY)]

Activates the SRDF/A session.

Requirements and restrictions
- The SRDF/A session must not be active.
- All primary devices must be ready on the link.
- The command must be issued to the primary side.

Syntax and options

LEGACY

The LEGACY parameter activates the SRDF/A group in the Legacy mode for a PowerMaxOS 5978 or HYPERMAX OS 5977 environment or a mixed PowerMaxOS 5978 or HYPERMAX OS 5977/Enginuity environment. In such environments, when LEGACY is not specified, SRDF/A is activated in MCM (Multi-Cycle Mode).

Note: See “MCM/Legacy mode” on page 287 for information about MCM/Legacy mode.

CONS_DEACT

Changes an SRDF/A group from SRDF/A active mode to SRDF/S mode while maintaining consistency.

Note: This is a long running command. It requires several cycle switches before it is complete.

Requirements and restrictions
- The SRDF/A session must be active.
- This command is rejected if the SRDF group is in an active MSC group.
- This command is rejected if the SRDF group includes cascaded devices (R21s).
- This command requires PowerMaxOS 5978 or HYPERMAX OS 5977, or Enginuity 5771 and later.
- The command must be issued to the primary side.

Syntax and options

CONS-DEACT is an alias of CONS_DEACT.

DEACT_TO_ADCOPY

Takes an SRDF/A group from SRDF/A active to ADCOPY.

Note: This is equivalent to a PEND_DEACT followed by internally setting the devices to ADCOPY.

Under PowerMaxOS 5978 or HYPERMAX OS 5977, the action is forced to DEACT_TO_ADCOPY_DISK.
Under Enginuity 5876 and earlier, if the SRDF/A session primary side includes cascaded devices (R21s) that are not diskless, the action is forced to DEACT_TO_ADCOPY_DISK.

Requirements and restrictions
- The SRDF/A session must be active.
- This command is rejected if the SRDF group is in an active MSC group.
- Requires PowerMaxOS 5978 or HYPERMAX OS 5977, or Enginuity 5771 and later.
- The command must be issued to the primary side.

Syntax and options
For this action, a hyphen (-) or an underscore (_) is a valid character in the action name.

DEACT_TO_ADCOPY_DISK
Takes an SRDF/A group from SRDF/A active to ADCOPY_DISK. Note that this is equivalent to a PEND_DEACT followed by internally setting the devices to ADCOPY_DISK.
If the SRDF/A session primary side includes cascaded devices (R21s) that are diskless, the action is forced to DEACT_TO_ADCOPY.

Requirements and restrictions
- The SRDF/A session must be active.
- This command is rejected if the SRDF group is in an active MSC group.
- Requires PowerMaxOS 5978 or HYPERMAX OS 5977, or Enginuity 5771 and later.
- The command must be issued to the primary side.

Syntax and options
For this action, a hyphen (-) or an underscore (_) is a valid character in the action name.

DROP
Deactivates the SRDF/A session and makes all devices TNR.
The primary side may have R2 invalid tracks. The secondary side may have R1 invalid tracks. A consistent copy is on the secondary side.
Issuing this command to a SRDF group running in an active MSC group causes MSC to DROP all SRDF/A sessions in the MSC group.
The command can be issued to either side.

Requirements and restrictions
- The SRDF/A session must be active.
DROP_SIDE

If SRDF/A is in the Transmit Idle state, the DROP action will not work because Transmit Idle requires that both sides of the SRDF/A relationship be available on the link. If the DROP state is required, then this DROP_SIDE action can be used.

Issuing this command to a SRDF group running in an active MSC group causes MSC to DROP all SRDF/A sessions in the MSC group.

Requirements and restrictions
- The command must be issued to the side where MSC is running.

Syntax and options
DROP-SIDE and DROPSIDE are aliases of DROP_SIDE.

PEND_DEACT

Waits until the end of the SRDF/A cycle, and then deactivates the SRDF/A session, but leaves all devices ready on the link. The secondary side cannot be considered consistent.

If the SRDF/A session primary side includes cascaded devices (R21s), the action is forced to DEACT_TO_ADCOPY if the R21s are diskless and to DEACT_TO_ADCOPY_DISK if not.

Requirements and restrictions
- The SRDF/A session must be active.
- This command is rejected if the SRDF group is in an active MSC group.
- The command must be issued to the primary side.

Syntax and options
PEND-DEACT is an alias of PEND_DEACT.

PEND_DROP

Waits until the end of the SRDF/A cycle and then performs a DROP.

Upon completion, the primary side may have R2 invalid tracks. The secondary side does not have R1 invalid tracks. A consistent copy is on the secondary side.

Requirements and restrictions
- SRDF/A session must be active.
- This command is rejected if the SRDF group is in an active MSC group.
- The command must be issued to the primary side.

Syntax and options
PEND-DROP is an alias of PEND_DROP.

SET_CACHE_LIMIT

Sets the cache limit.
The cache limit is a storage system-level setting that applies to all SRDF groups on the target storage system. The value is the percentage of write-pending space that SRDF/A can use before the storage system will start dropping SRDF/A groups.

Requirements and restrictions

- This command action requires PowerMaxOS 5978 or HYPERMAX OS 5977, or Enginuity 5771 and later.
- The command must be issued to both sides.

Syntax and options

Use the following syntax:

```
SET_CACHE_LIMIT, percentage-value
```

Where \(0 \leq \text{percentage-value} \leq 99\).

SET_DROP_PRIORITY

Sets the drop priority.

Setting the drop priority is an SRDF group-specific change. You can set the drop priority differently on the R1 side as compared to the R2 side. The priority within the storage system is what matters. The highest priority allowed is 1 and the lowest is 64.

Requirements and restrictions

- The command action PowerMaxOS 5978 or HYPERMAX OS 5977, or Enginuity 5771 and later.
- The command must be issued to the primary side.
- In case of swap, the priority value should be set on both sides.

Syntax and options

Use the following syntax:

```
SET_DROP_PRIORITY, priority-value
```

Where \(1 \leq \text{priority-value} \leq 64\).

SET_HOST_THROTTLE

Sets the I/O delay for writes to SRDF/A devices when cache resources for SRDF/A exceed preset limits.

SRDF/A delta sets 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. You can specify the throttle settings using SET_HOST_THROTTLE. Without this tunable cache feature, if write-pending limits are being exceeded, performance suffers across the entire storage system, not just for the SRDF/A devices.

Note that setting a non-zero value for Host Throttle causes the Cache Usage and Drop Priority to be not used. The Host Throttle is a storage system-level setting that applies to all SRDF groups in the storage system.
**Requirements and restrictions**
- The command action requires PowerMaxOS 5978 or HYPERMAX OS 5977, or Enginuity 5771 and later.
- The command must be issued to the primary side.
- In case of swap, the throttle value should be set on both sides.

**Syntax and options**
Use the following syntax:

```
SET_HOST_THROTTLE, throttle-value
Where 0 ≤ throttle-value ≤ 65535.
```

**SET_MIN_CYCLE_TIME**
Sets the minimum cycle time.

Setting the minimum cycle time is specific to SRDF groups. Setting this value does not impact MSC. MSC uses the cycle time specified in the MSC_CYCLE_TARGET.

**Requirements and restrictions**
- This command action requires PowerMaxOS 5978 or HYPERMAX OS 5977, or Enginuity 5771 and later.
- The command must be issued to the primary side.
- In case of swap, the minimum cycle time value should be set on both sides.

**Syntax and options**
Use the following syntax:

```
SET_MIN_CYCLE_TIME, time-value
Where 1 ≤ time-value ≤ 59.
```

Minimum cycle times less than 5 are valid only if both the remote and local storage systems for the SRDF group are at PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5773 and later.

**TOL_ON**
Turns Tolerance mode on.

When Tolerance mode is on and when SRDF/A is active, the following events do not cause SRDF/A to drop:
- An R1 in the SRDF/A group is made TNR.
- Devices in the SRDF/A group are removed from the SRDF/A group and made standard volumes (by issuing the #SC VOL command with the DELETEPAIR action).

**Requirements and restrictions**
- This action is rejected if the SRDF group is in an active MSC group.
- The command must be issued to the primary side.
Syntax and options

TOL-ON is an alias of TOL_ON.

TOL_OFF

Turns Tolerance mode off. Actions that would result in allowing the SRDF/A group to become inconsistent will be rejected (for example, suspending the devices on the link).

Requirements and restrictions

* All primary devices must be ready on the link.
* The command must be issued to the primary side.

Syntax and options

TOL-OFF is an alias of TOL_OFF.

TRANSMIT_IDLE,[ON|OFF]

Turns the Transmit Idle state on or off.

Intermittent link loss due to conditions such as network outages, network or switch maintenance, and other transient states can cause SRDF/A to drop. SRDF/A Transmit Idle provides resiliency under these conditions by allowing SRDF/A to remain active while the links are down.

When the SRDF links associated with SRDF/A are unable to transmit, the Transmit Idle state is activated and the SRDF mirrors continue to present normal status. SRDF/A is no longer transferring data to the remote site, but remains up and continues to accept new writes in the capture cycle.

SRDF/A Transmit Idle allows SRDF/A (following link loss) to:

* Continue to collect incoming data in the capture cycle (until R1 system cache limits are reached)
* Continue applying existing data to the R2

Once the error condition is resolved and the link resumes, SRDF/A cycle switching proceeds. Transmit Idle requires both sides of the SRDF/A relationship to be available on the link and the SC SRDFA command action TRANSMIT_IDLE to be set to ON for both sides.

The default Transmit Idle state is on and the setting is persistent. That is, the setting is retained even if SRDF/A is deactivated; when SRDF/A is reactivated, the setting applies to the newly-activated SRDF/A session.

Transmit Idle is enabled at the SRDF group level and can be set in advance of SRDF/A activation.

No ESCON RA support is provided.

The command must be issued to both sides. If issued to only one side and the SRDF link cannot transmit data, then the side that does not have Transmit Idle set will appear to drop and the side that has Transmit Idle set will display in the idle state. In an MSC or SRDF/Star environment, if this condition is met, then the MSC/STAR transmission will also drop.
Syntax and options

TRANSMIT-IDLE is an alias of TRANSMIT_IDLE.

#SC SRDFA_DSE

The #SC SRDFA_DSE command is used to activate, deactivate, and auto-activate the SRFA/A Delta Set Extension feature and to associate pools with an SRDF/A session. It can also be used to set the cache threshold value that will trigger the start of SRDF/A Delta Set Extension.

**Note:** DSE pools are available under Enginuity 5772 to 5876. With PowerMaxOS 5978 and HYPERMAX OS 5977, DSE pools are no longer used. For more information about how PowerMaxOS 5978 and HYPERMAX OS 5977 handle DSE pools, see the PowerMax Family Product Guide, VMAX All Flash Product Guide, or VMAX3 Family Product Guide.

Use the #SC SRDFA_DSE command to activate or deactivate SRDF/A DSE, or to control the AUTO_ACTIVATE feature of SRDF/A DSE. The SRDF/A Delta Set Extension (DSE) feature enhances SRDF/A resiliency by maintaining SRDF/A operational status during temporary shortages of link capacity or outages caused by link or other infrastructure failures in the SRDF environment. It is an adjunct to the Transmit Idle state and becomes active when the cache buffer reserved for SRDF/A in the storage system becomes full.

**Note:** #SC SRDFA_DSE and #SQ SRDFA_DSE commands only act on one side of an SRDF group pair, either the R1 or R2 side. You need to set SRDF/A Delta Set Extension on both sides of the SRDF group pair. This means that if you turn on SRDF/A Delta Set Extension on the primary side of the SRDF/A group pair, then you also need to turn it on for the secondary side.

SRDF/A DSE operation

SRDF/A is designed to reduce the impact of distance on host I/O response time in a long distance replication configuration. It does this by buffering data in cache, thereby approximating the response times that the host would experience if no replication were occurring. Because of this, the inherent delay in host I/O that occurs in synchronous replication is not present when SRDF/A is active. There may be periods of time when the incoming write I/O rate exceeds both the available bandwidth and the cache buffer of the SRDF/A configuration. This can upset the balance of cache, link, and storage system processing capacity required for successful SRDF/A operation.

Prior to SRDF/A Delta Set Extension, such imbalances would cause SRDF/A to drop, requiring SRDF/A to be restarted, SRDF/A device pairs resynchronized, and consistency re-established at the remote site. This process would result in elongated recovery times.

SRDF/A Delta Set Extension absorbs the impact of a temporary imbalance or loss of SRDF/A resources by writing SRDF/A data to a dedicated pool of disks in the storage system called a delta set extension pool, or **DSE pool**.

Four possible emulation types can be established for DSE pools, one each of the 3380, 3390, FBA(512), and FBA(520) device geometries. The emulation type associated with a DSE pool is determined by the emulation type of the first log device configured in that pool. While a DSE pool can support multiple SRDF/A groups in a storage system, a
device having a particular emulation type in an SRDF/A group can spill over to only one DSE pool. If multiple emulation types exist in an SRDF/A group, then multiple pools of the appropriate geometry will be associated with that SRDF group.

The size of the DSE pool is defined in the storage system and can be as large as you want, but may employ only the RAID 1, RAID 5, or RAID 6 protection mechanism. RAID 10 is not supported in DSE pools. The performance of the DSE pool will be affected by the protection mechanism you choose.

**Usage of the pool management utility**

DSE pools are managed using the pool management utility included with ResourcePak Base. The pool management utility provides support for creating DSE pools or SNAP pools and populating them with log devices defined in the storage system configuration file.

**Note:** The ResourcePak Base for z/OS Product Guide provides details on pool management.

SRDF Host Component can associate or disassociate DSE pools that have previously been defined and populated with log devices by the pool management utility.

**DSE pool assignment guidelines**

It is only necessary to have as many DSE pools associated with an SRDF group as the number of different device emulation types of devices in the SRDF group. Thus, if all devices in an SRDF group have the same emulation type, you would need only a single DSE pool associated with the SRDF group. At most four DSE pools need to be associated with an SRDF group, one for each emulation type.

DSE benefits are available for an SRDF group only when a DSE pool exists for each emulation type in the SRDF group. If you have a device of a particular emulation type defined in an SRDF group and no DSE pool associated with the SRDF group for that emulation type, then none of the tracks for that device can spill over. This could cause SRDF/A to drop if cache limits are exceeded.

**Syntax**

```bash
#SC SRDFA_DSE,LCL(cuu,srdfgrp), action[,[action-option]] | poolgeometry, P([poolname]) [,CQNAME=(cqname[,queue-option])] #SC SRDFA_DSE,RMT{((cuu,hoplist)|(cuu,hoplist,srdfgrp)), action[,[action-option]] | poolgeometry, P([poolname]) [,CQNAME=(cqname[,queue-option])]```

**Parameters**

**action**

*action* can be one of the following:

- ACT
- AUTO_ACT
- DEACT
- THRESHOLD

**Note:** Table 15 summarizes #SC SRDFA_DSE command actions.
**command-action**

Action options are specific to a command action. For a list and explanation of options available for a particular action, see the description of that action.

**cqname**

See “cqname” on page 130.

**cuu**

See “cuu” on page 130.

**LCL**

See “LCL” on page 131.

**poolgeometry**

`poolgeometry` can be one of the following:

- 3380_POOL
- 3390_POOL
- A400_POOL
- FBA_POOL

**Note:** Table 16 on page 300 summarizes #SC SRDFA_DSE pool geometry options.

**poolname**

Specifies the name of the DSE pool to use.

**queue-option**

See “queue-option” on page 131.

**RMT**

See “RMT” on page 132.

**srdfgrp**

See “srdfgrp” on page 133.

### Command actions

Table 15 summarizes #SC SRDFA_DSE command actions.

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<tr>
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<th>Action</th>
<th>Description</th>
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</thead>
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<td>ACT</td>
<td>Activate SRDF/A Delta Set Extension</td>
</tr>
<tr>
<td>299</td>
<td>AUTO_ACT,ON</td>
<td>OFF</td>
</tr>
<tr>
<td>299</td>
<td>DEACT</td>
<td>Deactivate SRDF/A Delta Set Extension</td>
</tr>
<tr>
<td>30</td>
<td>THRESHOLD</td>
<td>Change the cache threshold value to start SRDF/A Delta Set Extension</td>
</tr>
</tbody>
</table>
ACT

Activates SRDF/A Delta Set Extension.

Requirements and restrictions
◆ This action applies only to the SRDF/A session active on the SRDF group specified in the command.
◆ An SRDF/A session must be active for the SRDF group specified in the command.
◆ At least one pool must be associated with the SRDF/A group specified in the command.

Example
#SC SRDFA_DSE,LCL(cuu,srdfgrp),ACT

AUTO_ACT

Turns on or off automatic activation for Delta Set Extension.

AUTO_ACT will automatically activate SRDF/A Delta Set Extension for the specified SRDF group when SRDF/A is active. Once set to ON, it continues to apply even if SRDF/A drops and resumes.

Requirements and restrictions
◆ This action applies only to the SRDF/A session active on the SRDF group specified in the command.
◆ The associated DSE pool must be in working order.

Syntax and options

The syntax is as follows:
AUTO_ACT, ON|OFF

Where:

ON

Turns on automatic activation of DSE.

OFF

Turns off automatic activation of DSE.

Example
#SC SRDFA_DSE,LCL(cuu,srdfgrp),AUTO_ACT,ON

DEACT

Deactivates SRDF/A Delta Set Extension.

Requirements and restrictions
◆ This action applies only to the SRDF/A session active on the SRDF group specified in the command.
◆ An SRDF/A session must be active for the SRDF group specified in the command.
◆ At least one pool must be associated with the SRDF/A group specified in the command.
◆ SRDF/A DSE must be active.

Example
#SC SRDFA_DSE,LCL(cuu,srdfgrp),DEACT
THRESHOLD

Changes the cache threshold value to start SRDF/A Delta Set Extension.

**Note:** The cache percentage is the percentage of total system cache or, if you are using cache partitioning, then it is the percentage of the cache partition containing the SRDF group specified in the command.

This command applies only to the SRDF/A session active on the SRDF group specified in the command.

**Syntax and options**

The syntax is as follows:

```
THRESHOLD, threshold-value
```

Where:

- **threshold-value**
  
  The new cache threshold value. The default value is 50 (percent). Valid values are from 20 to 100.

**Example**

```
#SC SRDFA_DSE,LCL(cuu,srdfgrp),THRESHOLD,3
```

**Pool geometry**

Table 16 summarizes #SC SRDFA_DSE pool geometry options.

<table>
<thead>
<tr>
<th>P</th>
<th>Action</th>
<th>Description</th>
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<tbody>
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<td>3380_POOL</td>
<td>Define or remove the 3380 DSE pool</td>
</tr>
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<td>301</td>
<td>3390_POOL</td>
<td>Define or remove the 3390 DSE pool</td>
</tr>
<tr>
<td>301</td>
<td>A400_POOL</td>
<td>Define or remove the A400 DSE pool</td>
</tr>
<tr>
<td>302</td>
<td>FBA_POOL</td>
<td>Define or remove the FBA DSE pool</td>
</tr>
</tbody>
</table>

**3380_POOL**

Defines or removes the 3380 DSE pool.

This action applies only to the SRDF/A session active on the SRDF group specified in the command. The specified pool must be of emulation type 3380 and must be a DSE pool.

**Defining a pool**

To define a pool, use the following syntax:

```
3380_POOL,P(poolname)
```

Where:

- **poolname**
  
  The name of the DSE pool to use.

**Example**

```
#SC SRDFA_DSE,LCL(cuu,srdfgrp),3380_POOL,P(poolname)
```
Removing a pool
To remove a pool, use the following syntax:

```
3380_POOL, P()
```

**Example**

```
#SC SRDFA_DSE, LCL(cuu, srdfgrp), 3380_POOL, P()
```

3390_POOL

Defines or removes the 3390 DSE pool.

**Requirements and restrictions**

- This action applies only to the SRDF/A session active on the SRDF group specified in the command.
- The specified pool must be of emulation type 3390 and must be a DSE pool.

**Defining a pool**

To define a pool, use the following syntax:

```
3390_POOL, P(poolname)
```

Where:

```
poolname
```

The name of the DSE pool to use.

**Example**

```
#SC SRDFA_DSE, LCL(cuu, srdfgrp), 3390_POOL, P(poolname)
```

Removing a pool
To remove a pool, use the following syntax:

```
3390_POOL, P()
```

**Example**

```
#SC SRDFA_DSE, LCL(cuu, srdfgrp), 3390_POOL, P()
```

A400_POOL

Defines or removes the AS400 DSE pool.

**Requirements and restrictions**

- This action applies only to the SRDF/A session active on the SRDF group specified in the command.
- The specified pool must be of emulation type FBA(520) and must be a DSE pool.

**Defining a pool**

To define a pool, use the following syntax:

```
A400_POOL, P(poolname)
```

Where:

```
poolname
```

The name of the DSE pool to use.
Example #SC SRDFA_DSE,LCL(cuu,srdfgrp),A400_POOL,P(poolname)

Removing a pool
To remove a pool, use the following syntax:
A400_POOL, P()

Example #SC SRDFA_DSE,LCL(cuu,srdfgrp),A400_POOL,P()

FBA_POOL

Defines or removes the FBA DSE pool.

Requirements and restrictions
- This action applies only to the SRDF/A session active on the SRDF group specified in the command.
- The specified pool must be of emulation type FBA and must be a DSE pool.

Defining a pool
To define a pool, use the following syntax:
FBA_POOL, P(poolname)

Where:

poolname

The name of the DSE pool to use.

Example #SC SRDFA_DSE,LCL(cuu,srdfgrp),FBA_POOL,P(poolname)

Removing a pool
To remove a pool, use the following syntax:
FBA_POOL, P()

Example #SC SRDFA_DSE,LCL(cuu,srdfgrp),FBA_POOL,P()
The #SC SRDFA_WP command enables you to:

- Activate write pacing automatically when the SRDF/A devices become ready on the link
- Specify the maximum delay, in microseconds, that any I/O is delayed in an SRDF/A session
- Set the percent of the system write-pending cache used by all active SRDF/A sessions
- Activate statistics collection for write pacing operations

Using SRDF/A write pacing

SRDF/A write pacing extends the availability of SRDF/A by preventing conditions that result in cache overflow on both the R1 and R2 sides. SRDF/A detects when the SRDF I/O service rates are lower than the host I/O rates, and then takes corrective actions to slow down (pace) the host I/O rates to match the SRDF I/O service rates. Write pacing can work in conjunction with the SRDF/A DSE and transmit idle functionality.

In addition to being able to dynamically react to changes in the environment, SRDF/A write pacing can be configured on a SRDF/A session basis and can be used in combination with the existing SRDF/A drop policy functionality.

You can only activate SRDF/A write pacing on the R1 side and when the SRDF/A session is active. The trigger to activate write pacing is based on several factors, such as cache usage on the R1 side, the DSE spill rate, and the restore rate on the R2 side.

Write pacing actions are armed or disarmed based on the following threshold values being crossed. Note that “arming” means that write pacing is ready for use—pacing is not actually activated until the SC SRDFA_WP ACT action is specified.

- Pacing cache threshold (R1 side)—the percentage of the SRDF group's cache slots as compared to the total available cache slots. The #SC SRDFA_WP THRESHOLD action specifies the percentage.
- Pacing DSE savepool threshold (R1 side)—the percentage of the SRDF group’s tracks spilled into the DSE pool as compared to the total available DSE pool space for the group. The SC SRDFA_WP DSE_THOLD action specifies the percentage.

SRDF Host Component provides two types of write pacing: group-level and device-level. Both types of write pacing can be active for an SRDF/A session at the same time. Because this feature is dynamic, it is unique from similar features, such as SRDF/A DSE.

Group-level write pacing

When activated, this feature performs group-level write I/O pacing on all devices in the SRDF group (SRDF/A session). Group-level write pacing detects when the I/O service rates are lower than the host I/O rates, and then takes corrective actions to slow down the host I/O rates to match the SRDF I/O service rates. It occurs on an SRDF group-wide (SRDF/A session) basis. The monitoring and throttling of host write I/O rates controls the amount of cache used by SRDF/A. This prevents the cache from being overrun on both R1 and R2 sides, thereby keeping the SRDF/A session up and running.
Group-level write pacing provides an exemption capability to prevent group-level write I/O pacing on specified devices within the group. This function lets you specify devices to be totally exempt from group-level pacing. However, note that when a device is exempt from group-level pacing, it is not exempt from device-level pacing if the device meets the criteria of the device-level pacing controls in effect for the SRDF group.

**Device-level write pacing**

Device-level write pacing extends SRDF/A group-level write pacing to address cache overflow conditions caused by TimeFinder snap sessions on an R2 device. When device-level write pacing is enabled and activated for an SRDF group, only TimeFinder devices in the following categories automatically become eligible for device-level pacing:

- Activated virtual snap sessions on R2 volumes, including resnap operations.
- Full-volume clones on R2 volumes with and without precopy.
- Extent-based snaps.

When device-level pacing is activated, the operating environment monitors for certain events which could slow down the SRDF/A restore rate on the R2 device and paces the host I/O to the R1 volume as necessary. Devices cannot be made exempt from device-level pacing. If the operating environment detects that a device in the SRDF group becomes an active TimeFinder device engaging in one of the categories described above, its write I/O will be paced if needed.

The need for pacing is based on cache resource utilization, and the parameters that have been set for device pacing. Unlike group level pacing, the amount of pacing a particular device receives is based on its cache resource consumption relative to other devices in the SRDF group that are being actively device-paced.

**Restrictions and limitations**

- SRDF/A group-level write pacing requires that both the R1 and R2 storage systems are running PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5874 and later. To use the exemption capability, the storage system on the R1 side must be running PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5875 or 5876.
- SRDF/A device-level write pacing requires that both the R1 and R2 storage systems must be running Enginuity 5875 or 5876.
- In a cascaded SRDF environment, SRDF/A write pacing is only supported on the R1>R21 leg of the relationship.
- In a concurrent SRDF environment, write pacing is supported on both mirrors of the concurrent R1 devices only if both mirrors are operating in asynchronous mode. In this case, pacing calculations are performed independently for the two SRDF/A sessions, and the host write I/Os directed to both sessions are subject to the larger of the two calculated delays.
- Only the ACT and DEACT actions actually enable and disable SRDF/A write pacing. The remaining #SC SRDFA_WP command actions specify the SRDF dynamic parameters for write pacing on the storage system; they do not result in write pacing being turned on or off as a result of their values being changed.
- You can configure command actions on both the R1 and R2 sides; however, all actions are only performed against the R1 side, even for device-level pacing. Actions that set SRDF dynamic parameters can be performed against the R2 side, but only after a personality swap. If the device personalities will be swapped, be
sure to set identical write pacing command action values for the SRDF group on both the R1 and R2 storage systems. SRDF Host Component will not automatically set the values on both sides.

- If both group-level pacing and device-level pacing are active for an SRDF/A session, the group-level and device-level delays are calculated independently, and use the maximum calculated value for pacing. Note that as many as four different calculation results may be taken into account for a concurrent R1 device with both mirrors operating in asynchronous mode (group-level pacing for each mirror, device-level pacing for each mirror), using the longest calculated delay in the calculation.

- There is no exemption from device-level pacing as there is for group-level pacing, and the R1 group-level exempt state does not affect device-level pacing.

Syntax

Use the following syntax for all command actions except PTYPE:

```bash
#SC SRDFA_WP,LCL(cuu,srdfgrp),
action[action-option]
[,CQNAME=(cqname[,queue-option])]
#SC SRDFA_WP,RMT(cuu,hoplist[,srdfgrp]),
action[action-option]
[,CQNAME=(cqname[,queue-option])]
```

Use the following syntax for the PTYPE command action:

```bash
#SC SRDFA_WP,LCL(cuu,srdfgrp),
PTYPE(ptype-option)[,symdv#|symdv##-symdv###,ALL]
[,CQNAME=(cqname[,queue-option])]
#SC SRDFA_WP,RMT(cuu,hoplist[,srdfgrp]),
PTYPE(ptype-option)[,symdv#|symdv##-symdv###,ALL]
[,CQNAME=(cqname[,queue-option])]
```

Parameters

`action`

`action` can be one of the following:

- ACT
- AUTO_ACT
- DEACT
- DSE_THOLD
- MAXDELAY
- PTYPE
- STATS_OFF
- STATS_ON
- STATS_RESET
- THRESHOLD

Note: Table 17 on page 306 summarizes #SC SRDFA_WP command actions.
**action-option**

Action options are specific to a command action. For a list and explanation of options available for a particular action, see the description of that action.

**cqname**
See “cqname” on page 130.

**cuu**
See “cuu” on page 130.

**hoplist**
See “hoplist” on page 131.

**LCL**
See “LCL” on page 131.

**ptype-option**
See options listed for the PTYPE action in “PTYPE” on page 310.

**queue-option**
See “queue-option” on page 131.

**RMT**
See “RMT” on page 132.

**srdfgrp**
See “srdfgrp” on page 133.

**symdv#**
See “symdv#” on page 134.

### Command actions

Table 17 summarizes #SC SRDFA_WP command actions.

<table>
<thead>
<tr>
<th>P</th>
<th>Action</th>
<th>Description</th>
<th>Action options</th>
<th>Requires SRDF/A to be active?</th>
</tr>
</thead>
<tbody>
<tr>
<td>307</td>
<td>ACT</td>
<td>Activate SRDF/A write pacing</td>
<td>DPACE, GPACE, ALL</td>
<td>N</td>
</tr>
<tr>
<td>308</td>
<td>AUTO_ACT,[ON</td>
<td>OFF]</td>
<td>Automatically activate write pacing for the group when SRDF/A is activated for the group</td>
<td>DPACE, GPACE, ALL</td>
</tr>
<tr>
<td>308</td>
<td>DEACT</td>
<td>Deactivate SRDF/A write pacing</td>
<td>DPACE, GPACE, FORCE, ALL</td>
<td>Y</td>
</tr>
<tr>
<td>309</td>
<td>DSE_THOLD</td>
<td>Set the minimum DSE logpool usage level</td>
<td></td>
<td>N</td>
</tr>
<tr>
<td>310</td>
<td>MAXDELAY</td>
<td>Set the maximum I/O delay</td>
<td></td>
<td>N</td>
</tr>
<tr>
<td>310</td>
<td>PTYPE</td>
<td>Set pacing attributes for devices by assigning the devices to pacing categories</td>
<td>GPACE, NOGPACE</td>
<td>Y</td>
</tr>
<tr>
<td>311</td>
<td>STATS_OFF</td>
<td>Deactivate write pacing statistics collection</td>
<td></td>
<td>Y</td>
</tr>
</tbody>
</table>
ACT

Activates SRDF/A write pacing.

**Note:** This command action requires SRDF/A to be active.

By default, write pacing is deactivated for SRDF groups and devices prior to any write pacing commands being issued for them. Once ACT is set, write pacing continues to apply even if SRDF/A drops and resumes.

When ACT is issued on the R1 side of an SRDF/A session, write pacing will automatically be activated when the SRDF/A session is activated. SRDF Host Component will not block any attempt to activate the SRDF/A session if write pacing is enabled, even if the current environment cannot support write pacing.

The syntax is as follows:

\[
\text{ACT}([\text{ALL}], [\text{GPACE}], [\text{DPACE}])
\]

You can activate group level and device level write pacing independently, with or without the following action options:

**ALL**

Activates both device-level and group-level pacing.

**Note:** SRDF/A device-level write pacing requires that the storage systems are running Enginuity 5875 or 5876. If the storage systems are running Enginuity 5874 and you issue the ALL option, only group-level write pacing operations are affected.

**DPACE**

Activates device-level pacing.

**Note:** DPACE is not supported under PowerMaxOS 5978 and HYPERMAX OS 5977.

**GPACE**

*(Default)* Activates group-level pacing.

When no options are specified, the ACT action applies to group-level write pacing only.

**Example**

- To activate both group-level and device-level pacing:

  \[
  \text{SC SRDFA_WP,LCL(5100,22),ACT(DPACE,GPACE)}
  \]
To implicitly activate group-level pacing:

```
SC SRDFA_WP,LCL(5100,22),ACT
```

### AUTO_ACT

Controls whether write pacing is automatically activated for the group when SRDF/A is activated for the group.

**Note:** This command action does not require SRDF/A to be active.

You can set AUTO_ACT to ON or OFF, where OFF is the default setting.

### Syntax and options

The syntax is as follows:

```
AUTO_ACT [(ALL, [GPACE], [DPACE]),] [ON|OFF]
```

Automatic activation of group-level and device-level write pacing can be controlled independently using the following action options:

- **ALL**
  - Automatically activates both device-level and group-level pacing when SRDF/A is activated for the SRDF group.

- **DPACE**
  - Automatically activates device-level pacing when SRDF/A is activated for the SRDF group.

**Note:** DPACE is not supported under PowerMaxOS 5978 and HYPERMAX OS 5977.

- **GPACE**
  - (Default) Automatically activates group-level pacing when SRDF/A is activated for the SRDF group.

When no action options are specified, AUTO_ACT applies to group-level write pacing only.

### Example

- To turn on automatic activation for group-level write pacing only:

  ```
  SC SRDFA_WP,LCL(8700,2C),AUTO_ACT,ON
  ```

- To turn on automatic activation for group-level and device-level pacing:

  ```
  SC SRDFA_WP,LCL(8700,2C),AUTO_ACT(GPACE,DPACE),ON
  ```

- To turn off automatic activation for device-level pacing only:

  ```
  SC SRDFA_WP,LCL(8700,2C),AUTO_ACT(DPACE),OFF
  ```

### DEACT

Deactivates SRDF/A write pacing.
By default, write pacing is deactivated for SRDF groups and devices prior to any write pacing commands being issued for them. Once activated, write pacing continues to apply even if SRDF/A drops and resumes.

**Note:** This command action requires SRDF/A to be active.

### Syntax and options

The syntax is as follows:

\[
\text{DEACT}([\text{ALL}], [\text{GPACE}, \text{FORCE}], [\text{DPACE}])
\]

You can deactivate group level and device level write pacing independently, with or without the following action options:

- **ALL**
  - Deactivates both device-level and group-level pacing.

  **Note:** SRDF/A device-level write pacing requires that the storage systems are running Enginuity 5875 or 5876. If the storage systems are running Enginuity 5874 and you issue the ALL option, only group-level write pacing operations are affected.

- **DPACE**
  - Deactivates device-level pacing.

  **Note:** DPACE is not supported under PowerMaxOS 5978 and HYPERMAX OS 5977.

- **FORCE**
  - Deactivates device-level pacing immediately even if there are snaps active on devices in the SRDF group. This option is not recommended as adverse effects may occur as a result of the forced deactivation.

- **GPACE**
  - (Default) Deactivates group-level pacing.

When no options are specified, the ACT action applies to group-level write pacing only.

**Example**

- To deactivate device-level pacing without changing the state of group-level pacing:
  \[
  \text{SC SRDFA_WP, LCL(5100,22), DEACT(DPACE)}
  \]

- To force deactivation of device-level pacing:
  \[
  \text{SC SRDFA_WP, LCL(5100,22), DEACT(DPACE,FORCE)}
  \]

### DSE_THOLD

Specifies the minimum DSE log pool usage level at which write pacing will be armed.

**Note:** This command action does not require SRDF/A to be active.
Syntax and options

The syntax is as follows:

DSE_THOLD, threshold-value

The allowable values for threshold-value are from 1 to 100 percent. The default value is 90.

Example

To set the write pacing DSE threshold to 95 percent:

```
SC SRDFA_WP,LCL(8700,2C),DSE_THOLD,95
```

MAXDELAY

Specifies the maximum I/O delay, in microseconds, that will be applied to each host write I/O when write pacing is invoked.

Note: This command action does not require SRDF/A to be active.

MAXDELAY is used for both group-level and device-level write pacing.

Syntax and options

The syntax is as follows:

MAXDELAY, value

The allowable values are from 1 (1 usec) to 1000000 (1 second). The default value is 50000 (50 milliseconds).

Example

To set the write pacing maximum delay to 400 microseconds:

```
SC SRDFA_WP,LCL(8A00,F9),MAXDELAY,400
```

PTYPE

The PTYPE command action controls the pacing attributes for devices on an SRDF group basis by assigning the devices to pacing categories.

Note: This command action requires SRDF/A to be active.

Syntax and options

Use the following syntax:

PTYPE((GPACE|NOGPACE)) [, symdv#, symdv#-symdv#, ALL]

Action options are as follows:

GPACE

Removes devices from the NOGPACE (no group-level pacing) category and adds them to the GPACE (group-level pacing) category. This action does not change the DPACE (device-level pacing) category that the devices are in. When devices are assigned only to the GPACE category, they are not subject to the pacing controls of the DPACE category.
NOGPACE

Removes the devices from the GPACE category without changing their DPACE category assignment. Note that devices must have at least one pacing category assigned to them. If removing the device from the GPACE group would result in the device not having a pacing category assigned to it, the command is halted and an error message is issued indicating that a device must be assigned to at least one pacing category.

Example
To remove all devices in the SRDF group from the group-level pacing category and leave their current device-level pacing category assignments unchanged:

```shell
SC SRDFA_WP,LCL(8F00,23),PTYPE(NOOGPACE),ALL
```

STATS_OFF

Deactivates collection of SRDF/A write pacing statistics on the storage system by SRDF group.

This is the default setting. When SRDF/A write pacing is deactivated, statistics collection is automatically deactivated.

Note: This command action requires SRDF/A to be active.

Example
To turn off statistics collection:

```shell
SC SRDFA_WP,LCL(8700,2C),STATS_OFF
```

STATS_ON

Activates collection of SRDF/A write pacing statistics on the storage system by SRDF group when SRDF/A write pacing is active.

Note: This command action requires SRDF/A to be active.

Statistics collection may only be invoked on the primary (R1) site when SRDF/A write pacing is active on both the primary and secondary (R2) sites. In cascaded three-site configurations, statistics collection can only be run on the secondary storage system when SRDF/A is active on both the secondary and tertiary systems.

Example
To turn on statistics collection:

```shell
SC SRDFA_WP,LCL(8700,2C),STATS_ON
```

STATS_RESET

Resets SRDF/A write pacing statistics for the host.

Note: This command action requires SRDF/A to be active.

This command action may only be invoked on the R1 side at any time.

Example
To reset SRDF/A write pacing statistics for the host:

```shell
SC SRDFA_WP,LCL(8700,2C),STATS_RESET
```
THRESHOLD

Specifies the minimum percentage of the system write-pending cache used by all active SRDF/A sessions at which the storage system will start pacing host write I/Os for this SRDF group.

**Note:** This command action does not require SRDF/A to be active.

**Syntax and options**

The syntax is as follows:

```
THRESHOLD, threshold-value
```

Where:

```
threshold-value
```

The minimum cache percentage. Valid values are from 1 to 99 percent. The default value is 60.

This value should be set lower than the #SC SRDFA_DSE command THRESHOLD value described in “THRESHOLD” on page 300. This value must be set lower than the #SC SRDFA command SET_CACHE_LIMIT value described in “SET_CACHE_LIMIT” on page 292.

The operating environment considers the total cache used by all active SRDF/A sessions when deciding whether or not to initiate write pacing. If any SRDF group has a write pacing threshold set lower than the total cache used by all active SRDF/A sessions, then write I/Os to devices in those SRDF/A sessions are eligible to be paced.

**Example**

To set the write pacing threshold to 75 percent:

```
SC SRDFA_WP, LCL(2C00, E9), THRESHOLD, 75
```
The #SC VOL command modifies the status of SRDF volumes and provides the ability to set the SRDF operational mode by specifying the corresponding action. The #SC VOL command requires you to confirm the action you have specified, unless you have disabled confirmation by specifying NO for the OPERATOR_VERIFY initialization parameter.

Review the following topics before using the #SC VOL command, as appropriate:

- “Device filtering” on page 374
- “Performing standard (thick) to thin device type operations” on page 376
- “Creating an SRDF relationship to a second R2” on page 376
- “Implementing range support” on page 376
- “Performing composite actions” on page 376
- “R22 device implementation guidelines” on page 378

Syntax

```
#SC VOL, cuu,
action[(action-option[, action-option...])]
[, symdv#|symdv#-symdv#|ALL[, max_skew_value]]
[, SELECT(filter)]
[, CQNAME=(cqname[, queue-option])]

#SC VOL, cuu-cuu,
action[(action-option[, action-option...])]
[, SELECT(filter)]
[, CQNAME=(cqname[, queue-option])]

#SC VOL, LCL{(cuu, srdfgrp)|(cuu, srdfgrp, srdfgrp)},
action[(action-option[, action-option...])],
symdv#|symdv#-symdv#|ALL[, max_skew_value]
[, SELECT(filter)]
[, CQNAME=(cqname[, queue-option])]

#SC VOL, RMT{(cuu, hoplist)|(cuu, hoplist, srdfgrp)|(cuu, hoplist, srdfgrp)| (cuu, hoplist, srdfgrp, srdfgrp)},
action[(action-option[, action-option...])],
symdv#|symdv#-symdv#|ALL[, max_skew_value]
[, SELECT(filter)]
[, CQNAME=(cqname[, queue-option])]

#SC VOL, VOL(volser),
action[(action-option[, action-option...])]
[, SELECT(filter)]
[, CQNAME=(cqname[, queue-option])]

#SC VOL, SCFG(gnsgrp),
action[(action-option[, action-option...])]
[, SELECT(filter)]
[, CQNAME=(cqname[, queue-option])]

#SC VOL, G(groupname),
action[(action-option[, action-option...])]
[, SELECT(filter)]
[, CQNAME=(cqname[, queue-option])]
```
Note: For the RMT command format, the (rdfcuu) parameter is no longer used; however, it is tolerated for existing code that uses it.

Note: Some #SC VOL command actions use syntax different from that presented in the syntax diagram list. For those actions, the required syntax is presented in the description of the action.

Parameters

**action**

*action* can be one of the following:

- ADC_MAX
- ADCOPY_WP
- ADCOPY_DISK
- CASCRE
- CASDEL
- CASRSUM
- CASSUSP
- CASSWAP
- CREATEPAIR
- DELETEPAIR
- DOMINO
- HDELETEPAIR
- HMOVEPAIR
- HSWAP
- INVALIDATE
- ITA
- MOVEPAIR
- NADCOPY
- NDOMINO
- NITA
- NOGCM
- NRDM
- OFFLINE
- ONLINE
- PREFRESH
- PRE_RSUM
- R22SWITCH
- RDY
- RDF_NRDM
- RDF_RDM
- RDF_RSUM
- RDF_SUSP
- RDF_WR_ENABLE
- REFRESH
- RESUMEPAIR
- RFR_RSUM
- RNG_PREFRESH
- RNG_PRE_RSUM
- RNG_REFRESH
- RNG_RSUM
- R/O
- R/W
- SEMI-SYNC
- SUSP_CGRP
- SWAP
- SYNC
- USR_NRDM
- USR_RDM
- VALIDATE

Note: Table 19 on page 317 provides summary information about #SC VOL actions.

**action-option**

Action options are specific to a command *action*. For a list and explanation of options available for a particular action, see the description of that action or Table 19 on page 317. Action options are described in detail in “Command action options” on page 350.

**cqname**

See “cqname” on page 130.

**cuu**

See “cuu” on page 130.

**cuu-cuu**

Specifies a range of z/OS device numbers, where the first cuu is the starting z/OS device number of the range and the second cuu is the ending z/OS device number of the range. The ending device number must not be less than the starting device number.
G(groupname)
  See “G(groupname)” on page 130.

hoplist
  See “hoplist” on page 131.

LCL
  See “LCL” on page 131.

max_skew_value
  If setting ADC_MAX, this value specifies the maximum skew value for the
  device(s) that are or will be placed in adaptive copy mode. This value can range
  from 1 to 65535 (decimal).

queue-option
  See “queue-option” on page 131.

RMT
  See “RMT” on page 132.

Note: For this format, the third subparameter may alternatively be specified as an
asterisk (*). In that case, the command action then applies to all SRDF groups.

SCFG(gnsgrp)
  See “SCFG(gnsgrp)” on page 133.

SELECT(filter)
  Filters devices, as described in “Device selection using SELECT” on page 134,
  before device validation is performed.

Table 18 lists values that can be specified as a filter for the #SC VOL command:

<table>
<thead>
<tr>
<th>filter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD a</td>
<td>Select devices in adaptive copy disk mode</td>
</tr>
<tr>
<td>AW a</td>
<td>Select devices in adaptive copy write-pending mode</td>
</tr>
<tr>
<td>DL</td>
<td>Select diskless devices</td>
</tr>
<tr>
<td>FBA</td>
<td>Select FBA devices</td>
</tr>
<tr>
<td>R1 a</td>
<td>Select R1 devices</td>
</tr>
<tr>
<td>R2 a</td>
<td>Select R2 devices</td>
</tr>
<tr>
<td>R11</td>
<td>Select R11 devices</td>
</tr>
<tr>
<td>R21</td>
<td>Select R21 (cascaded) devices</td>
</tr>
<tr>
<td>R22</td>
<td>Select R22 devices</td>
</tr>
<tr>
<td>T</td>
<td>Select thin devices</td>
</tr>
</tbody>
</table>

a. The filter represents a device characteristic that applies at the mirror level. For such a filter,
   if an SRDF group is specified in the command (for example, by the LCL parameter), then
   only mirrors in that SRDF group are considered when determining whether a device
   matches the filter. If no SRDF group is specified in the command (neither LCL nor RMT nor
   the RA parameter is used), then all mirrors are considered when determining whether a
device matches the filter.
The following examples illustrate use of #SC VOL SELECT:

- Swap devices in range that are in adaptive copy write-pending mode:
  \[ SC\ VOL,5700,SWAP,ALL,SELECT(AW) \]

- Swap devices in range that are not in adaptive copy write-pending mode:
  \[ SC\ VOL,5700,SWAP,ALL,SELECT(!AW) \]

- Swap all R1 devices in range:
  \[ SC\ VOL,5700,SWAP,ALL,SELECT(R1) \]

- Swap devices in range that are not in either adaptive copy mode:
  \[ SC\ VOL,5700,SWAP,140-143,SELECT(!AD&!AW) \]

- Swap devices in range that are R2 or not in adaptive copy disk mode:
  \[ SC\ VOL,5700,SWAP,140-143,SELECT(!AD|R2) \]

\textit{srdfgrp}

See “srdfgrp” on page 133.

\textit{symdv#}

Specifies a PowerMax/VMAX device number or a range of PowerMax/VMAX device numbers in the form of \texttt{dev1-dev2} where \texttt{dev1} is the starting PowerMax/VMAX device number and \texttt{dev2} is the ending PowerMax/VMAX device number. If ALL is specified, all devices on the storage system that are eligible for the specified action are affected.

\textbf{Note:} If no \texttt{dev1-dev2} parameter is specified, SRDF Host Component attempts to use the \textit{cuu range} to determine the PowerMax/VMAX device number on which to perform the action. If you choose to specify a range of devices, you may specify a range of z/OS device numbers or a range of PowerMax/VMAX device numbers, but not both.

\textit{VOL(volser)}

See “VOL(volser)” on page 134.
## Command actions

Table 19 lists the options for the specified SC VOL actions.

<table>
<thead>
<tr>
<th>P</th>
<th>Action</th>
<th>Description</th>
<th>Valid volumes</th>
<th>Options</th>
<th>Compatibility options</th>
</tr>
</thead>
<tbody>
<tr>
<td>320</td>
<td>ADC_MAX&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Sets the adaptive copy maximum skew value for the volume(s).</td>
<td>R1/L1/B1</td>
<td>DETAIL, NODETAIL, NOEXEC</td>
<td></td>
</tr>
<tr>
<td>320</td>
<td>ADCOPY_WP&lt;sup&gt;d&lt;/sup&gt;</td>
<td>Sets the replication mode of an R1 device to adaptive copy write-pending mode.</td>
<td>R1/L1/B1</td>
<td>DETAIL, NODETAIL, NOEXEC, TDS</td>
<td></td>
</tr>
<tr>
<td>321</td>
<td>ADCOPY_DISK&lt;sup&gt;c&lt;/sup&gt;</td>
<td>Sets the replication mode of an R1 device to adaptive copy disk mode.</td>
<td>R1/L1/B1</td>
<td>DETAIL, NODETAIL, NOEXEC, TDS</td>
<td></td>
</tr>
<tr>
<td>322</td>
<td>CASCRE</td>
<td>Establishes a cascaded triplet relationship among three devices in the configurations R1&lt;-&gt;R21&lt;-&gt;R2.</td>
<td>Dynamic SRDF devices</td>
<td>ADCOPY_DISK, ADCOPY_WP, CEXMPT, DETAIL, DOMINO, ITRK, KEEPR2, NOCOPY, NODETAIL, NOEXEC, R2ACT, RDY, SQAR&lt;sup&gt;f&lt;/sup&gt;, STAR, STAR-A&lt;sup&gt;f&lt;/sup&gt;, SUSPEND</td>
<td>KEEPR1, LCLISR1, NADCOPY, NOITRK, NOFORCE, NOSUSP, RCVRY, SYNC</td>
</tr>
<tr>
<td>323</td>
<td>CASDEL</td>
<td>Terminates the SRDF relationships between both the R1&lt;-&gt;R21 and the R21&lt;-&gt;R2 pairs of one or more cascaded triplets.</td>
<td>R1/L1/B1, R2/L2/B2</td>
<td>DETAIL, FORCE, NOEXEC, NODETAIL</td>
<td></td>
</tr>
<tr>
<td>324</td>
<td>CASRSUM</td>
<td>Resumes the pairs in cascaded triplets when the R21 device of a triplet is diskless.</td>
<td>R1/L1/B1</td>
<td>DETAIL, FORCE, DETAIL, NOEXEC</td>
<td></td>
</tr>
<tr>
<td>324</td>
<td>CASSUSP</td>
<td>Suspending the pairs in cascaded triplets when the R21 device of a triplet is diskless.</td>
<td>R1/L1/B1</td>
<td>CEXMPT, DETAIL, FORCE, NODETAIL, NOEXEC</td>
<td></td>
</tr>
<tr>
<td>325</td>
<td>CASSWAP</td>
<td>Transforms each cascaded triplet R1&lt;-&gt;R21&lt;-&gt;R2 to the triplet R2&lt;-&gt;R21&lt;-&gt;R1, and transforms each cascaded triplet R2&lt;-&gt;R21&lt;-&gt;R1 to the triplet R1&lt;-&gt;R21&lt;-&gt;R2.</td>
<td>R1 or R2</td>
<td>ADCOPY_DISK, ADCOPY_WP, DETAIL, FORCE, NODETAIL, NOEXEC, NOSUSP</td>
<td>NADCOPY</td>
</tr>
<tr>
<td>326</td>
<td>CREATEPAIR</td>
<td>Establishes an SRDF relationship between two dynamic SRDF-enabled devices.</td>
<td>Dynamic SRDF devices</td>
<td>ADCOPY_DISK, ADCOPY_WP, ADSRDF, CEXMPT, DETAIL, DIFFERENTIAL, DOMINO, ITRK, KEEPR2, LCLISR2, NODETAIL, NOEXEC, NOCOPY, R2ACT, RCVRY, RDY&lt;sup&gt;j&lt;/sup&gt;, R/W, SEMI-SYNC, SQAR&lt;sup&gt;f&lt;/sup&gt;, STAR, STAR-A&lt;sup&gt;f&lt;/sup&gt;, SUSPEND</td>
<td>FORCE, KEEPR1, LCLISR1, NADCOPY, NOITRK, NOFORCE, NOSUSP, NRDY, SYNC</td>
</tr>
<tr>
<td>328</td>
<td>DEDELETEPAIR</td>
<td>Terminates the SRDF relationship between two devices that have a relationship previously established by CREATEPAIR.</td>
<td>Dynamic SRDF devices</td>
<td>DETAIL, FORCE, NOEXEC, RCVRY, SQAR&lt;sup&gt;f&lt;/sup&gt;, STAR, STAR-A&lt;sup&gt;f&lt;/sup&gt;, SUSPEND</td>
<td>NOFORCE</td>
</tr>
<tr>
<td>329</td>
<td>DOMINO</td>
<td>Enables Domino mode for the source (R1) device.</td>
<td>R1/L1/B1</td>
<td>DETAIL, NODETAIL, NOEXEC</td>
<td></td>
</tr>
<tr>
<td>330</td>
<td>HDELETEPAIR</td>
<td>Deletes only the local side of an SRDF pair, leaving the remote partner unchanged.</td>
<td>Dynamic SRDF devices</td>
<td>DETAIL, NODETAIL, NOEXEC, RCVRY, SQAR&lt;sup&gt;f&lt;/sup&gt;, STAR, STAR-A&lt;sup&gt;f&lt;/sup&gt;</td>
<td>FORCE</td>
</tr>
<tr>
<td>331</td>
<td>HMOVEPAIR</td>
<td>Changes the SRDF group of only the local device of an SRDF pair, leaving the remote partner unchanged.</td>
<td>Dynamic SRDF devices</td>
<td>DETAIL, NODETAIL, NOEXEC, RCVRY, SQAR&lt;sup&gt;f&lt;/sup&gt;, STAR, STAR-A&lt;sup&gt;f&lt;/sup&gt;</td>
<td>FORCE, NOFORCE</td>
</tr>
<tr>
<td>332</td>
<td>HSWAP</td>
<td>Swaps the SRDF relationship between only one side of the SRDF pair, leaving the remote partner unchanged.</td>
<td>Dynamic SRDF devices</td>
<td>ADCOPY_DISK, ADCOPY_WP, DETAIL, FAWE, ITRK, NODETAIL, NOEXEC, RCVRY, RDY, R/W, SEMI-SYNC, SQAR&lt;sup&gt;f&lt;/sup&gt;, STAR, STAR-A&lt;sup&gt;f&lt;/sup&gt;</td>
<td>FORCE, NADCOPY, NOFORCE, NOITRK, SYNC</td>
</tr>
<tr>
<td>333</td>
<td>INVALIDATE</td>
<td>Ensure that all of the tracks are considered invalid from the point of view of the SRDF partner volume.</td>
<td>R1/R2/L1/L2/B1/B2</td>
<td>DETAIL, NODETAIL, NOEXEC</td>
<td></td>
</tr>
<tr>
<td>334</td>
<td>ITA</td>
<td>Sets the Invalid Track Attribute.</td>
<td>R2/L2/B2</td>
<td>DETAIL, NODETAIL, NOEXEC</td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>Action</td>
<td>Description</td>
<td>Valid volumes</td>
<td>Options</td>
<td>Compatibility options</td>
</tr>
<tr>
<td>----</td>
<td>------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>---------------</td>
<td>------------------------------------------------------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>334</td>
<td>MOVEPAIR</td>
<td>Changes the SRDF group of one or more SRDF device pairs from one SRDF group (the source) to another SRDF group (the target).</td>
<td>R1/R2/L1/ L2/B1/B2</td>
<td>CEXMPT, DETAIL, NODETAIL, NOEXEC, RCVRY, SQAR', STAR, STAR-A'</td>
<td></td>
</tr>
<tr>
<td>335</td>
<td>NADCOPY</td>
<td>Disables adaptive copy SRDF replication mode for the source (R1) volume.</td>
<td>R1/L1/B1</td>
<td>DETAIL, NODETAIL, NOEXEC, TDS</td>
<td></td>
</tr>
<tr>
<td>336</td>
<td>NDOMINO</td>
<td>Disables Domino mode for the source (R1) volume.</td>
<td>R1/L1/B1</td>
<td>DETAIL, NODETAIL, NOEXEC</td>
<td></td>
</tr>
<tr>
<td>336</td>
<td>NITA</td>
<td>Removes the Invalid Track Attribute.</td>
<td>R2/L2/B2</td>
<td>DETAIL, NODETAIL, NOEXEC</td>
<td></td>
</tr>
<tr>
<td>336</td>
<td>NOGCM</td>
<td>Disables Geometry Compatible Mode (GCM) for the specified device or range of devices.</td>
<td>Dynamic SRDF devices</td>
<td>NOEXEC</td>
<td></td>
</tr>
<tr>
<td>337</td>
<td>NRDY</td>
<td>Makes target (R2) volume(s) not ready.</td>
<td>R2/L2/B2</td>
<td>DETAIL, NODETAIL, NOEXEC</td>
<td></td>
</tr>
<tr>
<td>337</td>
<td>OFFLINE</td>
<td>Varies the specified devices offline.</td>
<td></td>
<td>DETAIL, NODETAIL, NOEXEC</td>
<td></td>
</tr>
<tr>
<td>337</td>
<td>ONLINE</td>
<td>Varies the specified devices online.</td>
<td></td>
<td>DETAIL, NODETAIL, NOEXEC</td>
<td></td>
</tr>
<tr>
<td>338</td>
<td>PREFRESH</td>
<td>Causes only the updated tracks of R1 devices to be refreshed from the SRDF partner volume.</td>
<td>R1/L1/B1</td>
<td>DETAIL, NODETAIL, NOEXEC</td>
<td></td>
</tr>
<tr>
<td>338</td>
<td>PRE_RSUMc</td>
<td>Commences synchronization after PREFRESH.</td>
<td>R1/L1/B1</td>
<td>DETAIL, NODETAIL, NOEXEC</td>
<td></td>
</tr>
<tr>
<td>339</td>
<td>R22SWITCH</td>
<td>Acts on R22 devices in which one R2 mirror is link-blocked and the other R2 mirror is not link-blocked (valid R22 devices), blocking the currently unblocked mirror and unblocking the currently blocked mirror.</td>
<td>R22</td>
<td>DETAIL, GRPONLY, NODETAIL, NOEXEC</td>
<td></td>
</tr>
<tr>
<td>339</td>
<td>RDY</td>
<td>Makes target (R2) volume(s) ready to the host.</td>
<td>R2/L2/B2</td>
<td>DETAIL, NODETAIL, NOEXEC</td>
<td></td>
</tr>
<tr>
<td>340</td>
<td>RDF_NRDYc</td>
<td>Sets the volume not ready to the host.</td>
<td>R1/L1/B1</td>
<td>DETAIL, NODETAIL, NOEXEC, TDS</td>
<td></td>
</tr>
<tr>
<td>340</td>
<td>RDF_RDYc</td>
<td>Sets the volume ready to the host.</td>
<td>R1/L1/B1, R2/L2/B2</td>
<td>DETAIL, NODETAIL, NOEXEC</td>
<td></td>
</tr>
<tr>
<td>340</td>
<td>RDF_RSUMc</td>
<td>Resumes SRDF operation on the SRDF device pairs specified by the device range.</td>
<td>R1/L1/B1</td>
<td>DETAIL, NODETAIL, NOEXEC, RCVRY, TDS</td>
<td></td>
</tr>
<tr>
<td>341</td>
<td>RDF_SUSPc</td>
<td>Suspends SRDF operation on a specified volume.</td>
<td>R1/L1/B1</td>
<td>CEXMPT, DETAIL, FORCE, NODETAIL, NOEXEC, RCVRY</td>
<td>NOFORCE</td>
</tr>
<tr>
<td>342</td>
<td>RDF_WR_ENABLE</td>
<td>Clears the RWD status and allow the SRDF pair to begin synchronization.</td>
<td>R1/L1/B1</td>
<td>DETAIL, NODETAIL, NOEXEC</td>
<td></td>
</tr>
<tr>
<td>342</td>
<td>REFRESH</td>
<td>Causes updated tracks on each specified device to be marked as invalid and to subsequently be refreshed from its SRDF partner volume.</td>
<td>R1/R2/ L1/L2/ B1/B2</td>
<td>DETAIL, NODETAIL, NOEXEC</td>
<td></td>
</tr>
<tr>
<td>343</td>
<td>RESUMEPAIR</td>
<td>Acts on a suspended device pair, making the R1 ready on the link.</td>
<td>R1/L1/B1</td>
<td>DETAIL, DIFFERENTIAL, KEEPR2, NOCOPY, NODETAIL, NOEXEC, R22ACT, RCVRY, SQAR', STAR, STAR-A', SUSPEND</td>
<td>ADCOPY_DISK, ADCOPY_WP, ADSRDF, ITRK, KEEPR1, LCLISR1, NADCOPY, NOITRK, NOSUSP, SYNC</td>
</tr>
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</table>
Table 19  SC VOL command actions and options (page 3 of 3)

<table>
<thead>
<tr>
<th>P</th>
<th>Action</th>
<th>Description</th>
<th>Valid volumes</th>
<th>Options</th>
<th>Compatibility options</th>
</tr>
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<tbody>
<tr>
<td>344</td>
<td>RFR_RSUM&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Commences synchronization after REFRESH.</td>
<td>R1/L1/B1, R2/L2/B2</td>
<td>DETAIL, NODETAIL, NOEXEC, RCVRY</td>
<td></td>
</tr>
<tr>
<td>344</td>
<td>RNG_PREFRESH&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Causes only the updated tracks of R1 devices to be refreshed from the SRDF partner volume.</td>
<td></td>
<td>DETAIL, NODETAIL, NOEXEC</td>
<td></td>
</tr>
<tr>
<td>344</td>
<td>RNG_PRE_RSUM&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Commences synchronization after RNG_PREFRESH.</td>
<td></td>
<td>DETAIL, NODETAIL, NOEXEC</td>
<td></td>
</tr>
<tr>
<td>344</td>
<td>RNG_REFRESH&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Causes updated tracks on each specified device to be marked as invalid and to subsequently be refreshed from its SRDF partner volume.</td>
<td></td>
<td>DETAIL, NODETAIL, NOEXEC</td>
<td></td>
</tr>
<tr>
<td>344</td>
<td>RNG_RSUM&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Commences synchronization after RNG_REFRESH.</td>
<td></td>
<td>DETAIL, NODETAIL, NOEXEC, RCVRY</td>
<td></td>
</tr>
<tr>
<td>345</td>
<td>R/O</td>
<td>Makes target (R2) volume(s) read-only.</td>
<td>R2/L2/B2</td>
<td>DETAIL, NODETAIL, NOEXEC</td>
<td></td>
</tr>
<tr>
<td>345</td>
<td>R/W</td>
<td>Makes target (R2) volume(s) read and write-enabled.</td>
<td>R2/L2/B2</td>
<td>DETAIL, NODETAIL, NOEXEC</td>
<td></td>
</tr>
<tr>
<td>345</td>
<td>SEMI-SYNC</td>
<td>Sets the source (R1) volume to the semi-synchronous mode.</td>
<td>R1/L1/B1</td>
<td>DETAIL, NODETAIL, NOEXEC</td>
<td></td>
</tr>
<tr>
<td>346</td>
<td>SUSP_CGRP&lt;sup&gt;a&lt;/sup&gt;</td>
<td>A special form of the RDF_SUSP action that works with consistency groups.</td>
<td></td>
<td>DETAIL, NODETAIL, NOEXEC</td>
<td></td>
</tr>
<tr>
<td>346</td>
<td>SWAP</td>
<td>Swaps the SRDF relationship between two SRDF devices.</td>
<td>Dynamic SRDF devices or R1/L1/B1/R2/L2/B2</td>
<td>ADCOPY_DISK, ADCOPY_WP&lt;sup&gt;i&lt;/sup&gt;, DETAIL, DOMINO, FAVE, FORCE, ITRK, NOEXEC, NOSUSP, NOSUSP, NOSUSP, NOSUSP, RCVRY, R/O, R/R, R/W, SEMI-SYNC, SQAR&lt;sup&gt;f&lt;/sup&gt;, STAR, STAR-A&lt;sup&gt;f&lt;/sup&gt;</td>
<td>KEEPR1, KEEPR2, LCLISR1, LCLISR2, NADCOPY, SUSPEND, SYNC</td>
</tr>
<tr>
<td>348</td>
<td>SYNC</td>
<td>Sets the source (R1) volume to synchronous replication mode.</td>
<td>R1/L1/B1</td>
<td>DETAIL, NODETAIL, NOEXEC</td>
<td></td>
</tr>
<tr>
<td>348</td>
<td>USR_NRDY</td>
<td>Sets devices to a User-Not-Ready (UNR) control unit status.</td>
<td></td>
<td>DETAIL, NODETAIL, NOEXEC, TDS</td>
<td></td>
</tr>
<tr>
<td>349</td>
<td>USR_RDY</td>
<td>Clears the User-Not-Ready (UNR) control unit status of devices.</td>
<td></td>
<td>DETAIL, NODETAIL, NOEXEC, TDS</td>
<td></td>
</tr>
<tr>
<td>349</td>
<td>VALIDATE</td>
<td>Updates the invalid track table to remove all invalid track flags for all tracks residing on the SRDF partner device.</td>
<td>R1/L1/B1, R2/L2/B2</td>
<td>DETAIL, NODETAIL, NOEXEC</td>
<td></td>
</tr>
</tbody>
</table>

a. Whenever necessary, see action description for explanation of the valid volume types.
b. Compatibility options are accepted for compatibility with existing code and have no effect to the command.
c. For this action, a hyphen (-) or an underscore (_) is a valid character in the name.
d. For this action, you can specify ADCOPY or ADCOPY_WP or ADCOPY-WP.
e. For PowerMaxOS 5978 and HYPERMAX OS 5977, ADCOPY_WP is converted to ADCOPY_DISK, except when used with CREATEPAIR to create SRDF pairs on the second leg of a cascaded configuration.
f. Dell EMC GDDR is required to implement SRDF/SQAR and SRDF/Star-A functionality.
g. When issuing CREATEPAIR with these options to create the second leg of R11 configuration, the adaptive copy maximum skew value is set to the default value on both legs.
h. The RDY option must be specified with R/W.
i. When the SWAP action requires that a storage system running PowerMaxOS 5978 or HYPERMAX OS 5977 swap to an R1 personality, the ADCOPY_WP option is converted to ADCOPY_DISK and the action completes.

**Note:** The following #SC VOL command actions are allowed with SRDF/DM:
RDF_RDY, RDF_NRDY, ONLINE, OFFLINE, REFRESH, ADCOPY_DISK, ADCOPY_WP, VALIDATE, INVALIDATE, and MOVEPAIR.
ADC_MAX

Sets the adaptive copy maximum skew value for the volume(s).

This action may only be specified for devices in one of the supported adaptive copy modes.

Setting the skew value too high for devices in adaptive copy write-pending mode could result in excessive cache use, adversely affecting subsystem performance.

RAID 10 volumes will set this maximum value on each member in the RAID 10 group. Therefore, the RAID 10 display of the ADC_MAX value will be 4 times the individual member maximum value.

Valid volume types

Valid volume types are R1 (source volume), L1 (source volume that is also mirrored locally), B1 (R1 BCV).

Syntax and options

ADC_MAX, action-options, max_skew_value

ADC-MAX is an alias of ADC_MAX.

max_skew_value is maximum skew value from 1 to 65535.

The following options are available for this action: DETAIL, NODETAIL, NOEXEC.

Example

#SC VOL,F00,ADC_MAX,,80

ADCOPY_WP

Sets the replication mode of an R1 device to adaptive copy write-pending mode.

Adaptive copy write-pending mode

In adaptive copy write-pending mode, the storage system acknowledges writes to source (R1) volumes before confirming replication; consequently, the target (R2) volume may have unsynchronized tracks up to the maximum skew value in effect. Therefore, you should take recovery considerations into account when setting adaptive copy replication mode and the maximum skew value. Use the #SQ ADC command to view maximum skew value settings, and the #SC VOL command with the ADC_MAX action to change the maximum skew value settings.

Note: Except for cascaded devices, adaptive copy write-pending mode is not retained following an IML, and must be explicitly reinstated by an #SC VOL command with the ADCOPY_WP action.

Requirements and restrictions

- The ADCOPY_WP action in a cascaded configuration (R1->R21->R2) must adhere to the constraints described in Table 2, “Data modes allowed for cascaded SRDF,” on page 35.
- The ADCOPY_WP action is not allowed for devices in a consistency group or R21 non-diskless devices.
- ADCOPY_WP has no effect for devices in an SRDF group for which an SRDF/A session is active.
Conversion to ADCOPY_DISK

If an R1 that resides on a storage system running Enginuity 5876 is paired with an R2 on a storage system running PowerMaxOS 5978 or HYPERMAX OS 5977, the ADCOPY_WP action changes mode to adaptive copy write-pending (ADCOPY_WP). But if the R1 is on PowerMaxOS 5978 or HYPERMAX OS 5977, the mode is converted to ADCOPY_DISK and the action completes.

When CREATEPAIR(ADCOPY_WP) is issued to create the pairs on the second leg of a cascaded configuration, ADCOPY_WP is not converted to ADCOPY_DISK, causing R1s to become R21s.

Valid volume types

Valid volume types are R1 (source volume), L1 (source volume that is also mirrored locally), B1 (R1 BCV).

Syntax and options

ADCOPY and ADCOPY-WP are aliases of ADCOPY_WP.

The following options are available for this action: DETAIL, NODETAIL, NOEXEC, TDS.

ADCOPY_DISK

This action sets the replication mode of an R1 device to adaptive copy disk mode.

Adaptive copy disk mode

In adaptive copy disk mode, the storage system acknowledges writes to source (R1) volumes prior to confirmation of replication; consequently, the target (R2) volume may have unsynchronized tracks up to the maximum skew value in effect. Therefore, recovery considerations should be taken into account in setting adaptive copy replication mode and the maximum skew value. The #SQ ADC command may be used to view maximum skew value settings, and the #SC VOL command with the ADC_MAX action may be used to modify maximum skew value settings.

Note: Except for cascaded devices, adaptive copy disk mode replication is not retained following an IML, and must be explicitly reinstated by an #SC VOL command with the ADCOPY_DISK action.

Requirements and restrictions

◆ The use of the ADCOPY_DISK action in a cascaded configuration (R1->R21->R2) must adhere to the constraints described in Table 2, “Data modes allowed for cascaded SRDF,” on page 35.
◆ The ADCOPY_DISK action is not allowed for the following:
  ■ Devices in a consistency group
  ■ R21 diskless devices
◆ ADCOPY_DISK has no effect for devices in an SRDF group for which an SRDF/A session is active.

Valid volume types

Valid volume types are R1 (source volume), L1 (source volume that is also mirrored locally), B1 (R1 BCV).
**Syntax and options**

ADCOPY-DISK is an alias of ADCOPY_DISK.

The following options are available for this action: DETAIL, NODETAIL, NOEXEC, TDS.

**CASCRE**

This action establishes a cascaded triplet relationship among three devices in the configurations R1→R21→R2.

**Requirements and restrictions**

- The R21 devices may be diskless, but the R1 and R2 devices may not.
- The SRDF group specifications may not result in R1 and R2 devices residing on the same storage system.
- If the device that will become the R21 of a triplet is diskless, the devices of the triplet must have the same emulation mode and must be the same size. The ADSRDF option is not permitted.
- If the device that will become the R21 device of a triplet is diskless, the secondary storage system on which the R21 device will reside is required to be at PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5874 and later.
- The storage system on which the R1 and R2 devices of a triplet will reside are required to be at PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5773 and later. If at Enginuity 5773, application of an Enginuity patch is required to connect to diskless devices at the secondary site.
- When issuing this action from the R1 side of a storage system running PowerMaxOS 5978 or HYPERMAX OS 5977, ADCOPY_WP is converted to ADCOPY_DISK.

**Note:** ADCOPY_WP is not converted to ADCOPY_DISK when used with CREATEPAIR to create SRDF pairs on the second leg of a cascaded configuration.

- CASCRE is blocked if Dynamic Volume Expansion (DVE) is active on a requested device.

**Valid volume types**

Valid volume types are dynamic SRDF devices.
Syntax and options

This action is implemented using non-standard syntax in one of the following formats:

#SC VOL,LCL(cuu, srdfgrp, srdfgrp),
CASCRE(action-options), r1dv-r1dv, r21dv, r2dv

#SC VOL,RMT(cuu, hoplist, srdfgrp, srdfgrp),
CASCRE(action-options), r1dv-r1dv, r21dv, r2dv

Note: G(groupname), SCFG(gnsgrp), and VOL(volser) keywords are not supported.

The following action-options are available for this action: ADCOPY_WP¹, ADCOPY_DISK, CEXMPT, DETAIL, DOMINO, ITRK, KEEPR2, NOCOPY, NODETAIL, NOEXEC, R22ACT, RDY, SQAR², STAR, STAR-A², SUSPEND.

CASDEL

This action terminates the SRDF relationships between both the R1→R21 and the R21→R2 pairs of one or more cascaded triplets. The devices in each triplet must be suspended.

Requirements and restrictions

◆ Remote (RMT) operations are supported, but must be issued to the starting R1 or the ending R2 device, and not point to the R21 device. For examples, see “Performing remote operations” on page 418.

◆ If any eligible device triplet cannot be deleted because a device in the triplet has invalid tracks and the FORCE option was not specified, no device pairs will be deleted.

◆ If the R21 device of a triplet is diskless, CASDEL must be used to delete the pairs of the triplet. If the R21 device of a triplet is not diskless, either component pair may be deleted individually using the DELETEPAIR action.

Valid volume types

Valid volume types are R1 (source volume), L1 (source volume that is also mirrored locally), B1 (R1 BCV), R2 (target volume), L2 (target volume that is also mirrored locally), B2 (BCV target).

Syntax and options

Syntax example:

#SC VOL,LCL(cuu, srdfgrp),
CASDEL(action-options), r1dv-r1dv

#SC VOL,RMT(cuu, hoplist, srdfgrp),
CASDEL(action-options), r1dv-r1dv

Note: G(groupname), SCFG(gnsgrp), and VOL(volser) keywords are not supported.

1. For PowerMaxOS 5978 and HYPERMAX OS 5977, ADCOPY_WP is converted to ADCOPY_DISK.
2. Dell EMC GDDR is required to implement SRDF/SQAR or SRDF/Star-A functionality.
The following action-options are available for this action: DETAIL, FORCE, NODETAIL, NOEXEC, SQAR, STAR, STAR-A.

CASRSUM

This action may be used to resume the pairs in cascaded triplets.

If the R21 device of a triplet is diskless, CASRSUM must be used for this purpose. If the R21 device is not diskless, the device pairs may be resumed individually with the RDF_RSUM action.

Requirements and restrictions

- Similar to the RDF_RSUM action, the CASRSUM action will affect only those triplets in which the R1 device of the cascaded triplet is the local device.
- If the R21 device of a triplet is diskless, CASRSUM must be used to resume SRDF replication activity for the pairs of the triplet. If the R21 device of a triplet is not diskless, either component pair may be resumed individually using the RDF_RSUM action.

Valid volume types

Valid volume types are R1 (source volume), L1 (source volume that is also mirrored locally), B1 (R1 BCV).

Syntax and options

Syntax example:

```
#SC VOL,LCL(cuu,srdfgrp),
CASRSUM(action-options),rldv-rldv
```

**Note:** G(groupname), SCFG(gnsgrp), and VOL(volser) keywords are not supported.

The following action-options are available for this action: DETAIL, NODETAIL, NOEXEC.

CASSUSP

This action may be used to suspend the pairs in cascaded triplets. If the R21 device of a triplet is diskless, CASSUSP must be used for this purpose. If the R21 device is not diskless, the device pairs may be suspended individually with the RDF_SUSP action.

Similar to the RDF_SUSP action, the CASSUSP action will affect only those triplets in which the R1 device of the cascaded triplet is the local device.

If the R21 device of a triplet is diskless, CASSUSP must be used to suspend SRDF replication activity on the pairs of the triplet. If the R21 device of a triplet is not diskless, either component pair may be suspended individually using the RDF_SUSP action.

CASSUSP will also work against non-diskless device types.

---

1. Dell EMC GDDR is required to implement SRDF/SQAR or SRDF/Star-A functionality.
Valid volume types
Valid volume types are R1 (source volume), L1 (source volume that is also mirrored locally), B1 (R1 BCV).

Syntax and options
Syntax example:

```bash
#SC VOL,LCL(cuu,hoplist,srdfgrp),
CASSUSP(action-options),r1dv-r1dv
```

**Note:** G(groupname), SCFG(gnsgrp), and VOL(volser) keywords are not supported.

The following action-options are available for this action: CEXMPT, DETAIL, FORCE, NODETAIL, NOEXEC.

CASSWAP

This action effects personality swaps of the two device pairs in each of one or more cascaded triplets. Each cascaded triplet $R1 \leftrightarrow R21 \leftrightarrow R2$ is thus transformed to the triplet $R2 \leftrightarrow R21 \leftrightarrow R1$, and each cascaded triplet $R2 \leftrightarrow R21 \leftrightarrow R1$ is transformed to the triplet $R1 \leftrightarrow R21 \leftrightarrow R2$.

Requirements and restrictions

- All devices participating in the action must be suspended. If any eligible device triplet cannot be swapped because a device in the triplet has invalid tracks and the FORCE option was not specified, no devices will be swapped.
- If the R21 device of a triplet is diskless, CASSWAP must be used to swap the pairs of the triplet. If the R21 device of a triplet is not diskless, either component pair may be swapped individually using the SWAP action.
- PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5874 and later is required for use of the CASSWAP action. For PowerMaxOS 5978 and HYPERMAX OS 5977, ADCOPY_WP is converted to ADCOPY_DISK.
- CASSWAP is blocked if Dynamic Volume Expansion (DVE) is active on a requested device.

Valid volume types
Valid volume types are R1 (source volume) or R2 (target volume).

Syntax and options
Syntax example:

```bash
#SC VOL,LCL(cuu,srdfgrp),
CASSWAP(options),r1dv-r1dv
```

**Note:** G(groupname), SCFG(gnsgrp), and VOL(volser) keywords are not supported.

The following action-options are available for this action: ADCOPY_WP, ADCOPY_DISK, DETAIL, FORCE, NODETAIL, NOEXEC, NOSUSP.
**CREATEPAIR**

This action establishes an SRDF relationship between two dynamic SRDF-enabled devices.

The default synchronization direction is primary to secondary (R1>R2).

The CREATEPAIR action will fail if either side contains a diskless device (DL dev R21).

**Creating concurrent SRDF configuration**

To create a concurrent dynamic SRDF device arrangement:

1. Issue a CREATEPAIR to establish an SRDF pair.
2. Issue a second CREATEPAIR specifying the new R1 device and a second remote standard device to add a second R2 mirror for the R1 device.

**Creating cascaded SRDF configuration**

To create a cascaded dynamic SRDF device arrangement:

- Issue a CREATEPAIR pairing an existing R2 device with a standard device, specifying an SRDF group linking the R2's storage system to the standard device's storage system.

  This CREATEPAIR must specify the ADCOPY_DISK option.

  This adds an R1 mirror to the existing R2 device, which has now become an R21 device, and results in an R1>R21>R2 configuration. The three devices configured in this way are often referred to as a cascaded triplet, and the R21 device as a cascaded device.

It is also possible to create a cascaded dynamic SRDF device arrangement by issuing a CREATEPAIR specifying, as the secondary device, a device which is already the primary device of an existing pair. The existing pair must be in ADCOPY_DISK mode prior to issuing the command to create the second pair.

**Requirements and restrictions**

**Conversion to ADCOPY_DISK**

When issuing this action from the R1 side of a storage system running PowerMaxOS 5978 or HYPERMAX OS 5977, ADCOPY_WP is converted to ADCOPY_DISK.

Note: ADCOPY_WP is not converted to ADCOPY_DISK when used with CREATEPAIR to create SRDF pairs on the second leg of a cascaded configuration.

**Cascaded configurations**

Cascaded SRDF is available with PowerMaxOS 5978, HYPERMAX OS 5977, and Enginuity 5773 or later.

A cascaded device cannot be paired with devices on the same storage system. This state, which is known as a loopback, is not supported in SRDF Host Component. A CREATEPAIR action which would result in a loopback will not be allowed to proceed.

1. For PowerMaxOS 5978 and HYPERMAX OS 5977, ADCOPY_WP is converted to ADCOPY_DISK.
R22 devices
If the CREATEPAIR action results in creation of an R22 device, the newly created R2 mirror will be blocked and the new pair will be created in a suspended state unless the R22ACT option has been specified. If it has, and if the newly created R22 is valid, the previously existing R2 mirror of the new R22 will be blocked and the newly created R2 mirror will not be blocked. If the newly created R22 device is not valid, the R2 mirror that previously existed will be blocked and suspended as well. R22 devices are available with PowerMaxOS 5978, HYPERMAX OS 5977, and Enginuity 5773.150 or later.

R21 to R22 pairs
The device pairs that a single #SC VOL CREATEPAIR command can create are all “R21 to R22” or are all not “R21 to R22”. The command cannot create pairs where some are “R21 to R22” and others that are not “R21 to R22”.

Maximum device number
The maximum PowerMax/VMAX device number on either side is dependent on the level of the operating environment. The maximum device number that can participate in the SRDF configuration is the lower of the maximum numbers on both sides.

Thick and meta devices
Standard (thick) devices and meta devices are not supported with SRDF Host Component with PowerMaxOS 5978 and HYPERMAX OS 5977. However, these devices are still supported when running SRDF Host Component with Enginuity 5876.

Geometry Compatible Mode
When attempting to create an SRDF relationship between an FBA device on a storage system running Enginuity 5876 and an FBA device on a storage system running PowerMaxOS 5978 or HYPERMAX OS 5977, where the device under PowerMaxOS 5978 or HYPERMAX OS 5977 is exactly a half cylinder larger than the device under Enginuity 5876, then PowerMaxOS 5978 or HYPERMAX OS 5977 automatically enables or disables Geometry Compatible Mode (GCM) to make the device relationship an equal sized pair.

CREATEPAIR fails if the GCM attribute needs to be enabled/disabled and the PowerMaxOS 5978 or HYPERMAX OS 5977 device is already in a local or remote replication relationship. On the Enginuity 5876 side, if the volume is an FBA striped meta, then the head and all the members must be the same size.

Data Migration (DM) mode
If you are issuing a CREATEPAIR with a storage system that is not licensed for SRDF but is set to Data Migration (DM) mode, the CREATEPAIR must specify one of the ADCOPY mode options.

Dynamic Volume Expansion (DVE)
CREATEPAIR is blocked if Dynamic Volume Expansion (DVE) is active on a requested device.

Valid volume types
Valid volume types are dynamic SRDF devices.
Syntax and options

This action is implemented with non-standard syntax in one of the following formats:

```
#SC VOL,LCL(cuu,srdfgrp),
CREATEPAIR(action-options),r1dv-r1dv,r2dv
```

```
#SC VOL,RMT(cuu,hoplist,srdfgrp),
CREATEPAIR(action-options),r1dv-r1dv,r2dv
```

Where `r2dv` indicates the device number from which to begin scanning for eligible partner devices in the secondary storage system.

The following `action-options` are available for this action: ADCOPY_WP\textsuperscript{1,2}, ADCOPY_DISK\textsuperscript{2}, ADSRDF, CEXMPT, DETAIL, DIFFERENTIAL, DOMINO, ITRK, KEEP&R2, LCLISR2, NODETAIL, NOEXEC, NOCOPY, RCVRY, R22ACT, R/W, RDY\textsuperscript{3}, SEMI-SYNC, SQAR\textsuperscript{4}, STAR, STAR-A\textsuperscript{4}, SUSPEND.

DELETEPAIR

This action terminates the SRDF relationship between two devices that have a relationship previously established by CREATEPAIR.

The devices must be suspended.

A DELETEPAIR action against a pair in which either of the devices has a non-zero invalid track count will fail unless the FORCE option is specified.

Terminating in concurrent configurations

To delete only one of the concurrent mirrors of a concurrent device, use one of the following methods:

- If the partner of the remote mirror to be deleted is not concurrent, you may issue a DELETEPAIR to the partner without specifying an SRDF group.
- You may issue a DELETEPAIR to either remote mirror or to the partner device, specifying the LCL(cuu,srdfgrp) or RMT(cuu,hoplist,srdfgrp) format.

When using the DELETEPAIR action against a device with concurrent remote mirrors, ensure to correctly identify which device pairing to remove. This can be done by deleting the pair from the R2 side, or by selecting the appropriate SRDF group using the LCL(cuu,srdfgrp) or RMT(cuu,hoplist,srdfgrp) parameter.

Terminating in cascaded configurations

To terminate an R1\textasciitilde R21 device pairing for cascaded SRDF of a cascaded triplet, use one of the following methods:

1. For PowerMaxOS 5978 and HYPERMAX OS 5977, ADCOPY_WP is converted to ADCOPY_DISK.
2. When issuing CREATEPAIR with these options to create the second leg of R11 configuration, the adaptive copy maximum skew value is set to the default value on both legs.
3. The RDY option must be specified with R/W.
4. Dell EMC GDDR is required to implement SRDF/SQAR or SRDF/Star-A functionality.
• Issue a DELETEPAIR to the R21 device specifying the LCL(cuu,srdfgrp) or RMT(cuu,hoplist,srdfgrp) format where srdfgrp specifies the SRDF group number for which you want to delete the pair, or issue a DELETEPAIR to the R1 or the R2 device specifying the LCL(cuu,srdfgrp) or RMT(cuu,hoplist,srdfgrp) format where srdfgrp refers to the SRDF group linking the R1 or the R2 to the R21 partner.

Valid volume types
Valid volume types are dynamic SRDF devices.

Syntax and options
The following action-options are available for this action: DETAIL, FORCE, NODETAIL, NOEXEC, RCVRY, SQAR, STAR, STAR-A.

DOMINO
This action enables Domino mode for the 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.

LINKS DOMINO mode
LINKS DOMINO mode is a mode of operation in which all R1 devices go RDF_NOT READY if all links are dropped.

When an SRDF link not running with the Domino mode fails or is intentionally disabled, the application writing to the R1 is not aware of the failure of writes to the R2. When the link is restored, the invalid R2 tracks are automatically filled in by the more up-to-date R1 tracks.

Note: There are differences between dropping the links logically (by using Host Component commands) and physically (for example, by disconnecting link cables) when LINKS-DOMINO is enabled.

Table 20 through Table 22 show the source and target R1 results for various combinations of LINKS-DOMINO and target settings.

Table 20  Source is configured for LINKS-DOMINO=Yes; target=No

<table>
<thead>
<tr>
<th>Action taken</th>
<th>Source R1</th>
<th>Target R1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Links logically dropped at source</td>
<td>RDF-NRDY &amp; LNR</td>
<td>LNR</td>
</tr>
<tr>
<td>Links logically dropped at target</td>
<td>RDF-NRDY &amp; LNR</td>
<td>LNR</td>
</tr>
<tr>
<td>Links physically dropped at source</td>
<td>RDF-NRDY &amp; LNR</td>
<td>LNR</td>
</tr>
<tr>
<td>Links physically dropped at target</td>
<td>RDF-NRDY &amp; LNR</td>
<td>LNR</td>
</tr>
</tbody>
</table>
Valid volume types

Valid volume types are R1 (source volume), L1 (source volume that is also mirrored locally), B1 (R1 BCV).

Syntax and options

The following action-options are available for this action: DETAIL, NODETAIL, NOEXEC.

HDELETEPAIR

This action, known as half deletapair, deletes only the local side of an SRDF pair, leaving the remote partner unchanged.

This action 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 issue a CREATEPAIR to re-establish the partnership. Special procedures are provided for an SRDF/Star environment.

HDELETEPAIR is supported with PowerMaxOS 5978, HYPERMAX OS 5977, and Enginuity 5771 or later.

Device validation

The following conditions are checked when performing validation for the HDELETEPAIR action:

- Remote access is available.
- The local device indicates that it is configured as one device of a pair.
- The remote device indicates that it is configured as one device of a pair.
- The specified device is the original local device and, in that partnership, the local device is secondary (R2) and the remote device is primary (R1).
- The local/remote devices together are eligible to be partners.

<table>
<thead>
<tr>
<th>Table 21</th>
<th>Source is configured for LINKS-DOMINO=Yes; target=Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action taken</td>
<td>Source R1</td>
</tr>
<tr>
<td>Links logically dropped at source</td>
<td>RDF-NRDY &amp; LNR</td>
</tr>
<tr>
<td>Links logically dropped at target</td>
<td>RDF-NRDY &amp; LNR</td>
</tr>
<tr>
<td>Links physically dropped at source</td>
<td>RDF-NRDY &amp; LNR</td>
</tr>
<tr>
<td>Links physically dropped at target</td>
<td>RDF-NRDY &amp; LNR</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 22</th>
<th>Source is configured for LINKS-DOMINO=No; target=Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action taken</td>
<td>Source R1</td>
</tr>
<tr>
<td>Links logically dropped at source</td>
<td>LNR</td>
</tr>
<tr>
<td>Links logically dropped at target</td>
<td>LNR</td>
</tr>
<tr>
<td>Links physically dropped at source</td>
<td>LNR</td>
</tr>
<tr>
<td>Links physically dropped at target</td>
<td>LNR</td>
</tr>
</tbody>
</table>
If any of the above conditions does not exist, the remote device is of no consequence and is not considered in the validation.

**Valid volume types**

Valid volume types are dynamic SRDF devices.

**Syntax and options**

The following *action-options* are available for this action: DETAIL, NODETAIL, NOEXEC, RCVRY, SQAR\(^1\), STAR, STAR-A\(^1\).

**HMOVEPAIR**

This action, known as half movepair, changes the SRDF group of only the local device of an SRDF pair, leaving the remote partner unchanged.

**Requirements and restrictions**

- If HMOVEPAIR is issued to an R2 device and the remote partner is an accessible R1 device, the R1 device must be suspended (TNR state).
- If the R2 device is not part of a valid pair (for example, if the partner device was itself the object of an HDELETEPAIR or HSWAP action), the requirement that the R1 partner must be suspended does not apply. If the remote device is not accessible, the requirement that the R1 partner must be suspended likewise does not apply.
- If the HMOVEPAIR is issued to an R1 device, the device must be suspended, and if invalid tracks are detected, the FORCE option must be specified. If the FORCE option is not specified and a device range of ALL is specified, then if any eligible devices are found to have invalid tracks, the command is failed with no devices having been processed.
- The target group always denotes an SRDF group defined on the same storage system as that on which the source SRDF group is defined. If the other-side storage system of the target SRDF group is accessible, it must be the same as the other-side system of the source SRDF group.
- SRDF/A cannot be active on the source or the target SRDF group.
- You can use HMOVEPAIR to move devices out of an active SRDF/A group as long as the state of the devices is TNR. In this case, you do not have to specify any of the STAR, STAR-A, or SQAR flags. However, when moving devices into an active SRDF/A group, you must specify the appropriate STAR, STAR-A, or SQAR flag.
- HMOVEPAIR is supported with PowerMaxOS 5978, HYPERMAX OS 5977, and Enginuity 5773 or later.

**Device validation**

The following conditions are checked when performing validation for the HMOVEPAIR action:

- Remote access is available.
- The local device indicates that it is configured as one device of a pair.

---

1. Dell EMC GDDR is required to implement SRDF/SQAR or SRDF/Star-A functionality.
◆ The remote device indicates that it is configured as one device of a pair.
◆ The specified device is the original local device and, in that partnership, the local device is secondary (R2) and the remote device is primary (R1).
◆ The local/remote devices together are eligible to be partners.

If any of the above conditions does not exist, the remote device is of no consequence and is not considered in the validation.

Valid volume types
Valid volume types are dynamic SRDF devices.

Syntax and options
The action is implemented with non-standard syntax in one of the following formats:

```
#SC VOL,LCL(cuu, srdfgrp),
HMOVEPAIR(action-options),
symdv#1-symdv#2|ALL, target-srdfgrp
#SC VOL,RMT(cuu, hoplist, srdfgrp),
HMOVEPAIR(action-options),
symdv#1-symdv#2|ALL, target-srdfgrp
```

The following action-options are available for this action: DETAIL, NODETAIL, NOEXEC, RCVRY, SQAR\(^1\), STAR, STAR-A\(^1\).

**HSWAP**

This action, known as half swap, swaps the SRDF relationship between only one side of the SRDF pair, leaving the remote partner unchanged.

This action is provided for use in a disaster recovery situation. If the HSWAP action results in creation of an R22 device, the newly created R2 mirror will be blocked. Moreover, if the newly created R22 device is not valid, the R2 mirror that previously existed will be blocked and suspended as well.

**CAUTION**

**HSWAP** can result in an invalid SRDF configuration. If, as a result of HSWAP, you end up with an R1 partnered with an R1 or an R2 partnered with an R2, you need to assess the status of both sides of the relationship and correct using HSWAP or HDELETEPAIR actions as required.

Requirements and restrictions
◆ If HSWAP is issued to an R2 device and the remote partner is an accessible R1 device, the R1 device must be suspended (TNR state).
◆ If the R2 device is not part of a valid pair (for example, if the partner device was previously the object of an HDELETEPAIR or HSWAP action), the requirement that the R1 partner must be suspended does not apply. If the remote device is not accessible, the requirement that the R1 partner must be suspended likewise does not apply.

---

1. Dell EMC GDDR is required to implement SRDF/SQAR or SRDF/Star-A functionality.
◆ If the HSWAP is issued to an R1 device, the requirements applied to the R1 device are the same as for a SWAP action. That is, the R1 device must be suspended.

◆ If the HSWAP action is issued to an R11 device, the requirements applied to the R1 device are again the same as for a SWAP action. That is, the R1 mirror must be suspended. Additionally, the storage system on which the R11 device resides must be at PowerMaxOS 5978, HYPERMAX OS 5977 or Enginuity 5773 and later. Finally, the ADCOPY_DISK option must be specified for the HSWAP action. For PowerMaxOS 5978 and HYPERMAX OS 5977, ADCOPY_WP is converted to ADCOPY_DISK.

◆ HSWAP is supported by PowerMaxOS 5978, HYPERMAX OS 5977, and Enginuity 5771 or later.

Device validation
The following conditions are checked when performing validation for the HSWAP action:
◆ Remote access is available.
◆ The local device indicates that it is configured as one device of a pair.
◆ The remote device indicates that it is configured as one device of a pair.
◆ The specified device is the original local device and, in that partnership, the local device is secondary (R2) and the remote device is primary (R1).
◆ The local/remote devices together are eligible to be partners.
If any of the above conditions does not exist, the remote device is of no consequence and is not considered in the validation.

Valid volume types
Valid volume types are dynamic SRDF devices.

Syntax and options
Example syntax:
#SC VOL RMT(cuu,hoplist,srdfgrp),
HSWAP(action-options),symdv#1-symdv#2

The following action-options are available for this action: ADCOPY_WP, ADCOPY_DISK, DETAIL, FAWE, ITRK, NODETAIL, NOEXEC, RCVRY, R/W, RDY, SEMI-SYNC, SQAR, STAR, STAR-A.

INVALIDATE

Use this action 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 storage systems 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 action may be directed to the source (R1) volume to ensure that all of the R2 tracks are considered invalid from the source (R1) volume point of view.

1. Dell EMC GDDR is required to implement SRDF/SQAR or SRDF/Star-A functionality.
◆ When the SYNCH_DIRECTION is set to R1<R2, this action may be directed to the target (R2) volume to ensure that all of the R1 tracks are considered invalid from the target (R2) volume point of view.

INVALIDATE is blocked if Dynamic Volume Expansion (DVE) is active on a requested device.

Valid volume types
Valid volume types are R1 (source volume), L1 (source volume that is also mirrored locally), B1 (R1 BCV), R2 (target volume), L2 (target volume that is also mirrored locally), B2 (BCV target).

Syntax and options
The following action-options are available for this action: DETAIL, NODETAIL, NOEXEC.

ITA

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.

Valid volume types
Valid volume types are R2 (target volume), L2 (target volume that is also mirrored locally), B2 (BCV target).

Syntax and options
The following action-options are available for this action: DETAIL, NODETAIL, NOEXEC.

MOVEPAIR

This action changes the SRDF group of one or more SRDF device pairs from one SRDF group (the source) to another SRDF group (the target). Partner devices are moved to the other-side SRDF group of the target SRDF group.

Requirements and restrictions
◆ If the target SRDF group is an SRDF/Star, SRDF/Star-A, SRDF/SQAR, or SRDF/Star Recovery group and the device pair to be changed has unequal-size devices, the action is denied.

◆ The device pairs must be suspended (TNR state). SRDF/A cannot be active on the target SRDF group of a MOVEPAIR action unless in TOLERANCE mode or the CEXMPT option is specified.

◆ The target group always denotes an SRDF group defined on the same storage system as that on which the source SRDF group is defined. The other-side SRDF group of the target SRDF group must reside on the same storage system on which the other-side SRDF group of the source SRDF group resides.

◆ Full device pair moves require that both the source and the target sides of the SRDF connection are running PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5773 and later. Note also that prior to Enginuity 5874, SRDF/A cannot be active on the target SRDF group of a MOVEPAIR action.
You can use MOVEPAIR to move devices out of an active SRDF/A group as long as the state of the devices is TNR. In this case, you do not have to specify any of the STAR, STAR-A, or SQAR flags. However, when moving devices into an active SRDF/A group, you must specify the appropriate STAR, STAR-A, or SQAR flag.

Valid volume types
Valid volume types are R1 (source volume), L1 (source volume that is also mirrored locally), B1 (R1 BCV), R2 (target volume), L2 (target volume that is also mirrored locally), B2 (BCV target).

Syntax and options
The action is implemented with non-standard syntax in one of the following formats:

```
#SC VOL,LCL(cuu, srdfgrp),
MOVEPAIR(action-options),
symdv#1-symdv#2|ALL, target-srdfgrp
```

```
#SC VOL RMT(cuu, hoplist, srdfgrp),
MOVEPAIR(action-options),
symdv#1-symdv#2|ALL, target-srdfgrp
```

The following action-options are available for this action: CEXMPT, DETAIL, NODETAIL, NOEXEC, RCVRY, SQAR¹, STAR, STAR-A¹.

NADCOPY

This action disables adaptive copy SRDF replication mode for the source (R1) volume.

When this command is issued to remove a volume from adaptive copy mode, the state change does not take place until the volumes comprising the device pair are synchronized.

Requirements and restrictions

- NADCOPY is not valid for cascaded R2→R2 device pairs.
- This action has no effect on devices in an SRDF group on which an active SRDF/A session exists.

Valid volume types
Valid volume types are R1 (source volume), L1 (source volume that is also mirrored locally), B1 (R1 BCV).

Syntax and options
The following action-options are available for this action: DETAIL, NODETAIL, NOEXEC, TDS.

---

1. Dell EMC GDDR is required to implement SRDF/SQAR or SRDF/Star-A functionality.
NDOMINO

This action disables Domino mode for the 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.

**Note:** 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.

**Valid volume types**

Valid volume types are R1 (source volume), L1 (source volume that is also mirrored locally), B1 (R1 BCV).

**Syntax and options**

The following `action-options` are available for this action: DETAIL, NODETAIL, NOEXEC.

NITA

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.

**Valid volume types**

Valid volume types are R2 (target volume), L2 (target volume that is also mirrored locally), B2 (BCV target).

**Syntax and options**

The following `action-options` are available for this action: DETAIL, NODETAIL, NOEXEC.

NOGCM

Disables Geometry Compatible Mode (GCM) for the specified device or range of devices.

**Requirements and restrictions**

The NOGCM action applies to FBA devices that reside on storage system running PowerMaxOS 5978 or HYPERMAX OS 5977 and are not yet in an SRDF relationship.

**Valid volume types**

Valid volume types are dynamic SRDF devices.

**Syntax and options**

The following `action-options` are available for this action: NOEXEC.
NRDY

This action makes 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.

Valid volume types

Valid volume types are R2 (target volume), L2 (target volume that is also mirrored locally), B2 (BCV target).

Syntax and options

The following action-options are available for this action: DETAIL, NODETAIL, NOEXEC.

OFFLINE

When this action is issued, the SRDF Host Component address space uses the EMCSCF Cross System Communication component (CSC) to tell all ResourcePak Base SCF address spaces that support this function to vary the specified storage system devices offline.

This can be a very long running command. The devices will be taken offline to all LPARs that have a ResourcePak Base address space with CSC active and that support the function.

If there is more than one instance of ResourcePak Base on an LPAR that supports the function, then one ResourcePak Base instance will vary the devices offline and the other will wait on serialization. If the command takes more than five minutes to run, the ResourcePak Base instance waiting on serialization will timeout and no longer attempt to process the commands.

Syntax and options

The following action-options are available for this action: DETAIL, NODETAIL, NOEXEC.

ONLINE

When this action is issued, the SRDF Host Component address space uses the EMCSCF Cross System Communication component (CSC) to tell all ResourcePak Base SCF address spaces that support this function to vary the specified storage system devices online.

This can be a very long running command. The devices will be taken online to all LPARs that have a ResourcePak Base address space with CSC active and that support the function.

If there is more than one instance of ResourcePak Base on an LPAR that supports the function, then one ResourcePak Base instance will vary the devices online and the other will wait on serialization. If the command takes more than five minutes to run, the ResourcePak Base instance waiting on serialization will timeout and no longer attempt to process the commands.

Syntax and options

The following action-options are available for this action: DETAIL, NODETAIL, NOEXEC.
PREFRESH

This action causes only the updated tracks of R1 devices to be refreshed from the SRDF partner volume.

The PREFRESH action is intended for R1 devices whose R2 partner devices are write-enabled (control unit status R/W). PREFRESH executes the REFRESH action but bypasses certain tests that would cause REFRESH to fail for such an R1 device.

PREFRESH processing is initiated when a PRE_RSUM action is subsequently issued to the R1 devices.

Following successful PREFRESH processing, a query to the successfully processed R1 devices shows the 'P' indicator in the control unit status field of each device.

Note: The PREFRESH, RNG_PREFRESH, PRE_RSUM, and RNG_PRE_RSUM actions provide a way to start the synchronization of an R1 from an R2 that is still R/W to a host. Chapter 6, “Recovery Procedures,” discusses how this can be used as an additional recovery option.

Valid volume types

Valid volume types are R1 (source volume), L1 (source volume that is also mirrored locally), B1 (R1 BCV).

Syntax and options

The devices that must be specified in the command are the R1 devices whose invalid tracks are to be refreshed. The R1 devices must have control unit status RNR and the synch direction for each device pair must be R1<R2. If any R1 device in the range specified in the command is concurrent, an SRDF group must be specified in the command using the LCL or RMT keyword parameter.

The following action-options are available for this action: DETAIL, NODETAIL, NOEXEC.

PRE_RSUM

This action is used after an #SC VOL,cuu,PREFRESH command to commence synchronization.

PRE_RSUM executes the RFR_RSUM action but bypassing tests related to working with a R/W R2. Other than echoing the command, all messages indicate RFR_RSUM processing. After execution of PRE_RSUM, the R1 is in the RNR (RDF Not Ready) state.

Note: The PREFRESH, RNG_PREFRESH, PRE_RSUM, and RNG_PRE_RSUM actions provide a way to start the synchronization of an R1 from an R2 that is still R/W to a host. Chapter 6, “Recovery Procedures,” discusses how this can be used as an additional recovery option.

Requirements and restrictions

This command should be entered from the same system that the PREFRESH action was entered on. This action only operates on devices that have been objects of a PREFRESH action.
Valid volume types

Valid volume types are R1 (source volume), L1 (source volume that is also mirrored locally), B1 (R1 BCV).

Syntax and options

PRE-RSUM is an alias of PRE_RSUM.

The following action-options are available for this action: DETAIL, NODETAIL, NOEXEC.

R22SWTCH

This action acts on R22 devices in which one R2 mirror is link-blocked and the other R2 mirror is not link-blocked (valid R22 devices), blocking the currently unblocked mirror and unblocking the currently blocked mirror.

R22 devices in which both R2 mirrors are blocked are ignored by the R22SWTCH action. Suspended pairs remain suspended; R1 partners of the R2 mirrors are not affected by R22SWTCH, nor is access to them required for successful execution.

The R22SWTCH action is intended for use in the STAR/SQAR environment only. While R22SWTCH can be used outside of a STAR configuration, it does not resolve invalid tracks automatically. R22SWTCH only moves the link block state from one SRDF mirror to the other. The invalid tracks must be resolved before the new unblocked leg can be used.

Valid volume types

Valid volume types are R22 devices.

Syntax and options

For this action, a group specified (by means of the LCL keyword, for example) or implied (by means of the RMT keyword with a hop list but no third subparameter) is used only for R22 device selection, not for mirror selection. That is, the action is performed for valid R22 devices, one of whose R2 mirrors is in the specified or implied SRDF group, regardless of whether that mirror is blocked or not. Specify the GRPONLY option to cause the action to take place for an R22 device only if the R2 mirror in the specified or implied SRDF group is the one that is link-blocked.

The R22SWTCH action works with the full set of 'location' keywords: LCL, RMT, VOL, G, and SCFG.

Note that R22SWTCH may be used with the format LCL(cuu,srdgrp) without symdv#, a symdv# range, or ALL. In this case, the command must be issued to a valid z/OS cuu that is in the group to be switched.

The following action-options are available for this action: DETAIL, GRPONLY, NODETAIL, NOEXEC.

RDY

This action makes target (R2) volume(s) ready to the host.
Valid volume types
Valid volume types are R2 (target volume), L2 (target volume that is also mirrored locally), B2 (BCV target).

Syntax and options
The following action-options are available for this action: DETAIL, NODETAIL, NOEXEC.

RDF_NRDY
This action sets the 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.

Valid volume types
Valid volume types are R1 (source volume), L1 (source volume that is also mirrored locally), B1 (R1 BCV), R2 (target volume), L2 (target volume that is also mirrored locally), B2 (BCV target).

Syntax and options
RDF-NRDY is an alias of RDF_NRDY.

The following action-options are available for this action: DETAIL, NODETAIL, NOEXEC, TDS.

RDF_RDY
This action sets the volume ready to the host. This action is valid for both source (R1) and target (R2) volumes.

Valid volume types
Valid volume types are R1 (source volume), L1 (source volume that is also mirrored locally), B1 (R1 BCV), R2 (target volume), L2 (target volume that is also mirrored locally), B2 (BCV target).

Syntax and options
RDF-RDY is an alias of RDF_RDY.

The following action-options are available for this action: DETAIL, NODETAIL, NOEXEC.

RDF_RSUM
This action resumes SRDF operation on the SRDF device pairs specified by the device range.

Requirements and restrictions
- Only device pairs in which the primary device is local are eligible for processing.
If the secondary device of an eligible device pair is an invalid R22 device, the RDF_RSUM will be skipped for that device pair.

This action is not valid against volumes in a consistency group.

If either partner of a device pair to be resumed is diskless, the action will fail.

RDF_RSUM is blocked if Dynamic Volume Expansion (DVE) is active on a requested device.

Valid volume types

Valid volume types are R1 (source volume), L1 (source volume that is also mirrored locally), B1 (R1 BCV).

Syntax and options

RDF-RSUM is an alias of RDF_RSUM.

The following action-options are available for this action: DETAIL, NODETAIL, NOEXEC, RCVRY, TDS.

RDF_SUSP

This action suspends SRDF operation on a specified volume.

Requirements and restrictions

- If the volume is already suspended or in SRDF Write Disabled status, this action is ignored.
- If the device belongs to a consistency group, the suspend action is disallowed. 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.
- If the device to be suspended is the primary device of a device pair in an SRDF group on which an SRDF/A session is active, the suspend action will fail unless the SRDF/A session is in tolerance mode or the CEXMPT option is specified.
- 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. 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.
- If the device to be suspended or its remote partner is a diskless device, the suspend action is allowed if the device is an R1 device, but is denied if it is an R21 device.
- If R1 is in Domino mode, the suspend action will fail.

Valid volume types

Valid volume types are R1 (source volume), L1 (source volume that is also mirrored locally), B1 (R1 BCV).
**Syntax and options**

RDF-SUSP is an alias of RDF_SUSP.

The following *action-options* are available for this action: CEXMPT, DETAIL, FORCE, NODETAIL, NOEXEC, RCVRY.

**RDF_WR_ENABLE**

This action 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 action clears the RWD status and allows the SRDF pair to begin synchronization.

**Note:** 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, “Recovery Procedures.”

**Valid volume types**

Valid volume types are R1 (source volume), L1 (source volume that is also mirrored locally), B1 (R1 BCV).

**Syntax and options**

The following *action-options* are available for this action: DETAIL, NODETAIL, NOEXEC.

**REFRESH**

This action causes updated tracks on each specified device to be marked as invalid and to subsequently be refreshed from its SRDF partner volume. The devices that must be specified in the command are those whose invalid tracks are to be refreshed.

**Requirements and restrictions**

- When device tracks on R2 devices are to be refreshed from the corresponding tracks on the remote R1 partners, SYNCH_DIRECTION must be set to R1>R2 and the command must specify the R2 devices of the device pairs.
- When device tracks on R1 devices are to be refreshed from the corresponding tracks on the remote R2 partners, SYNCH_DIRECTION must be set to R1<R2 and the command must specify the R1 devices of the device pairs.
- All device pairs to be processed must be suspended.
- REFRESH is blocked if Dynamic Volume Expansion (DVE) is active on a requested device.

**REFRESH results**

A successful REFRESH action sets the pending track refresh state for each device in the command device range. Following the action, the devices processed will exhibit ‘-R’ appended to the CNTLUNIT STATUS column value in a volume query display.
**Initiating refresh**

To initiate the refresh, direct an #SC VOL RFR_RSUM action to the devices in the pending refresh state. Note that the synch direction at the time of the RFR_RSUM action must be the same as that which existed when the REFRESH action was processed.

**Valid volume types**

Valid volume types are R1 (source volume), L1 (source volume that is also mirrored locally), B1 (R1 BCV), R2 (target volume), L2 (target volume that is also mirrored locally), B2 (BCV target).

**Syntax and options**

The following action-options are available for this action: DETAIL, NODETAIL, NOEXEC.

For the REFRESH action, the #SC VOL command may not specify a device range including any concurrent device unless an SRDF group has been specified in the command, for example, by using the LCL or RMT keyword parameters.

**RESUMEPAIR**

This action acts on a suspended device pair, making the R1 ready on the link.

As with RDF_RSUM and CASRSUM, the device pairs considered for RESUMEPAIR processing are those in which the R1 is the local device and the R2 is the remote device. RESUMEPAIR is valid only for devices in an SRDF/Star, SRDF/Star-A, SRDF/SQAR, or SRDF/Star Recovery group.

For eligible pairs, if the R2 partner is a link-blocked mirror of a valid R22 and if the R22ACT option is specified, the link-block is switched to the currently unblocked R2 mirror. R22 devices whose link-blocked mirror was switched are listed in the command output. If R22ACT is not specified and a link-blocked R2 partner of an R1 in the device range is found, the RESUMEPAIR action is aborted following validation. If required, the command can be run with the NOEXEC option first to determine whether blocked R2 mirrors that could cause command failure are present.

RESUMEPAIR is blocked if Dynamic Volume Expansion (DVE) is active on a requested device.

**Valid volume types**

Valid volume types are R1 (source volume), L1 (source volume that is also mirrored locally), B1 (R1 BCV).

**Syntax and options**

Similar to CREATEPAIR, the RESUMEPAIR action allows the 'location' keywords LCL and RMT, but will also work with a z/OS CUU, provided the device range does not include concurrent devices.

The following action-options are available for this action: DETAIL, DIFFERENTIAL, KEEPR2, NOCOPY, NODETAIL, NOEXEC, R22ACT, RCVRY, SQAR¹, STAR, STAR-A¹, SUSPEND.

---

1. Dell EMC GDDR is required to implement SRDF/SQAR or SRDF/Star-A functionality.
RFR_RSUM

This action is used after a #SC VOL, cuu, REFRESH command to commence synchronization.

This command should be entered from the same system on which the REFRESH action was entered.

RFR_RSUM is blocked if Dynamic Volume Expansion (DVE) is active on a requested device.

Valid volume types

Valid volume types are R1 (source volume), L1 (source volume that is also mirrored locally), B1 (R1 BCV), R2 (target volume), L2 (target volume that is also mirrored locally), B2 (BCV target).

Syntax and options

RFR-RSUM is an alias of RFR_RSUM.

The following action-options are available for this action: DETAIL, NODETAIL, NOEXEC, RCVRY.

RNG_PREFRESH

Same as PREFRESH. See “Implementing range support” on page 376 for details.

RNG-PREFRESH is an alias of RNG_PREFRESH.

RNG_PRE_RSUM

Same as PRE_RSUM. See “Implementing range support” on page 376 for details.

RNG-PRE-RSUM is an alias of RNG_PRE_RSUM.

RNG_REFRESH

Same as REFRESH. See “Implementing range support” on page 376 for details.

RNG-REFRESH is an alias of RNG_REFRESH.

RNG_RSUM

Same as RFR_RSUM. See “Implementing range support” on page 376 for details.

RNG-RSUM is an alias of RNG_RSUM.
R/O

This action makes 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.

Valid volume types

Valid volume types are R2 (target volume), L2 (target volume that is also mirrored locally), B2 (BCV target).

Syntax and options

The following action-options are available for this action: DETAIL, NODETAIL, NOEXEC.

R/W

This action makes target (R2) volume(s) read and write-enabled. This allows a target (R2) volume to be written to from the channel.

Requirements and restrictions

◆ If you are running in SRDF/A mode, R/W cannot be issued to an R2 unless SRDF/A is dropped and the R1 is TNR.
◆ If you write to the target (R2) volume, you need to perform the testing and recovery procedures listed in Chapter 6, “Recovery Procedures.”
◆ R/W cannot be issued to an R2 unless the R1 is TNR. SRDF/A 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 personality change.
◆ When a REFRESH is issued, the link must be available because the R1 is checked to see if it is in TNR status.

Valid volume types

Valid volume types are R2 (target volume), L2 (target volume that is also mirrored locally), B2 (BCV target).

Syntax and options

The following action-options are available for this action: DETAIL, NODETAIL, NOEXEC.

SEMI-SYNC

This action sets the 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.

Requirements and restrictions

◆ Setting SEMI-SYNC does not affect adaptive copy mode if in effect.
Semi-synchronous mode is not supported on Symmetrix DMX-3 models or on any VMAX model with FICON directors.

**Valid volume types**

Valid volume types are R1 (source volume), L1 (source volume that is also mirrored locally), B1 (R1 BCV).

**Syntax and options**

The following *action-options* are available for this action: DETAIL, NODETAIL, NOEXEC.

**SUSP_CGRP**

This is a special form of the RDF_SUSP action that works with consistency groups. SUSP_CGRP functions exactly as RDF_SUSP, except it trips an SRDF consistency group. This command must be issued to a valid z/OS cuu that is in the consistency group.

**Requirements and restrictions**

- SUSP_CGRP should not be used on genned FBA devices.
- The ConGroup STC (Started Task Control) must be running for the SUSP_CGRP to operate as intended.

**Valid volume types**

Valid volume types are R1 (source volume), L1 (source volume that is also mirrored locally), B1 (R1 BCV).

**Syntax and options**

SUSP-CGRP is an alias of SUSP_CGRP.

SUSP_CGRP should only be used with the format cuu or LCL(cuu,srdfgrp) and should not specify a PowerMax/VMAX device number, a range of PowerMax/VMAX device numbers, or ALL.

The following *action-options* are available for this action: DETAIL, NODETAIL, NOEXEC.

**SWAP**

This action swaps the SRDF relationship between two SRDF devices.

**Requirements and restrictions**

- The swap is not permitted if either partner device would enter an invalid state. For example, in the device arrangement R2<->R11<->R2, a swap of either pair, or a half-swap of either mirror of the R11 device, is permitted only if the R11 device resides on a storage system at PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5773 and later. The ADCOPY_DISK option must be specified. The SWAP action will fail if either partner is a diskless device.
- If the SWAP action results in the creation of an R22 device, the newly created R2 mirror will be blocked. Moreover, if the newly created R22 device is not valid, the R2 mirror that previously existed will be blocked and suspended as well.
- SWAP is blocked if Dynamic Volume Expansion (DVE) is active on a requested device.

**Device state after SWAP**

To retain the same attributes, specify device options that match the R1/R2 state prior to the swap action. For any option not specified, the default (underlined) options are used to determine the resulting device state.

When the swap completes, the devices are placed into the state defined by the options. Because the R1 has to be TNR to perform the SWAP, setting the DOMINO option causes the R1 to go RNR.

The R2 in all actions that create an SRDF device pair is set to Read-Only (RO) and Not Ready (NR). If another state is required, use the SRDF Host Component #SC VOL command on the R2.

On R1-R2 personality swap actions, the new R2 defaults to Not Ready to the host (NRDY) unless otherwise specified in the SWAP. It is strongly suggested that the R1 devices be offline prior to the SWAP action. If an R1 device has two remote mirrors and cascaded SRDF is not available, the SWAP action is disabled.

**Adaptive copy settings**

When a SWAP action with the ADCOPY_WP option requires that a storage system running PowerMaxOS 5978 or HYPERMAX OS 5977 swaps to an R1 personality, the ADCOPY_WP option is converted to ADCOPY_DISK and the action completes.

If an adaptive copy option is specified, the maximum skew value for each device is initially set to the maximum possible value of 65535. To specify another value, use the #SC VOL command with the ADC_MAX action to set the required value for the devices.

**Device validation**

For an #SC VOL SWAP action, any device in the specified range is ineligible for a personality swap if it is:

- Not TNR
- Part of a consistency group
- A member of an SRDF group on which SRDF/A is active
- The target of any SNAP operation, including Compatible Flash (IBM FlashCopy)

If such a device is found, the command fails unless FORCE is specified, in which case a warning message is issued and the command proceeds for eligible devices.

**Operator verification**

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.
Valid volume types

Valid volume types are dynamic SRDF devices or R1 (source volume), L1 (source volume that is also mirrored locally), B1 (R1 BCV), R2 (target volume), L2 (target volume that is also mirrored locally), B2 (BCV target).

Syntax and options

Syntax example:

```
#SC VOL RMT(cuu, hoplist, srdfgrp),
SWAP(options), symdv#1-symdv#2
```

The following action-options are available for this action: ADCOPY_WP\(^1\), ADCOPY_DISK, DETAIL, DOMINO, FAWE, FORCE, ITRK, NADCOPY, NODETAIL, NODOMINO, NOEXEC, NOITRK, NRDY, NOSUSP, RCVRY, R/O, R/W, RDY, SYNC, SEMI-SYNC, SQAR\(^2\), STAR, STAR-A\(^2\).

The SWAP action option defaults are as follows (underlined): DOMINO\(\text{[NODOMINO]}\), ITRK\(\text{[NOITRK]}\), SYNC\(\text{[SEMI-SYNC]}\), ADCOPY_WP\(\text{[ADCOPY_DISK]}\), NADCOPY, RDY\(\text{[NRDY]}\), R/O\(\text{[R/W]}\).

SYNC

This action sets the source (R1) volume to synchronous replication mode.

Synchronous replication mode is an SRDF mode of operation that ensures 100% synchronized mirroring between the two storage systems.

This setting is preserved and does not need to be reset following an IML.

Setting SYNC does not affect adaptive copy mode if in effect.

Valid volume types

Valid volume types are R1 (source volume), L1 (source volume that is also mirrored locally), B1 (R1 BCV).

Syntax and options

The following action-options are available for this action: DETAIL, NOEXEC.

USR_NRDY

This action sets devices to a User-Not-Ready (UNR) control unit status.

This action is valid for both SRDF (paired) and standard (unpaired) devices.

When a volume is set UNR, any attempt to perform I/O to the volume from the host returns in an “intervention required” condition. UNR status may be cleared only by a USR_RDY action, and is unaffected by other #SC VOL actions.

---

1. When the SWAP action requires that a storage system running PowerMaxOS 5978 or HyperMax OS 5977 swaps to an R1 personality, the ADCOPY_WP option is converted to ADCOPY_DISK and the action completes.
2. Dell EMC GDDR is required to implement SRDF/SQAR or SRDF/Star-A functionality.
Because user-not-ready status is at the device level, rather than at the mirror level, specifying an SRDF group in the command affects device selection only. Devices that are already in UNR or RNR status are not eligible. When ineligible devices are detected in the device range, the ineligible devices are skipped but the command proceeds for other devices.

For a device in user-not-ready status, #SQ VOL displays show UNR in the control unit status field and #SQ STATE displays show U in the RNR column. Devices in user-not-ready status are eligible for dynamic SRDF actions, but are not eligible for RDF_NRDY or RDF_RDY actions.

**Syntax and options**

The following *action-options* are available for this action: DETAIL, NODETAIL, NOEXEC, TDS.

**USR_RDY**

This action clears the user-not-ready (UNR) control unit status of devices.

This action is valid only for devices in user-not-ready status, and valid for all such devices.

Because user-not-ready status is at the device level, rather than at the mirror level, specifying an SRDF group in the command affects device selection only. Devices that are already in RNR status are not eligible. When ineligible devices are detected in the device range, the ineligible devices are skipped but the command proceeds for other devices.

**Syntax and options**

The following *action-options* are available for this action: DETAIL, NODETAIL, NOEXEC, TDS.

**VALIDATE**

This action 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 storage systems 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 action 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 action 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.

**Note:** Chapter 6, “Recovery Procedures,” describes how to use this action.

VALIDATE is blocked if Dynamic Volume Expansion (DVE) is active on a requested device.
Valid volume types

Valid volume types are R1 (source volume), L1 (source volume that is also mirrored locally), B1 (R1 BCV), R2 (target volume), L2 (target volume that is also mirrored locally), B2 (BCV target).

Syntax and options

The following action-options are available for this action: DETAIL, NODETAIL, NOEXEC.

Command action options

Table 19 on page 317 provides a summary of available and compatibility options for the #SC VOL actions.

Note: In the following descriptions, see a particular action on the left for information about use of the action option for that action.

ADCOPY_DISK

This option is mutually exclusive with the ADCOPY_WP and NADCOPY options.

CASCRE action

The ADCOPY_DISK option sets device pair attributes after the action is complete but before any required synchronization takes place:

- If not specified: If ADCOPY_WP is specified, each newly created R1→R21 device pair is set to adaptive copy write-pending mode (with PowerMaxOS 5978 and HYPERMAX OS 5977, ADCOPY_WP is converted to ADCOPY_DISK). Otherwise, each newly created R1→R21 device pair is placed into synchronous replication mode. This does not apply to the newly-created R21→R2 device pair. The adaptive copy mode of the R21→R2 device pair is determined solely by the device characteristics of the R21 device, and is unaffected by the non-specification of ADCOPY_DISK.

- If specified: Each newly created R1→R21 device pair is placed into adaptive copy disk mode. This does not apply to the newly-created R21→R2 device pair. The adaptive copy mode of the R21→R2 device pair is determined solely by the device characteristics of the R21 device, and is unaffected by the specification of ADCOPY_DISK.

CASSWAP action

The ADCOPY_DISK option sets device pair attributes after the action is complete but before any required synchronization takes place:

- If not specified: If the ADCOPY_WP is specified, each resulting R1→R21 device pair is set to adaptive copy write-pending mode (with PowerMaxOS 5978 and HYPERMAX OS 5977, ADCOPY_WP is converted to ADCOPY_DISK). Otherwise, each resulting R1→R21 device pair is placed into synchronous replication mode. This does not apply to the resulting R21→R2 device pair. The adaptive copy mode of the R21→R2 device pair is determined solely by the device characteristics of the R21 device, and is unaffected by the non-specification of ADCOPY_DISK.

- If specified: Each resulting R1→R21 device pair is placed into adaptive copy disk mode. This does not apply to the resulting R21→R2 device pair. The adaptive copy mode of the R21→R2 device pair is determined solely by the device characteristics of the R21 device, and is unaffected by the specification of ADCOPY_DISK.
CREATEPAIR

**action**  
The ADCOPY_DISK option affects eligibility of devices as follows:

- **If not specified:** Devices to be paired for which the intended primary device would be cascaded are ineligible.
- **If specified:** Devices to be paired for which the intended primary device would be cascaded and is not diskless are eligible.

The ADCOPY_DISK option sets device pair attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** If ADCOPY_WP is specified, each newly created device pair is set to adaptive copy write-pending mode (with PowerMaxOS 5978 and HYPERMAX OS 5977, ADCOPY_WP is converted to ADCOPY_DISK). Otherwise, each newly created device pair is placed into synchronous replication mode.
- **If specified:** Each newly created device pair is placed into adaptive copy disk mode.

The ADCOPY_DISK option is not permitted when creating a diskless cascaded device pair (R21 → R2).

The ADCOPY_DISK option is required when creating a non-diskless cascaded device pair (R21 → R2).

HSWAP

**action**  
The ADCOPY_DISK option affects eligibility of devices as follows:

- **If not specified:** Devices which would become primary and would be cascaded after the half-swap are ineligible.
- **If specified:** Devices which would become primary and would be cascaded after the half-swap and are not diskless are eligible.

The ADCOPY_DISK option sets device state attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** Each half-swapped primary device is placed into synchronous replication mode; no effect if a secondary device.
- **If specified:** Each half-swapped primary device is placed into adaptive copy disk mode; no effect if a secondary device.

The HSWAP option is not permitted when a mirror of a diskless R22 cascaded device is being half-swapped.

The HSWAP option is required when a mirror of a non-diskless cascaded device is being half-swapped.

SWAP

**action**  
The ADCOPY_DISK option affects eligibility of device pairs as follows:

- **If not specified:** Device pairs for which the primary device would be cascaded after the swap are ineligible.
- **If specified:** Device pairs for which the primary device would be cascaded after the swap and are not diskless are eligible.

The ADCOPY_DISK option sets device pair attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** Each swapped device pair is placed into synchronous replication mode.
If specified: Each swapped device pair is placed into adaptive copy disk mode.

The ADCOPY_DISK option is not permitted when a pair including an R2 mirror of a
diskless R22 cascaded device is being swapped.

The ADCOPY_DISK option is required when a pair including an R2 mirror of a
non-diskless R22 cascaded device is being swapped.

ADCOPY_WP

This option is mutually exclusive with the ADCOPY_DISK and NADCOPY options.

For PowerMaxOS 5978 and HYPERMAX OS 5977, ADCOPY_WP is converted to
ADCOPY_DISK, except when used with CREATEPAIR to create SRDF pairs on the
second leg of a cascaded configuration.

Note: The ADCOPY keyword specified for CREATEPAIR, SWAP and HSWAP
commands is taken as ADCOPY_WP.

CASCRE

The ADCOPY_WP option sets device pair attributes after the action is complete but
before any required synchronization takes place:

If not specified: If ADCOPY_DISK is specified, each newly created R1–>R21 device
pair is set to adaptive copy disk mode. Otherwise, each newly created R1–>R21
device pair is placed into synchronous replication mode. This does not apply to the
newly-created R21–>R2 device pair. The adaptive copy mode of the R21–>R2
device pair is determined solely by the device characteristics of the R21 device,
and is unaffected by the non-specification of ADCOPY_WP.

If specified: Each newly created R1–>R21 device pair is placed into adaptive copy
write-pending mode. This does not apply to the newly-created R21–>R2 device
pair. The adaptive copy mode of the R21–>R2 device pair is determined solely by
the device characteristics of the R21 device, and is unaffected by the specification
of ADCOPY_WP.

When issuing CASCRE from the R1 side of a storage system running PowerMaxOS
5978 or HYPERMAX OS 5977, ADCOPY_WP is converted to ADCOPY_DISK.

CASSWAP

The ADCOPY_WP option sets device pair attributes after the action is complete but
before any required synchronization takes place:

If not specified: If ADCOPY_DISK is specified, each resulting R1–>R21 device
pair is set to adaptive copy disk mode. Otherwise, each resulting R1–>R21 device pair is
placed into synchronous replication mode. This does not apply to the resulting
R21–>R2 device pair. The adaptive copy mode of the R21–>R2 device pair is
determined solely by the device characteristics of the R21 device, and is
unaffected by the non-specification of ADCOPY_WP.

If specified: Each resulting R1–>R21 device pair is placed into adaptive copy
write-pending mode. This does not apply to the resulting R21–>R2 device pair. The
adaptive copy mode of the R21–>R2 device pair is determined solely by the device
characteristics of the R21 device, and is unaffected by the specification of
ADCOPY_WP. For PowerMaxOS 5978 and HYPERMAX OS 5977, ADCOPY_WP is
converted to ADCOPY_DISK.
CREATEPAIR

The ADCOPY_WP option affects eligibility of devices as follows:

- **If not specified**: Devices to be paired for which the intended primary device would be cascaded are ineligible.
- **If specified**: Devices to be paired for which the intended primary device would be cascaded and is diskless are eligible.

The ADCOPY_WP option sets device pair attributes after the action is complete but before any required synchronization takes place:

- **If not specified**: If ADCOPY_DISK is specified, each newly created device pair is set to adaptive copy disk mode. Otherwise, each newly created device pair is placed into synchronous replication mode.
- **If specified**: Each newly created device pair is placed into adaptive copy write-pending mode.

The ADCOPY_WP option is required when creating a diskless cascaded device pair (R21 ↔ R2).

The ADCOPY_WP is not permitted when creating a non-diskless cascaded device pair (R21 ↔ R2).

When issuing CREATEPAIR from the R1 side of a storage system running PowerMaxOS 5978 or HYPERMAX OS 5977, ADCOPY_WP is converted to ADCOPY_DISK.

HSMART

The ADCOPY_WP option affects eligibility of devices as follows:

- **If not specified**: Devices which would become primary and would be cascaded after the half-swap are ineligible.
- **If specified**: Diskless devices which would become primary and would be cascaded after the half-swap are eligible.

The ADCOPY_WP option sets device state attributes after the action is complete but before any required synchronization takes place:

- **If not specified**: Each half-swapped primary device is placed into synchronous replication mode; not applicable for a secondary device.
- **If specified**: Each half-swapped primary device is placed into adaptive copy write-pending mode; no effect if a secondary device. For PowerMaxOS 5978 and HYPERMAX OS 5977, ADCOPY_WP is converted to ADCOPY_DISK.

The ADCOPY_WP option is required when a mirror of a diskless R22 cascaded device is being half-swapped.

The ADCOPY_WP option is not permitted when a mirror of a non-diskless cascaded device is being half-swapped.

SWAP

The ADCOPY_WP option affects eligibility of device pairs as follows:

- **If not specified**: Device pairs for which the primary device would be cascaded after the swap are ineligible.
- **If specified**: Device pairs for which the primary device is diskless and would be cascaded after the swap are eligible.
The ADCOPY_WP option sets device pair attributes after the action is complete but before any required synchronization takes place:

- **If not specified**: Each swapped device pair is placed into synchronous replication mode.
- **If specified**: Each swapped device pair is placed into adaptive copy write-pending mode.

The ADCOPY_WP option is required when a pair including an R2 mirror of a diskless R22 cascaded device is being swapped.

The ADCOPY_WP option is not permitted when a pair including an R2 mirror of a non-diskless R22 cascaded device is being swapped.

When a SWAP action with the ADCOPY_WP option requires that a storage system running PowerMaxOS 5978 or HYPERMAX OS 5977 swaps to an R1 personality, ADCOPY_WP is converted to ADCOPY_DISK and the action completes.

### ADSRDF

To create a dynamic SRDF pair when the R1 device is smaller than the R2 device, you must use the ADSRDF option.

- **CREATEPAIR action**
  - The ADSRDF option affects eligibility of devices as follows:
    - **If not specified**: Devices to be paired must be of equal size. Devices for which the intended partners are of unequal sizes are ineligible.
    - **If specified**: Devices to be paired for which the intended secondary device is larger than the intended primary device are eligible.

If a CREATEPAIR action attempts to pair unequal-sized devices and the ADSRDF option is not specified, the request is denied. This behavior reduces the likelihood of creating unintended device pairs due to an incorrectly specified device number, or of inadvertently creating device pairs that cannot subsequently be swapped.

Note that the ADSRDF option does not prevent the creation of pairs with equal-sized devices, and it may be specified if a range of pairs to be created includes pairs of equal-sized devices and pairs of unequal-sized devices. ADSRDF has no effect if either device to be paired is diskless.

**Note**: The ADSRDF option does not apply to FBA meta devices with different sizes.

### CEXMPT

With PowerMaxOS 5978, HYPERMAX OS 5977, and Enginuity 5773.150 or later, the Consistency Exempt (CEXMPT) option is provided for the SRDF/A environment to indicate that a volume should be considered exempt from the consistency requirements for the group. This allows for dynamic expansion without taking the group offline and while maintaining consistency.

At initialization, SRDF/A establishes consistency between the local and remote sides. In normal operation, SRDF/A provides a consistent copy of the data on the R2 side. However, if there are tracks that need to be copied as part of an initial synchronization operation, the data is not consistent until those tracks have been copied to the remote...
storage system. Also, when new SRDF device pairs are created, a full synchronization is required. As a result, adding new SRDF devices to an existing SRDF/A group causes the group to look inconsistent.

Adding a new device pair to the SRDF group on which an SRDF/A session is active with tolerance mode on causes the SRDF/A session to become inconsistent; consistency is only regained after a full SRDF/A resynchronization. If tolerance mode is not set, the request to add a new device pair is denied.

To solve this problem, the CEXMPT option is available for the #SC VOL command to allow a new device to be excluded from the consistency check until the tracks have been copied to the remote storage system. Using the CEXMPT option when adding a device pair to an SRDF group on which an SRDF/A session is active and tolerance mode is off, or when suspending a device pair in such an SRDF group, addresses the issues as follows:

- The request can be honored without deactivating the SRDF/A session.
- Consistency of the existing SRDF/A session R2 data is maintained.
- If a device pair is being added, the newly added device pair participates in the consistency of the R2 data afforded by SRDF/A within two cycle switches once synchronization of the newly added device pair has been established. (If the pair already exists and is synchronized, synchronization is established immediately.)

When the devices are added to the SRDF/A group in CEXMPT mode, you must then wait for the CEXMPT indication to clear before starting to use those devices or to consider them part of the consistent image. The CEXMPT indication will clear after two cycle switches once synchronization has been established.

⚠️ CAUTION

You cannot use devices in the CEXMPT state until this state is cleared.

---

**CASCRE action**

The CEXMPT option affects eligibility of devices as follows:

- **If not specified:** If an active SRDF/A session exists on the SRDF group in which a new device pair will be defined and the SRDF/A session is not in Tolerance mode, the devices are ineligible to be paired.

- **If specified:** The presence of an active SRDF/A session on the SRDF group in which a new device pair will be defined is not considered in determining whether the devices are eligible to be paired.

The CEXMPT option sets device pair attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** No change in device or device pair state or attributes will occur if any device pair in any triplet to be created by the command would be in an SRDF group on which there is an active SRDF/A session with tolerance mode off, because command processing will have been terminated following validation.

- **If specified:** If there is an active SRDF/A session with tolerance off on one of the SRDF groups in which device pairs will be created by the action, the state for all device pairs thus created is set to consistency exempt and the SRDF/A session is set to an inconsistent state. This option has no effect if SRDF/A is not active on the SRDF groups on which device pairs are being created.
CASSUSP action

The CEXMPT option affects eligibility of device triplets as follows:

- **If not specified:** If any device triplet in the range includes a device pair in an SRDF group on which there is an active SRDF/A session with tolerance mode off, no triplets are eligible and command processing is ended following validation.

- **If specified:** SRDF/A status is not considered in determining device triplet eligibility.

The CEXMPT option sets device pair attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** No change in device or device pair state or attributes will occur if any triplet in the device range includes a device pair in an SRDF group on which there is an active SRDF/A session with tolerance mode off, because the request will have been denied during validation.

- **If specified:** If a triplet to be suspended includes a device pair in an SRDF group on which an active SRDF/A session exists, the device pair state within the SRDF/A group is set to consistency exempt and the SRDF/A session is set to an inconsistent state. This option has no effect for triplets neither of whose device pairs is in an SRDF group on which an active SRDF/A session exists.

CREATEPAIR action

The CEXMPT option affects eligibility of devices as follows:

- **If not specified:** If an active SRDF/A session exists on the SRDF group in which a new device pair will be defined and the SRDF/A session is not in Tolerance mode, the devices are ineligible to be paired.

- **If specified:** The presence of an active SRDF/A session on the SRDF group in which a new device pair will be defined is not considered in determining whether the devices are eligible to be paired.

The CEXMPT option sets device pair attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** A request to create a device pair in an SRDF group on which an active SRDF/A session with tolerance mode off is denied.

- **If specified:** Each device pair created in an SRDF/A group is set to consistency exempt state and the SRDF/A session is set to an inconsistent state. This option has no effect if SRDF/A is not active in the SRDF group in which a new device pair has been defined.

MOVEPAIR action

The CEXMPT option affects eligibility of device pairs as follows:

- **If not specified:** If an active SRDF/A session exists on the specified target SRDF group of the SRDF group switch (movepair) action and the SRDF/A session is not in Tolerance mode, all device pairs are ineligible.

- **If specified:** The presence of an active SRDF/A session on the specified target SRDF group of the SRDF group switch (movepair) action is not considered in determining whether device pairs are eligible. The device pairs must be suspended (TNR state).

The CEXMPT option sets device pair attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** A request to move a device pair to an SRDF group on which an active SRDF/A session with tolerance mode off is denied.
The CEXMPT option affects eligibility of devices as follows:

- If not specified: Devices which are primary and for which there is an active SRDF/A session not in Tolerance mode on the SRDF group of the mirror to be suspended are ineligible.

- If specified: The presence of an active SRDF/A session on the SRDF group of the mirror to be suspended is not considered in determining whether the device is eligible.

The CEXMPT option sets device pair attributes after the action is complete but before any required synchronization takes place:

- If not specified: A request to suspend a device pair in an SRDF group on which an active SRDF/A session with tolerance mode off is denied.

- If specified: Sets device pair state within SRDF/A group to consistency exempt and the SRDF/A session is set to an inconsistent state. This option has no effect if SRDF/A is not active in the SRDF group to which the device pair belongs.

The DETAIL option allows you to override the effect of the COMMAND_DETAILS initialization parameter for individual commands.

When the COMMAND_DETAILS parameter is not in effect, the DETAIL option may be used to generate device list detail messages for the entered command only.

This option is valid only if the STAR or SQAR option is also specified and the specified SRDF group has the Star or SQAR attribute.

The DIFFERENTIAL option sets device state attributes after the action is complete but before any required synchronization takes place:

- If not specified: Full device synchronization takes place.

- If specified: Only changed tracks are copied, as identified by the SRDF/Star or SQAR maintained track information.

In LINKS-DOMINO mode, a source (R1) volume will go not-ready if the target (R2) volume is not ready or links are down. An R1 volume that is ready will become not ready if the R2 volume becomes not-ready or if the link to the R2 volume is lost.

Note: “LINKS DOMINO mode” on page 329 describes the Domino mode.
**CASCRE**

**action**
The DOMINO option sets device pair attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** A newly created device pair is not automatically placed into DOMINO mode (but may be placed into DOMINO mode if the target SRDF group has the LINKS-DOMINO attribute).

- **If specified:** Each newly created device pair is placed into DOMINO mode. Note that both legs R1->R21 and R21->R2 are placed into LINKS-DOMINO mode.

**CREATEPAIR**

**action**
The DOMINO option sets device pair attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** A newly created device pair is not automatically placed into DOMINO mode (but may be placed into DOMINO mode if the target SRDF group has the LINKS-DOMINO attribute).

- **If specified:** Each newly created device pair is placed into DOMINO mode.

**SWAP**

**action**
The DOMINO option sets device pair attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** A device pair retains its DOMINO mode (but may be placed into DOMINO mode if the target SRDF group has the LINKS-DOMINO attribute).

- **If specified:** The swapped device pair is placed into DOMINO mode.

**FAWE**

**HSWAP**

**action**
The FAWE option sets device attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** Writes are prohibited to FBA devices attached to the FA port.

- **If specified:** Turns OFF the Write Prohibit bit on FBA devices attached to the FA port for all affected R2 devices prior to the swap.

**SWAP**

**action**
The FAWE option sets device attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** Writes are prohibited to FBA devices attached to the FA port.

- **If specified:** Turns OFF the Write Prohibit bit on FBA devices attached to the FA port for all affected R2 devices prior to the swap.

**FORCE**

**CASDEL**

**action**
The FORCE option affects eligibility of device triplets as follows:

- **If not specified:** If any device triplet in the range includes a device with invalid tracks, no triplets are eligible and command processing is ended following validation.

- **If specified:** The existence of invalid tracks is not considered in determining device triplet eligibility.
The FORCE option affects eligibility of device triplets as follows:

- **If not specified**: If any device triplet in the range includes a device with invalid tracks, no triplets are eligible and command processing is ended following validation.

- **If specified**: The existence of invalid tracks is not considered in determining device triplet eligibility.

The FORCE option affects eligibility of device triplets as follows:

- **If not specified**: If any device triplet in the range includes a device with invalid tracks, no triplets are eligible and command processing is ended following validation.

- **If specified**: The existence of invalid tracks is not considered in determining device triplet eligibility.

The FORCE option affects eligibility of device triplets as follows:

- **If not specified**: If any device triplet in the range includes a device with invalid tracks, no triplets are eligible and command processing is ended following validation.

- **If specified**: The existence of invalid tracks is not considered in determining device triplet eligibility.

The FORCE option affects eligibility of device pairs as follows:

- **If not specified**: A device pair with invalid tracks on either device in the pair is not eligible.

- **If specified**: The existence of invalid tracks on either device in a pair is not considered in determining whether the device pair is eligible.

The FORCE option affects eligibility of device pairs as follows:

- **If not specified**: A device pair with invalid tracks owed to the primary (R1) device on either device in the pair is not eligible.

- **If specified**: The existence of invalid tracks owed to the primary (R1) device on either device in a pair is not considered in determining whether the pair is eligible.

The FORCE option affects eligibility of devices as follows:

- **If not specified**: If any device in the range includes a device with R1 invalid tracks, no devices are eligible and command processing is ended following validation.

- **If specified**: The existence of R1 invalid tracks is not considered in determining device eligibility.

The FORCE option affects eligibility of devices as follows:

- **If not specified**: If any device in the range includes a device with R1 invalid tracks, no devices are eligible and command processing is ended following validation.

- **If specified**: The existence of R1 invalid tracks is not considered in determining device eligibility.

The GRPONLY option affects eligibility of devices as follows:

- **If not specified**: Link blocks are switched between mirrors for all valid R22 devices in the device range.

- **If specified**: The link block is switched for a device pair only if the blocked mirror is in the SRDF group specified or implied in the command.

If the Invalid Track Attribute is set, the target (R2) volume will go not ready if the source (R1) volume (its mirrored device) has invalid tracks on the target (R2) volume and a state of change has been requested on the target (R2) volume.

The ITRK option sets device pair attributes after the action is complete but before any required synchronization takes place:

- **If not specified**: A newly created device pair is not automatically assigned the Invalid Track Attribute.

- **If specified**: Each newly created device pair is assigned the Invalid Track Attribute. Note that both legs R1->R21 and R21->R2 are assigned the Invalid Track Attribute.
CREATEPAIR action
The ITRK option sets device pair attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** A newly created device pair is not automatically assigned the Invalid Track Attribute.
- **If specified:** Each newly created device pair is assigned the Invalid Track Attribute.

HSWAP action
The ITRK option sets device pair attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** A device pair retains its Invalid Track Attribute setting.
- **If specified:** The swapped device pair is assigned the Invalid Track Attribute. Note that since HSWAP is an R2 only attribute, ITRK would not be effective on R1|L1|B1 devices.

SWAP action
The ITRK option sets device pair attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** A device pair retains its Invalid Track Attribute setting.
- **If specified:** The swapped device pair is assigned the Invalid Track Attribute.

KEEPR2

CASCRE action
The KEEP2R option sets device attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** Device synchronization proceeds from R1 to R2.
- **If specified:** Causes device synchronization to proceed from R2 to R1.

CREATEPAIR action
The KEEP2R option sets device attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** Device synchronization proceeds from R1 to R2.
- **If specified:** Causes device synchronization to proceed from R2 to R1.

RESUMEPAIR action
The KEEP2R option sets device attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** Device synchronization proceeds from R1 to R2.
- **If specified:** Causes device synchronization to proceed from R2 to R1.

LCLISR1

CREATEPAIR action
The LCLISR1 option sets device attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** The local device of each newly created device pair is the secondary (R2) device in the pair.
- **If specified:** The local device of each newly created device pair is the primary (R1) device in the pair, unless LCLISR2 is specified.
LCLISR2

CREATEPAIR action
The LCLISR2 option sets device attributes after the action is complete but before any required synchronization takes place:

- If not specified: The local device of each newly created device pair is the primary (R1) device in the pair.
- If specified: The local device of each newly created device pair is the secondary (R2) device in the pair.

NADCOPY

CREATEPAIR action
This option is mutually exclusive with the ADCOPY_DISK and ADCOPY_WP options.

The NADCOPY option sets device pair attributes after the action is complete but before any required synchronization takes place:

- If not specified: If either of the adaptive copy options ADCOPY_DISK or ADCOPY_WP is specified, each newly created device pair is set to the corresponding adaptive copy replication mode. Otherwise, each newly created device pair is set to synchronous replication mode.
- If specified: Each newly created device pair is set to synchronous replication mode.

HSWAP action
The NADCOPY option sets device attributes after the action is complete but before any required synchronization takes place:

- If not specified: If either of the adaptive copy options ADCOPY_DISK or ADCOPY_WP is specified, each half-swapped device is set to the corresponding adaptive copy replication mode. Otherwise, each half-swapped primary device is set to synchronous replication mode.
- If specified: Each half-swapped primary device is set to synchronous replication mode.

SWAP action
The NADCOPY option affects eligibility of device pairs as follows:

- If not specified: If either of the adaptive copy options ADCOPY_DISK or ADCOPY_WP is specified, validation proceeds according as described under the specified adaptive copy option. Otherwise, a request to swap a device pair that would result in a primary device that is cascaded is denied.
- If specified: A request to swap a device pair resulting in a primary device that is cascaded is denied.

The NADCOPY option sets device pair attributes after the action is complete but before any required synchronization takes place:

- If not specified: If either of the adaptive copy options ADCOPY_DISK or ADCOPY_WP is specified, each swapped device pair is set to the corresponding adaptive copy replication mode. Otherwise, each swapped device pair is set to synchronous replication mode.
- If specified: Each swapped device pair is set to synchronous replication mode.
NOCOPY

The NOCOPY option sets device attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** Device synchronization proceeds in a manner governed by other options.
- **If specified:** Causes device synchronization to be bypassed. This option may be appropriate during failover procedures in an SRDF/Star environment.

**IMPORTANT**
Specify the NOCOPY option only if the devices that will become partner devices are already synchronized. If the devices are not synchronized, specifying this option can cause errors in the storage system when SRDF replication is resumed.

NODETAIL

The DETAIL option allows you to override the effect of the COMMAND_DETAILS initialization parameter for individual commands.

When COMMAND_DETAILS parameter is in effect, the NODETAIL option may be used to suppress device list detail messages for the entered command only.

NODOMINO

The NODOMINO option sets device pair attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** A device pair retains its DOMINO mode.
- **If specified:** The swapped device pair is not automatically placed into DOMINO mode even if the pair was in DOMINO mode before the swap.

NOEXEC

With SRDF Host Component (but not with the REXX interface), the NOEXEC option is available for a number of #SC VOL command actions. Specify the NOEXEC option to skip command processing after the validation phase. This allows you to view in advance the devices that would be processed if the command were allowed to execute. It also allows you to correct conditions resulting in device ineligibility prior to actually issuing the command.

NOITRK

The NOITRK option sets device pair attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** A device pair retains its Invalid Track Attribute setting.
- **If specified:** The swapped device pair is not automatically assigned the Invalid Track Attribute even if the pair had it before the swap.
### NOSUSP

#### CASWAP SWAP actions

The NOSUSP option sets device pair attributes after the action is complete but before any required synchronization takes place:

- **If not specified**: Each swapped device pair remains suspended.
- **If specified**: Each swapped device pair is resumed, enabling SRDF replication activity.

### NRKY

#### SWAP action

The NRKY option sets device attributes after the action is complete but before any required synchronization takes place:

- **If not specified**: The secondary device of a swapped device pair appears according to the R1/R2 state prior to the swap action.
- **If specified**: The secondary device of a swapped device pair appears not ready to the host.

### R22ACT

#### CASCRE action

The R22ACT option sets device attributes after the action is complete but before any required synchronization takes place:

- **If not specified**: If a valid R22 device is created by the CASCRE action, the new R2 mirror is blocked and the new device pair is suspended.
- **If specified**: If the newly created R22 device is valid, the previously existing R2 mirror of the new R22 device is blocked. The newly created R2 mirror is not blocked, but the R21 <-> R22 device pair is still created in a suspended state.

#### CREATEPAIR action

The R22ACT option sets device attributes after the action is complete but before any required synchronization takes place:

- **If not specified**: If a valid R22 device is created by the CREATEPAIR action, the new R2 mirror is blocked and the new device pair is suspended.
- **If specified**: If the newly created R22 device is valid, the previously existing R2 mirror of the new R22 device is blocked. The newly created R2 mirror is not blocked, but the new pair is still created in a suspended state.

#### RESUMEPAIR action

The R22ACT option sets device attributes after the action is complete but before any required synchronization takes place:

- **If not specified**: If R22ACT is not specified and a link-blocked R2 partner of an R1 in the device range is found, the RESUMEPAIR action is aborted following validation.
- **If specified**: For eligible pairs, if the R2 partner is a link-blocked mirror of a valid R22 and if the R22ACT option is specified, the link-block is switched to the currently unblocked R2 mirror. R22 devices whose link-blocked mirror was switched are listed in the command output.
IMPORTANT

The RCVRY option is to be used in a recovery situation only.

**CASCRE action**
The RCVRY option affects eligibility of devices as follows:
- **If not specified**: CASCRE works on diskless devices without the RCVRY option.
- **If specified**: Both diskless and non-diskless devices are considered when determining eligibility.

**CREATEPAIR action**
The RCVRY option affects eligibility of devices as follows:
- **If not specified**: Diskless devices are not eligible.
- **If specified**: Both diskless and non-diskless devices are considered when determining eligibility.

**DELETEPAIR action**
The RCVRY option affects eligibility of devices as follows:
- **If not specified**: Device pairs including a diskless device are not eligible.
- **If specified**: Both diskless and non-diskless devices are considered when determining eligibility.

**HDELETEPAIR action**
The RCVRY option affects eligibility of devices as follows:
- **If not specified**: Diskless devices are not eligible.
- **If specified**: Both diskless and non-diskless devices are considered when determining eligibility.

**HMOVEPAIR action**
The RCVRY option affects eligibility of devices as follows:
- **If not specified**: Diskless devices are not eligible.
- **If specified**: Both diskless and non-diskless devices are considered when determining eligibility.

**HSWAP action**
The RCVRY option affects eligibility of devices as follows:
- **If not specified**: Diskless devices are not eligible.
- **If specified**: Both diskless and non-diskless devices are considered when determining eligibility.

**MOVEPAIR action**
The RCVRY option affects eligibility of devices as follows:
- **If not specified**: Device pairs including a diskless device are not eligible.
- **If specified**: Both diskless and non-diskless devices are considered when determining eligibility.

**RDF_SUSP action**
The RCVRY option affects eligibility of devices as follows:
- **If not specified**: Diskless devices are not eligible.
- **If specified**: Both diskless and non-diskless devices are considered when determining eligibility.
RDF_RSUM

action

The RCVRY option affects eligibility of devices as follows:

◆ **If not specified:** Diskless devices are not eligible.
◆ **If specified:** Both diskless and non-diskless devices are considered when determining eligibility.

**Note:** If the R2 of a device pair being resumed is diskless, allowing replication to it could cause cache to become exhausted on the storage system.

RESUMEPAIR

The RCVRY option affects eligibility of devices as follows:

◆ **If not specified:** Diskless devices are not eligible.
◆ **If specified:** Both diskless and non-diskless devices are considered when determining eligibility.

**Note:** If the R2 of a device pair being resumed is diskless, allowing replication to it could cause cache to become exhausted on the storage system.

RFR_RSUM

action

The RCVRY option affects eligibility of devices as follows:

◆ **If not specified:** Diskless devices are not eligible.
◆ **If specified:** Both diskless and non-diskless devices are considered when determining eligibility.

**Note:** If the R2 of a device pair being resumed is diskless, allowing replication to it could cause cache to become exhausted on the storage system.

RNG_RSUM

action

The RCVRY option affects eligibility of devices as follows:

◆ **If not specified:** Diskless devices are not eligible.
◆ **If specified:** Both diskless and non-diskless devices are considered when determining eligibility.

**Note:** If the R2 of a device pair being resumed is diskless, allowing replication to it could cause cache to become exhausted on the storage system.

SWAP

action

The RCVRY option affects eligibility of devices as follows:

◆ **If not specified:** Device pairs including a diskless device are not eligible.
◆ **If specified:** Both diskless and non-diskless devices are considered when determining eligibility.

**R/O**

SWAP

action

The R/O option sets device attributes after the action is complete but before any required synchronization takes place:

◆ **If not specified:** The secondary device of a swapped device pair appears according to the R1/R2 state prior to the swap action.
◆ **If specified:** The R2 device of a swapped device pair is set read-only.
RDY

The RDY option sets device attributes after the action is complete but before any required synchronization takes place:

- **If not specified**: The secondary device of a newly created device pair appears not ready to the host.
- **If specified**: The secondary device of a newly created device pair appears ready to the host.

CREATEPAIR

The RDY option sets device attributes after the action is complete but before any required synchronization takes place:

- **If not specified**: The secondary device of a newly created device pair appears not ready to the host.
- **If specified**: The secondary device of a newly created device pair appears ready to the host.

HSWAP

The RDY option sets device attributes after the action is complete but before any required synchronization takes place:

- **If not specified**: The secondary device of a swapped device pair appears not ready to the host.
- **If specified**: The secondary device of a swapped device pair appears ready to the host.

SWAP

The RDY option sets device attributes after the action is complete but before any required synchronization takes place:

- **If not specified**: The secondary device of a swapped device pair appears according to the R1/R2 state prior to the swap action.
- **If specified**: The secondary device of a swapped device pair appears ready to the host.

R/W

The R/W option sets device attributes after the action is complete but before any required synchronization takes place:

- **If not specified**: The R2 device of a newly-created device pair is set read-only.
- **If specified**: The R2 device of a newly created device pair is set read/write.

RDY must be specified with R/W.

Example

```
#SC VOL,LCL(6C00,09),CREATEPAIR(R/W,RDY),18D,3D
```

HSWAP

The R/W option sets device attributes after the action is complete but before any required synchronization takes place:

- **If not specified**: The R2 device of a swapped device pair is set read-only or set to the state of the swapped R2 depending on whether or not other options were specified.
- **If specified**: The R2 device of a swapped device pair is set read/write.

For a swap operation, the device must be suspended before the HSWAP command can be issued. RDY must be specified with R/W.
**SWAP action**

The R/W option sets device attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** The R2 device of a swapped device pair is set read-only or set to the state of the swapped R2 depending on whether or not other options were specified.
- **If specified:** The R2 device of a swapped device pair is set read/write.

For a swap operation, the device must be suspended before the SWAP command can be issued.

RDY must be specified with R/W.

*Example*  
#SC VOL, 6E4D, SWAP (RDY, R/W)

**SEMI-SYNC CREATEPAIR action**

The SEMI-SYNC option sets device pair attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** The SRDF replication mode of each newly created device pair is set to synchronous mode.
- **If specified:** The SRDF replication mode of each newly created device pair is set to semi-synchronous mode if supported by the control unit of the primary device in the new pair. If not supported, the command is processed and message EMCCY02I is issued; the resulting pair(s) will be in SYNC mode.

**SWAP action**

The SEMI-SYNC option sets device pair attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** The SRDF replication mode of each swapped device pair is unchanged.
- **If specified:** The SRDF replication mode of each swapped device pair is set to semi-synchronous mode.

**SQAR**

**CASCRE action**

The SQAR option affects eligibility of device pairs as follows:

- **If not specified:** A request to create a device pair which would be in an SRDF group with the SQAR or SQAR recovery attribute is denied.
- **If specified:** The SQAR or SQAR recovery attribute of the target SRDF group is not considered when validating a request to create a device pair.

When the SQAR option is specified with CASCRE, SRDF Host Component will not fail the request if it cannot validate that there is a common R11.

**CASDEL action**

The SQAR option affects eligibility of device pairs as follows:

- **If not specified:** A request to delete a device pair which would be in an SRDF group with the SQAR or SQAR recovery attribute is denied.
- **If specified:** The SQAR or SQAR recovery attribute of the target SRDF group is not considered when validating a request to delete a device pair.
CREATEPAIR

The SQAR option affects eligibility of device pairs as follows:

- **If not specified**: A request to create a device pair either partner of which would be in an SRDF group with the SQAR or SQAR recovery attribute is denied.
- **If specified**: The SQAR or SQAR recovery attribute of the target SRDF group is not considered when validating a request to create a device pair.

When the SQAR option is specified with CREATEPAIR, SRDF Host Component will not fail the request if it cannot validate that there is a common R11.

DELETEPAIR

The SQAR option affects eligibility of device pairs as follows:

- **If not specified**: A request to delete a device pair either partner of which is in an SRDF group with the SQAR or SQAR recovery attribute is denied.
- **If specified**: The SQAR or SQAR recovery attribute of the SRDF group in which a device pair is defined is not considered when validating a request to delete the device pair.

HDELETEPAIR

The SQAR option affects eligibility of devices as follows:

- **If not specified**: A request to half-delete a device from an SRDF group with the SQAR or SQAR recovery attribute is denied.
- **If specified**: The SQAR attribute of the SRDF group in which a device is defined is not considered when validating a request to half-delete the device.

HMOVEPAIR

The SQAR option affects eligibility of devices as follows:

- **If not specified**: A request to half-move a device from or to an SRDF group with the SQAR or SQAR recovery attribute is denied.
- **If specified**: The SQAR attribute of the SRDF group from or to which a device is to be moved is not considered when validating a request to half-move the device.

You must specify the SQAR flag when moving devices into an active SRDF/A group. The SQAR flag is not required when moving TRN devices out of an active SRDF/A group.

HSWAP

The SQAR option affects eligibility of devices as follows:

- **If not specified**: A request to half-swap a device in an SRDF group with the SQAR or SQAR recovery attribute is denied.
- **If specified**: The SQAR attribute of the SRDF group in which a device is defined is not considered when validating a request to half-swap the device.

MOVEPAIR

The SQAR option affects eligibility of device pairs as follows:

- **If not specified**: A request to move a device pair from or to an SRDF group with the SQAR or SQAR recovery attribute is denied.
- **If specified**: The SQAR attribute of the SRDF group from or to which a device pair is to be moved is not considered when validating a request to move the device pair.

You must specify the SQAR flag when moving devices into an active SRDF/A group. The SQAR flag is not required when moving TRN devices out of an active SRDF/A group.
**RESUMEPAIR**

Action

The SQAR option affects eligibility of device pairs as follows:

- **If not specified:** A request to resume a device pair from or to an SRDF group with the SQAR or SQAR recovery attribute is denied.
- **If specified:** The SQAR attribute of the SRDF group from or to which a device pair is defined is not considered when validating a request to resume the device pair.

**SWAP**

Action

The SQAR option affects eligibility of device pairs as follows:

- **If not specified:** A request to swap a device pair either partner of which is in an SRDF group with the SQAR attribute is denied.
- **If specified:** The SQAR attribute of the SRDF group in which a device pair is defined is not considered when validating a request to swap the device pair.

**STAR**

**CASCRE**

Action

The STAR option affects eligibility of device pairs as follows:

- **If not specified:** A request to create a device pair which would be in an SRDF group with the Star or Star recovery attribute is denied.
- **If specified:** The Star or Star recovery attribute of the target SRDF group is not considered when validating a request to create a device pair.

**CASDEL**

Action

The STAR option affects eligibility of device pairs as follows:

- **If not specified:** A request to delete a device pair which would be in an SRDF group with the Star or Star recovery attribute is denied.
- **If specified:** The Star or Star recovery attribute of the target SRDF group is not considered when validating a request to delete a device pair.

**CREATEPAIR**

Action

The STAR option affects eligibility of device pairs as follows:

- **If not specified:** A request to create a device pair either partner of which would be in an SRDF group with the Star or Star recovery attribute is denied.
- **If specified:** The Star and Star recovery attributes of the target SRDF group are not considered when validating a request to create a device pair.

**DELETEPAIR**

Action

The STAR option affects eligibility of device pairs as follows:

- **If not specified:** A request to delete a device pair either partner of which is in an SRDF group with the Star or Star recovery attribute is denied.
- **If specified:** The Star and Star recovery attributes of the SRDF group in which a device pair is defined are not considered when validating a request to delete the device pair.

**HDELETEPAIR**

Action

The STAR option affects eligibility of devices as follows:

- **If not specified:** A request to half-delete a device from an SRDF group with the Star or Star recovery attribute is denied.
- **If specified:** The Star and Star recovery attributes of the SRDF group in which a device is defined are not considered when validating a request to half-delete the device.
HMOVEPAIR action

The STAR option affects eligibility of devices as follows:

- **If not specified**: A request to half-move a device from or to an SRDF group with the Star or Star recovery attribute is denied.
- **If specified**: The Star and Star recovery attributes of the SRDF group from or to which a device is to be moved are not considered when validating a request to half-move the device.

You must specify the STAR flag when moving devices into an active SRDF/A group. The STAR flag is not required when moving TRN devices out of an active SRDF/A group.

HSWAP action

The STAR option affects eligibility of devices as follows:

- **If not specified**: A request to half-swap a device in an SRDF group with the Star or Star recovery attribute is denied.
- **If specified**: The Star and Star recovery attributes of the SRDF group in which a device is defined are not considered when validating a request to half-swap the device.

MOVEPAIR action

The STAR option affects eligibility of device pairs as follows:

- **If not specified**: A request to move a device pair from or to an SRDF group with the Star or Star recovery attribute is denied.
- **If specified**: The Star and Star recovery attributes of the SRDF group from or to which a device pair is to be moved are not considered when validating a request to move the device pair.

You must specify the STAR flag when moving devices into an active SRDF/A group. The STAR flag is not required when moving TRN devices out of an active SRDF/A group.

RESUMEPAIR action

The STAR option affects eligibility of device pairs as follows:

- **If not specified**: A request to resume a device pair from or to an SRDF group with the Star or Star recovery attribute is denied.
- **If specified**: The Star or Star recovery attribute of the SRDF group from or to which a device pair is defined is not considered when validating a request to resume the device pair.

SWAP action

The STAR option affects eligibility of device pairs as follows:

- **If not specified**: A request to swap a device pair either partner of which is in an SRDF group with the Star or Star recovery attribute is denied.
- **If specified**: The Star and Star recovery attributes of the SRDF group in which a device pair is defined are not considered when validating a request to swap the device pair.
The STAR-A option affects eligibility of device pairs as follows:

- **If not specified**: A request to create a device pair which would be in an SRDF group with the Star-A or Star-A recovery attribute is denied.

- **If specified**: The Star-A or Star-A recovery attribute of the target SRDF group is not considered when validating a request to create a device pair.

The STAR-A option affects eligibility of device pairs as follows:

- **If not specified**: A request to delete a device pair which would be in an SRDF group with the Star-A or Star-A recovery attribute is denied.

- **If specified**: The Star-A or Star-A recovery attribute of the target SRDF group is not considered when validating a request to delete a device pair.

The STAR-A option affects eligibility of device pairs as follows:

- **If not specified**: A request to create a device pair either partner of which would be in an SRDF group with the Star-A or Star-A recovery attribute is denied.

- **If specified**: The Star-A or Star-A recovery attributes of the target SRDF group are not considered when validating a request to create a device pair.

The STAR-A option affects eligibility of device pairs as follows:

- **If not specified**: A request to delete a device pair either partner of which is in an SRDF group with the Star-A or Star-A recovery attribute is denied.

- **If specified**: The Star-A or Star-A recovery attributes of the SRDF group in which a device pair is defined are not considered when validating a request to delete the device pair.

The STAR-A option affects eligibility of devices as follows:

- **If not specified**: A request to half-delete a device from an SRDF group with the Star-A or Star-A recovery attribute is denied.

- **If specified**: The Star-A or Star-A recovery attributes of the SRDF group in which a device is defined are not considered when validating a request to half-delete the device.

The STAR-A option affects eligibility of devices as follows:

- **If not specified**: A request to half-move a device from or to an SRDF group with the Star-A or Star-A recovery attribute is denied.

- **If specified**: The Star-A or Star-A recovery attributes of the SRDF group from or to which a device is to be moved are not considered when validating a request to half-move the device.

You must specify the STAR-A flag when moving devices into an active SRDF/A group. The STAR-A flag is not required when moving TRN devices out of an active SRDF/A group.

---

1. Dell EMC GDDR is required to implement SRDF/Star-A functionality.
The STAR-A option affects eligibility of devices as follows:

- **If not specified**: A request to half-swap a device in an SRDF group with the Star-A or Star-A recovery attribute is denied.
- **If specified**: The Star-A or Star-A recovery attributes of the SRDF group in which a device is defined are not considered when validating a request to half-swap the device.

The STAR-A option affects eligibility of device pairs as follows:

- **If not specified**: A request to move a device pair from or to an SRDF group with the Star-A or Star-A recovery attribute is denied.
- **If specified**: The Star-A or Star-A recovery attributes of the SRDF group from or to which a device pair is to be moved are not considered when validating a request to move the device pair.

You must specify the STAR-A flag when moving devices into an active SRDF/A group. The STAR-A flag is not required when moving TRN devices out of an active SRDF/A group.

The STAR-A option affects eligibility of device pairs as follows:

- **If not specified**: A request to resume a device pair from or to an SRDF group with the Star-A or Star-A recovery attribute is denied.
- **If specified**: The Star-A or Star-A recovery attribute of the SRDF group from or to which a device pair is defined is not considered when validating a request to resume the device pair.

The STAR-A option affects eligibility of device pairs as follows:

- **If not specified**: A request to swap a device pair either partner of which is in an SRDF group with the Star-A or Star-A recovery attribute is denied.
- **If specified**: The Star-A or Star-A recovery attributes of the SRDF group in which a device pair is defined are not considered when validating a request to swap the device pair.

The SUSPEND option sets device pair attributes after the action is complete but before any required synchronization takes place:

- **If not specified**: Device synchronization proceeds in a manner governed by other options.
- **If specified**: Causes newly created device pairs to be suspended and device synchronization to be delayed.

The SUSPEND option sets device pair attributes after the action is complete but before any required synchronization takes place:

- **If not specified**: Device synchronization proceeds in a manner governed by other options.
- **If specified**: Causes newly created device pairs to be suspended and device synchronization to be delayed.
RESUMEPAIR action

The SUSPEND option sets device pair attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** Device synchronization proceeds in a manner governed by other options.
- **If specified:** Causes newly resumed device pairs to be suspended and device synchronization to be delayed.

SYNC CASCRE action

The SYNC option sets device pair attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** The SRDF replication mode of each newly created device pair is unchanged.
- **If specified:** The SRDF replication mode of each newly created device pair is set to synchronous mode.

CREATEPAIR action

The SYNC option sets device pair attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** The SRDF replication mode of each newly created device pair is unchanged.
- **If specified:** The SRDF replication mode of each newly created device pair is set to synchronous mode.

HSWAP action

The SYNC option sets device pair attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** The SRDF replication mode of each swapped device pair is unchanged.
- **If specified:** The SRDF replication mode of each swapped device pair is set to synchronous mode.

SWAP action

The SYNC option sets device pair attributes after the action is complete but before any required synchronization takes place:

- **If not specified:** The SRDF replication mode of each swapped device pair is unchanged.
- **If specified:** The SRDF replication mode of each swapped device pair is set to synchronous mode.

TDS

Specify the TDS (Tolerate Desired State) option to prevent “no eligible device found” errors when the device or devices are in the required state.

- When the TDS option is not specified and a required state device is found, #SC VOL does not add the device to the eligible device list. If all requested devices are in the required state, the “no eligible device found” error occurs.
- When the TDS option is specified and a required state device is found, #SC VOL recognizes that a required state device exists. The device is not added to the eligible device list but the “no eligible device found” error does not occur if all requested devices are in the required state.
Device filtering

Devices go through a filtering process before they are considered for #SC VOL command processing.

**Phase 1 filtering - determining devices for processing**

This section describes the filtering process used to determine the set of devices to be considered for #SC VOL command processing. The process starts with the set of all devices on the storage system identified by the gatekeeper/hoplist combination.

The filtering rules, each of which may remove devices from this set, are then successively applied. After all the rules have been applied, the remaining set of devices are considered for processing.

The intention of phase 1 filtering is to utilize a set of exclusion conditions not to be treated as errors, but just as a way to simplify specification of ranges of devices to be processed without having to deal with range gaps, device personalities, or the occurrence of device types required by the command issuer (or system programmer) to be ignored.

Therefore, exclusion of a device during phase 1 filtering is treated neither as warranting an error nor a warning message. To do otherwise would undermine the purpose of phase 1 filtering.

**Filtering rules**

*Note: In the following rule descriptions, the phrase 'devices <meeting certain conditions> are considered for processing' means that any devices not meeting those conditions are removed from the set.*

If ALL is specified for the device range, it is the same as if a numeric device range of 0000 to the maximum device number on the storage system had been specified.

1. If an SRDF group is specified (that is, LCL or RMT is used), only those devices in the specified range and also in the specified SRDF group are considered for processing. If the specified range is ALL, then all devices in the specified SRDF group are considered for processing.

2. If no SRDF group is specified (neither LCL nor RMT is used), only devices in the specified range are considered for processing. If the specified range is ALL, then all devices on the storage system are considered for processing.

3. For certain commands applying only to R1s or R2s, devices with no mirror having the required SRDF personality are not considered for processing.

4. Power vault devices are not considered for processing.

5. If the FBA_ENABLE initialization parameter is not specified, FBA devices are not considered for processing. (If the FBA_ENABLE initialization parameter is specified, FBA devices are considered for processing if not otherwise excluded.)
Phase 1 complete
At the completion of the Phase 1 filtering process, the set of devices that are considered for processing appears in the 'REQUESTED DEVICES' detail message if the COMMAND_DETAILS initialization parameter was specified. Any devices that were not considered for processing are treated as follows:

◆ Devices excluded because they did not belong to a specified/implied SRDF group are listed in message EMCCV79I.
◆ Devices that were not considered for processing because they were FBA devices and FBA_ENABLE was not specified as an initialization parameter are not listed in any message.

If all devices have been eliminated from consideration, an error message such as EMCGM10E is issued (usually including the text 'COMMAND ABORTED') and command processing ends.

Phase 2 filtering - validating devices
Phase 2 filtering may have either of two purposes, and two corresponding outcomes:

◆ If command processing will continue despite ineligibility of some devices, the filtering is essentially an extension of phase 1 filtering. However, in this case a warning condition is warranted.
◆ If command processing will terminate if any devices are found to be ineligible, an error condition is warranted.

If any devices have not been eliminated from consideration, an EMCGM41I or EMCGM48I message is issued listing the remaining devices. These remaining devices are then checked for eligibility based on device state and other considerations. This is known as validation. Devices that are determined to be eligible are listed in an EMCGM42I or EMCGM49I message. If a device fails to meet eligibility requirements, one of the following may take place:

◆ Command processing may terminate immediately
◆ Command processing may skip the device associated with the validation failure and continue with validation of the next device

After device validation, command processing may terminate if any devices have failed validation, or may continue on to processing of the eligible devices. The former results in an error return, the latter a warning. An example of the former is most dynamic SRDF actions; an example of the latter is the exclusion of devices with an unacceptable sync direction.

If all devices were successfully validated, command processing continues on to device processing. If no devices were successfully validated, command processing terminates.

Device processing
Eligible devices are processed as required by the specified action. If an error is encountered, one of the following may take place:

◆ Command processing may terminate immediately
An attempt may be made to reverse all device changes, after which command processing terminates.

Command processing may skip the device associated with the error and continue with the next device.

When device processing is complete, an EMCGM43I or EMCGM4AI message is issued listing the devices that have been successfully processed. Depending upon the error handling, other messages may be issued listing devices for which errors were encountered.

Performing standard (thick) to thin device type operations

Standard (thick) devices and metadevices are not supported with SRDF Host Component with PowerMaxOS 5978 and HYPERMAX OS 5977. However, these devices are still supported when running SRDF Host Component with Enginuity 5876. Standard-to-thin and thin-to-thin operations are supported for both CKD and FBA devices.

Creating an SRDF relationship to a second R2

If the Concurrent SRDF feature is enabled, then you can use the CREATEPAIR action to create an SRDF relationship to a second R2 mirror. You can determine whether Concurrent SRDF is enabled in the configuration by using the #SQ CNFG command. The second R2 mirror must be in a different SRDF group from the first. If, when adding the second R2 mirror, KEEP2R2 is specified, the existing R2 must be in the suspended state (RDF_SUSP).

Implementing range support

Starting with SRDF Host Component 8.0, the #SC VOL actions RNG_REFRESH, RNG_RSUM, RNG_PREFRESH, and RNG_PRE_RSUM and the equivalent actions without the RNG_ prefix are processed in the same way. SRDF Host Component tries to combine device lists into ranges wherever possible. The RNG_ actions have been maintained for compatibility.

Performing composite actions

Composite #SC VOL command actions are available to support cascaded SRDF operations. These actions allow you to manage cascaded SRDF with a single command.

The #SC VOL composite command actions are:

- CASCRE—Creates a cascaded configuration
- CASSUSP—Suspends pairs in a cascaded configuration
- CASRSUM—Resumes pairs in a cascaded configuration
- CASDEL—Terminates relationships in a cascaded configuration
- CASSWAP—Performs SRDF personality swap on both device pairs

**Note:** Composite #SC VOL command actions should be used to manage diskless device operations whenever possible. However, in certain cases the individual environments may need to be managed using standard #SC VOL actions rather than the composite actions.

A cascaded triplet consists of three devices in one of the following configurations:
#SC VOL composite actions act on cascaded triplets by processing the pairs comprising each triplet in a synchronized manner. Processing of the local pair (the R1→R21 pair in the first configuration shown above and the R2→R21 pair in the second) is said to take place in Environment 1. Processing of the remote pair (the R21→R2 pair in the first configuration shown above and the R21→R1 pair in the second) is said to take place in Environment 2. When command results are displayed, the results are displayed separately for each environment.

For composite actions, only the Environment 1 local devices are specified in the #SC VOL command. The Environment 1 remote devices and the Environment 2 device pairs are discovered by the command processor. The local SRDF group must also be specified by using the LCL or RMT keyword in the command.

Validating environment consistency—During command processing, validation is performed separately for Environment 1 device pairs and for Environment 2 device pairs. At the completion of validation, the eligible device pairs in Environment 1 are compared with the eligible device pairs in Environment 2. This is done by comparing the remote devices of the eligible Environment 1 device pairs with the local devices of the eligible Environment 2 device pairs. In most cases, these must be the same. That is, only triplets for which both the Environment 1 device pair and the Environment 2 device pair are eligible can be processed. If one device pair of a triplet is eligible and the other device pair of the triplet is not, then the triplet cannot be processed.

In certain cases there may be discrepancies between the Environment 1 and Environment 2 eligible device pairs, dependent upon both the action and the reason for ineligibility. For example, a CASRSUM action can proceed even if a device pair is found to be ready on the link and therefore ineligible to be resumed. In such cases, the action is applied to the eligible device pairs and skipped for the ineligible device pairs.

Restrictions for cascaded SRDF—Cascaded SRDF has the following restrictions:

- PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5773 and later is required on the secondary site (with R21 devices). The primary and tertiary sites can run PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5771 and later.
- An R21 device cannot be paired with another R21 device (R1→R21→R21→R2 is not allowed).
- R21 devices cannot be BCV or PPRC devices.
- R21 devices are only supported on Gig-E and Fibre adapters.
- Thin and standard devices cannot be mixed in a cascaded SRDF/Star environment.
R22 device implementation guidelines

An R22 device is valid if a single R11 is the source for the R22 data on each of its mirrors as shown in Figure 16:

- If a device becomes an R22 device due to a CREATEPAIR, SWAP, or HSWAP action, the newly created R2 mirror is always inactive, and if the newly created R22 device is invalid, the R2 mirror that existed previously becomes inactive as well.
- If one of the R2 mirrors of an R22 device is eliminated using a SWAP, HSWAP, DELETEPAIR, or HDELETEPAIR action, the remaining R2 mirror becomes active.
- If an R22 device is valid and the partner of the inactive R2 mirror is in TNR state, if RDF_RSUM is applied to the partner of the inactive R2 mirror then the inactive R2 mirror becomes active and the active R2 mirror becomes inactive.
Miscellaneous commands

#HELP

The #HELP and #HELP CMDLIST commands display a list of all SRDF Host Component commands. #HELP can also be used to display code descriptions and the full syntax of all SRDF Host Component commands.

Syntax

#HELP [CMDLIST] | [CODES[,option]] | [SYNTAX,command_type,command_value[,action]]

Parameters

CMDLIST

Displays a list of all SRDF Host Component commands with descriptions.

CODES[,option]

Provides information about codes used in SRDF Host Component command displays.

option

Valid option values are:

- ADCMODE
- CNTLUNIT_STATUS
- DA-IP
- DV
- FILTER
- MR
- RA
- RCS
- TYP
- SYS_STATUS
- VOLSER

SYNTAX,command_type,command_value[,command_action]

Displays the full syntax for all SRDF Host Component commands.

Note: You can display information describing how to use this command by entering /#HELP SYNTAX or /#HELP SYNTAX,HELP.

command_type

Valid command_type values are:

- SQ
- SC
- HELP
- TF
- STOP

Note: If TF or STOP is specified, no further parameters are accepted.
Valid `command_value` options for SQ and SC are:

<table>
<thead>
<tr>
<th>command_value</th>
<th>MSG</th>
<th>SRDFA</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADC</td>
<td>RAID</td>
<td>SRDFA_DSE</td>
</tr>
<tr>
<td>CNFG</td>
<td>RAID5</td>
<td>SRDFA_VOL</td>
</tr>
<tr>
<td>DSTAT</td>
<td>RAID6</td>
<td>SRDFA_WP</td>
</tr>
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<td>EPVOL</td>
<td>RAID10</td>
<td>SRDFA_WP_VOL</td>
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<td>LINK</td>
<td>MIRROR</td>
<td>SRDF_CMPR</td>
</tr>
<tr>
<td>MIRROR</td>
<td>VOL</td>
<td></td>
</tr>
</tbody>
</table>

Valid `command_value` options for HELP are CMDLIST and CODES.

A valid action for the specified command (for example, CREATEPAIR for SC VOL). When an action is entered following an SC command, a description of the action is displayed along with examples of its use and an explanation of the command's parameters.

Examples

**Example 1**

```bash
#HELP SYNTAX,SC,VOL,CREATEPAIR

SYNTAX FOR SC,VOL,CREATEPAIR

Description: This action establishes an SRDF relationship between two dynamic SRDF-enabled devices.

Examples:

```bash
#SC VOL,LCL(cuu,rdfgroup#),CREATEPAIR(options),r1dv-r1dv,r2dv
#SC VOL,RMT(cuu,hoplist,rdfgroup#),CREATEPAIR(options),r1dv-r1dv,r2dv
```

Parameters:

- cuu
  - This parameter specifies a z/OS device number.
- rdfgroup#
  - This parameter specifies the SRDF group to which the entered command applies.
- options
  - ADCOPY_WP, ADCOPY_DISK, ADSRDF, CEXMPT, DETAIL, DIFFERENTIAL, DOMINO, ITRK, KEEPR2, LCLISR2, NOEXEC, NOCOPY, NODETAIL, RCVRY, R22ACT, R/W, RDY, SEMI-SYNC, SQAR, STAR, STAR-A, SUSPEND
- r1dv
  - R1 device
- r2dv
  - R2 device
Example 2

HELP SYNTAX, SQ, SRDFA

SYNTAX FOR SQ SRDFA

#SQ SRDFA (CAS)|(NOCAS) ,cuu ,CYCLETOD ,CQNAME=(cqname ,queue-option )

#SQ SRDFA (CAS)|(NOCAS) ,RMT (cuu,mhlist)|(cuu,mhlist,rdfgroup#)|
(cuu,mhlist,* ) ,CYCLETOD ,CQNAME=(cqname ,queue-option )

#SQ SRDFA (CAS)|(NOCAS) ,LCL(cuu,rdfgroup#) ,CYCLETOD
,CQNAME=(cqname ,queue-option )

#SQ SRDFA (CAS)|(NOCAS) ,G(groupname) ,CYCLETOD
,CQNAME=(cqname ,queue-option )

#SQ SRDFA (CAS)|(NOCAS) ,SCFG(scfggroupname) ,CYCLETOD
,CQNAME=(cqname ,queue-option )

Example 3

HELP SYNTAX, STOP

SYNTAX FOR STOP

#STOP

The #STOP command terminates SRDF Host Component.

Syntax

#STOP

#TF

The #TF command allows Dell EMC TimeFinder commands to be issued. The commands are issued one at a time directly to Dell 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.

Displaying TimeFinder command output

The TimeFinder output is optimized to avoid overflow of the SRDF message table. The following messages may be eliminated when they occur redundantly: BCVM039I, BCVM069I, BCVM140I. Blank lines between device output are also eliminated.

The maximum length of a TimeFinder/Mirror message is 91 characters. The rest of the message is truncated. For a complete message, use to the TimeFinder/Mirror batch interface.

Syntax

#TF timefinder-command

Parameters

timefinder-command

TimeFinder commands use the syntax described in the TimeFinder/Mirror for z/OS Product Guide.
CHAPTER 5
Operations and Examples

This chapter covers the following topics:

◆ Configuring SRDF operations ................................................................. 384
◆ Performing operations using hop list ....................................................... 386
◆ Resetting TNR status for R1 ................................................................. 388
◆ Performing personality swap ................................................................. 392
◆ Creating and deleting dynamic SRDF pair .............................................. 395
◆ Creating SRDF group ........................................................................... 405
◆ Modifying SRDF group ......................................................................... 409
◆ Manipulating and displaying FBA device states ........................................ 411
◆ Performing cascaded SRDF operations .................................................. 413
◆ Performing concurrent SRDF/A operations ............................................ 420
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◆ Performing SRDF/A MSC operations ..................................................... 442
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◆ Performing SRDF/Star HA planned failover ......................................... 460

Note: Some of the examples in this section were performed with earlier versions of software. Therefore, your output displays may not look exactly like the ones appearing in these examples.
Configuring SRDF operations

The examples in this section illustrate how to use the `#SC VOL` command to set up SRDF operations.

Suspending SRDF for single address

The following example suspends SRDF for one z/OS address:

```
#SC VOL,2150,RDF_SUSP
```

SRDF suspends z/OS address 2150.

Suspending SRDF for range of addresses

The following example suspends SRDF for a range of z/OS addresses:

```
#SC VOL,2150-215F,RDF_SUSP
```

SRDF suspends z/OS addresses 2150 - 215F.

Resuming SRDF for single device

The following command resumes SRDF for one device using PowerMax/VMAX device number:

```
#SC VOL,2100,RDF_RSUM,0050
```

This example accesses the storage system associated with z/OS address 2100 and SRDF resumes PowerMax/VMAX 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 storage system. The action is not performed on 2100.

Resuming SRDF for range of devices

The following example resumes SRDF for a range of devices using PowerMax/VMAX device numbers:

```
#SC VOL,2100,RDF_RSUM,0050-005F
```

This example accesses the storage system associated with z/OS address 2100 and SRDF resumes PowerMax/VMAX device numbers 0050 through 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 storage system. The action is not performed on 2100.

Resuming SRDF for range of devices in concurrent environment

The following example resumes SRDF for a range of devices using PowerMax/VMAX device numbers in a concurrent SRDF environment:

```
#SC VOL,LCL(4440,3),RDF_RSUM,0050-005F
```
This example accesses the storage system associated with z/OS address 4440, and SRDF resumes PowerMax/VMAX device numbers 0050 through 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 storage system. The action is not performed on 4440.

### Changing status to ready

The following example changes status to ready for a range of R2 devices from a host connected to an R1 device:

```
#SC VOL,RMT(8BD0),RDY,01D0-01DF
```

This example accesses the storage system associated with z/OS address 8BD0, and passes the command over the SRDF link to the target storage system and changes the remote target PowerMax/VMAX device numbers 01D0 through 01DF to a READY status.

### Changing status to read-only

The following example changes status to read-only for one R2 device from host connected to a R1 device:

```
#SC VOL,RMT(8BD0,1),R/O,01D0
```

This example accesses the storage system associated with z/OS address 8BD0, and passes the command over the SRDF link defined to SRDF group 01 to the target storage system and changes the remote target PowerMax/VMAX device number 01D0 to READ ONLY status.

### Changing status to read/write

The following example changes 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
```

This example accesses the storage system associated with z/OS address 4450, and passes the command over the SRDF link defined to SRDF group 03 to the target storage system and changes the remote target PowerMax/VMAX device numbers 0060 through 006F to READ/WRITE status.
Performing operations using hop list

The examples in this section explain how to carry out various SRDF operations in a multihop configuration. Figure 29 shows the configuration used in the following examples.

**Figure 29** SRDF multihop configuration

*Note:* Normally, configurations are created starting at SRDF group 0, but to make these examples easier to understand, they are made unique.

### Querying devices

The following example queries 16 devices on storage system C in Figure 29, starting at symdv# 0070:

```
#SQ VOL,RMT(1000,0.2),16,0070
```

The following example queries all devices on storage system F:

```
#SQ VOL,RMT(1000,0.2.4.7),ALL
```

### Setting device pair replication to adaptive copy disk mode

The following example changes all devices on storage system C in Figure 29 to adaptive copy disk mode:

```
#SC VOL,RMT(1000,0.2),ADCOPY_DISK,ALL
```
SRDF-suspending devices

The following example SRDF-suspends devices 0080 - 00AF on storage system D to VMAX E in Figure 29:

```
#SC VOL, RMT(1000, 0.2.4, 6), RDF_SUSP, 0080, 48
```

Changing R2 devices to R/W

The following example changes all R2 devices to R/W on storage system F in Figure 29:

```
#SC VOL, RMT(1000, 0.2.4.7), R/W, ALL
```
Resetting TNR status for R1

The following examples assume an R1 storage system at cuu=2100 and an R2 storage system with no host attachment. The PowerMax/VMAX device number range for the R1 storage system is 020-02F. The PowerMax/VMAX device number range for the R2 storage system is 030-03F. The R1 storage system (2100) is channel attached to the host. The R2 storage system is connected to the R1 storage system through SRDF group 00.

A range of SRDF R1 devices can be in TNR (Target Not Ready) status for a number of reasons. The most common cause is the use of the RDF_SUSP action for the #SC VOL command:

```
#SC VOL,2100,RDF_SUSP,020-02F
```

This command sets the TNR status for the range of PowerMax/VMAX devices 020-02F in storage system at cuu 2100. Figure 30 provides more information.

```
EMCMN001 SRDF-HC : (11) #SQ VOL,AA00,TNR
EMCQV34I SRDF-HC DISPLAY FOR (11) #SQ VOL,AA00,TNR
SERIAL #:0001967-01170/0KDNR MICROCODE LEVEL:5977-778
----------------------------------------------------------------------
CUU   CH|LCL DEV |VOLSER|---------------------------|LCL INV|---------
------------------------| TOTAL|SYS |DCB|CNTLUNIT |  |  R1  |  R2  |SY
LGRP |RMT DEV | RGRP | CYLS |STAT|OPN|STATUS   |MR|INVTRK|INVTRK|%
----------------------------------------------------------------------
2120  20   000020 OFFLIN   1113 Offlin   0 R/W       TH
     00   000030 00 TNR-SY R1 0 0 **
2121  21   000021 OFFLIN   1113 Offlin   0 R/W       TH
     00   000031 00 TNR-SY R1 0 0 **
2122  22   000022 OFFLIN   1113 Offlin   0 R/W       TH
     00   000032 00 TNR-SY R1 0 0 **
2123  23   000023 OFFLIN   1113 Offlin   0 R/W       TH
     00   000033 00 TNR-SY R1 0 0 **
2124  24   000024 OFFLIN   1113 Offlin   0 R/W       TH
     00   000034 00 TNR-SY R1 0 0 **
2125  25   000025 OFFLIN   1113 Offlin   0 R/W       TH
     00   000035 00 TNR-SY R1 0 0 **
2126  26   000026 OFFLIN   1113 Offlin   0 R/W       TH
     00   000036 00 TNR-SY R1 0 0 **
2127  27   000027 OFFLIN   1113 Offlin   0 R/W       TH
     00   000037 00 TNR-SY R1 0 0 **
2128  28   000028 OFFLIN   1113 Offlin   0 R/W       TH
     00   000038 00 TNR-SY R1 0 0 **
2129  29   000029 OFFLIN   1113 Offlin   0 R/W       TH
     00   000039 00 TNR-SY R1 0 0 **
212A  2A   00002A OFFLIN   1113 Offlin   0 R/W       TH
     00   00003A 00 TNR-SY R1 0 0 **
212B  2B   00002B OFFLIN   1113 Offlin   0 R/W       TH
     00   00003B 00 R/W-SY A1 0 0 **
212C  2C   00002C OFFLIN   1113 Offlin   0 R/W       TH
     00   00003C 00 R/W-SY A1 0 0 **
212D  2D   00002D OFFLIN   1113 Offlin   0 R/W       TH
     00   00003D 00 R/W-SY A1 0 0 **
212E  2E   00002E OFFLIN   1113 Offlin   0 R/W       TH
     00   00003E 00 R/W-SY A1 0 0 **
212F  2F   00002F OFFLIN   1113 Offlin   0 R/W       TH
     00   00003F 00 R/W-SY A1 0 0 **
END OF DISPLAY SORT_ORDER = SYMDEV
Total devices displayed = 16
```

Figure 30 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. Figure 31 on page 389 provides more information.

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.

Perform the following steps to reset TNR status for R1 devices and to clear R1 invalid tracks from the R2 device display:

1. Ensure that the R1 storage system is set for SYNCH_DIRECTION of R1>R2 by issuing the following command:

```
#SC CNFG,RMT(2100,00),SYNCH_DIRECTION,R1>R2
```
2. Set the R2 device range to read-only by issuing the following command:

```
#SC VOL,RMT(2100,00),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(2100,00),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(2100,00),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(2100,00),16,030
```

Figure 32 and Figure 33 show the status of the R1 and R2 devices after the procedure completes. The invalid tracks are cleared.

```
Figure 32  Status of R1 devices after the procedure
```
EMCMN001I SRDF-HC : (11) #SQ VOL,AA00,TNR
EMCQV34I SRDF-HC DISPLAY FOR (11) #SQ VOL,AA00,TNR
SERIAL #:0001967-01170/0KDNR MICROCODE LEVEL:5977-778

<table>
<thead>
<tr>
<th>CUU</th>
<th>CH</th>
<th>LCL DEV</th>
<th>VOLSER</th>
<th>TOTAL</th>
<th>DCB</th>
<th>CNTLUNIT</th>
<th>R1</th>
<th>R2</th>
<th>SY</th>
</tr>
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<tr>
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<td>RMT DEV</td>
<td>RGRP</td>
<td>CYLS</td>
<td>STAT</td>
<td>OPN</td>
<td>STATUS</td>
<td>MR</td>
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<td>INVTRK</td>
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<td>1113 OFFL</td>
<td>0 R/O</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>00</td>
<td>000020</td>
<td>00</td>
<td>R2</td>
<td>0</td>
<td>0 **</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>3131</td>
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<td>1113 OFFL</td>
<td>0 R/O</td>
<td>TH</td>
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</tr>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
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<td>000032 OFFLIN</td>
<td>1113 OFFL</td>
<td>0 R/O</td>
<td>TH</td>
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<td></td>
</tr>
<tr>
<td>00</td>
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<td>00</td>
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<td>0 **</td>
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<tr>
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<td>000033 OFFLIN</td>
<td>1113 OFFL</td>
<td>0 R/O</td>
<td>TH</td>
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<td></td>
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<tr>
<td>00</td>
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</tr>
<tr>
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<td>1113 OFFL</td>
<td>0 R/O</td>
<td>TH</td>
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</tr>
<tr>
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<td>1113 OFFL</td>
<td>0 R/O</td>
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</tr>
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<td>R2</td>
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<td>0 **</td>
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<td></td>
<td></td>
</tr>
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</tr>
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</tr>
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<td>1113 OFFL</td>
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</tr>
<tr>
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</tr>
<tr>
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<td>0</td>
<td>0 **</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

END OF DISPLAY
SORTE ORDER = SYMDEV
Total devices displayed = 16

Figure 33 Status of R2 devices after the procedure
Performing personality swap

The following procedure describes how to perform a non-cascaded personality swap of R1 and R2.

---

**Note:** When performing cascaded SRDF personality swaps, use the SC VOL,RMT(cuu,hoplist,srdfgrp),SWAP,symdv# command format to issue the remote swap.

1. Query the R1s and R2s to be swapped.

```
#SQ VOL,AA4C,2
```

```
EMCMN001I SRDF-HC : (18) #SQ VOL,AA4C,2
EMCQV341I SRDF-HC DISPLAY FOR (18) #SQ VOL,AA4C,2
SERIAL #:0001967-01170/0KDNR MICROCODE LEVEL:5977-778

----------------------------------------| LCL INV |
|------------------------| TOTAL|SYS |DCB|CNTLUNIT |  |  R1  |  R2  |SY |
| LGRP |RMT DEV | RGRP | CYLS |STAT|OPN|STATUS   |MR|INVTRK|INVTRK|%
|------------------------| TOTAL|SYS |DCB|CNTLUNIT |  |  R1  |  R2  |SY |
| AA4C 4C 00006C OFFLIN 1113 OFFL 0 R/W TH 1C 000120 C1 R/W-SY R1 0 0 **
| AA4D 4D 00006D OFFLIN 1113 OFFL 0 R/W TH 1C 000121 C1 R/W-SY R1 0 0 **
```

```
END OF DISPLAY SORT_ORDER = SYMDEV
Total devices displayed = 2
```

```
#SQ VOL,6592,2
```

```
EMCMN001I SRDF-HC : (19) #SQ VOL,6592,2
EMCQV341I SRDF-HC DISPLAY FOR (19) #SQ VOL,6592,2
SERIAL #:0001967-01175/0KDNY MICROCODE LEVEL:5977-782

----------------------------------------| LCL INV |
|------------------------| TOTAL|SYS |DCB|CNTLUNIT |  |  R1  |  R2  |SY |
| LGRP |RMT DEV | RGRP | CYLS |STAT|OPN|STATUS   |MR|INVTRK|INVTRK|%
|------------------------| TOTAL|SYS |DCB|CNTLUNIT |  |  R1  |  R2  |SY |
| 6592 92 00006C OFFLIN 1113 OFFL 0 N/R TH C1 00006C 1C R2 0 0 **
| 6593 93 00006D OFFLIN 1113 OFFL 0 N/R TH C1 00006D 1C R2 0 0 **
```

```
END OF DISPLAY SORT_ORDER = SYMDEV
Total devices displayed = 2
```

2. Issue the #SC VOL, SWAP action to perform a personality swap of R1 and R2. Set the mode to ADCOPY-DISK. An error is received because SRDF was not suspended.

```
#SC VOL,AA4C-AA4D,SWAP
```

```
EMCMN001I SRDF-HC : (20) #SC VOL,AA4C-AA4D,SWAP
EMCMON01I Command has finished for box 000196701170
EMCGM41I Requested devices - Count= 2
00006C-00006D
EMCGM22I R1 devices are not suspended
00006C-00006D
EMCCW56E No eligible devices found
EMCM10E COMMAND ABORTED
```

---
3. Suspend SRDF.

```
#SC VOL,AA4C-AA4D,RDF_SUSP
```

```
EMCMN001 SRDF-HC : (21) #SC VOL,AA4C-AA4D,RDF_SUSP
EMCGM401 Command has finished for box 000196701170
EMCGM411 Requested devices - Count= 2
  00006C-00006D
EMCGM421 Eligible devices - Count= 2
  00006C-00006D
EMCGM431 Completed devices - Count= 2
  00006C-00006D
EMCM071 COMMAND COMPLETED
```

4. Query devices to confirm SRDF is suspended.

```
#SQ VOL,AA4C,2
```

```
EMCMN001 SRDF-HC : (22) #SQ VOL,AA4C,2
EMCQV341 SRDF-HC DISPLAY FOR (22) #SQ VOL,AA4C,2
SERIAL #:0001967-01170/OKDNR MICROCODE LEVEL:5977-778

--------- --------- ------------------------ ------------------------
CUU   CH|LCL DEV |VOLSER|---------------------------|LCL INV|---------
------------------------| TOTAL|SYS |DCB|CNTLUNIT |  |  R1  |  R2  |SY
LGRP |RMT DEV | RGRP | CYLS |STAT|OPN|STATUS   |MR|INVTRK|INVTRK|%
------------------------| TOTAL|SYS |DCB|CNTLUNIT |  |  R1  |  R2  |SY
--------- --------- ------------------------ ------------------------
AA4C  4C   00006C OFFLIN 1113 OFFL 0 R/W TH
  1C     000120     C1                           R2      0      0 **
AA4D  4D   00006D OFFLIN 1113 OFFL 0 R/W TH
  1C     000121     C1                           R2      0      0 **
END OF DISPLAY        SORT_ORDER = SYMDEV
Total devices displayed = 2
```

5. Issue SWAP again for the devices.

```
#SC VOL,AA4C-AA4D,SWAP
```

```
EMCMN001 SRDF-HC : (23) #SC VOL,AA4C-AA4D,SWAP
EMCGM401 Command has finished for box 000196701170
EMCGM411 Requested devices - Count= 2
  354 00006C-00006D
EMCGM421 Eligible devices - Count= 2
  355 00006C-00006D
EMCGM431 Completed devices - Count= 2
  356 00006C-00006D
EMCM071 COMMAND COMPLETED
```

6. Query devices to show the R1 is now an R2 and the remote R2 is now the R1.

```
#SQ VOL,AA4C,2
```

```
EMCMN001 SRDF-HC : (24) #SQ VOL,AA4C,2
EMCQV341 SRDF-HC DISPLAY FOR (24) #SQ VOL,AA4C,2
SERIAL #:0001967-01170/OKDNR MICROCODE LEVEL:5977-778

--------- --------- ------------------------ ------------------------
CUU   CH|LCL DEV |VOLSER|---------------------------|LCL INV|---------
------------------------| TOTAL|SYS |DCB|CNTLUNIT |  |  R1  |  R2  |SY
LGRP |RMT DEV | RGRP | CYLS |STAT|OPN|STATUS   |MR|INVTRK|INVTRK|%
------------------------| TOTAL|SYS |DCB|CNTLUNIT |  |  R1  |  R2  |SY
--------- --------- ------------------------ ------------------------
AA4C  4C   00006C OFFLIN 1113 OFFL 0 N/R TH
  1C     000120     C1                           R2      0      0 **
AA4D  4D   00006D OFFLIN 1113 OFFL 0 N/R TH
  1C     000121     C1                           R2      0      0 **
END OF DISPLAY        SORT_ORDER = SYMDEV
Total devices displayed = 2
```
7. Resume SRDF on the devices that are now the R1s.

#SC VOL,RMT(70CE),RDF_RSUM,8E-8F

8. Query the devices.
Creating and deleting dynamic SRDF pair

The following procedure illustrates how to create dynamic SRDF pairs using the #SC VOL CREATEPAIR action and delete them using the DELETEPAIR action.

1. Issue the #SQ CNFG command to verify that dynamic SRDF is turned on for the storage system. Dynamic SRDF needs to be set for each device. With PowerMaxOS 5978 and HYPERMAX OS 5977, all devices are dynamic.

```
#SQ CNFG,AA00
EMCMNO01 SRDF-HC : (72) #SQ CNFG,AA00
EMCMG11 SRDF-HC DISPLAY FOR (72) #SQ CNFG,AA00
SERIAL #:001967-01170/0KDNR MEM:685 GB TYPE:2107 MODEL:VMAX200K
CNTRL:
MICROCODE LEVEL: 5977-813 CONCURRENT-RDF
CONCURRENT DRDF: YES 3-DYN-MIRROR
SYMMETRIX DATA ENCRYPTION: DISABLED
ALL FLASH: NO
SWITCHED-RDF DYNAMIC-RDF NO-AUTO-LINKS RDFGRP LINKS-OFF-ON-POWERUP
LINKS-DOMINO: RDFGRP SYNCH_DIRECTION: GLOBAL LINK: LOCAL
SSID(S): AA00 AB00 AC00 AC01 AC02 AC03 AC04 AC05
AC06 AC07 AC08 AC09 AC0A AC0B
FIBRE CHANNEL ADAPTER (FA) DIRECTORS: 031(01D)- 032(02D)- 033(03D)- 034(04D)- 035(05D)- 036(06D)
GIGE REMOTE (RE) DIRECTORS: 063(03G)- 065(05G)
FIBRE CHANNEL REMOTE (RF) DIRECTORS:
041(01E) 042(02E) 044(04E) 046(06E)
FICON (EF) DIRECTORS:
051(01F) 052(02F) 053(03F) 054(04F) 055(05F) 056(06F)
GIGE OPEN SYSTEMS (SE) DIRECTORS:
064(04G)= 066(06G)=
INFRASTRUCTURE MANAGEMENT (IM) DIRECTORS:
001(01A) 002(02A) 003(03A) 004(04A) 005(05A) 006(06A)
ENGINUITY DATA SERVICES (ED) DIRECTORS:
011(01B) 012(02B) 013(03B) 014(04B) 015(05B) 016(06B)
SAS BACKEND (DS) DIRECTORS:
021(01C) 022(02C) 023(03C) 024(04C) 025(05C) 026(06C)
END OF DISPLAY
```

```
#SQ CNFG,6200
EMCMNO01 SRDF-HC : (83) #SQ CNFG,6200
EMCMG11 SRDF-HC DISPLAY FOR (83) #SQ CNFG,6200
SERIAL #:001967-01130/0KDLN MEM:962 GB TYPE:2107 MODEL:VMAX200K
CNTRL:UYE1
MICROCODE LEVEL: 5977-813 CONCURRENT-RDF
CONCURRENT DRDF: YES 3-DYN-MIRROR
SYMMETRIX DATA ENCRYPTION: DISABLED
ALL FLASH: NO
SWITCHED-RDF DYNAMIC-RDF NO-AUTO-LINKS RDFGRP LINKS-OFF-ON-POWERUP
LINKS-DOMINO: RDFGRP SYNCH_DIRECTION: GLOBAL LINK: LOCAL
SSID(S): 6200 6300 2001 0002
FIBRE CHANNEL ADAPTER (FA) DIRECTORS:
031(01D)- 032(02D)- 033(03D)- 034(04D)
FIBRE CHANNEL REMOTE (RF) DIRECTORS:
061(01G) 062(02G) 063(03G) 064(04G)
FICON (EF) DIRECTORS:
051(01F) 052(02F) 053(03F) 054(04F)
INFRASTRUCTURE MANAGEMENT (IM) DIRECTORS:
001(01A) 002(02A) 003(03A) 004(04A)
ENGINUITY DATA SERVICES (ED) DIRECTORS:
011(01B) 012(02B) 013(03B) 014(04B)
SAS BACKEND (DS) DIRECTORS:
021(01C) 022(02C) 023(03C) 024(04C)
END OF DISPLAY
```
2. Issue the `#SQ LINK` command to verify that it is a switched configuration.

```
#SQ LINK,AA00,E
EMCMN0I SRDF-HC : (89) #SQ LINK,AA00,E
EMCQLO1I SRDF-HC EXTENDED DISPLAY FOR #SQ LINK,AA00,E
SERIAL #:001967-01170/0KDNR MICROCODE LEVEL:5977-0813
DR GP _OTHER__S/N_ OD OG RCS | % M:SS RATE | %L DD:HH:MM:SS TOTAL-I/O
41 SW ................ .. .. FYY | .. 8:03 25 | .. 06:23:49:50 24551922
42 ** ******************** ** FNY | .. 8:03 00 | .. 06:23:49:50 0
44 SW .......................... FYY | .. 8:03 95 | .. 06:23:49:50 19321514
46 SW .......................... FYY | .. 8:03 57 | .. 06:23:49:50 55816072
63 ** ******************** ** ENY | .. 8:03 00 | .. 06:23:49:50 0
65 ** ******************** ** ENY | .. 8:03 00 | .. 06:23:49:50 0
END OF DISPLAY
```

3. The `#SQ RDFGRP` command displays the SRDF group information.

```
#SQ RDFGRP,AA00,RA(F0)
EMCMN0I SRDF-HC : (90) #SQ RDFGRP,AA00,RA(F0)
EMCQR00I SRDF-HC DISPLAY FOR (90) #SQ RDFGRP,AA00,RA(F0)
MY SERIAL #        MY MICROCODE
-------------------   ------------
0001967-01170/0KDNR     5977-813
MY GRP ONL PC OS GRP  OS SERIAL   OS MICROCODE SYNCHDIR FEATURE
------ --- -- ------ ------------ ----------- -------- -------------
LABEL      TYPE    AUTO-LINKS-RECOVERY    LINKS_DOMINO   MSC_GROUP
---------- ------- ---------------------- ---------------- ----------
F0    Y   F   F1   0001967-01130  5977-813   G(R1>R2)
EMCTESTF0  DYNAMIC    AUTO-LINKS-RECOVERY   LINKS-DOMINO:NO
( SW,HW ) CMPR ENABLED = ( N,N )
MY DIR# OS RA# ST -----MY WWN-----
------- ------ -- ----------------
44(0B) 62(04) 0A 50000973501248CB
63(07) 0A
46(08) 62(04) 0A 5000097350124948
63(07) 0A
END OF DISPLAY
```

4. Issue `#SQ VOL` commands to query the devices. Devices AA84-AA87 are changed to the R1 devices. Devices 62F0-62F3 are changed to the R2 devices.

```
#SQ VOL,AA84,5
EMCMN0I SRDF-HC : (82) #SQ VOL,AA84,5
EMCQVJ31I SRDF-HC DISPLAY FOR (82) #SQ VOL,AA84,5
SERIAL #:001967-01170/0KDNR MICROCODE LEVEL:5977-813
----------- ----------- ----------- ----------- ----------- --------------- 
CUU CH|LCL DEV |VOLSER|---------------------------|LCL INV|---------
LGRP |RMT DEV | RGRP | TOTAL |SY|DCB|CNTLUNIT |MR |R1 |R2 |SY
| | | CYLS | STAT | OPN |STATUS | R1 |INVTRK |INVTRK |%
AA84 84 0000A4 OFFLIN 1113 OFFL 0 R/W TH
AA85 85 0000A5 OFFLIN 1113 OFFL 0 R/W TH
AA86 86 0000A6 OFFLIN 1113 OFFL 0 R/W TH
AA87 87 0000A7 OFFLIN 1113 OFFL 0 R/W TH
AA88 88 0000A8 OFFLIN 1113 OFFL 0 R/W TH
END OF DISPLAY SORT_ORDER = SYMDEV
Total devices displayed = 5
```
5. Issue the **#SC VOL** command with the **CREATEPAIR** action.

**#SC VOL, AA00, 5, A4**

```
EMCMN01 SRDF-HC : (87) #SC VOL, AA00, 5, A4
EMCQV34I SRDF-HC DISPLAY FOR (87) #SC VOL, AA00, 5, A4
SERIAL #:0001967-01170/0KDNR MICROCODE LEVEL:5977-813

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</table>

AA84  84 0000A4 OFFLIN 1113 OFFL 0 R/W TH
F0   000130 F1 R/W-SY R1 0 0 **
AA85  85 0000A5 OFFLIN 1113 OFFL 0 R/W TH
F0   000131 F1 R/W-SY R1 0 0 **
AA86  86 0000A6 OFFLIN 1113 OFFL 0 R/W TH
F0   000132 F1 R/W-SY R1 0 0 **
AA87  87 0000A7 OFFLIN 1113 OFFL 0 R/W TH
F0   000133 F1 R/W-SY R1 0 0 **
AA88  88 0000A8 OFFLIN 1113 OFFL 0 R/W TH
F0   000134 F1 R/W-SY R1 0 0 **

END OF DISPLAY SORT_ORDER = SYMDEV
Total devices displayed = 5
```
Operations and Examples

#SQ VOL, 6200, 5, 130

EMCMNO01 SRDF-HC : (91) #SQ VOL, 6200, 5, 130
EMCQV34I SRDF-HC DISPLAY FOR (91) #SQ VOL, 6200, 5, 130
SERIAL #: 0001967-01130/0KDNR MICROCODE LEVEL: 5977-813

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END OF DISPLAY SORT_ORDER = SYMDEV
Total devices displayed = 5

7. Issue the #SC VOL command with the RDF_SUSP action to suspend SRDF for PowerMax/VMAX device numbers A4-A6.

#SC VOL, LCL(AA00, F0), RDF_SUSP, A4-A6

EMCMNO01 SRDF-HC : (92) #SC VOL, LCL(AA00, F0), RDF_SUSP, A4-A6
EMCMG40I Command has finished for box 000196701170
EMCMG41I Requested devices - Count= 5
0000A4-0000A8
EMCMG42I Eligible devices - Count= 5
0000A4-0000A8
EMCMG43I Completed devices - Count= 5
0000A4-0000A8
EMCMG07I COMMAND COMPLETED

#SQ VOL, LCL(AA00, F0), ALL

EMCMNO01 SRDF-HC : (94) #SQ VOL, LCL(AA00, F0), ALL
EMCQV34I SRDF-HC DISPLAY FOR (94) #SQ VOL, LCL(AA00, F0), ALL
SERIAL #: 0001967-01170/0KDNR MICROCODE LEVEL: 5977-813

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<th>LCL DEV</th>
<th>VOLSER</th>
<th>TOTAL</th>
<th>DCB</th>
<th>CNTRLUNIT</th>
<th>R1</th>
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</table>

END OF DISPLAY SORT_ORDER = SYMDEV
Total devices displayed = 5
8. Issue an \#SC VOL command to query devices until all invalid tracks are sent for devices AA84-AA88.

\#SQ VOL, AA00, 5, A4

EMCMN001 SRDF-HC : (112) \#SQ VOL, AA00, 5, A4
EMCQV341 SRDF-HC DISPLAY FOR (112) \#SQ VOL, AA00, 5, A4
SERIAL #:0001967-01170/0KDNR MICROCODE LEVEL: 5977-813

-----------------------------------------------| LCL INV |---------

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<td>84</td>
<td>0000A4 OFFLIN 1113 OFFL 0 R/W TH</td>
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<td>TNR-SY R1 0 **</td>
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END OF DISPLAY SORT_ORDER = SYMDEV
Total devices displayed = 5

9. Issue an \#SC VOL command with the DELETEPAIR action to delete SRDF pairs for AA86-AA88. You receive EMCCM22I because SRDF was still active for PowerMax/VMAX device numbers A6-A8.

\#SC VOL, AA86-AA88, DELETEPAIR

EMCMN001 SRDF-HC : (113) \#SC VOL, AA86-AA88, DELETEPAIR
EMCGM401 Command has finished for box 000196701170
EMCGM41I Requested devices - Count= 3
0000A6-0000A8
EMCCM22I R1 devices are not suspended
0000A6-0000A8
EMCCW56E No eligible devices found
EMCGM10E COMMAND ABORTED

10. Issue the \#SC VOL command with the RDF_SUSP action to suspend SRDF.

\#SC VOL, LCL(AA00, F0), RDF_SUSP, A4-A8

EMCMN001 SRDF-HC : (114) \#SC VOL, LCL(AA00, F0), RDF_SUSP, A4-A8
EMCGM401 Command has finished for box 000196701170
EMCGM41I Requested devices - Count= 5
0000A4-0000A8
EMCGM42I Eligible devices - Count= 5
0000A4-0000A8
EMCGM43I Completed devices - Count= 5
0000A4-0000A8
EMCGM07I COMMAND COMPLETED
## SQ VOL, LCL(AA00, F0), ALL

EMCMN00I SRDF-HC : (116) #SQ VOL, LCL(AA00, F0), ALL
EMCQV34I SRDF-HC DISPLAY FOR (116) #SQ VOL, LCL(AA00, F0), ALL
SERIAL #: 0001967-01170/0KDNR MICROCODE LEVEL: 5977-813

```
------------------------ | TOTAL | SYS | DCB | CNTLUNIT | MR | INVTRK | INVTRK |
------------------------ | R1   | R2  |     |          |    |         |         |
LGRP | RMT DEV | RGRP | CYLS | STAT | OPN | STATUS | MR | INVTRK | INVTRK |%
------------------------ | R1   | R2  |     |          |    |         |         |
AA84 84 0000A4 OFFLIN 1113 OFFL 0 R/W TH
F0 000130 F1 TNR-SY R1 0 16695 0
AA85 85 0000A5 OFFLIN 1113 OFFL 0 R/W TH
F0 000131 F1 TNR-SY R1 0 16695 0
AA86 86 0000A6 OFFLIN 1113 OFFL 0 R/W TH
F0 000132 F1 TNR-SY R1 0 0 **
AA87 87 0000A7 OFFLIN 1113 OFFL 0 R/W TH
F0 000133 F1 TNR-SY R1 0 0 **
AA88 88 0000A8 OFFLIN 1113 OFFL 0 R/W TH
F0 000134 F1 TNR-SY R1 0 0 **
END OF DISPLAY SORT_ORDER = SYMDEV
Total devices displayed = 5
```

11. Re-issue the #SC VOL command with the DELETEPAIR action. Notice in the last queries that R1s and R2s are now standard devices.

## SC VOL, AA86-AA88, DELETEPAIR

EMCMN00I SRDF-HC : (117) #SC VOL, AA86-AA88, DELETEPAIR
EMCMGN01 Command has finished for box 000196701170
EMCMGN01 Requested devices - Count = 3
0000A6-0000A8
EMCMGN01 Eligible devices - Count = 3
0000A6-0000A8
EMCMGN01 Completed devices - Count = 3
0000A6-0000A8
EMCMGN01 COMMAND COMPLETED

## SQ VOL, AA00, 5, A4

EMCMQV34I SRDF-HC DISPLAY FOR (120) #SQ VOL, AA00, 5, A4
SERIAL #: 0001967-01170/0KDNR MICROCODE LEVEL: 5977-813

```
------------------------ | TOTAL | SYS | DCB | CNTLUNIT | MR | INVTRK | INVTRK |
------------------------ | R1   | R2  |     |          |    |         |         |
LGRP | RMT DEV | RGRP | CYLS | STAT | OPN | STATUS | MR | INVTRK | INVTRK |%
------------------------ | R1   | R2  |     |          |    |         |         |
AA84 84 0000A4 OFFLIN 1113 OFFL 0 R/W TH
F0 000130 F1 TNR-SY R1 0 16695 0
AA85 85 0000A5 OFFLIN 1113 OFFL 0 R/W TH
F0 000131 F1 TNR-SY R1 0 16695 0
AA86 86 0000A6 OFFLIN 1113 OFFL 0 R/W TH
AA87 87 0000A7 OFFLIN 1113 OFFL 0 R/W TH
AA88 88 0000A8 OFFLIN 1113 OFFL 0 R/W TH
END OF DISPLAY SORT_ORDER = SYMDEV
Total devices displayed = 5
```
12. Issue the `#SC VOL` command with the `DELETEPAIR` action to devices AA84-AA85. However, because of invalid tracks owed to the R2, EMCCM40I is received and the command fails.

```
#SC VOL, AA84-AA85, DELETEPAIR
EMCMN00I SRDF-HC : (123) #SC VOL, AA84-AA85, DELETEPAIR
EMCMG40I Command has finished for box 000196701170
EMCMG41I Requested devices - Count= 2
  0000A4-0000A5
EMCMG40I Local devices owe invalid tracks to the remotes
  0000A4-0000A5
EMCMG56E No eligible devices found
EMCMG10E COMMAND ABORTED
```

13. Issue the `#SC VOL` command with the `DELETEPAIR` action to devices AA84-AA85, this time with the `FORCE` option. You continue to receive EMCCVE5W warnings because there are tracks owed, but the command is successful. The last queries show that devices are set as they were in step 4.

```
#SC VOL, AA84-AA85, DELETEPAIR (FORCE)
EMCMN00I SRDF-HC : (123) #SC VOL, AA84-AA85, DELETEPAIR (FORCE)
EMCMG40I Command has finished for box 000196701170
EMCMG41I Requested devices - Count= 2
  0000A4-0000A5
EMCMG56E DELETEPAIR: R1 INDICATES DATA OWED TO THE R2
  0000A4-0000A5
EMCMG42I Eligible devices - Count= 2
  0000A4-0000A5
EMCMG43I Completed devices - Count= 2
  0000A4-0000A5
EMCMG07I COMMAND COMPLETED
```
### #SQ VOL, AA00, 5, A4

EMCMN001 SRDF-HC : (124) #SQ VOL, AA00, 5, A4
EMCQV34I SRDF-HC DISPLAY FOR (124) #SQ VOL, AA00, 5, A4
SERIAL #:0001967-01170/0KDNR MICROCODE LEVEL:5977-813

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END OF DISPLAY  
SORT_ORDER = SYMDEV  
Total devices displayed = 5

### #SQ VOL, 6200, 5, 130

EMCMN001 SRDF-HC : (125) #SQ VOL, 6200, 5, 130
EMCQV34I SRDF-HC DISPLAY FOR (125) #SQ VOL, 6200, 5, 130
SERIAL #:0001967-01130/0KDLN MICROCODE LEVEL:5977-813

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END OF DISPLAY  
SORT_ORDER = SYMDEV  
Total devices displayed = 5
Using Geometry Compatible Mode

Geometry Compatible Mode (GCM) allows SRDF relationships to be established between an FBA device on a storage system running Enginuity 5876 and an FBA device on a storage system running PowerMaxOS 5978 or HYPERMAX OS 5977, where the device under PowerMaxOS 5978 or HYPERMAX OS 5977 is exactly 1/2 cylinder larger than the device under Enginuity 5876.

When pairing devices on storage systems with different FBA track sizes (64K for storage systems running Enginuity 5876 and 128K for those running PowerMaxOS 5978 or HYPERMAX OS 5977), if an FBA device under Enginuity 5876 is configured with an odd number of cylinders, there is no size on the PowerMaxOS 5978 or HYPERMAX OS 5977 side that exactly matches the configuration.

For example, consider the following devices:

```
EMCMN001 SRDF-HC : (12) #SQ VOL,3A00,1,298C
EMCQV341 SRDF-HC DISPLAY FOR (12) #SQ VOL,3A00,1,298C
SERIAL #:0001957-00086/0GKHV MICROCODE LEVEL:5876-286
-------------------------------------------------------------------
CUU CH|LCL DEV |VOLSER|---------------------------|LCL INV|---------
------------------------| TOTAL|SYS |DCB|CNTLUNIT |  |  R1  |  R2  |SY
LGRP |RMT DEV | RGRP | CYLS |STAT|OPN|STATUS   |MR|INVTRK|INVTRK|%
-------------------------------------------------------------------
???? ?? 00298C *F64* 973  R/W  TH
END OF DISPLAY          SORT_ORDER = SYMDEV
```

One cannot establish an equal sized SRDF relationship between these devices, because TOTAL CYLS 973/2 = 486.5.

The devices would be subject to 'R2 larger than R1' rules and no action could take place that would attempt to restore data from the R2 to the R1, nor could the R1 be larger than the R2:

```
EMCMN001 SRDF-HC : (13) #SQ VOL,6200,1,1022
EMCQV341 SRDF-HC DISPLAY FOR (13) #SQ VOL,6200,1,1022
SERIAL #:0001967-01130/0KDLN MICROCODE LEVEL:5977-738
-------------------------------------------------------------------
CUU CH|LCL DEV |VOLSER|---------------------------|LCL INV|---------
------------------------| TOTAL|SYS |DCB|CNTLUNIT |  |  R1  |  R2  |SY
LGRP |RMT DEV | RGRP | CYLS |STAT|OPN|STATUS   |MR|INVTRK|INVTRK|%
-------------------------------------------------------------------
???? ?? 001022 *F128* 487  R/W  TH
END OF DISPLAY          SORT_ORDER = SYMDEV
```

With GCM mode enabled, the device is treated for replication purposes as if it is a half cylinder smaller than its configured size, thus allowing equal sized SRDF pairing:

```
MCMN001 SRDF-HC : (20) #SC VOL,LCL(3A00,B7),CREATEPAIR,298C,1022
EMCGM401 Command has finished for box 000195700086
EMCGM411 Requested devices - Count= 1
  00298C
EMCGM421 Eligible devices - Count= 1
  00298C
EMCGM431 Completed devices - Count= 1
  00298C
EMCGM071 COMMAND COMPLETED
```
GCM mode is set/cleared automatically if the following conditions are met:

- The CREATEPAIR action involves a device under Enginuity 5876 as the R1 and a device under PowerMaxOS 5978 or HYPERMAX OS 5977 as the R2.
- The R2 under PowerMaxOS 5978 or HYPERMAX OS 5977 is only a half cylinder larger than the device under Enginuity 5876.

Devices operating in GCM mode are indicated with "G128" in SRDF Host Component queries:

```
MCMN001I SRDF-HC : (21) #SQ VOL,LCL(3A00,B7),ALL
EMCQV34I SRDF-HC DISPLAY FOR (21) #SQ VOL,LCL(3A00,B7),ALL
SERIAL #:0001957-00086/0GKHV MICROCODE LEVEL:5876-286

-----------------------------------------------
CUU   CH|LCL DEV| VOLSER|---------------------------|LCL INV|---------
------------------------| TOTAL|SYS |DCB|CNTLUNIT |  |  R1  |  R2  |SY
LGRP |RMT DEV | RGRP | CYLS |STAT|OPN|STATUS   |MR|INVTRK|INVTRK|%
-----------------------------------------------
????  ?? 00298C "G128"  973          R/W      TH
B7     001022     B7                 R/W-SY    R1      0      0 **
END OF DISPLAY                       SORT_ORDER = SYMDEV
Total devices displayed = 1
```

When the SRDF relationship is removed (using the DELETEPAIR action of the #SC VOL command), the PowerMaxOS 5978 or HYPERMAX OS 5977 device keeps its GCM state to maintain data integrity. So, if the GCM attribute is enabled it stays on until one of the following occurs:

- GCM is turned off manually.

**Note:** You can use the NOGCM action of the #SC VOL command to clear the GCM attribute.

- GCM needs to be disabled because the device is an R2 in another CREATEPAIR action.

If the PowerMaxOS 5978 or HYPERMAX OS 5977 device is going to be an R1, and GCM is on, it will remain on, and the device will behave as if it was a half cylinder smaller.
Creating SRDF group

The following procedure demonstrates how to create an SRDF group under PowerMaxOS 5978 or HYPERMAX OS 5977.

1. Find the serial number of the remote storage system using the `#SQ CNFG` command.

```
#SQ CNFG, AA00
EMCGM11I SRDF-HC DISPLAY FOR #SQ CNFG, AA00
SERIAL #: 0001967-01170/0KDNR MEM: 688 GB TYPE: 2107 MODEL: VMAX200K
CNTRL:
MICROCODE LEVEL: 5977-790 CONCURRENT-RDF
CONCURRENT DRDF: YES 3-DYN-MIRROR
SYMMETRIX DATA ENCRYPTION: DISABLED
SWITCHED-RDF DYNAMIC-RDF NO-AUTO-LINKS RDFGRP LINKS-OFF-ON-POWERUP
LINKS-DOMINO: RDFGRP SYNCH_DIRECTION: GLOBAL LINK: LOCAL
SSID(S): AA00 AB00 AC00 AC01 AC02 AC03 AC04 AC05 AC06 AC07 AC08 AC09 AC0A AC0B
FIBRE CHANNEL ADAPTER (FA) DIRECTORS:
  031(01D) - 032(02D) - 033(03D) 034(04D) - 035(05D) - 036(06D)
FIBRE CHANNEL REMOTE (RF) DIRECTORS:
  041(01E) 042(02E) 044(04E) 046(06E)
FICON (EF) DIRECTORS:
  051(01F) 052(02F) 053(03F) 054(04F) 055(05F) 056(06F)
GIGE OPEN SYSTEMS (SE) DIRECTORS:
  064(04G) - 066(06G)
INFRASTRUCTURE MANAGEMENT (IM) DIRECTORS:
  001(01A) 002(02A) 003(03A) 004(04A) 005(05A) 006(06A)
ENGINUITY DATA SERVICES (ED) DIRECTORS:
  011(01B) 012(02B) 013(03B) 014(04B) 015(05B) 016(06B)
SAS Backend (DS) DIRECTORS:
  021(01C) 022(02C) 023(03C) 024(04C) 025(05C) 026(06C)
GIGE Remote (RE) DIRECTORS:
  063(03G) 065(05G)
END OF DISPLAY
```

2. Obtain the link director numbers for the remote and local systems using the `#SQ LINK, cuu,port` and `#SQ LINK, RMT(cuu),port` commands.

**Note:** Multiple directors can be selected and specified in the command. “Modifying SRDF group” on page 409 provides more information.
### #SQ LINK, AA00, PORT

EMCQL001 SRDF-HC DISPLAY FOR #SQ LINK, AA00, PORT
SERIAL #: 0001967-01170/0KDNR MICROCODE LEVEL: 5977-0790

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END OF DISPLAY

### #SQ LINK, 6400, PORT

EMCQL001 SRDF-HC DISPLAY FOR #SQ LINK, 6400, PORT
SERIAL #: 0001967-01175/0KDNY MICROCODE LEVEL: 5977-0782

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END OF DISPLAY
3. Select an SRDF group number that is not already being used on both the local and the remote systems. Use the #SQ RDFGRP,CUU command and the #SQ RDFGRP,RMT(cuu) command to see which numbers are being used.

### #SQ RDFGRP, 6400

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<th>TYPE</th>
<th>AUTO-LINKS-RECOVERY</th>
<th>LINKS_DOMINO</th>
<th>MSC_GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>0D</td>
<td>Y</td>
<td>F</td>
<td></td>
<td>G(NONE)</td>
</tr>
<tr>
<td>01</td>
<td>Y</td>
<td>F</td>
<td></td>
<td>G(NONE)</td>
</tr>
<tr>
<td>11</td>
<td>Y</td>
<td>F</td>
<td></td>
<td>G(NONE)</td>
</tr>
<tr>
<td>13</td>
<td>Y</td>
<td>F</td>
<td></td>
<td>G(NONE)</td>
</tr>
</tbody>
</table>

### #SQ RDFGRP, RMT(6400, 11)

<table>
<thead>
<tr>
<th>LABEL</th>
<th>TYPE</th>
<th>AUTO-LINKS-RECOVERY</th>
<th>LINKS_DOMINO</th>
<th>MSC_GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>0D</td>
<td>Y</td>
<td>F</td>
<td></td>
<td>G(NONE)</td>
</tr>
<tr>
<td>01</td>
<td>Y</td>
<td>F</td>
<td></td>
<td>G(NONE)</td>
</tr>
<tr>
<td>11</td>
<td>Y</td>
<td>F</td>
<td></td>
<td>G(NONE)</td>
</tr>
<tr>
<td>13</td>
<td>Y</td>
<td>F</td>
<td></td>
<td>G(NONE)</td>
</tr>
</tbody>
</table>
4. Select a label name (any 8 characters) and build the command.

```sh
#SC RDFGRP,6400,02,ADD,LDIR(51(0A)),RDIR(41(06)),RSER(000196701170),RGRP(02),LABEL(GRP02)
```

EMCMN00I SRDF-HC : #SC RDFGRP,6400,02,ADD,LDIR(51(0A)),RDIR(41(06)),RSER(000196701170),RGRP(02),LABEL(GRP02)
EMCGM07I COMMAND COMPLETED
EMCGM40I Command has finished for box 000196701175

5. Build the SRDF group on multiple directors:

```sh
#SC RDFGRP,6400,03,ADD,LDIR(51(0A),52(0A)),RDIR(41(06),42(07)),RGRP(03),LABEL(GRP03),RSER(000196701170)
```

EMCMN00I SRDF-HC : #SC RDFGRP,6400,03,ADD,LDIR(51(0A),52(0A)),RDIR(41(06),42(07)),RGRP(03),LABEL(GRP03),RSER(000196701170)
EMCGM07I COMMAND COMPLETED
EMCGM40I Command has finished for box 000196701175

6. Issue #SQ RDFGRP,cuu to see the newly created group. Notice the LABEL option was used:

```sh
#SQ RDFGRP,RMT(6400,02),LABEL(GRP*)
```

EMCMN00I SRDF-HC : #SQ RDFGRP,RMT(6400,02),LABEL(GRP*)
EMCQR00I SRDF-HC DISPLAY FOR #SQ RDFGRP,6400,LABEL(GRP*)

<table>
<thead>
<tr>
<th>MY SERIAL #</th>
<th>MY MICROCODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0001967-01175/0KDNY</td>
<td>5977-782</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MY GRP ONL PC OS GRP OS SERIAL OS MICROCODE SYNCHDIR FEATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LABEL TYPE AUTO-LINKS-RECOVERY LINKS_DOMINO MSC_GROUP</td>
</tr>
<tr>
<td>-------------------------------------------------------------</td>
</tr>
<tr>
<td>02 Y F 02 0001967-01170 5977-790 G(NONE)</td>
</tr>
<tr>
<td>GRP02 DYNAMIC AUTO-LINKS-RECOVERY LINKS_DOMINO:NO</td>
</tr>
<tr>
<td>( SW,HW ) CMPR ENABLED = ( N,N )</td>
</tr>
<tr>
<td>03 Y F 03 0001967-01170 5977-790 G(NONE)</td>
</tr>
<tr>
<td>GRP03 DYNAMIC AUTO-LINKS-RECOVERY LINKS_DOMINO:NO</td>
</tr>
<tr>
<td>( SW,HW ) CMPR ENABLED = ( N,N )</td>
</tr>
</tbody>
</table>

END OF DISPLAY

```sh
#SQ RDFGRP,RMT(6400,02),LABEL(GRP*)
```

EMCMN00I SRDF-HC : #SQ RDFGRP,RMT(6400,02),LABEL(GRP*)
EMCQR00I SRDF-HC DISPLAY FOR #SQ RDFGRP,RMT(6400,02),LABEL(GRP*)

<table>
<thead>
<tr>
<th>MY SERIAL #</th>
<th>MY MICROCODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0001967-01170/0KDNR</td>
<td>5977-782</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MY GRP ONL PC OS GRP OS SERIAL OS MICROCODE SYNCHDIR FEATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LABEL TYPE AUTO-LINKS-RECOVERY LINKS_DOMINO MSC_GROUP</td>
</tr>
<tr>
<td>-------------------------------------------------------------</td>
</tr>
<tr>
<td>02 Y F 02 0001967-01175 5977-782 G(NONE)</td>
</tr>
<tr>
<td>GRP02 DYNAMIC AUTO-LINKS-RECOVERY LINKS_DOMINO:NO</td>
</tr>
<tr>
<td>( SW,HW ) CMPR ENABLED = ( N,N )</td>
</tr>
<tr>
<td>03 Y F 03 0001967-01175 5977-782 G(NONE)</td>
</tr>
<tr>
<td>GRP03 DYNAMIC AUTO-LINKS-RECOVERY LINKS_DOMINO:NO</td>
</tr>
<tr>
<td>( SW,HW ) CMPR ENABLED = ( N,N )</td>
</tr>
</tbody>
</table>

END OF DISPLAY
Modifying SRDF group

The following procedure illustrates how to modify, add, or delete director numbers.

1. Issue command #SQ RDFGRP, cuu, RA(#).

   #SQ RDFGRP, AA00, RA(F0)
   
   EMCMN001 SRDF-HC : (126) #SQ RDFGRP, AA00, RA(F0)
   EMCMQRO01 SRDF-HC DISPLAY FOR (126) #SQ RDFGRP, AA00, RA(F0)
   MY SERIAL # MY MICROCODE
   ------------------- ------------
   0001967-01170/0KDNR 5977-813

   MY GRP ONL PC OS GRP  OS SERIAL   OS MICROCODE SYNCHDIR FEATURE
   ----- --- -- ------ ------------ ------------ -------- -------------
   LABEL TYPE AUTO-LINKS-RECOVERY LINKS_DOMINO MSC_GROUP
   ---------- ------- ---------------------- ---------------- ----------
   F0 Y F F1   0001967-01130 5977-813 G(R1>R2)
   EMCCTestF0 DYNAMIC AUTO-LINKS-RECOVERY LINKS-DOMINO:NO
   ( SW,HW ) CMPR ENABLED = ( N,N )

   MY DIR# OS RA# ST ----- MY WWN-----
   ------- ------ -- ----------------
   44(0B) 62(04) 0A 50000973501248CB
   63(07) 0A
   46(08) 62(04) 0A 5000097350124948
   63(07) 0A

   END OF DISPLAY

2. Issue the #SQ LINK command with the PORT option to determine which director/port combination can be added.

   #SQ LINK, AA00, PORT
   
   EMCMN001 SRDF-HC : (127) #SQ LINK, AA00, PORT
   EMCMQLO01 SRDF-HC DISPLAY FOR #SQ LINK, AA00, PORT
   SERIAL #:0001967-01170/0KDNR MICROCODE LEVEL:5977-0813
   CUU_DIR RA P CONN _STATUS_ MM:SS I/O-RATE DDD:HH:MM:SS TOTAL-I/O_
   AA00 41 RF 2 YY ONLINE 8:27  63 007:00:38:27 24695587
   06 SW  Y ONLINE 141585
   07 SW  Y ONLINE 15842
   AA00 42 RF 1 N ONLINE 8:27  007:00:38:27  0
   07 SW  N PENDING  0
   AA00 44 RF 2 NY ONLINE 8:27 18 007:00:38:27 19397634
   0A SW  N PENDING  0
   0B SW  Y ONLINE  0
   197865
   AA00 46 RF 2YN ONLINE 8:27  59 007:00:38:27 56078879
   08 SW  Y ONLINE  0
   0B SW  N PENDING  0
   AA00 63 RE 2 NN ONLINE 8:27  007:00:38:27  0
   05 SW  N PENDING  0
   06 SW  N PENDING  0
   AA00 65 RE 2 NN ONLINE 8:27  007:00:38:27  0
   04 SW  N PENDING  0
   06 SW  N PENDING  0

   END OF DISPLAY
3. Issue the #SC RDFGRP command with the MODIFY action to add another director/port to the group.

```
#SC RDFGRP,AA00,F0,MODIFY,LDIR(+41(07))
```

EMCMN001 SRDF-HC : (128) #SC RDFGRP,AA00,F0,MODIFY,LDIR(+41(07))
EMCMG07I COMMAND COMPLETED
EMCMG40I Command has finished for box 000196701170

```
#SQ RDFGRP,AA00,RA(F0)
```

EMCMN001 SRDF-HC : (129) #SQ RDFGRP,AA00,RA(F0)
EMCMQ001 SRDF-HC DISPLAY FOR (129) #SQ RDFGRP,AA00,RA(F0)

```
MY SERIAL #        MY MICROCODE
-------------------   ------------
0001967-01170/0KDNR     5977-813
```

```
MY GRP ONL PC OS GRP  OS SERIAL   OS MICROCODE SYNCHDIR FEATURE
------------------- --- -- ------ ------------ ------------ -------- ------------
LABEL      TYPE    AUTO-LINKS-RECOVERY    LINKS_DOMINO   MSC_GROUP
---------- ------- ---------------------- ---------------- ----------
F0    Y   F   F1   0001967-01130  5977-813   G(R1>R2)
EMCTESTF0  DYNAMIC    AUTO-LINKS-RECOVERY   LINKS-DOMINO:NO
( SW,HW ) CMPR ENABLED = ( N,N )
```

```
MY DIR# OS RA# ST -----MY WWN-----
------- ------ -- ----------------
41(07) 62(04) 0A 5000097350124807
63(07) 0A
44(0B) 62(04) 0A 50000973501248CB
63(07) 0A
46(08) 62(04) 0A 5000097350124948
63(07) 0A
END OF DISPLAY
```

4. You can also remove director numbers by issuing the #SC RDFGRP command with the MODIFY action.

```
#SC RDFGRP,AA00,F0,MODIFY,RDIR(-63(07))
```

EMCMN001 SRDF-HC : (130) #SC RDFGRP,AA00,F0,MODIFY,RDIR(-63(07))
EMCMG07I COMMAND COMPLETED
EMCMG40I Command has finished for box 000196701170

```
#SQ RDFGRP,AA00,RA(F0)
```

EMCMN001 SRDF-HC : (131) #SQ RDFGRP,AA00,RA(F0)
EMCMQ001 SRDF-HC DISPLAY FOR (131) #SQ RDFGRP,AA00,RA(F0)

```
MY SERIAL #        MY MICROCODE
-------------------   ------------
0001967-01170/0KDNR     5977-813
```

```
MY GRP ONL PC OS GRP  OS SERIAL   OS MICROCODE SYNCHDIR FEATURE
------------------- --- -- ------ ------------ ------------ -------- ------------
LABEL      TYPE    AUTO-LINKS-RECOVERY    LINKS_DOMINO   MSC_GROUP
---------- ------- ---------------------- ---------------- ----------
F0    Y   F   F1   0001967-01130  5977-813   G(R1>R2)
EMCTESTF0  DYNAMIC    AUTO-LINKS-RECOVERY   LINKS-DOMINO:NO
( SW,HW ) CMPR ENABLED = ( N,N )
```

```
MY DIR# OS RA# ST -----MY WWN-----
------- ------ -- ----------------
41(07) 62(04) 0A 5000097350124807
63(07) 0A
44(0B) 62(04) 0A 50000973501248CB
63(07) 0A
46(08) 62(04) 0A 5000097350124948
63(07) 0A
END OF DISPLAY
```
Manipulating and displaying FBA device states

The SRDF Host Component #SQ VOL command does not provide a view of open host adapter states. You can use the #SQ FAVOL command to view the FBA devices that are write prohibited on these adapters and #SC FAVOL to control the FBA device state by setting the Write Prohibit bit to off. The following steps illustrate this procedure.

1. Issue #SQ FAVOL, cuu, ALL. The display shows all FBA devices configured to open systems adapters with the Write Prohibit bit set to ON.

   #SQ FAVOL, 3A00, ALL

   EMCMN01I SRDF-HC : (390) #SQ FAVOL, 3A00, ALL
   EMCQV42I SRDF-HC DISPLAY FOR #SQ FAVOL, 3A00, ALL
   SERIAL #:0001957-00086/0GKHV MICROCODE LEVEL:5876-0193
   DEV | DRT-DRN      | WRITE PROHIBITED PORTS
   00B0  SF-06E (046)  0,1
         SF-09E (049)  0,1
   00B1  SF-06E (046)  0,1
         SF-09E (049)  0,1
   00F2  SE-08E (048)  0,1
         SE-08G (068)  0,1
         SE-11G (06B)  0,1
         SE-12G (06C)  0,1
   00F3  SE-08E (048)  0,1
         SE-08G (068)  0,1
         SE-11G (06B)  0,1
         SE-12G (06C)  0,1
   00F4  SE-08E (048)  0,1
         SE-08G (068)  0,1
         SE-11G (06B)  0,1
         SE-12G (06C)  0,1
   00F5  SE-08E (048)  0,1
         SE-08G (068)  0,1
         SE-11G (06B)  0,1
         SE-12G (06C)  0,1
   END OF DISPLAY     Total devices displayed = 6

2. Issue the #SC FAVOL command to write-enable devices F2-F4.

   #SC FAVOL, 3A00, WRITEENABLE, F2-F4

   EMCMN01I SRDF-HC : (398) #SC FAVOL, 3A00, WRITEENABLE, F2-F4
   EMCMG40I COMMAND HAS FINISHED FOR BOX 000195700086
   EMCMG41I REQUESTED DEVICES
   00F2-00F4
   EMCMG42I ELIGIBLE DEVICES
   00F2-00F4
   EMCMG43I COMPLETED DEVICES
   00F2-00F4
   EMCMG07I COMMAND COMPLETED
3. Issue another #SQ FAVOL command. Devices F2-F4 no longer display as write-prohibited.

#SQ FAVOL, 3A00, ALL

EMCMN00I SRDF-HC : (399) #SQ FAVOL,3A00,ALL
EMCQV42I SRDF-HC DISPLAY FOR #SQ FAVOL,3A00,ALL
SERIAL #:0001957-00086/0GKHV MICROCODE LEVEL:5876-0193

<table>
<thead>
<tr>
<th>DEV</th>
<th>DRT-DRN</th>
<th>WRITE PROHIBITED PORTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>00B0 SFR-06E (046)</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>SFR-09E (049)</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>00B1 SFR-06E (046)</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>SFR-09E (049)</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>00F5 SFR-08E (048)</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>SFR-08G (068)</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>SFR-11G (06B)</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>SFR-12G (06C)</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>00F6 SFR-08E (048)</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>SFR-08G (068)</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>SFR-11G (06B)</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>SFR-12G (06C)</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>00F7 SFR-08E (048)</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>SFR-08G (068)</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>SFR-11G (06B)</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>SFR-12G (06C)</td>
<td>0,1</td>
<td></td>
</tr>
</tbody>
</table>

END OF DISPLAY Total devices displayed = 5
Performing cascaded SRDF operations

This example demonstrates how to perform cascaded SRDF operations. The environment in this scenario is as follows:

<table>
<thead>
<tr>
<th>Site A</th>
<th>Site B</th>
<th>Site C</th>
</tr>
</thead>
<tbody>
<tr>
<td>9E00</td>
<td>4200</td>
<td>9A00</td>
</tr>
<tr>
<td>Storage system serial number</td>
<td>Storage system serial number</td>
<td>Storage system serial number</td>
</tr>
<tr>
<td>000190103387</td>
<td>000190100849</td>
<td>000190300344</td>
</tr>
</tbody>
</table>

**Note:** There is no required order for the creation of synchronous and asynchronous SRDF groups. Your displays may vary from those shown in this example.

1. Issue the `#SC RDFGRP` command with the ADD action to create an SRDF group between site A and site B.

```plaintext
#SC RDFGRP,9E00,04,ADD,LDIR(28,38),RDIR(28,38),LABEL(TSTCAS1),RSER(000190100849),RGRP(44)
```

EMCMN00I SRDF-HC : (16) #SC RDFGRP,9E00,04,ADD,LDIR(28,38),RDIR(28,38),LABEL(TSTCAS1),RSER(000190100849),RGRP(44)

EMCGM07I COMMAND COMPLETED

EMCGM40I COMMAND HAS FINISHED FOR BOX 000190103387

```plaintext
#SQ RDFGRP,9E00,RA(04)
```

EMCMN00I SRDF-HC : (31) #SQ RDFGRP,9E00,RA(04)

EMCQR00I SRDF-HC DISPLAY FOR (31) #SQ RDFGRP,9E00,RA(04)

MY SERIAL #   MY MICROCODE
------------  ------------
000190103387    5773-43

MY GRP ONL PC OS GRP  OS SERIAL   OS MICROCODE SYNCHDIR FEATURE
------- ------ -- ------ ------------ ------------ -------- ------------
LABEL      TYPE    AUTO-LINKS-RECOVERY    LINKS_DOMINO   MSC_GROUP
---------- ------- ---------------------- --------------------------
04    Y   F   44   000190100849   5773-43    G(R1>R2)
TSTCAS1    DYNAMIC    AUTO-LINKS-RECOVERY LINKS-DOMINO:NO
( SW,HW ) CMPR ENABLED = ( N,N )

MY DIR# OS RA# ST -----MY WWN-----
------- ------ -- ----------------
28     37   02 5006048AD52FD6C7
27   02

38     37   02 5006048AD52FD6D7
27   02

END OF DISPLAY
2. Issue the #SC RDFGRP command with the ADD action to create an SRDF group between site B and site C.

```plaintext
#SC RDFGRP,RMT(9E00,04),54,ADD,LDIR(28), RDIR(40),LABEL(TSTCAS2),RSER(000190300344),RGRP(64)
```

EMCMN01 SRDF-HC : (4) #SC RDFGRP,RMT(9E00,04),54,ADD,LDIR(28), RDIR(40),LABEL(TSTCAS2),RSER(000190300344),RGRP(64)

EMCMG07I COMMAND COMPLETED

EMCMG40I COMMAND HAS FINISHED FOR BOX 000190103387

#SQ RDFGRP,RMT(9E00,04),RA(54)

EMCMN01 SRDF-HC : (24) #SQ RDFGRP,RMT(9E00,04),RA(54)

3. Create pairs from site A to site B.

```plaintext
#SQ VOL,9E00,8,50
```

EMCMN01 SRDF-HC : (26) #SQ VOL,9E00,8,50

```plaintext
#SQ VOL,RMT(9E00,04),8,B0
```

EMCMN01 SRDF-HC : (27) #SQ VOL,RMT(9E00,04),8,B0
Performing cascaded SRDF operations

4. Create pairs from site B to site C using the wrong mode (that is, a mode other than ADCOPY-DISK). The EMCCV50I message indicates the incorrect mode was specified.

#SC VOL, RMT(9E00, 04, 54), CREATEPAIR, B0-B7, A0

EMCMN01 SRDF-HC : (34) #SC VOL, RMT(9E00, 04, 54), CREATEPAIR, B0-B7, A0
EMCCV50I CREATEPAIR 00B0-00A0(0008) R1 OF R21 IN WRONG RDF MODE
000190100849/00B0/00B0
EMCMG10E COMMAND ABORTED
5. Create pairs from site B to site C with ADCOPY-DISK mode.

```
#SC VOL,RMT(9E00,04,54),CREATEPAIR(ADCOPY_DISK),B0-B7,A0
```

```
EMCMN00I SRDF-HC : (35) #SC VOL,RMT(9E00,04,54),CREATEPAIR(ADCOPY_DISK),B0-B7,A0
EMCM44I COMMAND HAS FINISHED FOR BOX 000190100849
EMCM45I REQUESTED DEVICES
  00B0-00B7
EMCM46I ELIGIBLE DEVICES
  00B0-00B7
EMCMG07I COMMAND COMPLETED

#SQ VOL,RMT(9E00,04),8,B0
```

```
EMCMN00I SRDF-HC : (36) #SQ VOL,RMT(9E00,04),8,B0
EMCQV00I SRDF-HC DISPLAY FOR (36) #SQ VOL,RMT(9E00,04),8,B0
SERIAL #:0001901-00948/ MICROCODE LEVEL:5773-43
DV_ADDR | _SYM_ | | | TOTAL | SY | DCB | CNTLUNIT | | R1 | R2 | SY
SYS CH | DEV | RDEV | GP | VOLSER | CYLS | STAT | OPN | STATUS | MR | INVTRK | INVTRK | %
4290 | 90 | 00B0 | 0050 | 44 | OFFLIN | 3339 | OFFL | 0 | N/R | L2 | 0 | 0 **
  | | | | | | | | | | | | |
4291 | 91 | 00B1 | 0051 | 44 | OFFLIN | 3339 | OFFL | 0 | N/R | L2 | 0 | 0 **
  | | | | | | | | | | | | |
4292 | 92 | 00B2 | 0052 | 44 | OFFLIN | 3339 | OFFL | 0 | N/R | L2 | 0 | 0 **
  | | | | | | | | | | | | |
4293 | 93 | 00B3 | 0053 | 44 | OFFLIN | 3339 | OFFL | 0 | N/R | L2 | 0 | 0 **
  | | | | | | | | | | | | |
4294 | 94 | 00B4 | 0054 | 44 | OFFLIN | 3339 | OFFL | 0 | N/R | L2 | 0 | 0 **
  | | | | | | | | | | | | |
4295 | 95 | 00B5 | 0055 | 44 | OFFLIN | 3339 | OFFL | 0 | N/R | L2 | 0 | 0 **
  | | | | | | | | | | | | |
4296 | 96 | 00B6 | 0056 | 44 | OFFLIN | 3339 | OFFL | 0 | N/R | L2 | 0 | 0 **
  | | | | | | | | | | | | |
END OF DISPLAY

#SQ VOL,RMT(9E00,04.54),8,A0
```

```
EMCMN00I SRDF-HC : (37) #SQ VOL,RMT(9E00,04.54),8,A0
EMCQV00I SRDF-HC DISPLAY FOR (37) #SQ VOL,RMT(9E00,04.54),8,A0
SERIAL #:0001901-03387/ MICROCODE LEVEL:5773-43
DV_ADDR | _SYM_ | | | TOTAL | SY | DCB | CNTLUNIT | | R1 | R2 | SY
SYS CH | DEV | RDEV | GP | VOLSER | CYLS | STAT | OPN | STATUS | MR | INVTRK | INVTRK | %
9A80 | 80 | 00A0 | 00B0 | 64 | OFFLIN | 3339 | OFFL | 0 | N/R | R2 | 0 | 26,668 46
  | | | | | | | | | | | | |
9A81 | 81 | 00A1 | 00B1 | 64 | OFFLIN | 3339 | OFFL | 0 | N/R | R2 | 0 | 28,855 42
  | | | | | | | | | | | | |
9A82 | 82 | 00A2 | 00B2 | 64 | OFFLIN | 3339 | OFFL | 0 | N/R | L2 | 0 | 29,955 40
  | | | | | | | | | | | | |
9A83 | 83 | 00A3 | 00B3 | 64 | OFFLIN | 3339 | OFFL | 0 | N/R | L2 | 0 | 29,819 40
  | | | | | | | | | | | | |
9A84 | 84 | 00A4 | 00B4 | 64 | OFFLIN | 3339 | OFFL | 0 | N/R | L2 | 0 | 0 **
  | | | | | | | | | | | | |
9A85 | 85 | 00A5 | 00B5 | 64 | OFFLIN | 3339 | OFFL | 0 | N/R | L2 | 0 | 0 **
  | | | | | | | | | | | | |
9A86 | 86 | 00A6 | 00B6 | 64 | OFFLIN | 3339 | OFFL | 0 | N/R | L2 | 0 | 0 **
  | | | | | | | | | | | | |
9A87 | 87 | 00A7 | 00B7 | 64 | OFFLIN | 3339 | OFFL | 0 | N/R | L2 | 0 | 0 **
  | | | | | | | | | | | | |
END OF DISPLAY
```
Using CAS actions

The following #SC VOL command actions allow you to manage 3-site cascaded SRDF operations with a single command:

- CASCRE—Creates a cascaded configuration
- CASSUSP—Suspends pairs in a cascaded configuration
- CASRSUM—Resumes pairs in a cascaded configuration
- CASDEL—Terminates relationships in a cascaded configuration
- CASSWAP—Performs SRDF personality swap on both device pairs

For a diskless devices, these CAS actions must be used to manage the environment. For non-diskless devices, you can issue the single CREATEPAIR, DELETESPAIR, and SWAP actions, but the CAS actions make the management easier.

Performing local operations

1. Issue the #SC VOL command with the CASCRE action to build the 3-site cascaded SRDF environment.

   Specify the two SRDF groups in the cascaded configuration, and the PowerMax/VMAX device numbers in all three systems:

   \[
   \text{SC VOL, LCL(cuu, ra1, ra2), CASCRE, adev#1-adev#2, bdev#1, cdev#1}
   \]

   Where:
   - ra1 is the SRDF group between the site A storage system and the site B storage system
   - ra2 is the SRDF group between the site B storage system and the site C storage system
   - adev#1-adev#2 is a contiguous range of devices in the site A storage system
   - bdev#1 is the starting device number of a range of contiguous devices in the site B storage system
   - cdev#1 is the starting device number of a range of contiguous devices in the site C storage system

   For example:

   \[
   \#SC VOL, LCL(9A00, B4, F4), CASCRE, 80-83, 4E0, 80
   \]

   Issue #SQ VOL commands to verify the result, for example:

   \[
   \#SQ VOL, 9A00, 3, 80
   \#SQ VOL, RMT(9A00, B4), 3, 4E0
   \#SQ VOL, RMT(9A00, B4.F4), 3, 80
   \]

2. Issue the #SC VOL command with the CASSUSP action to suspend the R1s on the link at the two different sites. The devices are initially ready on the link and sending data. The CASSUSP action suspends both of the R1 devices.

   For example:

   \[
   \#SC VOL, LCL(8700, 23), CASSUSP, ALL
   \]

   Verify the device status with the #SQ VOL command, for example:

   \[
   \#SQ VOL, 8700, 3, 38
   \]
Operations and Examples

#SQ VOL, RMT(8700, 23), 3, 48
#SQ VOL, RMT(8700, 23.12), 3, 58

3. Issue the #SC VOL command with the CASRSUM action to resume the R1s on the link in a cascaded environment.

For example:

SC VOL, LCL(8700, 05), CASRSUM, ALL

Verify the device status with the #SQ VOL command, for example:

#SQ VOL, 8700, 3, 30
#SQ VOL, RMT(8700, 05), 3, 922
#SQ VOL, RMT(8700, 05.10), 3, 40

4. Issue the #SC VOL command with the CASSWAP action to perform an SRDF personality swap on the device pairs.

IMPORTANT

Use this command with caution if data is being written to the devices as the command is issued. The default behavior is to make the "ending" R2 device into a N/R state, preventing any I/O.

Suppose that the following #SQ VOL commands show that R1 devices are at site A.

#SQ VOL, 8700, 3, 30
#SQ VOL, RMT(8700, 05), 3, 922
#SQ VOL, RMT(8700, 05.10), 3, 40

Issue the #SC VOL command with the CASSWAP action to swap the devices:

#SC VOL, LCL(8700, 05), CASSWAP, 30–32

Issue the above #SQ VOL commands to verify that after the CASSWAP action is issued, there are R2 devices at site A.

5. Delete the cascaded SRDF environment using the CASDEL action of the #SC VOL command.

For example:

#SC VOL, LCL(8700, 05), CASDEL, ALL

Verify the device status with the #SQ VOL command, for example:

#SQ VOL, 8700, 3, 30
#SQ VOL, RMT(8700, 05), 3, 922
#SQ VOL, RMT(8700, 05.10), 3, 40

Performing remote operations

Remote #SC VOL CAS operations are supported, but must be issued to the site A R1 device or the Site C R2 device, and not point to the R21/D21 device.

1. Issue a CASCRE action from the site B system. This action acts upon the starting R1 device at site A.

Display the devices using the #SQ VOL command, for example:

#SQ VOL, 8900, 1, 922
Performing cascaded SRDF operations

Operations and Examples

1. Issue the \#SC VOL CASCRE command:

   \#SC VOL, RMT(8900, 24), CASCRE, 50, 922, 50

   Verify the device status with the \#SQ VOL command, for example:

   \#SQ VOL, RMT(8900, 24), 1, 50
   \#SQ VOL, 8900, 1, 922
   \#SQ VOL, RMT(8900, 10), 1, 50

2. Issue a CASSUSP action from site B to the site A R1 device.

   \textbf{Note:} As with the RDF_SUSP and RDF_RSUM \#SC VOL actions, the CASSUSP and CASRSUM actions must point to the starting R1 device. The actions should not point to the devices that make up the R21/D21. When running from site C, the CASSUSP and CASRSUM actions can be issued remotely to act upon the site A R1 device.

   For example:

   \#SC VOL, RMT(8900, 24), CASSUSP, 50

   Verify the device status with the \#SQ VOL command, for example:

   \#SQ VOL, RMT(8900, 24), 1, 50
   \#SQ VOL, 8900, 1, 922
   \#SQ VOL, RMT(8900, 10), 1, 50

3. Issue a CASSUSP action from site C to the site A R1 device.

   For example:

   \#SC VOL, RMT(8500, 10.24), CASSUSP, 50

   Verify the device status with the \#SQ VOL command, for example:

   \#SQ VOL, RMT(8500, 10.24), 1, 50
   \#SQ VOL, 8500, 1, 922
   \#SQ VOL, RMT(8500, 10), 1, 922

4. Issue a CASDEL action remotely to the site C R2 device.

   Display the devices using the \#SQ VOL command, for example:

   \#SQ VOL, RMT(8900, 24), 1, 50
   \#SQ VOL, 8900, 1, 922
   \#SQ VOL, RMT(8900, 10), 1, 50

   Issue the \#SC VOL CASDEL command:

   \#SC VOL, RMT(8900, 10), CASDEL, 50

   Verify the device status with the \#SQ VOL command, for example:

   \#SQ VOL, 8900, 1, 922
   \#SQ VOL, RMT(8900, 24), 1, 50
   \#SQ VOL, RMT(8900, 10), 1, 50
Performing concurrent SRDF/A operations

In a concurrent SRDF configuration, data on a single source device is remotely mirrored to two target devices at the same time, providing two available copies of data. These mirrors operate independently but concurrently.

**Note:** To simultaneously operate both mirrors in SRDF/A mode, the concurrent R1 device must reside on a storage system running PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5876. The R2 devices can reside on any storage system supporting connections to a storage system running PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5875 or 5876.

This example demonstrates that concurrent SRDF/A mirrors operate independently by activating operations on two target devices and then changing the minimum cycle time on the first leg without affecting the cycle time used by the second leg.

1. The following display illustrates the initial state of the first leg (group 67) and the second leg (group f1).

```plaintext
#SQ VOL, 6200, 2, D3
EMCMN00I SRDF-HC : (156) #SQ VOL,6200,2,D3
EMCQV34I SRDF-HC DISPLAY FOR (156) #SQ VOL,6200,2,D3
SERIAL #:0001967-01130/0KDLN MICROCODE LEVEL:5977-813

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<th>STAT</th>
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<td>OFFL</td>
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<td>000193</td>
<td>60</td>
<td>R/W-SY</td>
<td>A1</td>
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<td>0 **</td>
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END OF DISPLAY SORT_ORDER = SYMDEV
Total devices displayed = 2
```

2. Activate the first leg and display it.

```plaintext
#SC SRDFA, LCL(6200, 67), ACT
EMCMN00I SRDF-HC : (157) #SC SRDFA,LCL(6200,67),ACT
EMCGM07I COMMAND COMPLETED
EMCGM40I Command has finished for box 000196701130

#SQ VOL, 6200, 2, D3
EMCMN00I SRDF-HC : (158) #SQ VOL,6200,2,D3
EMCQV34I SRDF-HC DISPLAY FOR (158) #SQ VOL,6200,2,D3
SERIAL #:0001967-01130/0KDLN MICROCODE LEVEL:5977-813

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</table>
END OF DISPLAY SORT_ORDER = SYMDEV
Total devices displayed = 2
```
3. Display the first leg. The #SQ SRDFA display indicates SRDF/A is running.

#SQ SRDFA,LCL(6200,67)

EMCMN001 SRDF-HC : (159) #SQ SRDFA,LCL(6200,67)
EMCQR001 SRDF-HC DISPLAY FOR (159) #SQ SRDFA,LCL(6200,67)

My SERIAL #  MY MICROCODE
-------------------   ------------
0001967-01130/0KDLN     5977-813

MY GRP ONL PC OS GRP OS SERIAL   OS MICROCODE SYCHDIR FEATURE
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5. Display the second leg. The #SQ SRDFA display indicates SRDF/A is running.

```sql
#SQ SRDFA, LCL(6200, F1)
EMCMN001 SRDF-HC: (162) #SQ SRDFA, LCL(6200, F1)
EMCQR001 SRDF-HC DISPLAY FOR (162) #SQ SRDFA, LCL(6200, F1)
   MY SERIAL #  MY MICROCODE
--------------   ------------
0001967-01130/0KDLN     5977-813
MY GRP ONL PC OS GRP  OS SERIAL   OS MICROCODE SYNCHDIR FEATURE
--------------   --------------   ---------------------
LABEL   TYPE     AUTO-LINKS-RECOVERY    LINKS_DOMINO   MSC_GROUP
---------- ------- ---------------------- ---------------------------
F1   Y   F   F0   0001967-01170  5977-813   G(R1>R2) SRDFA ACTIVE
MFYE2UFF1  DYNAMIC    AUTO-LINKS-RECOVERY   LINKS-DOMINO:NO
   ( SW,HW ) CMPR ENABLED = ( N,N )

---------------------------------------------------------------------
PRIMARY SIDE: CYCLE#              5 MIN CYCLE TIME                  15
SECONDARY CONSISTENT ( Y )          TOLERANCE                  ( N )
CAPTURE CYCLE SIZE       0 TRANSMIT CYCLE SIZE               0
AVERAGE CYCLE TIME      15 AVERAGE CYCLE SIZE               0
TIME SINCE LAST SWITCH 4 DURATION OF LAST CYCLE                15
MAX THROTTLE TIME       65,535 MAX CACHE PERCENTAGE           75
HA WRITES               52,879,628 RPTD HA WRITES              35,480,548
HA DUP. SLOTS            5,547,329 SECONDARY DELAY           19
LAST CYCLE SIZE         0 DROP PRIORITY                   33
CLEANUP RUNNING   ( N )          MSC WINDOW IS OPEN   ( N )
SRDF/A TRANSMIT IDLE ( Y )          SRDF/A DSE ACTIVE   ( Y )
MSC ACTIVE              ( N )          WRITE PACING STATS ON ( N )
WRITE PACING ACTIVE    ( N )          WRITE PACING ACTIIVE ( N )
WP THRESHOLD       60 WP DSE THRESHOLD       90
WP MAXDELAY           50,000 WP (GRP,DEV) AUTO ACTIVATE ( N,N )
CYCLE MODE             ( M )          CEXMPT                      0
TRANSMIT CYCLE NUMBER 4 TRANSMIT QUEUE DEPTH          2
LAST TRANSMIT TIME     0 AVG TRANSMIT TIME              0
---------------------------------------------------------------------
END OF DISPLAY
6. Change the minimum cycle time on the first leg and display the new value.

```
#SC SRDFA, LCL(6200, 67), SET_MIN_CYCLE_TIME, 10
EMCMN00I SRDF-HC : (164) #SC SRDFA, LCL(6200, 67), SET_MIN_CYCLE_TIME, 10
EMCGM07I COMMAND COMPLETED
EMCGM40I Command has finished for box 000196701130

#SQ SRDFA, LCL(6200, 67)
EMCMN00I SRDF-HC : (165) #SQ SRDFA, LCL(6200, 67)
EMCQR00I SRDF-HC DISPLAY FOR (165) #SQ SRDFA, LCL(6200, 67)

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<td>N</td>
</tr>
<tr>
<td>CAPTURE CYCLE SIZE</td>
<td>0</td>
<td>TRANSMIT CYCLE SIZE</td>
<td>0</td>
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<tr>
<td>AVERAGE CYCLE TIME</td>
<td>14</td>
<td>AVERAGE CYCLE SIZE</td>
<td>0</td>
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<tr>
<td>TIME SINCE LAST SWITCH</td>
<td>8</td>
<td>DURATION OF LAST CYCLE</td>
<td>11</td>
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<tr>
<td>MAX THROTTLE TIME</td>
<td>65,535</td>
<td>MAX CACHE PERCENTAGE</td>
<td>75</td>
</tr>
<tr>
<td>HA WRITES</td>
<td>52,879,628</td>
<td>RPTD HA WRITES</td>
<td>35,480,548</td>
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<tr>
<td>HA DUP. SLOTS</td>
<td>5,547,329</td>
<td>SECONDARY DELAY</td>
<td>19</td>
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<tr>
<td>LAST CYCLE SIZE</td>
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<td>DROP PRIORITY</td>
<td>33</td>
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<td>CLEANUP RUNNING</td>
<td>N</td>
<td>MSC WINDOW IS OPEN</td>
<td>N</td>
</tr>
<tr>
<td>SRDF/A TRANSMIT IDLE</td>
<td>Y</td>
<td>SRDF/A DSE ACTIVE</td>
<td>Y</td>
</tr>
<tr>
<td>MSC ACTIVE</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WRITE PACING ACTIVE</td>
<td>N</td>
<td>WRITE PACING STATS ON</td>
<td>N</td>
</tr>
<tr>
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<td>DPACING ACTIVE</td>
<td>N</td>
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<td>WP THRESHOLD</td>
<td>60</td>
<td>WP DSE THRESHOLD</td>
<td>90</td>
</tr>
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<td>WP MAXDELAY</td>
<td>50,000</td>
<td>WP (GRP, DEV) AUTO ACTIVATE</td>
<td>N, N</td>
</tr>
<tr>
<td>CYCLE MODE</td>
<td>L</td>
<td>CSEXMT</td>
<td></td>
</tr>
</tbody>
</table>

END OF DISPLAY
```
7. Display the second leg. The minimum cycle time remains unchanged at 15.

```
#SQ SRDFA,LCL(6200,F1)
EMCMN001 SRDF-HC : (166) #SQ SRDFA,LCL(6200,F1)
EMCQR001 SRDF-HC DISPLAY FOR (166) #SQ SRDFA,LCL(6200,F1)
          MY SERIAL #        MY MICROCODE
          --------------- ------
0001967-01130/0KDLN     5977-813

MY GRP ONL PC OS GRP  OS SERIAL   OS MICROCODE SYNCHDIR FEATURE
-------- --- -- ------ ------------ ------------ -------- -------------
LABEL      TYPE    AUTO-LINKS-RECOVERY    LINKS_DOMINO   MSC_GROUP
---------- ------- ---------------------- ---------------- ----------
F1    Y   F   F0   0001967-01170  5977-813   G(R1>R2) SRDFA ACTIVE
MFYE2UFF1  DYNAMIC    AUTO-LINKS-RECOVERY   LINKS-DOMINO:NO
( SW,HW ) CMPR ENABLED = ( N,N )

PRIMARY SIDE: CYCLE#             15 MIN CYCLE TIME                  15
SECONDARY CONSISTENT ( Y )          TOLERANCE                  ( N )
CAPTURE CYCLE SIZE                0 TRANSMIT CYCLE SIZE            0
AVERAGE CYCLE TIME                15 AVERAGE CYCLE SIZE            0
TIME SINCE LAST SWITCH            8 DURATION OF LAST CYCLE            15
MAX THROTTLE TIME                 65,535 MAX CACHE PERCENTAGE        75
HA WRITES                         52,879,628 RPTD HA WRITES       35,480,548
HA DUP. SLOTS                      5,547,329 SECONDARY DELAY            23
LAST CYCLE SIZE                   0 DROP PRIORITY                   33
CLEANUP RUNNING ( N )            MSC WINDOW IS OPEN             ( N )
SRDF/A TRANSMIT IDLE ( Y )        SRDF/A DSE ACTIVE            ( Y )
MSC ACTIVE ( N )                  WRITE PACING STATS ON ( N )
WRITE PACING ACTIVE ( N )        WRITE PACING STATS ON ( N )
CPACING ACTIVE ( N )             WRITE PACING STATS ON ( N )
WP THRESHOLD                      50,000 WP DSE THRESHOLD         90
WP MAXDELAY                       50,000 WP (GRP,DEV) AUTO ACTIVATE ( N,N )
CYCLE MODE ( M )                  CEXMPT                           0
TRANSMIT CYCLE NUMBER             14 TRANSMIT QUEUE DEPTH          2
LAST TRANSMIT TIME                0 AVG TRANSMIT TIME             0

END OF DISPLAY
```

Using SRDF groups in the same MSC group for R2 device consistency

The following example illustrates how to run both SRDF/A legs within a single MSC group. This keeps the R2 devices consistent among SRDF groups when performing concurrent SRDF/A operations.

Note: “Performing SRDF/A MSC operations” on page 442 provides more information about running MSC.

1. Define the MSC parameters in the SRDF Host Component parameter file. Name the MSC group with the MSC_GROUP_NAME statement and use MSC_INCLUDE_SESSION statements to include the first leg (group 04) and the second leg (group 07) in the SRDF/A MSC group.

```
MSC_GROUP_NAME=EMCMSC1
MSC_WEIGHT_FACTOR=0
MSC_INCLUDE_SESSION=8A40,(04)
MSC_INCLUDE_SESSION=8A41,(07)
MSC_GROUP_END
```
2. Issue an MSC,DISPLAY command to verify that MSC is enabled.

/F emcscf,MSC,DISPLAY

SCF1390I MSC,DISPLAY
SCF1391I MSC - DISPLAY COMMAND ACCEPTED.
SCF1320I MSC - TASK ENABLED

3. Issue an #SC GLOBAL, PARM_REFRESH command to pass the MSC definition to SCF.

#SC GLOBAL, PARM_REFRESH

EMCMN00I SRDF-HC : (50) #SC GLOBAL, PARM_REFRESH
EMCP03I SSIDTBL REFRESHED, STATISTICS FOR ADDED DEVICES FOLLOW
EMCP00I SSID(S): 71 TOTAL DEV(S): 13,308 SUPPORTED DEV(S): 13,308
EMCM00I MSC_GROUP_NAME= EMCMS1 HAS PASSED VALIDATION
EMCM01I MSC HAS POSTED SCF WITH NEW DEFINITION(S)
EMCM07I - for MSC Group EMCMS1
EMCM07I COMMAND COMPLETED

4. Issue an MSC,VERBOSE ON command to see the details of the MSC environment. MSC coordinates the SRDF/A cycle switching of both SRDF groups to keep a consistent image between the groups.

Note: MSC,VERBOSE ON produces extra status display messages to the console. Issue an MSC,VERBOSE OFF to disable the display of these messages.

SCF1323I MSC - ALLOW OVERWRITE OF SCRATCH AREA AND BOXLIST
SCF1322I MSC - AUTO RECOVERY ENABLED
SCF1367I MSC - ADCOPY-DISK on SRDFA DROP disabled due to AUTO_RECOVER
SCF1568I MSC - GROUP=EMCMSC1 WEIGHT FACTOR = 0
SCF1569I MSC - GROUP=EMCMSC1 STEAL LOCK AFT = 2 MIN(S)
SCF1342I MSC - GROUP=EMCMSC1 PROCESS_FC03-ALL BOXES ACTIVE
SCF1523I MSC - GROUP=EMCMSC1 GLOBAL CONSISTENCY HAS BEEN ACHIEVED
SCF1564I MSC - GROUP=EMCMSC1 TIME OF DAY FOR CYCLE 00000001 IS 07:23:30.01
SCF1390I MSC,VERBOSE ON
SCF1391I MSC - VERBOSE COMMAND ACCEPTED.

SCF1345I MSC - GROUP=EMCMSC1 MOTHER TASK FUNCTION TIMER
SCF1343I MSC - GROUP=EMCMSC1 PROCESS_FC04-TIME FOR SWITCH
SCF1382I MSC - GROUP=EMCMSC1 (8A40,04) PROCESS_FC04-CAN WE SWITCH?
SCF1382I MSC - GROUP=EMCMSC1 (8A41,07) PROCESS_FC04-CAN WE SWITCH?
SCF1344I MSC - GROUP=EMCMSC1 PROCESS_FC05-ALL BOXES CAN SWITCH
SCF1383I MSC - GROUP=EMCMSC1 (8A40,04) PROCESS_FC05-OPEN AND SWITCH
SCF1383I MSC - GROUP=EMCMSC1 (8A41,07) PROCESS_FC05-OPEN AND SWITCH
SCF1346I MSC - GROUP=EMCMSC1 PROCESS_FC06-ALL BOXES OPENED WINDOW AND CYCLE SWITCHED
SCF1564I MSC - GROUP=EMCMSC1 TIME OF DAY FOR CYCLE 00000002 IS 07:24:00.07
SCF1384I MSC - GROUP=EMCMSC1 (8A40,04) PROCESS_FC06-CLOSE WINDOW
SCF1384I MSC - GROUP=EMCMSC1 (8A41,07) PROCESS_FC06-CLOSE WINDOW
SCF1347I MSC - GROUP=EMCMSC1 PROCESS_FC07-ALL BOXES CLOSED WINDOW
SCF1454I MSC - GROUP=EMCMSC1 NEXT WAKE UP AT X'07243000'
SCF1390I MSC,VERBOSE OFF
SCF1391I MSC - VERBOSE COMMAND ACCEPTED.
SCF1564I MSC - GROUP=EMCMSC1 TIME OF DAY FOR CYCLE 00000003 IS 07:24:30.05
SCF1564I MSC - GROUP=EMCMSC1 TIME OF DAY FOR CYCLE 00000004 IS 07:25:00.10
SCF1564I MSC - GROUP=EMCMSC1 TIME OF DAY FOR CYCLE 00000005 IS 07:25:30.01
SCF1564I MSC - GROUP=EMCMSC1 TIME OF DAY FOR CYCLE 00000006 IS 07:26:00.06
SCF1564I MSC - GROUP=EMCMSC1 TIME OF DAY FOR CYCLE 00000007 IS 07:26:30.03
5. Issue #SQ SRDFA commands to verify that each SRDF group is under the same MSC group, cycle switching with the same MSC cycle tags.

```
#SQ SRDFA, LCL(8A00, 04)
EMCMN001 SRDF-HC : (53) #SQ SRDFA, LCL(8A00, 04)
EMCQR001 SRDF-HC DISPLAY FOR (53) #SQ SRDFA, LCL(8A00, 04)
  MY SERIAL # MY MICROCODE
------------------- ------------
0001926-00291/0AAWH 5875-187

MY GRP ONL PC OS GRP  OS SERIAL OS MICROCODE SYNCDIR FEATURE
---------------------------------- ----------------------------------
LABEL TYPE AUTO-LINKS-RECOVERY LINKS_DOMINO MSC_GROUP
----------------- ------- ---------------------- ------------------
04 Y F 04 0001926-00296 5875-187 G(R1>R2) SRDFA A MSC
MFTL2C4 DYNAMIC AUTO-LINKS-RECOVERY LINKS-DOMINO: NO (EMCMSC1)
( SW, HW ) CMPR ENABLED = ( Y, Y )

PRIMARY SIDE: CYCLE# 54 MIN CYCLE TIME 15
SECONDARY CONSISTENT ( Y ) TOLERANCE ( N )
CAPTURE CYCLE SIZE 0 TRANSMIT CYCLE SIZE 0
AVERAGE CYCLE TIME 24 AVERAGE CYCLE SIZE 0
TIME SINCE LAST SWITCH 1 DURATION OF LAST CYCLE 30
MAX THROTTLE TIME 11 MAX CACHE PERCENTAGE 94
HA WRITES 2,394,583 RPTD HA WRITES 1,861,692
HA DUP. SLOTS 2,019 SECONDARY DELAY 31
LAST CYCLE SIZE 0 DROP PRIORITY 33
CLEANUP RUNNING ( N ) MSC WINDOW IS OPEN ( N )
SRDF/A TRANSMIT IDLE ( Y ) SRDF/A DSE ACTIVE ( N )
MSC ACTIVE ( Y ) ACTIVE SINCE 04/26/2011 07:23:16
CAPTURE TAG C0000000 00000000 TRANSMIT TAG C0000000 0000000F
GLOBAL CONSISTENCY ( Y ) STAR RECOVERY AVAILABLE ( N )
WRITE PACING ACTIVE ( N ) WRITE PACING STATS ON ( N )
GPACING ACTIVE ( N ) DPACING ACTIVE ( N )
WP THRESHOLD 60 WP DSE THRESHOLD 90
WP MAXDELAY 50,000 WP (GRP, DEV) AUTO ACTIVATE ( N, N )
CEXMT 0

END OF DISPLAY
```
Performing concurrent SRDF/A operations

Using SRDF groups in different MSC groups

With the multiple MSC group support in ResourcePak Base, each of the SRDF groups on the SRDF/A legs can be specified in different MSC groups. The following example illustrates how to control each of the SRDF groups separately. Each SRDF group has a separate point of consistency and participates in different MSC groups.

Note: “Performing SRDF/A MSC operations” on page 442 provides more information about running MSC.

1. Define two MSC groups in the SRDF Host Component configuration file.

```plaintext
MSC_GROUP_NAME=EMCMSC1
MSC_WEIGHT_FACTOR=0
MSC_INCLUDE_SESSION=8A40,(04)
MSC_GROUP_END
 *
MSC_GROUP_NAME=EMCMSC2
MSC_WEIGHT_FACTOR=0
MSC_INCLUDE_SESSION=8A41,(07)
MSC_GROUP_END
 *
```
2. Issue an MSC,DISPLAY command to verify that MSC is enabled.

/F scf,MSC,DISPLAY
SCF1390I MSC,DISPLAY
SCF1391I MSC - DISPLAY COMMAND ACCEPTED.
SCF1320I MSC - TASK ENABLED

3. Issue an #SC GLOBAL, PARM_REFRESH command to pass the MSC definitions to SCF.

#SC GLOBAL,PARM_REFRESH
EMCMN00I SRDF-HC : (55) #SC GLOBAL,PARM_REFRESH
EMCP03I SSID/DBL REFRESHED, STATISTICS FOR ADDED DEVICES FOLLOW
EMCS001 SSID(S): 71 TOTAL DEV(S): 13,308 SUPPORTED DEV(S): 13,308
EMCMBOE1 MSC_GROUP_NAME= EMCMSC1 HAS PASSED VALIDATION
EMCMBOE1 MSC_GROUP_NAME= EMCMSC2 HAS PASSED VALIDATION
EMCMBOEI Multiple MSC definitions found, specific activation required
EMCM07I COMMAND COMPLETED

4. Start the first MSC group.

#SC GLOBAL,PARM_REFRESH,MSCG(EMCMSC1)
EMCMN00I SRDF-HC : (59) #SC GLOBAL,PARM_REFRESH,MSCG(EMCMSC1)
EMCMBOFI MSC HAS POSTED SCF WITH NEW DEFINITION(S)
EMCB1FI - for MSC Group EMCMSC1
EMCM07I COMMAND COMPLETED

5. The first group begins cycle switching.

SCF15C2I MSC - GTF USR Tracing enabled for Event Id 0067
SCF1592I MSC - GROUP=EMCMSC1 CYCLE TIME WARN AFTER = 5 MIN(S)
SCF1323I MSC - ALLOW OVERWRITE OF SCRATCH AREA AND BOXLIST
SCF1322I MSC - AUTO RECOVERY ENABLED
SCF1367I MSC - ADCOPY-DISK on SRDFA DROP disabled due to AUTO_RECOVER
SCF1568I MSC - GROUP=EMCMSC1 WEIGHT FACTOR = 0
SCF1569I MSC - GROUP=EMCMSC1 STEAL LOCK AFTER = 2 MIN(S)
SCF1342I MSC - GROUP=EMCMSC1 PROCESS_FC03-ALL BOXES ACTIVE
SCF1523I MSC - GROUP=EMCMSC1 GLOBAL CONSISTENCY HAS BEEN ACHIEVED
SCF1564I MSC - GROUP=EMCMSC1 TIME OF DAY FOR CYCLE 00000001 IS 07:46:02.01
SCF1564I MSC - GROUP=EMCMSC1 TIME OF DAY FOR CYCLE 00000002 IS 07:47:02.01
SCF1232I ASY -- CONTROLLER 00291 RDFGRP(04) TOLERANCE CHANGED ON -> OFF
SCF1564I MSC - GROUP=EMCMSC1 TIME OF DAY FOR CYCLE 00000003 IS 07:47:32.00
SCF1564I MSC - GROUP=EMCMSC1 TIME OF DAY FOR CYCLE 00000004 IS 07:47:32.00

6. Start the first MSC group.

#SC GLOBAL,PARM_REFRESH,MSCG(EMCMSC2)
EMCMN00I SRDF-HC : (60) #SC GLOBAL,PARM_REFRESH,MSCG(EMCMSC2)
EMCMBOFI MSC HAS POSTED SCF WITH NEW DEFINITION(S)
EMCB1FI - for MSC Group EMCMSC2
EMCM07I COMMAND COMPLETED
7. The second group begins cycle switching.

SCF1543I MSC - GTF USR Tracing enabled for Event Id 0067
SCF1542I MSC - GROUP=EMCMSC2 CYCLE TIME WARN AFTER = 5 MIN(S)
SCF1327I MSC - ALLOW OVERWRITE OF SCRATCH AREA AND BOXLIST
SCF1322I MSC - AUTO RECOVERY ENABLED
SCF1367I MSC - ADCOPY-DISK on SRDFA DROP disabled due to AUTO_RECOVER
SCF1568I MSC - GROUP=EMCMSC2 WEIGHT FACTOR = 0
SCF1569I MSC - GROUP=EMCMSC2 STEAL LOCK AFTER = 2 MIN(S)
SCF1564I MSC - GROUP=EMCMSC1 TIME OF DAY FOR CYCLE 00000014 IS 07:55:32.01
SCF1342I MSC - GROUP=EMCMSC2 PROCESS_FC03-ALL BOXES ACTIVE
SCF1564I MSC - GROUP=EMCMSC2 GLOBAL CONSISTENCY HAS BEEN ACHIEVED
SCF1564I MSC - GROUP=EMCMSC2 TIME OF DAY FOR CYCLE 00000001 IS 07:55:43.01
SCF1564I MSC - GROUP=EMCMSC1 TIME OF DAY FOR CYCLE 00000015 IS 07:56:02.01
SCF1564I MSC - GROUP=EMCMSC2 TIME OF DAY FOR CYCLE 00000002 IS 07:56:13.00
SCF1564I MSC - GROUP=EMCMSC1 TIME OF DAY FOR CYCLE 00000016 IS 07:56:32.01

8. Issue #SQ SRDFA commands to verify that each group is cycle switching independently.

#SQ SRDFA,LCL(8A00,04)

EMCMN00I SRDF-HC : (61) #SQ SRDFA,LCL(8A00,04)
EMCQR00I SRDF-HC DISPLAY FOR (61) #SQ SRDFA,LCL(8A00,04)
 MY SERIAL #          MY MICROCODE
-------------------   ------------
0001926-00291/0AAWH     5875-187

MY GRP ONL PC OS GRP OS SERIAL   OS MICROCODE SYNCHDIR FEATURE
------------------- ------- ------- ------- ---------------------- ----------------- -------------------
LABEL      TYPE    AUTO-LINKS-RECOVERY    LINKS_DOMINO   MSC_GROUP
---------- ------- ---------------------- ---------------- ----------
04        Y   F   04   0001926-00296  5875-187 G(R1>R2) SRDFA A MSC
MPTL2C4    DYNAMIC    AUTO-LINKS-RECOVERY   LINKS-DOMINO:NO (EMCMSC1) ( SW,HW ) CMPR ENABLED = ( Y,Y )

PRIMARY SIDE: CYCLE# 126 MIN CYCLE TIME 15
SECONDARY CONSISTENT ( Y ) TOLERANCE ( N )
CAPTURE CYCLE SIZE 0 TRANSMIT CYCLE SIZE 0
AVERAGE CYCLE TIME 26 AVERAGE CYCLE SIZE 0
TIME SINCE LAST SWITCH 3 DURATION OF LAST CYCLE 30
MAX THROTTLE TIME 11 MAX CACHE PERCENTAGE 94
HA WRITES 2,394,583 RPTD HA WRITES 1,861,692
HA DUP. SLOTS 2,019 SECONDARY DELAY 33
LAST CYCLE SIZE 0 DROP PRIORITY 33
CLEANUP RUNNING ( N ) MSC WINDOW IS OPEN ( N )
SRDF/A TRANSMIT IDLE ( Y ) SRDF/A DSE ACTIVE ( N )
MSC ACTIVE ( Y ) ACTIVE SINCE 04/26/2011 07:45:48
CAPTURE TAG C0000000 00000016 TRANSMIT TAG C0000000 00000015
GLOBAL CONSISTENCY ( Y ) STAR RECOVERY AVAILABLE ( N )
WRITE PACING ACTIVE ( N ) WRITE PACING STATS ON ( N )
GPACING ACTIVE ( N ) DPACING ACTIVE ( N )
WP THRESHOLD 60 WP DSE THRESHOLD 90
WP MAXDELAY 50,000 WP (GRP,DEV) AUTO ACTIVATE ( N,N )
CEXMT 0

END OF DISPLAY
#SQ SRDFA,LCL(8A00,07)

EMCN001I SRDF-HC : (62) #SQ SRDFA,LCL(8A00,07)
EMCQR001I SRDF-HC DISPLAY FOR (62) #SQ SRDFA,LCL(8A00,07)
MY SERIAL # MY MICROCODE
------------------- -------------
0001926-00291/0AAWH 5875-187

MY GRP ONL PC OS GRP OS SERIAL OS MICROCODE SYNCHDIR FEATURE
------------------- -----------------------------

<table>
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<th>LABEL</th>
<th>TYPE</th>
<th>AUTO-LINKS-RECOVERY</th>
<th>LINKS_DOMINO</th>
<th>MSC_GROUP</th>
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<td>MFTC2TM07</td>
<td>DYNAMIC</td>
<td>AUTO-LINKS-RECOVERY</td>
<td>LINKS-DOMINO:NO</td>
<td>EMCMSC2</td>
</tr>
<tr>
<td></td>
<td>( SW,HW ) CMPR ENABLED = ( Y,Y )</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PRIMARY SIDE: CYCLE# 145 MIN CYCLE TIME 15
SECONDARY CONSISTENT ( Y ) TOLERANCE ( N )
CAPTURE CYCLE SIZE 0 TRANSMIT CYCLE SIZE 0
AVERAGE CYCLE TIME 16 AVERAGE CYCLE SIZE 0
TIME SINCE LAST SWITCH 25 DURATION OF LAST CYCLE 26
MAX THROTTLE TIME 11 MAX CACHE PERCENTAGE 94
HA WRITES 2,394,583 RPTD HA WRITES 1,861,692
HA DUP. SLOTS 2,019 SECONDARY DELAY 51
LAST CYCLE SIZE 0 DROP PRIORITY 33
CLEANUP RUNNING ( N ) MSC WINDOW IS OPEN ( N )
SRDF/A TRANSMIT IDLE ( Y ) SRDF/A DSE ACTIVE ( N )
MSC ACTIVE ( Y ) ACTIVE SINCE 04/26/2011 07:55:29
CAPTURE TAG C0000000 00000002 TRANSMIT TAG 80000000 00000001
GLOBAL CONSISTENCY ( Y ) STAR RECOVERY AVAILABLE ( N )
WRITE PACING ACTIVE ( N ) WRITE PACING STATS ON ( N )
GPACING ACTIVE ( N ) DPACING ACTIVE ( N )
WP THRESHOLD 60 WP DSE THRESHOLD 90
WP MAXDELAY 50,000 WP (GRP,DEV) AUTO ACTIVATE ( N,N )
CEXMT 0

END OF DISPLAY
Moving dynamic SRDF pairs

This example demonstrates how to move dynamic SRDF device pairs using the #SC VOL command with the MOVEPAIR action. This command allows movement of devices between SRDF groups without full resynchronization.

See “MOVEPAIR” on page 334 for information about #SC VOL MOVEPAIR command syntax and usage.

**Note:** If a device pair is in a consistency group, it cannot be moved out of the group, even though the consistency group is tripped (that is, in the TNR state). In this case, an error message similar to the following is issued and the consistency group must be disabled:

SRDF-HC : (14) #SC VOL,LCL(9E20,49),MOVEPAIR,40,4A
MOVEPAIR 0040-0040(0001) DEVICE IN CGROUP 000190103387/0041/0050
COMMAND ABORTED

In the procedure described in the following steps, device 35 is moved from group 49 to group 4A.

1. The following #SQ VOL display illustrates the receiving R1 SRDF/A group 4A (no device 35 exists).

```
#SQ VOL, 9E00, RA(4A)
EMCQV00I SRDF-HC DISPLAY FOR (41) #SQ VOL,9E00,RA(4A)
SERIAL #:0001901-03387/ MICROCODE LEVEL:5773-43
DV_ADDR| _SYM_     |      |TOTAL|SYS |DCB|CNTLUNIT|  |  R1  |  R2  |SY
SYS  CH|DEV  RDEV GP|VOLSER| CYLS|STAT|OPN|STATUS  |MR|INVTRK|INVTRK| %
9E10 10 0030 0030 4A UAC00G 3339 ONPV 0 R/W-AS A1 0 0 **
9E11 11 0031 0031 4A UAC00H 3339 ONPV 0 R/W-AS A1 0 0 **
???? ?? 090B 090B 4A OFFLIN 1113 N/A 0 R/W-AS L1 0 0 **
???? ?? 090C 090C 4A OFFLIN 1113 N/A 0 R/W-AS L1 0 0 **
???? ?? 090D 090D 4A OFFLIN 1113 N/A 0 R/W-AS L1 0 0 **
END OF DISPLAY
```

2. The following #SQ VOL display illustrates the receiving R2 SRDF/A group 0A (no device 35 exists).

```
#SQ VOL, 4200, RA(0A)
EMCMN00I SRDF-HC : (42) #SQ VOL,4200,RA(0A)
EMCMN00I SRDF-HC DISPLAY FOR (42) #SQ VOL,4200,RA(0A)
SERIAL #:0001903-00353/ MICROCODE LEVEL:5773-163
DV_ADDR| _SYM_     |      |TOTAL|SYS |DCB|CNTLUNIT|  |  R1  |  R2  |SY
SYS  CH|DEV  RDEV GP|VOLSER| CYLS|STAT|OPN|STATUS  |MR|INVTRK|INVTRK| %
4210 10 0030 0030 QA OFFLIN 3339 OFFL 0 N/R A2 0 0 **
4211 11 0031 0031 QA OFFLIN 3339 OFFL 0 N/R A2 0 0 **
4213 13 0033 0033 QA OFFLIN 3339 OFFL 0 N/R A2 0 0 **
???? ?? 090B 090B QA OFFLIN 1113 N/A 0 N/R L2 0 0 **
???? ?? 090C 090C QA OFFLIN 1113 N/A 0 N/R L2 0 0 **
???? ?? 090D 090D QA OFFLIN 1113 N/A 0 N/R L2 0 0 **
END OF DISPLAY
```
3. As shown in the following display, #SQ SRDFA receiving group 4A is active. It needs to be made inactive.

```sql
#SQ SRDFA, LCL(9E00, 4A)
```

EMCMN001 SRDF-HC : (43) #SQ SRDFA, LCL(9E00, 4A)
EMCQR001 SRDF-HC DISPLAY FOR (43) #SQ SRDFA, LCL(9E00, 4A)
MY SERIAL # MY MICROCODE
-----------------------
000190103387 5773-46

MY GRP ONL PC OS GRP OS SERIAL OS MICROCODE SYNCHDIR FEATURE
------------- -------------- -------------- --------------
LABEL TYPE AUTO-LINKS-RECOVERY LINKS_DOMINO MSC_GROUP
---------- ------- ---------------------- --------------------------
4A Y F 0A 000190100849 5773-46 G(R1>R2) SRDFA ACTIVE
MFAC2ADA DYNAMIC AUTO-LINKS-RECOVERY LINKS_DOMINO: NO
SW, HW CMPR ENABLED = (N, N)
----------------------------------------------------------------------
PRIMARY SIDE: CYCLE# 3 MIN CYCLE TIME 30
SECONDARY CONSISTENT ( Y ) TOLERANCE ( N )
CAPTURE CYCLE SIZE 0 TRANSMIT CYCLE SIZE 0
AVERAGE CYCLE TIME 61 AVERAGE CYCLE SIZE 0
TIME SINCE LAST SWITCH 1 DURATION OF LAST CYCLE 31
MAX THROTTLE TIME 0 MAX CACHE PERCENTAGE 94
HA WRITES 976,240 RPTD HA WRITES 861,065
HA DUP. SLOTS 1,617 SECONDARY DELAY 32
LAST CYCLE SIZE 0 DROP PRIORITY 33
CLEANUP RUNNING ( N ) MSC WINDOW IS OPEN ( N )
SRDF/A TRANSMIT IDLE ( Y ) SRDF/A DSE ACTIVE ( N )
MSC ACTIVE ( N )
----------------------------------------------------------------------
END OF DISPLAY

4. The following error is returned if the #SC VOL command with the MOVEPAIR action is issued to a target SRDF group that is in SRDF/A mode.

```sql
#SC VOL, LCL(9E00, 49), MOVEPAIR, 30, 4A
```

EMCMN001 SRDF-HC : (17) #SC VOL, LCL(9E00, 49), MOVEPAIR, 30, 4A
EMCCV6FE MOVEPAIR denied, SRDF/A active on target RDF group 4A
EMCGM10E COMMAND ABORTED

5. Stop SRDF/A by issuing the #SC SRDFA command with the PEND_DROP action.

```sql
#SC SRDFA, LCL(9E00, 4A), PEND_DROP
```

EMCMN001 SRDF-HC : (49) #SC SRDFA, LCL(9E00, 4A), PEND_DROP
EMCCCR101 STARTING WAIT FOR SRDFA CYCLE SWITCH
EMCCR111 END OF WAIT FOR SRDFA CYCLE SWITCH
EMCM07I COMMAND COMPLETED
EMCM04I COMMAND HAS FINISHED FOR BOX 000190103387

```sql
#SQ SRDFA, LCL(9E00, 4A)
```

EMCMN001 SRDF-HC : (50) #SQ SRDFA, LCL(9E00, 4A)
EMCQR06E QUERY FOR SRDFA - SRDFA NOT FOUND

```sql
#SQ SRDFA, LCL(4200, 0A)
```

EMCMN001 SRDF-HC : (53) #SQ SRDFA, LCL(4200, 0A)
EMCQR06E QUERY FOR SRDFA - SRDFA NOT FOUND
6. The following #SQ VOL display shows the receiving group 4A R1 side after the PEND_DROP operation.

```
#SQ VOL, 9E00, RA(4A)

EMCMN00I SRDF-HC : (51) #SQ VOL, 9E00, RA(4A)
EMCQV00I SRDF-HC DISPLAY FOR (51) #SQ VOL, 9E00, RA(4A)
SERIAL #:001901-03387/ MICROCODE LEVEL:5773-43
DV_ADDR _SYM_ | TOTAL/SYS DCB CNTLUNIT | R1 | R2 | SY
SYS CH DEV RDEV GP VOLSER CYLS STAT OPN STATUS | MR INVRK INVRK %
9E10 10 0030 0030 4A UAC000 3339 ONPV 0 | TNR-SY | R1 0 0 **
9E11 11 0031 0031 4A UAC00H 3339 ONPV 0 | TNR-SY | R1 0 0 **
???? ?? 090B 090B 4A OFFLIN 1113 N/A 0 | TNR-SY | L1 0 0 **
???? ?? 090D 090D 4A OFFLIN 1113 N/A 0 | TNR-SY | L1 0 0 **
END OF DISPLAY
```

7. The following #SQ VOL display shows the receiving group 0A R2 side after the PEND_DROP operation.

```
#SQ VOL, 4200, RA(0A)

EMCMN00I SRDF-HC : (52) #SQ VOL, 4200, RA(0A)
EMCQV00I SRDF-HC DISPLAY FOR (52) #SQ VOL, 4200, RA(0A)
SERIAL #:001903-03353/ MICROCODE LEVEL:5773-163
DV_ADDR _SYM_ | TOTAL/SYS DCB CNTLUNIT | R1 | R2 | SY
SYS CH DEV RDEV GP VOLSER CYLS STAT OPN STATUS | MR INVRK INVRK %
4210 10 0030 0030 0A OFFLIN 3339 OFFL 0 | N/R | R2 0 0 **
4211 11 0031 0031 0A OFFLIN 3339 OFFL 0 | N/R | R2 0 0 **
4213 13 0033 0033 0A OFFLIN 3339 OFFL 0 | N/R | R2 0 0 **
???? ?? 090B 090B 0A OFFLIN 1113 N/A 0 | N/R | L2 0 0 **
???? ?? 090D 090D 0A OFFLIN 1113 N/A 0 | N/R | L2 0 0 **
END OF DISPLAY
```

8. The following #SQ VOL display shows the device to be moved (group 49 device 35) from the R1 side.

```
#SQ VOL, 9E00, RA(49)

EMCMN00I SRDF-HC : (46) #SQ VOL, 9E00, RA(49)
EMCQV00I SRDF-HC DISPLAY FOR (46) #SQ VOL, 9E00, RA(49)
SERIAL #:001903-03353/ MICROCODE LEVEL:5773-43
DV_ADDR _SYM_ | TOTAL/SYS DCB CNTLUNIT | R1 | R2 | SY
SYS CH DEV RDEV GP VOLSER CYLS STAT OPN STATUS | MR INVRK INVRK %
9E12 12 0032 0032 49 UAC001 3339 ONPV 0 | R/W-SY | R1 0 0 **
9E13 13 0033 0033 49 UAC00J 3339 ONPV 0 | TNR-AD | R1 0 0 **
9E14 14 0034 0034 49 UAC00K 3339 ONPV 0 | TNR-AD | R1 0 0 **
9E15 15 0035 0035 49 UAC00L 3339 ONPV 0 | TNR-SY | R1 0 0 **
9E16 16 0036 0036 49 UAC00M 3339 ONPV 0 | TNR-SY | R1 0 0 **
```

9. The following #SQ VOL display shows the device to be moved (group 09 device 35) from the R2 side.

```
#SQ VOL, 4200, RA(09)

EMCMN00I SRDF-HC : (47) #SQ VOL, 4200, RA(09)
EMCQV00I SRDF-HC DISPLAY FOR (47) #SQ VOL, 4200, RA(09)
SERIAL #:001903-03353/ MICROCODE LEVEL:5773-163
DV_ADDR _SYM_ | TOTAL/SYS DCB CNTLUNIT | R1 | R2 | SY
SYS CH DEV RDEV GP VOLSER CYLS STAT OPN STATUS | MR INVRK INVRK %
4212 12 0032 0032 09 OFFLIN 3339 OFFL 0 | N/R | R2 0 0 **
4214 14 0034 0034 09 OFFLIN 3339 OFFL 0 | N/R | R2 0 0 **
4215 15 0035 0035 09 OFFLIN 3339 OFFL 0 | N/R | R2 0 0 **
4216 16 0036 0036 09 OFFLIN 3339 OFFL 0 | N/R | R2 0 0 **
```
10. Issue the \#SC VOL command with the MOVEPAIR action from group 49 to group 4A R1 side.

\#SC VOL,LCL(9E00,49),MOVEPAIR,35,4A

EMCMN01I SRDF-HC : (54) \#SC VOL,LCL(9E00,49),MOVEPAIR,35,4A
EMCM40I COMMAND HAS FINISHED FOR BOX 000190103387
EMCM07I COMMAND COMPLETED

11. The following \#SQ VOL displays show receiving groups 4A and 0A with device 35 added.

\#SQ VOL,9E00,RA(4A)

EMCMN01I SRDF-HC : (55) \#SQ VOL,9E00,RA(4A)
EMCQV00I SRDF-HC DISPLAY FOR (55) \#SQ VOL,9E00,RA(4A)
SERIAL #:0001901-03387/ MICROCODE LEVEL:5773-43
DV_ADDR| _SYM_ | | TOTAL|SYS |DCB|CNTLUNIT | | R1 | R2 |SY
SYS CH|DEV RDEV GP|VOLSER| CYLS|STAT|OPN|STATUS |MR|INVTRK|INVTRK| %
9E10 10 0030 0030 4A UAC00G 3339 ONPV 0 TNR-SY R1 0 0 **
9E11 11 0031 0031 4A UAC00H 3339 ONPV 0 TNR-SY R1 0 0 **
9E15 15 0035 0035 4A UAC00L 3339 ONPV 0 TNR-SY R1 0 0 **
???? ?? 090B 090B 4A OFFLIN 1113 N/A 0 TNR-SY L1 0 0 **
???? ?? 090C 090C 4A OFFLIN 1113 N/A 0 TNR-SY L1 0 0 **
???? ?? 090D 090D 4A OFFLIN 1113 N/A 0 TNR-SY L1 0 0 **
END OF DISPLAY

\#SQ VOL,4200,RA(0A)

EMCMN01I SRDF-HC : (56) \#SQ VOL,4200,RA(0A)
EMCQV00I SRDF-HC DISPLAY FOR (56) \#SQ VOL,4200,RA(0A)
SERIAL #:0001903-00353/ MICROCODE LEVEL:5773-163
DV_ADDR| _SYM_ | | TOTAL|SYS |DCB|CNTLUNIT | | R1 | R2 |SY
SYS CH|DEV RDEV GP|VOLSER| CYLS|STAT|OPN|STATUS |MR|INVTRK|INVTRK| %
4210 10 0030 0030 0A OFFLIN 3339 OFFL 0 N/R R2 0 0 **
4211 11 0031 0031 0A OFFLIN 3339 OFFL 0 N/R R2 0 0 **
4213 13 0033 0033 0A OFFLIN 3339 OFFL 0 N/R R2 0 0 **
4215 15 0035 0035 0A OFFLIN 3339 OFFL 0 N/R R2 0 0 **
???? ?? 090B 090B 0A OFFLIN 1113 N/A 0 N/R L2 0 0 **
???? ?? 090C 090C 0A OFFLIN 1113 N/A 0 N/R L2 0 0 **
???? ?? 090D 090D 0A OFFLIN 1113 N/A 0 N/R L2 0 0 **
END OF DISPLAY

12. The \#SQ VOL displays show receiving groups 49 and 09 with device 35 removed after the MOVEPAIR. The PowerMax/VMAX device number is no longer associated with the source SRDF groups.

\#SQ VOL,9E00,RA(49)

EMCMN01I SRDF-HC : (57) \#SQ VOL,9E00,RA(49)
EMCQV00I SRDF-HC DISPLAY FOR (57) \#SQ VOL,9E00,RA(49)
SERIAL #:0001901-03387/ MICROCODE LEVEL:5773-43
DV_ADDR| _SYM_ | | TOTAL|SYS |DCB|CNTLUNIT | | R1 | R2 |SY
SYS CH|DEV RDEV GP|VOLSER| CYLS|STAT|OPN|STATUS |MR|INVTRK|INVTRK| %
9E12 12 0032 0032 49 UAC00I 3339 ONPV 0 R/W-SY R1 0 0 **
9E13 13 0033 0033 49 UAC00J 3339 ONPV 0 TNR-AD R1 0 0 **
9E14 14 0034 0034 49 UAC00K 3339 ONPV 0 TNR-AD R1 0 0 **
9E16 16 0036 0036 49 UAC00M 3339 ONPV 0 TNR-SY R1 0 0 **
9E17 17 0037 0037 49 UAC00N 3339 ONPV 0 TNR-SY R1 0 0 **
9E18 18 0038 0038 49 UAC00O 3339 ONPV 0 TNR-SY R1 0 0 **
13. Issue the #SC VOL command with the RDF_RSUM action to the devices in the target SRDF group.

#SC VOL, LCL(9E00, 4A), RDF_RSUM, ALL

EMCMN00I SRDF-HC : (59) #SC VOL, LCL(9E00, 4A), RDF_RSUM, ALL
EMCCV79I DEVICES IN RANGE ARE NOT IN SPECIFIED RDF GROUP:
0020-002F, 0032-0034, 0036-090A, 090E-14A7, 14AA-14BF, 14E0-155F, 1640-169F
EMCCVAFI NO AVAILABLE LINKS FOR THE FOLLOWING DEVICES
0032-0034, 0036-0057, 0060-006F, 00D0-00D7, 0140-0152, 0154-015F, 0170-0173, 0178-017B, 04D1-04D2, 0909-090A, 0E50-0E5F, 14AA-14AF
EMCGM40I COMMAND HAS FINISHED FOR BOX 000190103387
EMCGM41I REQUESTED DEVICES
0030-0031, 0035, 090B-090D
EMCGM42I ELIGIBLE DEVICES
0030-0031, 0035, 090B-090D
EMCGM43I COMPLETED DEVICES
0030-0031, 0035, 090B-090D
EMCGM07I COMMAND COMPLETED

14. The following #SQ VOL command display shows the target of the MOVEPAIR SRDF group. The devices are resumed on the link.

#SQ VOL, 9E00, RA(4A)

EMCMN00I SRDF-HC : (60) #SQ VOL, 9E00, RA(4A)
EMCQV00I SRDF-HC DISPLAY FOR (60) #SQ VOL, 9E00, RA(4A)
SERIAL #:0001901-03387/ MICROCODE LEVEL:5773-43
DV_ADDR | _SYM_ | TOTAL | SYS | DCB | CNTLUNIT | R1 | R2 | SY
SYS CH| DEV| RDEV| GP| VOLSER| CYLS| STAT| OPN| STATUS| MR| INVTRK| INVTRK| %
9E10 10 0030 0030 4A UAC00G 3339 ONPV 0 R-W-SY R1 0 0 **
9E11 11 0031 0031 4A UAC00H 3339 ONPV 0 R-W-SY R1 0 0 **
9E15 15 0035 0035 4A UAC00L 3339 ONPV 0 R-W-SY R1 0 0 **
???? ?? 090B 090B 4A OFFLIN 1113 N/A 0 R-W-SY L1 0 0 **
???? ?? 090C 090C 4A OFFLIN 1113 N/A 0 R-W-SY L1 0 0 **
???? ?? 090D 090D 4A OFFLIN 1113 N/A 0 R-W-SY L1 0 0 **
END OF DISPLAY
15. The following display illustrates the target of the MOVEPAIR SRDF group on the secondary/R2 side.

```
#SQ VOL, 4200, RA(0A)
```

```
EMCMN00I SRDF-HC : (61) #SQ VOL, 4200, RA(0A)
EMCQV00I SRDF-HC DISPLAY FOR (61) #SQ VOL, 4200, RA(0A)
SERIAL #: 001903-00353/ MICROCODE LEVEL: 5773-163
DV_ADDR | _SYM_ |   | TOTAL | SYS | DCB | CNTLUNIT |   |   |
SYS | CH | DEV | RDEV | GP | VOLSER | CYLS | STAT | OPN | STATUS | MR | INVTRK | INVTRK | %
4210 10 0030 0030 0A OFFLIN 3339 OFFL 0 N/R R2 0 0 **
4211 11 0031 0031 0A OFFLIN 3339 OFFL 0 N/R R2 0 0 **
4213 13 0033 0033 0A OFFLIN 3339 OFFL 0 N/R R2 0 0 **
4215 15 0035 0035 0A OFFLIN 3339 OFFL 0 N/R R2 0 0 **
???? ?? 090B 090B 0A OFFLIN 1113 N/A 0 N/R L2 0 0 **
???? ?? 090C 090C 0A OFFLIN 1113 N/A 0 N/R L2 0 0 **
???? ?? 090D 090D 0A OFFLIN 1113 N/A 0 N/R L2 0 0 **
END OF DISPLAY
```

16. Activate SRDF/A using the #SC SRDFA command with the ACT action.

```
#SC SRDFA, LCL(9E00, 4A), ACT
```

```
EMCMN00I SRDF-HC : (62) #SC SRDFA, LCL(9E00, 4A), ACT
EMCGM07I COMMAND COMPLETED
EMCGM40I COMMAND HAS FINISHED FOR BOX 000190103387
```

17. The following display illustrates SRDF/A has been activated.

```
#SQ SRDFA, LCL(9E00, 4A)
```

```
EMCMN00I SRDF-HC : (63) #SQ SRDFA, LCL(9E00, 4A)
EMCQRO00I SRDF-HC DISPLAY FOR (63) #SQ SRDFA, LCL(9E00, 4A)
MY SERIAL # MY MICROCODE
000190103387 5773-46
MY GRP ONS PC OS GRP OS SERIAL OS MICROCODE SYNCHDIR FEATURE
--------- --------- -------------- --------------------- -------------- ----
LABEL | TYPE | AUTO-LINKS-RECOVERY | LINKS_DOMINO | MSC_GROUP |
---------- ------- ---------------------- ----------------- ----------
4A | Y | F | 0A | 000190100849 | 5773-46 | G(R1>R2) | SRDFA ACTIVE |
MFAC2ADA | DYNAMIC | AUTO-LINKS-RECOVERY | LINKS-DOMINO: NO |
( SW, HW ) | CMPR ENABLED = ( N,N ) |
--------- ------- ---------------------- ----------------- ----------
PRIMARY SIDE: CYCLE# 1 MIN CYCLE TIME 30
SECONDARY CONSISTENT ( Y ) TOLERANCE ( N )
CAPTURE CYCLE TIME 0 TRANSMIT CYCLE SIZE 0
AVERAGE CYCLE TIME 0 AVERAGE CYCLE SIZE 0
TIME SINCE LAST SWITCH 25 DURATION OF LAST CYCLE 0
MAX THROTTLE TIME 0 MAX CACHE PERCENTAGE 94
HA WRITES 976,240 RPTD HA WRITES 861,065
HA DUP. SLOTS 1,617 SECONDARY DELAY 25
LAST CYCLE SIZE 0 DROP PRIORITY 33
CLEANUP RUNNING ( N ) MSC WINDOW IS OPEN ( N )
SRDF/A TRANSMIT IDLE ( Y ) SRDF/A DSE ACTIVE ( N )
MSC ACTIVE ( N )
--------- ------- ---------------------- ----------------- ----------
END OF DISPLAY
### Using the CEXMPT option

Starting with Enginuity 5773.150, a consistency exempt (CEXMPT) option is provided for an SRDF/A environment to indicate that a volume should be considered exempt from the consistency requirements for the group. This allows for dynamic expansion without taking the group offline and while maintaining consistency.

When moving dynamic pairs, you can use the CEXMPT option so that SRDF/A does not have to be deactivated and reactivated.

The following example illustrates the use of the CEXMPT option.

1. The `#SQ VOL` command displays the devices in SRDF/A group F1.

```
#SQ VOL, 6200, 3, 130
```

```
EMCMN001 SRDF-HC : (179)  #SQ VOL,6200,3,130
EMCQV341 SRDF-HC DISPLAY FOR (179)  #SQ VOL,6200,3,130
SERIAL #: 0001967-01130/0KDLN  MICROCODE LEVEL: 5977-813

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</table>
END OF DISPLAY  
SORT_ORDER = SYMDEV
Total devices displayed = 3
```

2. This `#SQ VOL` display illustrates the devices to be moved from group F2 into SRDF/A group F1.

```
#SQ VOL, 6200, 2, 133
```

```
EMCMN001 SRDF-HC : (180)  #SQ VOL,6200,2,133
EMCQV341 SRDF-HC DISPLAY FOR (180)  #SQ VOL,6200,2,133
SERIAL #: 0001967-01130/0KDLN  MICROCODE LEVEL: 5977-813

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<td>R/W-SY</td>
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</table>
END OF DISPLAY  
SORT_ORDER = SYMDEV
Total devices displayed = 2
```

3. Issue an `#SC VOL` command with the RDF_SUSP action to suspend the devices before issuing the MOVEPAIR action command.

```
#SC VOL, LCL(6200, F2), RDF_SUSP, 133-134
```

```
EMCMN001 SRDF-HC : (181)  #SC VOL,LCL(6200,F2),RDF_SUSP,133-134
EMCGM401 Command has finished for box 000196701130
EMCGM411 Requested devices - Count= 2
   000133-000134
EMCGM421 Eligible devices - Count= 2
   000133-000134
EMCGM431 Completed devices - Count= 2
   000133-000134
EMCGM071 COMMAND COMPLETED
```
4. The #SQ VOL display shows that the devices are suspended and ready for the
MOVEPAIR operation.

#SQ VOL, 6200, 2, 133

EMCMN001 SRDF-HC : (182) #SQ VOL, 6200, 2, 133
EMCQV34I SRDF-HC DISPLAY FOR (182) #SQ VOL, 6200, 2, 133
SERIAL #:0001967-01130/0KDLN MICROCODE LEVEL:5977-813

<table>
<thead>
<tr>
<th>CUU</th>
<th>CH</th>
<th>LCL DEV</th>
<th>VOLSER</th>
<th>TOTAL SYS</th>
<th>DCB</th>
<th>CNTLUNIT</th>
<th>R1</th>
<th>R2</th>
<th>SY</th>
</tr>
</thead>
<tbody>
<tr>
<td>62F3</td>
<td>F3</td>
<td>000133</td>
<td>OFFLIN</td>
<td>1113</td>
<td>OFFL</td>
<td>0</td>
<td>R/W</td>
<td>TH</td>
<td></td>
</tr>
<tr>
<td>F2</td>
<td>0000A7</td>
<td>F3</td>
<td>000134</td>
<td>OFFLIN</td>
<td>1113</td>
<td>OFFL</td>
<td>0</td>
<td>R/W</td>
<td>TH</td>
</tr>
</tbody>
</table>

END OF DISPLAY

Total devices displayed = 2

5. Issue an #SC VOL MOVEPAIR command with the CEXMPT option to add the
devices to the running SRDF/A group F1.

#SC VOL, LCL(6200, F2), MOVEPAIR(CEXMPT), 133-134, F1

EMCMN001 SRDF-HC : (183) #SC VOL, LCL(6200, F2), MOVEPAIR(CEXMPT), 133-134, F1
EMCGM40I Command has finished for box 000196701130
EMCGM41I Requested devices - Count= 2
000133-000134
EMCGM42I Eligible devices - Count= 2
000133-000134
EMCGM43I Completed devices - Count= 2
000133-000134
EMCGM07I COMMAND COMPLETED

6. Issue an #SQ VOL command to confirm that the specified devices are now in group
F1. TNR-AX status indicates the devices are suspended, asynchronous mode with
CEXMPT.

#SQ VOL, 6200, 5, 130

EMCMN001 SRDF-HC : (184) #SQ VOL, 6200, 5, 130
EMCQV34I SRDF-HC DISPLAY FOR (184) #SQ VOL, 6200, 5, 130
SERIAL #:0001967-01130/0KDLN MICROCODE LEVEL:5977-813

<table>
<thead>
<tr>
<th>CUU</th>
<th>CH</th>
<th>LCL DEV</th>
<th>VOLSER</th>
<th>TOTAL SYS</th>
<th>DCB</th>
<th>CNTLUNIT</th>
<th>R1</th>
<th>R2</th>
<th>SY</th>
</tr>
</thead>
<tbody>
<tr>
<td>62F0</td>
<td>F0</td>
<td>000130</td>
<td>OFFLIN</td>
<td>1113</td>
<td>OFFL</td>
<td>0</td>
<td>R/W</td>
<td>TH</td>
<td></td>
</tr>
<tr>
<td>F1</td>
<td>0000A4</td>
<td>F0</td>
<td>000131</td>
<td>OFFLIN</td>
<td>1113</td>
<td>OFFL</td>
<td>0</td>
<td>R/W</td>
<td>TH</td>
</tr>
</tbody>
</table>

END OF DISPLAY

Total devices displayed = 5
The #SQ SRDFA,LCL display confirms there are four CEXMPT devices in the SRDF group.

### #SQ SRDFA,LCL(6200,F1)

- **Label**: MY SERIAL #
- **Value**: 0001967-01130/0KDLN 5977-813

<table>
<thead>
<tr>
<th>MY GRP ONL PC OS GRP</th>
<th>MY SERIAL</th>
<th>OS SERIAL</th>
<th>OS MICROCODE</th>
<th>SYNCHDIR</th>
<th>FEATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC</td>
<td>F1</td>
<td>F0</td>
<td>0001967-01170</td>
<td>5977-813</td>
<td>G(R1&gt;R2) SRDFA ACTIVE</td>
</tr>
<tr>
<td></td>
<td>MFYE2UFF1</td>
<td>DYNAMIC</td>
<td>AUTO-LINKS-RECOVERY</td>
<td>LINKS-DOMINO:NO</td>
<td></td>
</tr>
</tbody>
</table>

- **Primary Side**: CYCLE# 68 MIN CYCLE TIME 15
- **Secondary Consistent**: (Y)
- **Capture Cycle Size**: 0
- **Average Cycle Time**: 15
- **Time Since Last Switch**: 4
- **Max Throttle Time**: 65,535
- **HA Writes**: 52,879,628
- **Primary Cycle Size**: 5,547,329
- **Last Cycle Size**: 0
- **Cleanup Running**: (N)
- **SRDF/A Transmit Idle**: (Y)
- **Write Pacing Active**: (N)
- **Write Pacing Stats On**: (N)
- **WP Threshold**: 60
- **Cycle Mode**: (M)
- **Transmit Cycle Number**: 67
- **Last Transmit Time**: 0

END OF DISPLAY
8. The #SQ SRDFA,RMT display shows there are also four CEXMPT devices in the SRDF group on the secondary side.

#SQ SRDFA,RMT(6200,F1)

EMCMN001 SRDF-HC : (187) #SQ SRDFA,RMT(6200,F1)
EMCQR001 SRDF-HC DISPLAY FOR (187) #SQ SRDFA,RMT(6200,F1)
  MY SERIAL #  MY MICROCODE
  -------------------   ------------
  0001967-01170/0KDNR     5977-813

MY GRP ONL PC OS GRP OS SERIAL   OS MICROCODE SYNCHDIR FEATURE
  -------------------   ------------   ---------   ---------   -----------   ---------
  LABEL TYPE            AUTO-LINKS-RECOVERY LINKS_DOMINO MSC_GROUP
  ----------- ------- ---------------------- ----------------- --------------
  F0    Y   F   F1   0001967-01130  5977-813   G(R1>R2) SRDFA ACTIVE
  MFYE2UFF1  DYNAMIC    AUTO-LINKS-RECOVERY   LINKS-DOMINO:NO
  ( SW,HW ) CMPR ENABLED = ( N,N )

SECONDARY SIDE: CYCLE#           72 CYCLE TOD  11/17/2016 07:00:07
SECONDARY CONSISTENT ( Y )
  CYCLE SUSPENDED ( N )  RESTORE DONE ( Y )
RECEIVE CYCLE SIZE 0 APPLY CYCLE SIZE 0
AVERAGE CYCLE TIME 15 AVERAGE CYCLE TIME 0
TIME SINCE LAST SWITCH 0 DURATION OF LAST CYCLE 15
MAX THROTTLE TIME 0 MAX CACHE PERCENTAGE 75
TOTAL RESTORES 0 TOTAL MERGES 0
SECONDARY DELAY 15 DROP PRIORITY 33
CLEANUP RUNNING ( N )  HOST INTERVENTION REQUIRED ( N )
SRDF/A TRANSMIT IDLE ( Y )  SRDF/A DSE ACTIVE ( Y )
MSC ACTIVE ( N )
WRITE PACING ACTIVE ( N )  WRITE PACING STATS ON ( N )
GPACING ACTIVE ( N )  DPACING ACTIVE ( N )
WP THRESHOLD 60 WP DSE THRESHOLD 90
WP MAXDELAY 50,000 WP (GRP,DEV) AUTO ACTIVATE ( N,N )
CYCLE MODE ( M )  CEXMPT 2
RECEIVE CYCLE NUMBER 73
LAST TRANSMIT TIME 0 AVG TRANSMIT TIME 0

9. Issue an #SC VOL, LCL,RDF_RSUM command to the devices to make them ready on the link and to clear the consistency exempt status. Note that two cycle switches after full synchronization occur before all of the devices in the SRDF group become consistent.

#SC VOL, LCL(6200,F1), RDF_RSUM, 133-134

EMCMN001 SRDF-HC : (188) #SC VOL, LCL(6200,F1), RDF_RSUM, 133-134
EMCGM401I Command has finished for box 000196701130
EMCGM411I Requested devices - Count= 2
  000133-000134
EMCGM421I Eligible devices - Count= 2
  000133-000134
EMCGM431I Completed devices - Count= 2
  000133-000134
EMCGM07I COMMAND COMPLETED
10. The #SQ VOL display shows that the consistency exempt status has been cleared.

<table>
<thead>
<tr>
<th>CUU</th>
<th>CH</th>
<th>LCL DEV</th>
<th>VOLSER</th>
<th>LGRP</th>
<th>RMT DEV</th>
<th>RGRP</th>
<th>TOTAL</th>
<th>DCB</th>
<th>CNTLUNIT</th>
<th>R1</th>
<th>R2</th>
<th>SY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SYMDEV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**#SQ VOL,6200,5,130**

EMCMN00I SRDF-HC : (189) #SQ VOL,6200,5,130
EMCMQV34I SRDF-HC DISPLAY FOR (189) #SQ VOL,6200,5,130
SERIAL #:001967-001130/0KDLN MICROCODE LEVEL:5977-813

<table>
<thead>
<tr>
<th>CUU</th>
<th>CH</th>
<th>LCL DEV</th>
<th>VOLSER</th>
<th>LGRP</th>
<th>RMT DEV</th>
<th>RGRP</th>
<th>TOTAL</th>
<th>DCB</th>
<th>CNTLUNIT</th>
<th>R1</th>
<th>R2</th>
<th>SY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SYMDEV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11. The #SQ SRDFA display shows that there are no CEXMPT devices in the SRDF group.

**#SQ SRDFA,LCL(6200,F1)**

EMCMN00I SRDF-HC : (190) #SQ SRDFA,LCL(6200,F1)
EMCMQRO01 SRDF-HC DISPLAY FOR (190) #SQ SRDFA,LCL(6200,F1)
MY SERIAL # MY MICROCODE

<table>
<thead>
<tr>
<th>LABEL</th>
<th>TYPE</th>
<th>AUTO-LINKS-RECOVERY</th>
<th>LINKS_DOMINO</th>
<th>MSC_GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>Y</td>
<td>F</td>
<td>F0</td>
<td>001967-0170 5977-813</td>
</tr>
</tbody>
</table>

MFYE2UFF1 DYNAMIC AUTO-LINKS-RECOVERY LINKS-DOMINO:NO ( SW,HW ) CMPR ENABLED = ( N,N )

<table>
<thead>
<tr>
<th>PRIMARY SIDE: CYCLE#</th>
<th>90 MIN CYCLE TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>SECONDARY CONSISTENT</td>
<td>( Y ) TOLERANCE ( N )</td>
</tr>
<tr>
<td>CAPTURE CYCLE SIZE</td>
<td>0 TRANSMIT CYCLE SIZE</td>
</tr>
<tr>
<td>AVERAGE CYCLE TIME</td>
<td>15 AVERAGE CYCLE SIZE</td>
</tr>
<tr>
<td>TIME SINCE LAST SWITCH</td>
<td>14 DURATION OF LAST CYCLE</td>
</tr>
<tr>
<td>MAX THROTTLE TIME</td>
<td>65,535 MAX CACHE PERCENTAGE</td>
</tr>
<tr>
<td>HA WRITES</td>
<td>52,879,628 RPTD HA WRITES</td>
</tr>
<tr>
<td>HA DUP. SLOTS</td>
<td>5,547,329 SECONDARY DELAY</td>
</tr>
<tr>
<td>LAST CYCLE SIZE</td>
<td>0 DROP PRIORITY</td>
</tr>
<tr>
<td>CLEANUP RUNNING</td>
<td>( N ) MSC WINDOW IS OPEN</td>
</tr>
<tr>
<td>SRDF/A TRANSMIT IDLE</td>
<td>( Y ) SRDF/A DSE ACTIVE</td>
</tr>
<tr>
<td>MSC ACTIVE</td>
<td>( N )</td>
</tr>
<tr>
<td>WRITE PACING ACTIVE</td>
<td>( N ) WRITE PACING STATS ON</td>
</tr>
<tr>
<td>GAPACING ACTIVE</td>
<td>( N ) GAPACING ACTIVE</td>
</tr>
<tr>
<td>WP THRESHOLD</td>
<td>60 WP DSE THRESHOLD</td>
</tr>
<tr>
<td>WP MAXDELAY</td>
<td>50,000 WP (GRP,DEV) AUTO ACTIVATE</td>
</tr>
<tr>
<td>CYCLE MODE</td>
<td>( M ) CEXMLPT</td>
</tr>
<tr>
<td>TRANSmit CYCLE NUMBER</td>
<td>89 TRANSMIT QUEUE DEPTH</td>
</tr>
<tr>
<td>Last TRANSMIT TIME</td>
<td>0 AVG TRANSMIT TIME</td>
</tr>
</tbody>
</table>

END OF DISPLAY
Performing SRDF/A MSC operations

SRDF Multi-Session Consistency (MSC) is a Dell EMC technology that provides consistency across multiple SRDF/A sessions within a single or multiple storage systems. SRDF/A with MSC is supported by a started SCF task that performs cycle-switching and cache recovery operations across all SRDF/A sessions in the MSC group or groups. Up to eight MSC groups are supported for each SCF task.

MSC coordinates the SRDF/A cycle switching among SRDF groups. The cycle switch occurs during a very brief time period when no host writes are being serviced by the storage system. You define the MSC parameters, including which SRDF groups are to be coordinated and the cycle times, in the SRDF Host Component configuration file. Achieving the cycle switch requires a single coordination point from which the cycle switch process can be driven in all participating storage systems—this function occurs in the SCF address space.

If SRDF Host Component is started after the SCF/MSC environment is fully enabled, the MSC parameters are posted to SCF immediately. If SRDF Host Component is started before the SCF/MSC environment has been fully enabled, you must issue an SC GLOBAL,PARM_REFRESH command to post the MSC group parameters to SCF.

Single MSC group procedure

The following procedure describes how to perform SRDF/A MSC operations for a single MSC group.

1. The MSC environment in SCF must be enabled before it can accept any parameters posted from Host Component. To ensure that the MSC environment is enabled, issue the SCF command F emcscf,MSC,DISPLAY.

   The following example display indicates the environment is enabled:

   SCF1390I MSC,DISPLAY
   SCF1391I MSC - DISPLAY COMMAND ACCEPTED.
   SCF1320I MSC - TASK ENABLED
   SCF1600I MSFMSC                    ACTIVE    MSC            WF=0
   SCF1601I (900E,B0)          0001926-02840  0001926-00291
   SCF1601I (8704,2C)          0001926-00304  0001926-00312
   SCF1602I MSC Display complete

   The following display indicates the environment is disabled:

   SCF1390I MSC,DISPLAY
   SCF1391I MSC - DISPLAY COMMAND ACCEPTED.
   SCF1321I MSC - TASK DISABLED

2. If the display indicates that the environment is disabled, issue the SCF command F emcscf,MSC,ENABLE:

   SCF1390I MSC,ENABLE
   SCF1391I MSC - ENABLE COMMAND ACCEPTED.
   SCF1320I MSC - TASK ENABLED

3. For this example, the following MSC parameters are defined in the SRDF Host Component configuration file:

   MSC_GROUP_NAME=EMCMSC
   MSC_WEIGHT_FACTOR=0
MSC_INCLUDE_SESSION=6C0F,(09)
MSC.Include_SESSION=8703,(2B)
MSC_CYCLE_TARGET=15
MSC_GROUP_END

4. To post these MSC group parameters to SCF, issue the SRDF Host Component command #SC GLOBAL,PARM_REFRESH:

```plaintext
#SC GLOBAL, PARM_REFRESH
EMCMN00I SRDF-HC : #SC GLOBAL, PARM_REFRESH
EMCB10E (    37) MSC_CYCLE_TARGET STATEMENT INVALID
EMCMB03E (  123) MSC_GROUP_NAME MISSING INCLUDE_SESSION STATEMENT OR MISSING GROUP_END
EMCGM07I COMMAND COMPLETED
```

```plaintext
#SC GLOBAL, PARM_REFRESH
EMCMN00I SRDF-HC : #SC GLOBAL, PARM_REFRESH
EMCMB03E (  123) MSC_GROUP_NAME MISSING INCLUDE_SESSION STATEMENT OR MISSING GROUP_END
EMCGM07I COMMAND COMPLETED
```

```plaintext
#SC GLOBAL, PARM_REFRESH
EMCMN00I SRDF-HC : #SC GLOBAL, PARM_REFRESH
EMCP03I SSIDTBBL REFRESHED, STATISTICS FOR ADDED DEVICES FOLLOW
EMCP00I SSID(s):  82 TOTAL DEV(s): 16,292 SUPPORTED DEV(s): 15,908
EMCMB0DE SRDF/A IS NOT FOUND FOR CUU 6C0F FOUND IN MSC_GROUP EMCMSC
EMCMN00I SRDF-HC : #SC GLOBAL, PARM_REFRESH
EMCP03I SSIDTBBL REFRESHED, STATISTICS FOR ADDED DEVICES FOLLOW
EMCP00I SSID(s):  82 TOTAL DEV(s): 16,292 SUPPORTED DEV(s): 15,908
EMCMB0EI MSC_GROUP_NAME = EMCMSC HAS PASSED VALIDATION
EMCMB0FI MSC HAS POSTED SCF WITH NEW DEFINITION(S)
EMCMN00I SRDF-HC : #SC GLOBAL, PARM_REFRESH
EMCGM07I COMMAND COMPLETED
```

**Note:** If there were syntax errors for any of the MSC parameters, SRDF Host Component issues messages indicating the errors. SRDF Host Component also issues messages if SRDF/A is not currently running for any of the SRDF groups that are participating in the MSC group.

When the MSC parameters are posted to SCF, messages are issued in the SCF job log and syslog to indicate the time and the cycle switching status. The log also indicates if the auto-recovery feature has been enabled for this MSC group:

```plaintext
SCF1592I MSC - GROUP=EMCMSC CYCLE TIME WARN AFTER = 5 MIN(S)
SCF1323I MSC - ALLOW OVERWRITE OF SCRATCH AREA AND BOXLIST
SCF1322I MSC - AUTO RECOVERY ENABLED
SCF1367I MSC - ADCOPY-DISK on SRDFA DROP disabled due to AUTO_RECOVER
SCF1568I MSC - GROUP=EMCMSC WEIGHT FACTOR = 0
SCF1569I MSC - GROUP=EMCMSC STEAL LOCK AFTER = 2 MIN(S)
SCF1342I MSC - GROUP=EMCMSC PROCESS_FC03-ALL BOXES ACTIVE
SCF1523I MSC - GROUP=EMCMSC GLOBAL CONSISTENCY HAS BEEN ACHIEVED
SCF1564I MSC - GROUP=EMCMSC TIME OF DAY FOR CYCLE 00000001 IS 14:01:01.01
SCF1236I ASY -- CONTROLLER 00296 RDFGRP(38) SECONDARY DELAY = 7382
SCF1564I MSC - GROUP=EMCMSC TIME OF DAY FOR CYCLE 00000002 IS 14:01:16.02
SCF1564I MSC - GROUP=EMCMSC TIME OF DAY FOR CYCLE 00000003 IS 14:01:31.02
```

If any of the MSC parameters defined in the SRDF Host Component configuration file need to be changed, including those for the Automated Recovery feature, you must issue an MSC REFRESH command to purge the running MSC group.
5. Issue the MSC,REFRESH command to stop the cycle switching coordination among the SRDF/A groups.

6. To stop SRDF/A for a consistent image on the secondary side, issue an MSC,PENDDROP command. This command stops SRDF replication. Then issue the MSC,REFRESH command to purge the existing MSC environment.

7. The SRDF groups need to be conditioned to restart replication and SRDF/A. Issue the #SC GLOBAL,PARM_REFRESH command to post the new MSC group to the SCF task after the devices are ready on the link and in single system SRDF/A.

Multiple MSC groups procedure

MSC allows up to eight MSC groups to run under a single SCF task. Only one STAR definition is allowed per SCF task. If multiple MSC groups are detected in the SRDF Host Component initialization parameters, the MSC environment is initialized differently than for a single MSC group.

During an initial SRDF Host Component startup, or after an SC GLOBAL,PARM_REFRESH command is issued, the MSC group parameters are defined to SCF, but the MSC cycle switching does not start. You must issue an #SC GLOBAL,PARM_REFRESH,MSGG(name) command for the specified MSC group to start the cycle switching. You can specify a single group name with name or you can start all defined groups using an asterisk (*).

An #SC GLOBAL PARM_REFRESH command redefines any existing MSC group definition. It is not necessary to issue an MSC REFRESH command to delete the definition before issuing a PARM_REFRESH.

Note: When multiple MSC groups are defined, note that an MSC,DISABLE for a specific MSC group does not delete the MSC definition. A DISABLE for all groups, MSCG(“*”), deletes the definition as well as disables the MSC environment.

1. To ensure that the MSC environment is enabled, issue the SCF command F emcscf,MSC,DISPLAY.

   The MSC display shows all of the MSC groups that have been posted. The following example shows that SRDF Host Component has posted multiple MSC groups to SCF. None of the MSC groups are currently having the cycle switches coordinated, as indicated by the INACTIVE states of each of the groups.

   F emcscf,MSC,DISPLAY

   SCF1390I MSC DISPLAY
   SCF1391I MSC - DISPLAY COMMAND ACCEPTED.
   SCF1320I MSC - TASK ENABLED
   SCF1600I STAREDP INACTIVE STAR WF=0 EDPCGRP
   SCF1601I (5102,22),(BD)/20 0001926-00143 0001926-00261 0001926-00262
   SCF1601I (5103,23),(BD)/21 0001926-00143 0001926-00261 0001926-00262
   SCF1600I MSC_EDP1 INACTIVE MSC WF=2
   SCF1601I (C210,C0) 0001903-00346 0001903-00353
   SCF1601I (C211,C1) 0001903-00346 0001903-00353
   SCF1602I MSC Display complete

   When the MSC environment is enabled, the response provides additional display lines for each active MSC group, containing the group name, status (ACTIVE, INACTIVE, DEACT, or PENDDROP), mode (MSC or STAR), and the session
Performing SRDF/A MSC operations

information. The mode is supplemented with "(CAS)" for cascaded sessions.
WF=n indicates the weight factor. For SRDF/Star configurations, the ConGroup
name displays after WF.

The session information is comprised of the gatekeeper CCUU and the SRDF
groups.

- When one SRDF group is displayed after the gatekeeper, it represents the
  SRDF/A (asynchronous) SRDF group.
- When two groups are displayed, it represents a cascaded configuration, where
  the first SRDF group is the synchronous group and the second is the SRDF/A
  group.
- For SRDF/Star environments, the individual SRDF group displayed is the
  recovery group.
- For concurrent SRDF/Star environments, the SRDF group displayed after the
  "/" is the synchronous group (from A to B).
- The serial numbers in the display represent the A, B, and C storage systems
  respectively.

2. Once the MSC environments have been built, issue an
SC GLOBAL,PARM_REFRESH for each MSC group to launch the MSC cycle
switching:

```sh
#SC GLOBAL,PARM_REFRESH,MSCG(EMCTMSC1)
EMCMN00I SRDF-HC : (4) #SC GLOBAL,PARM_REFRESH,MSCG(EMCTMSC1)
EMCMB0FI MSC HAS POSTED SCF WITH NEW DEFINITION(S)
EMCGM07I COMMAND COMPLETED
```

If there are no groups displayed in the MSC display, then a full
SC GLOBAL,PARM_REFRESH must be done, followed by an
SC GLOBAL,PARM_REFRESH for each of the MSC groups:

3. If a validation error occurs, a message indicates the error:

```sh
#SC GLOBAL,PARM_REFRESH,MSCG(EMCMSC4)
EMCMN00I SRDF-HC : (58) #SC GLOBAL,PARM_REFRESH,MSCG(EMCMSC4)
EMCMB3EE Validation error detected for MSC Group EMCMSC4
EMCGM07I COMMAND COMPLETED
```

To resolve this, perform the following steps:

a. Fix the error that caused the condition.

b. Issue an MSC,REFRESH to refresh the MSC environment.

c. Populate the MSC environment with a full SC GLOBAL,PARM_REFRESH.

d. Issue an SC GLOBAL,PARM_REFRESH for each of the MSC groups.
Dynamically adding and deleting devices in SRDF/Star

You can dynamically add or delete devices in an SRDF/Star configuration without having to first suspend SRDF/Star. This functionality ensures the availability of SRDF/Star during configuration changes.

**Note:** You can also perform dynamic operations on 2-site (non-Star) configurations.

To perform dynamic operations, you must add or delete devices for both the SRDF/S and SRDF/A legs of the Star configuration. MSC and SRDF/Star recognize the addition or deletion of devices for an active MSC SRDF group and incorporates these changes into the SRDF/Star configuration.

**Requirements and restrictions**

Dynamic device add or delete operations require PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5773 and later.

Note the following:

- Dynamic add/delete processing applies only to primary MSC servers (MSC_WEIGHT_FACTOR = 0).
- Any device supported by an #SC VOL CREATEPAIR command is eligible for dynamic device addition.
- Any device supported by an #SC VOL DELETEPAIR command is eligible for dynamic device deletion.
- All devices must be the same type.
- Devices should not be in use and should not contain any data needed for recovery.

**Dynamic device add procedure**

The process for dynamic addition of devices has three stages.

1. **External preparation**—You need to prepare or “stage” devices for addition to the production SRDF/Star configuration.

   **Note:** It is recommended to have separate staging SRDF groups for both synchronous and asynchronous devices.

   In the staging SRDF group, execute CREATEPAIR commands to create a synchronous and an asynchronous pair in a concurrent or cascaded topology. Then, allow these devices to synchronize until there are no invalid tracks on either leg.

   Once the devices are synchronized, execute an RDF_SUSP to suspend the SRDF/S pairs before the MOVEPAIR operation, which moves them into the production SRDF/S groups in the SRDF/Star configuration. A resume pair (RDF_RSUM) immediately follows.

2. **ConGroup processing**—ConGroup provides a new ADD command that allows a device or range of devices (by CUU or PowerMax/VMAX device number) to be added to a specified consistency group name within a ConGroup address space.
After completing the ADD processing for the SRDF/S pair in ConGroup, execute a MOVEPAIR for the asynchronous leg specifying the CEXMPT (consistency exempt) option to add the device to the production SRDF/A leg. A resume pair (RDF_RSUM) should immediately follow.

3. MSC processing—Once the resume processing of the devices that were moved into the SRDF/A group has completed, issue an MSC ADDDEV command to the primary MSC server.

Note: The MSC ADDDEV command is described in the ResourcePak Base for z/OS Product Guide.

The ADDDEV command validates the existence and synchronized state of the SRDF/S leg and the ConGroup protection status. It then begins the process of discovering the newly added SRDF/A devices by comparing the current SRDF/Star configuration to the configuration that existed prior to the last successful addition of new devices.

Once the configuration is validated, a check is performed for any CEXMPT devices. If none are found, SDDF session management will include the new devices when it is next invoked. If CEXMPT devices are found, SDDF devices are not added to the SDDF session management and CEXMPT is checked again at the next SRDF/A cycle switch.

The final phase of MSC ADD processing is to register the SDDF sessions for the new synchronous and asynchronous devices.

Note: Throughout this entire process, the STAR RECOVERY AVAILABLE status is unchanged. If a problem occurs during this MSC processing, the environment is restored to its 'pre-ADDDEV' state, a message is issued, and processing must be reinitiated by another invocation of ADDDEV.

Figure 34 shows the SRDF/Star environment before the MSC ADDDEV command is issued.
In Figure 34, the devices in SRDF groups 90 and 97 are concurrent and the devices in staging groups 9E and DF are also concurrent.

The following procedure describes how to add devices in the SRDF/A leg of this running SRDF/Star configuration.

1. Issue an `#SC VOL, CREATEPAIR` command to add devices into staging group DF. Observe and ensure that there are no invalid tracks.

```plaintext
#SC VOL, LCL(AA00,DF), CREATEPAIR, B4-B7, 114
```

```plaintext
EMCMN00I SRDF-HC : (11) #SC VOL,LCL(AA00,DF),CREATEPAIR,B4-B7,114
EMCGM40I Command has finished for box 000196701170
EMCGM41I Requested devices - Count= 4
0000B4-0000B7
EMCGM42I Eligible devices  - Count= 4
0000B4-0000B7
EMCGM43I Completed devices - Count= 4
0000B4-0000B7
EMCGM07I COMMAND COMPLETED
```

2. Issue an `#SQ VOL` command to display the new devices to be added on the staging synchronous SRDF group DF.

```plaintext
#SQ VOL, AA00, 4, B4
```

```plaintext
EMCMQ34I SRDF-HC DISPLAY FOR (13) #SQ VOL,AA00,4,B4
SERIAL #:0001967-01170/0KDNR MICROCODE LEVEL:5977-813
----------------------------------------------------------------------
CUU   CH| LCL DEV | VOLSER|---------------------------| LCL INV |---------
------------------------| TOTAL | SYS | DCB| CNTLUNIT |  |  R1  |  R2  | SY
LGRP | RMT DEV | RGRP | CYLS | STAT| OPN| STATUS |MR| INVTRK| INVTRK| %
----------------------------------------------------------------------
AA94  94  0000B4 OFFLIN  1113 OFFL   0 R/W       TH
DF    000114 DF    R/W-SY    R1      0      0 **
AA95  95  0000B5 OFFLIN  1113 OFFL   0 R/W       TH
DF    000115 DF    R/W-SY    R1      0      0 **
AA96  96  0000B6 OFFLIN  1113 OFFL   0 R/W       TH
DF    000116 DF    R/W-SY    R1      0      0 **
AA97  97  0000B7 OFFLIN  1113 OFFL   0 R/W       TH
DF    000117 DF    R/W-SY    R1      0      0 **
END OF DISPLAY SORT_ORDER = SYMDEV
Total devices displayed = 4
```

3. Issue an `#SC VOL, CREATEPAIR` command to add devices into staging group 9E. Observe and ensure that there are no invalid tracks.

```plaintext
#SC VOL, LCL(AA00, 9E), CREATEPAIR, B4-B7, 11AC
```

```plaintext
EMCMN00I SRDF-HC : (14) #SC VOL,LCL(AA00,9E),CREATEPAIR,B4-B7,11AC
EMCGM40I Command has finished for box 000196701170
EMCGM41I Requested devices - Count= 4
0000B4-0000B7
EMCGM42I Eligible devices  - Count= 4
0000B4-0000B7
EMCGM43I Completed devices - Count= 4
0000B4-0000B7
EMCGM07I COMMAND COMPLETED
4. Issue an `#SQ VOL` command to display the new devices to be added on the staging SDRF group 9E. Observe and ensure that there are no invalid tracks.

```
#SQ VOL,AA00,4,B4
```

```
EMCMN00I SRDF-HC : (15) #SQ VOL,AA00,4,B4
EMCQV34I SRDF-HC DISPLAY FOR (15) #SQ VOL,AA00,4,B4
SERIAL #:0001967-01170/0KDNR MICROCODE LEVEL:5977-813
----------------------------------------------------------------------
CUU   CH|LCL DEV |VOLSER|---------------------------|LCL INV|---------
--------|---------|--------|---------------------------|---------|--------
------------------------| TOTAL|SYS |DCB|CNTLUNIT |  |  R1  |  R2  |SY
LGRP |RMT DEV | RGRP | CYLS |STAT|OPN|STATUS   |MR|INVTRK|INVTRK|%
----------------------------------------------------------------------
AA94  94   0000B4 OFFLIN 1113 OFFL 0 R/W       TH
  DF 000114 DF R/W-SY R1 0 0 **
  9E 0001AC 9E R/W-SY R1 0 0 **
AA95  95   0000B5 OFFLIN 1113 OFFL 0 R/W       TH
  DF 000115 DF R/W-SY R1 0 0 **
  9E 0001AD 9E R/W-SY R1 0 0 **
AA96  96   0000B6 OFFLIN 1113 OFFL 0 R/W       TH
  DF 000116 DF R/W-SY R1 0 0 **
  9E 0001AE 9E R/W-SY R1 0 0 **
AA97  97   0000B7 OFFLIN 1113 OFFL 0 R/W       TH
  DF 000117 DF R/W-SY R1 0 0 **
  9E 0001AF 9E R/W-SY R1 0 0 **
END OF DISPLAY SORT_ORDER = SYMDEV
Total devices displayed = 4
```

5. Issue an `#SC VOL, RDF_SUSP` command to suspend the devices on the staging synchronous group DF.

```
#SC VOL,LCL(AA00,DF),RDF_SUSP,ALL
```

```
EMCMN00I SRDF-HC : (17) #SC VOL,LCL(AA00,DF),RDF_SUSP,ALL
EMCGM40I Command has finished for box 000196701170
EMCGM41I Requested devices - Count=     4
0000B4-0000B7
EMCGM42I Eligible devices  - Count=     4
0000B4-0000B7
EMCGM43I Completed devices - Count=     4
0000B4-0000B7
EMCGM07I COMMAND COMPLETED
```

6. Issue an `#SQ VOL` command to confirm the devices are suspended. The TNR-SY status indicates the devices are suspended and synchronous mode.

```
#SQ VOL,AA00,4,B4
```

```
EMCMN00I SRDF-HC : (18) #SQ VOL,AA00,4,B4
EMCQV34I SRDF-HC DISPLAY FOR (18) #SQ VOL,AA00,4,B4
SERIAL #:0001967-01170/0KDNR MICROCODE LEVEL:5977-813
----------------------------------------------------------------------
CUU   CH|LCL DEV |VOLSER|---------------------------|LCL INV|---------
--------|---------|--------|---------------------------|---------|--------
------------------------| TOTAL|SYS |DCB|CNTLUNIT |  |  R1  |  R2  |SY
LGRP |RMT DEV | RGRP | CYLS |STAT|OPN|STATUS   |MR|INVTRK|INVTRK|%
----------------------------------------------------------------------
AA94  94   0000B4 OFFLIN 1113 OFFL 0 R/W       TH
  DF 000114 DF R/W-SY R1 0 0 **
  9E 0001AC 9E R/W-SY R1 0 0 **
AA95  95   0000B5 OFFLIN 1113 OFFL 0 R/W       TH
  DF 000115 DF R/W-SY R1 0 0 **
  9E 0001AD 9E R/W-SY R1 0 0 **
AA96  96   0000B6 OFFLIN 1113 OFFL 0 R/W       TH
  DF 000116 DF R/W-SY R1 0 0 **
  9E 0001AE 9E R/W-SY R1 0 0 **
AA97  97   0000B7 OFFLIN 1113 OFFL 0 R/W       TH
  DF 000117 DF R/W-SY R1 0 0 **
  9E 0001AF 9E R/W-SY R1 0 0 **
END OF DISPLAY SORT_ORDER = SYMDEV
Total devices displayed = 4
```
7. Issue an `#SC VOL,MOVEPAIR` command to move the synchronous devices from staging group DF to group 90. The STAR option must be supplied, as the target group has the STAR option set.

```plaintext
#SC VOL, LCL(AA00, DF), MOVEPAIR(STAR), ALL, 90
```

EMCMN00I SRDF-HC : (19) #SC VOL,LCL(AA00,DF),MOVEPAIR(STAR),ALL,90
EMCMG40I Command has finished for box 000196701170
EMCMG41I Requested devices - Count= 4
0000B4-0000B7
EMCMG42I Eligible devices - Count= 4
0000B4-0000B7
EMCMG43I Completed devices - Count= 4
0000B4-0000B7
EMCMG07I COMMAND COMPLETED

8. The devices display in synchronous SRDF group 90.

```plaintext
#SQ VOL, AA00, RA(90)
```

EMCMN00I SRDF-HC : (20) #SQ VOL,AA00,RA(90)
EMCQV34I SRDF-HC DISPLAY FOR (20) #SQ VOL,AA00,RA(90)
SERIAL #:0001967-01170/0KDNR MICROCODE LEVEL:5977-813

```
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<td>TH</td>
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<td>0 **</td>
</tr>
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<td>C1</td>
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<tr>
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<td>90</td>
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<td>R1</td>
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<td>0 **</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
```

END OF DISPLAY

Total devices displayed = 8

9. Issue an `#SC VOL,RDF_RSUM` for the devices on the synchronous leg.

```plaintext
#SC VOL, LCL(AA00, 90), RDF_RSUM, ALL
```

EMCMN00I SRDF-HC : (21) #SC VOL,LCL(AA00,90),RDF_RSUM,ALL
EMCMG40I Command has finished for box 000196701170
EMCMG41I Requested devices - Count= 8
0000B0-0000B7
EMCCVC7I Devices in ConGroups will be excluded
0000B0-0000B3
EMCMG42I Eligible devices - Count= 4
0000B4-0000B7
EMCMG43I Completed devices - Count= 4
0000B4-0000B7
EMCMG07I COMMAND COMPLETED
Dynamically adding and deleting devices in SRDF/Star 451

Operations and Examples

#SQ VOL,AA00,RA(90)

EMCMMN01 SRDF-HC : (22) #SQ VOL,AA00,RA(90)
EMCQV34I SRDF-HC DISPLAY FOR (22) #SQ VOL,AA00,RA(90)
SERIAL #:0001967-01170/0KDNR MICROCODE LEVEL:5977-813

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</tbody>
</table>

END OF DISPLAY

Total devices displayed = 8

10. Issue a ConGroup ADD command to add devices to the consistency group.

F cgrpname,ADD DEV(dev#-dev#) CNTRL(serial#) RAGROUP(srdfgrp) GROUP(cgrpname)

EMCP001I ADD DEV(B4-B7) GRP(MSFSGRPX) RA(90) SER(000196701170)
CGRP152I 0000B4-0000B7
CGRP641I MSFSGRPX (S0303539) ASID(0066) Adding Devices To: MSFSGRPX
CGRP623I Dynamic Device ADD Phase 1 MSFSGRPX Count: 4 RC: 0 RS: 0
CGRP534I ENA/DIS  CUU AA00 000196701170 Local
CGRP623I Dynamic Device ADD Phase 2 MSFSGRPX Count: 4 RC: 0 RS: 0

11. Issue a ConGroup DISPLAY command to show the devices have been added.

CRTL SER#=000196701170 uCode: 5077 GroupId: 0001

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<th>CG</th>
<th>Sync</th>
<th>InvT</th>
<th>RA</th>
<th>GRP/Mirr</th>
<th>NR</th>
</tr>
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<tr>
<td>Cuu</td>
<td>Dev#</td>
<td>or oth</td>
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<td>1234</td>
<td>1234</td>
<td>1234</td>
<td>1234</td>
<td>1234</td>
<td>1234</td>
</tr>
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<td>......</td>
<td>.A.</td>
<td>...E.</td>
<td>...S.</td>
<td>......</td>
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<td>...S.</td>
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</table>
12. Suspend devices in staging group 9E for the asynchronous pairs.

```
#SC VOL,LCL(AA00,9E),RDF_SUSP,ALL
```

EMCMN00I SRDF-HC : (23) #SC VOL,LCL(AA00,9E),RDF_SUSP,ALL
EMCMG40I Command has finished for box 000196701170
EMCMG41I Requested devices - Count= 4
  0000B4-0000B7
EMCMG42I Eligible devices - Count= 4
  0000B4-0000B7
EMCMG43I Completed devices - Count= 4
  0000B4-0000B7
EMCMG07I COMMAND COMPLETED

13. Issue an #SQ VOL command to confirm the devices are suspended (status is TNR-SY).

```
#SQ VOL,AA00,RA(9E)
```

EMCMN00I SRDF-HC : (25) #SQ VOL,AA00,RA(9E)
EMCQV34I SRDF-HC DISPLAY FOR (25) #SQ VOL,AA00,RA(9E)
SERIAL #:0001967-01170/0KDNR MICROCODE LEVEL:5977-813

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END OF DISPLAY SORT_ORDER = SYMDEV
Total devices displayed = 4

14. Issue an #SC VOL,MOVEPAIR command to move the asynchronous devices from staging group 9E to group 97. The STAR and CEXMPT options must be specified.

```
#SC VOL,LCL(AA00,9E),MOVEPAIR(STAR,CEXMPT),ALL,97
```

EMCMN00I SRDF-HC : (26) #SC VOL,LCL(AA00,9E),MOVEPAIR(STAR,CEXMPT),ALL,97
EMCMG40I Command has finished for box 000196701170
EMCMG41I Requested devices - Count= 4
  0000B4-0000B7
EMCMG42I Eligible devices - Count= 4
  0000B4-0000B7
EMCMG43I Completed devices - Count= 4
  0000B4-0000B7
EMCMG07I COMMAND COMPLETED
15. The devices display in asynchronous SRDF group 97. The TNR-AX status indicates the devices are suspended, asynchronous mode with CEXMPT.

```
#SQ VOL,LCL(AA00,97),ALL
```

```
EMCMN001 SRDF-HC : (28) #SQ VOL,LCL(AA00,97),ALL
EMCQV34I SRDF-HC DISPLAY FOR (28) #SQ VOL,LCL(AA00,97),ALL
SERIAL #:0001967-01170/0KDNR MICROCODE LEVEL:5977-813

------------------------| TOTAL|SYS |DCB|CNTLUNIT |  |  R1  |  R2  |SY |
LGRP |RMT DEV | RGRP | CYLS |STAT|OPN|STATUS   |MR|INVTRK|INVTRK|%
------------------------| TOTAL|SYS |DCB|CNTLUNIT |  |  R1  |  R2  |SY |
AA90  90   0000B0 OFFLIN 1113 OFFL 0 R/W TH
97    0001A8 97     R/W-AS A1 0 0 **
AA91  91   0000B1 OFFLIN 1113 OFFL 0 R/W TH
97    0001A9 97     R/W-AS A1 0 0 **
AA92  92   0000B2 OFFLIN 1113 OFFL 0 R/W TH
97    0001AA 97     R/W-AS A1 0 0 **
AA93  93   0000B3 OFFLIN 1113 OFFL 0 R/W TH
97    0001AB 97     R/W-AS A1 0 0 **
AA94  94   0000B4 OFFLIN 1113 OFFL 0 R/W TH
97    0001AC 97     TNR-AX A1 0 0 **
AA95  95   0000B5 OFFLIN 1113 OFFL 0 R/W TH
97    0001AD 97     TNR-AX A1 0 0 **
AA96  96   0000B6 OFFLIN 1113 OFFL 0 R/W TH
97    0001AE 97     TNR-AX A1 0 0 **
AA97  97   0000B7 OFFLIN 1113 OFFL 0 R/W TH
97    0001AF 97     TNR-AX A1 0 0 **

END OF DISPLAY SORT_ORDER = SYMDEV
Total devices displayed = 8
```

16. Issue an #SC VOL,RDF_RSUM to resume SRDF operation for the devices on the asynchronous leg of the Star configuration.

```
&SC VOL,LCL(AA00,97),RDF_RSUM,ALL
```

```
EMCMN001 SRDF-HC : (29) &SC VOL,LCL(AA00,97),RDF_RSUM,ALL
EMCM40I Command has finished for box 000196701170
EMCM41I Requested devices - Count= 8 0000B0-0000B7
EMCM34I Devices ready, not resumed 265 0000B0-0000B3
EMCM42I Eligible devices - Count= 4 0000B4-0000B7
EMCM43I Completed devices - Count= 4 0000B4-0000B7
EMCM07I COMMAND COMPLETED
```

17. Issue an F emcscf,MSC,ADDDEV command to add the new pairs into MSC.

```
F emcscf,MSC,ADDDEV
```

```
SCF1390I MSC ADDDEV
SCF1391I MSC - ADD COMMAND ACCEPTED.
SCF15CCMSC - GROUP=EMCSTAR (0AACF,97) Add processing initiated
SCF15CFMSC - GROUP=EMCSTAR (0AACF,97) Adding device (00B4/0114/01AC)
SCF15CFMSC - GROUP=EMCSTAR (0AACF,97) Adding device (00B5/0115/01AD)
SCF15CFMSC - GROUP=EMCSTAR (0AACF,97) Adding device (00B6/0116/01AE)
SCF15CFMSC - GROUP=EMCSTAR (0AACF,97) Adding device (00B7/0117/01AF)
SCF15CDSMSC - GROUP=EMCSTAR (0AACF,97) Add processing completed
SCF1564MSC - GROUP=EMCSTAR TIME OF DAY FOR CYCLE 00000495 IS 13:43:57.
SCF1496I MSC - GROUP=EMCSTAR Perform STAR SDDF RESET for Session 1
```
The MSC,ADDDEV command causes a search for new devices to be initiated, for all MSC SRDF groups or a specific SRDF group. Any new devices are found by comparing the current SRDF/Star configuration to the configuration that existed prior to the last successful addition of new devices. If no new devices are found, message SCF15D2I is issued and Add processing terminates.

Dynamic device delete procedure

You can dynamically delete devices in an SRDF/Star configuration without having to first suspend SRDF/Star.

IMPORTANT
Ensure that the devices to be deleted are not in use and do not contain any data needed for recovery.

You must delete devices from the MSC SRDF group prior to starting the dynamic device delete operation. For dynamic device deletion, a staging SRDF group is recommended, but optional. The staging group serves as a location to move deleted devices when a MOVEPAIR operation is performed.

The following steps summarize the dynamic delete device operation:

- Issue an RDF_SUSP command for the SRDF/A mirror.
- Issue a MOVEPAIR command to move the SRDF/A mirror to the staging asynchronous SRDF group.
- Issue an MSC,DELDEV command to remove the devices from SRDF/Star management.

When you issue MSC,DELDEV, a search for deleted devices is initiated, for all MSC SRDF groups or a specific SRDF group. Deleted devices are found by comparing the current SRDF/Star configuration to the configuration that existed prior to the last successful device deletion. If no deleted devices are found, message SCF15D2I is issued and delete processing terminates.

Note: The MSC,DELDEV command is described in the ResourcePak Base for z/OS Product Guide.

- Issue a ConGroup DEL DEV command to remove the synchronous mirror from ConGroup protection.

Note: The DEL DEV command is described in the Consistency Groups for z/OS Product Guide.

- Issue an RDF_SUSP command for the synchronous mirror.
- Issue a MOVEPAIR command to move the synchronous mirror to the staging synchronous SRDF group.

The following example procedure illustrates a dynamic device delete operation. Note that this example uses the same SRDF groups and staging groups as the dynamic add example illustrated in Figure 34 on page 447.
1. Suspend the devices on the SRDF/A leg of the configuration in asynchronous RA group 97. Use the CEXMPT option to exempt the devices from consistency.

```
#SC VOL, LCL(AA00, 97), RDF_SUSP(CEXMPT), B4-B7
```

2. Issue an #SQ VOL command to confirm the devices are suspended. The TNR-AX status indicates the devices are suspended, asynchronous mode with CEXMPT.

```
#SQ VOL, AA00, RA(97)
```

3. Issue an #SC VOL MOVEPAIR to move the asynchronous devices to the staging group 9E.

```
#SC VOL, LCL(AA00, 97), MOVEPAIR(STAR), B4-B7, 9E
```
4. Issue an #SQ VOL command to confirm that the devices display in asynchronous SRDF group 9E.

```sql
#SQ VOL,AA00,RA(9E)
```

EMCMN00 SRDF-HC : (34) #SQ VOL,AA00,RA(9E)
EMCQV34I SRDF-HC DISPLAY FOR (34) #SQ VOL,AA00,RA(9E)
SERIAL #:0001967-01170/0KDNR MICROCODE LEVEL:5977-813

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</table>

Total devices displayed = 4

Shortly after the MOVEPAIR operation completes, a message indicates that the group no longer has CEXMPT devices:

```
13.58.11 S0303539 SCF15BEI MSC - GROUP=EMCSTAR                   (0AACF,97) No longer in CExempt mode
```

5. Issue an MSC DELDEV command to asynchronous SRDF group 97.

Deleted devices are found by comparing the current SRDF/Star configuration to the configuration that existed prior to the last successful device deletion.

```sql
F emcscf,MSC,DELDEV,SESS(cuu,ra)
```

```
14.00.09 S0303539 SCF1390I MSC,DELDEV,SESS(AACF,97) 14.00.09 S0303539 SCF1391I MSC - DEL COMMAND ACCEPTED.
14.00.10 S0303539 SCF1564I MSC - GROUP=EMCSTAR TIME OF DAY FOR CYCLE 00000585 IS 14:00:09.29
14.00.11 S0303539 SCF1496I MSC - GROUP=EMCSTAR Perform STAR SDDF RESET for Session 1
14.00.11 S0303539 SCF15CCI MSC - GROUP=EMCSTAR (0AACF,97) Delete processing initiated
14.00.13 S0303539 SCF15CFI MSC - GROUP=EMCSTAR (0AACF,97) Deleting device
14.00.13 S0303539 SCF15CFI MSC - GROUP=EMCSTAR (0AACF,97) Deleting device
14.00.13 S0303539 SCF15CFI MSC - GROUP=EMCSTAR (0AACF,97) Deleting device
14.00.13 S0303539 SCF15CFI MSC - GROUP=EMCSTAR (0AACF,97) Deleting device
14.00.14 S0303539 SCF15CDI MSC - GROUP=EMCSTAR (0AACF,97) Delete processing completed
```

6. Issue the ConGroup DEL DEV command to remove the consistency group attributes from the device (and, if present, delete it from the AutoSwap group).

```sql
DEL DEV(B4-B7) GRP(MSFCGRPX) SER(000196701170)
```

EMCP001I DEL DEV(B4-B7) GRP(MSFCGRPX) SER(000196701170)
CGRP152I 0000B4-0000B7
CGRP641I MSFCGRPX (S0303539) ASID(0066) Deleting Devices From: MSFCGRPX
CGRP623I Dynamic Device DELETE Phase 1 MSFCGRPX Count: 4 RC: 0 RS: 0
CGRP534I ENA/DIS CUU AA00 000196701170 Local
CGRP623I Dynamic Device DELETE Phase 2 MSFCGRPX Count: 4 RC: 0 RS: 0
CGRP623I Dynamic Device DELETE Phase 3 MSFCGRPX Count: 4 RC: 0 RS: 0

The devices no longer appear in the ConGroup display.
7. Issue an #SC VOL RDF_SUSP to suspend the devices in SRDF group 90 on the synchronous leg of the SRDF/Star configuration.

```
#SC VOL, LCL(AA00, 90) , RDF_SUSP , B4-B7
```

EMCMN001 SRDF-HC : (35) #SC VOL, LCL(AA00, 90) , RDF_SUSP , B4-B7
EMCGM401 Command has finished for box 000196701170
EMCGM41I Requested devices - Count= 4
0000B4-0000B7
EMCGM42I Eligible devices - Count= 4
0000B4-0000B7
EMCGM43I Completed devices - Count= 4
0000B4-0000B7
EMCGM07I COMMAND COMPLETED

8. Issue an #SQ VOL to confirm the devices are suspended (status is TNR-SY).

```
#SQ VOL, AA00, RA(90)
```

EMCMN001 SRDF-HC : (36) #SQ VOL, AA00, RA(90)
EMCQV34I SRDF-HC DISPLAY FOR (36) #SQ VOL, AA00, RA(90)
SERIAL #: 0001967-01170/OKDNR MICROCODE LEVEL: 5977-813

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<td></td>
<td>000114</td>
<td>90</td>
<td>TNR-SY</td>
<td>R1</td>
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<tr>
<td>AA95</td>
<td>95</td>
<td>0000B5</td>
<td>OFFLIN</td>
<td>1113</td>
<td>OFFL</td>
<td>0</td>
<td>R/W</td>
<td>TH</td>
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<tr>
<td></td>
<td>000115</td>
<td>90</td>
<td>TNR-SY</td>
<td>R1</td>
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<td>0**</td>
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<tr>
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<td>96</td>
<td>0000B6</td>
<td>OFFLIN</td>
<td>1113</td>
<td>OFFL</td>
<td>0</td>
<td>R/W</td>
<td>TH</td>
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<tr>
<td></td>
<td>000116</td>
<td>90</td>
<td>TNR-SY</td>
<td>R1</td>
<td>0</td>
<td>0**</td>
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<td>0**</td>
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</tr>
</tbody>
</table>

END OF DISPLAY

Total devices displayed = 8

9. Issue an #SC VOL MOVEPAIR to move the devices out of the synchronous SRDF group 90 to the staging group DF.

```
#SC VOL, LCL(AA00, 90) , MOVEPAIR(STAR) , B4-B7 , DF
```

EMCMN001 SRDF-HC : (38) #SC VOL, LCL(AA00, 90), MOVEPAIR(STAR), B4-B7, DF
EMCGM401 Command has finished for box 000196701170
EMCGM41I Requested devices - Count= 4
0000B4-0000B7
EMCGM42I Eligible devices - Count= 4
0000B4-0000B7
EMCGM43I Completed devices - Count= 4
0000B4-0000B7
EMCGM07I COMMAND COMPLETED
Dynamically adding and deleting groups in MSC

You can now add or delete an SRDF/A group to or from an active MSC group. This functionality ensures the availability of MSC during configuration changes.

Note that when adding/deleting a group, the configuration relationship must be complete. During the ADD process normal validation occurs. If an error is encountered prior to the task for the group being started, an error message is issued. If an error is encountered during task initiation for the new group, result in a back out situation.

Requirements

Dynamic session add or delete operations require an operating environment level that supports MSC operations.

Note the following:

- The group must have complete relationships and SRDF/A must be in an ACTIVE state prior to the ADD operation.
- The same information specified on the MSC_INCLUDE_SESSION will be required. The INCLUDE statement must be specified in the SRDF Host Component global parameter member prior to issuing the #SC GLOBAL PARM_REFRESH command. This requirement guarantees the persistence of the MSC group definitions.
- An #SC GLOBAL, PARM_REFRESH command must be issued for the specific MSC group.
- All devices in the group should be synchronized with no invalid tracks.
- Only one dynamic ADD/DELETE operation can be active per MSC group. Message EMCMB62E is issued if multiple ADD/DELETE operations are attempted.
- To avoid potential cache problems in I/O intensive environments, ADD operations are deferred until just before the next cycle switch. The ADD is deferred until the R2 side is consistent. An SCF1388I "waiting for consistency" message will be issued (once per cycle) until the ADD can be completed. The MSC_ALLOW_INCONSISTENT option does not apply to a session ADD because it is not desirable to compromise R2 consistency for the entire MSC group due to a new session.
- Adding a session using a duplicate gatekeeper device is not blocked.

Restrictions

- ADD/DELETE processing pertains only to MSC; Star/SQAR groups are not supported.
- MSC only adds one session per MSC group per cycle.
- Global MSC group statements cannot be overridden.
- High Availability (HA) MSC environment:
  - The ADD operation must be done on the primary server first. If the ADD is issued to the secondary servers before the primary server, an SCF1623E "Primary not done" message will be issued. When the request is complete on the primary server, the ADD operation(s) should be done on all secondary
servers. Because the definition exists in the storage system, an SCF1452I "add/delete already active" message will be issued.

Conversely, the DELETE operation should be done on all secondary servers first. When the request is complete on the secondary servers, the DELETE operation(s) should be done on the primary server.

The following example illustrates the ADD/DELETE process:

1. The initial environment is as follows.

```
MSC_GROUP_NAME=EMCGROUP
MSC_WEIGHT_FACTOR=0
MSC_INCLUDE_SESSION=3A00,(D0)
MSC_INCLUDE_SESSION=9A00,(D3)
MSC_CYCLE_TARGET=5
MSC_GROUP_END
```

2. Use MSC_INCLUDE_SESSION statements to define new groups:

```
MSC_GROUP_NAME=EMCGROUP
MSC_WEIGHT_FACTOR=0
MSC_INCLUDE_SESSION=3A00,(D0)
MSC_INCLUDE_SESSION=F805,(AC)
MSC_INCLUDE_SESSION=F804,(B9)
MSC_INCLUDE_SESSION=F805,(AD)
MSC_CYCLE_TARGET=5
MSC_GROUP_END
```

3. Issue the ADD command.

```
SC GLOBAL,PARM_REFRESH,MSCG(EMCGROUP),ADD
```

4. Messages are issued to indicate the status of the ADD operation.

```
SCF1610I  MSC - GROUP=EMCGROUP Dynamic Session processing initiated
SCF1614I  MSC - GROUP=EMCGROUP (0F804,B9) Adding Session
SCF1615I  MSC - GROUP=EMCGROUP (0F804,B9) Session Add successful
SCF1564I  MSC - GROUP=EMCGROUP TIME OF DAY FOR CYCLE 00000026 IS 12:53:55.00
SCF1614I  MSC - GROUP=EMCGROUP (0F804,AD) Adding Session
SCF1615I  MSC - GROUP=EMCGROUP (0F804,AD) Session Add successful
SCF1611I  MSC - GROUP=EMCGROUP Dynamic Session processing complete
```

5. To remove these groups, remove the MSC_INCLUDE_SESSION statements and then issue the DELETE command.

```
SC GLOBAL,PARM_REFRESH,MSCG(EMCGROUP),DELETE
```

6. Messages are issued to indicate the status of the DELETE operation.

```
SCF1610I  MSC - GROUP=EMCGROUP Dynamic Session processing initiated
SCF1617I  MSC - GROUP=EMCGROUP (0F805,AC) Deleting Session
SCF1618I  MSC - GROUP=EMCGROUP (0F805,AC) Session Delete successful
SCF1564I  MSC - GROUP=EMCGROUP TIME OF DAY FOR CYCLE 0000009F IS 13:24:11.05
SCF1617I  MSC - GROUP=EMCGROUP (0F804,B9) Deleting Session
SCF1618I  MSC - GROUP=EMCGROUP (0F804,B9) Session Delete successful
SCF1611I  MSC - GROUP=EMCGROUP Dynamic Session processing complete
```
Performing SRDF/Star HA planned failover

High Availability (HA) mode ensures the continuous operation of SRDF/Star in the event of loss or removal of the primary server, and eliminates MSC (and SCF) as a single point of failure.

Note: Automation for SRDF/Star configurations is provided by Dell EMC GDDR.

Background

SRDF/Star is an MSC mode of operation for a three-site configuration running MSC with ConGroup protection, providing for differential resynchronization of the R2 devices at Site C with the other surviving site. This differential resynchronization is enabled by the SDDF sessions. During SRDF/Star initialization, two SDDF sessions per synchronous device are registered in the Site B storage system (for concurrent operations) or the Site A storage system (for cascaded operations). These are referred to as the "main" sessions. Additionally, one session per SRDF/A R2 device is registered in the Site C storage system. The Site C sessions are only used in a recovery situation and are not actively managed by SRDF/Star.

In addition to the SDDF session management at the R1 and synchronous R2 sites, there is a link between the primary MSC server and the Consistency Group started task in the form of a 'registration' process that occurs at MSC initialization. An important part of the SRDF/Star operation is that a third SDDF session, located at the asynchronous secondary site, is also managed by the Star MSC task. In the event of a ConGroup trip, this third SDDF session, normally inactive, must be activated by MSC to enable tracking of changed data at the asynchronous R2 to later enable a differential resynchronization with the synchronous R2 that preserves the (more current) data on the asynchronous R2. This activation of the asynchronous site SDDF session is triggered by communication between the ConGroup address space that has the ownership function for RDF-ECA (that is, responsible for protecting the synchronous R1/R2 relationship) and the Star MSC server which must be running on the same z/OS system as the ConGroup task.

HA mode

HA mode for SRDF/Star allows a secondary server to assume management of the SDDF sessions and transfers ConGroup ownership from the primary server to the secondary server. ConGroup ownership must be transferred because it is tightly coupled with the primary MSC. ConGroup communicates with MSC using an internal interface to provide notification of state changes for the R1 devices. This capability can be used for both planned and unplanned outages of the primary server.

Requirements and restrictions

Dynamic device add or delete operations require PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5771 and later.
Planned failover procedure

The following sample procedure could be used to invoke a takeover of SRDF/Star control by the secondary MSC server for a planned failover. Figure 35 illustrates the SRDF/Star configuration:

1. Issue an MSC,DEACT,RETAIN command to deactivate the primary server.

   \[ \text{emcscf,MSC,DEACT,RETAIN} \]
   \[ \text{SCF1390I } \text{MSC,DEACT,RETAIN} \]
   \[ \text{SCF1471R } \text{MSC - GROUP=MSFTMSC4} \]
   \[ \text{SCF1391I } \text{MSC - DEACT COMMAND ACCEPTED} \]
   \[ \text{SCF1564I } \text{MSC - GROUP=MSFTMSC4} \]
   \[ \text{SCF1572I } \text{MSC - GROUP=MSFTMSC4} \]
   \[ \text{SCF1585I } \text{MSC - GROUP=MSFTMSC4} \]

   *28 SCF1471R MSC - GROUP=MSFTMSC4
   NO OTHER SERVER FOUND - CONTINUE, DISABLE, OR CANCEL
   SCF1391I MSC - DEACT COMMAND ACCEPTED
   SCF1564I MSC - GROUP=MSFTMSC4
   TIME OF DAY FOR CYCLE 00000025 IS 17:51:27.24
   R 28,CONTINUE
   SCF1572I MSC - GROUP=MSFTMSC4
   DEACT CONTINUES
   SCF1585I MSC - GROUP=MSFTMSC4
   DEACT complete

2. Issue an emccgrp,TAKEOVER command to move the ConGroup ownership.

   \[ \text{emccgrp,TAKEOVER} \]
   \[ \text{EMCP001I } \text{TAKEOVER} \]
   \[ \text{CGRP6501 Ownership Moved To:X006 (this system) From:X005} \]
3. Issue an `emccgrp,D ENV` command to display the new ConGroup owner.

```
F emccgrp,D ENV
```

CGRP2821 D
ENV 833
TIME/GHA: 2997662/81D3B88B
CG-Set# / DSKGLB@/ PC#
00000005/17548280/00006A00
AUTO_REFRESH=N/A
DISABLE_ON_VERIFY_ERROR=YES
DISPLAY_CONGROUP_LISTOPT=LIST
RESUME_OPTION=NOTNRMSG+RSMALLIT
SAF_CLASS=DATASET
SAF_PROFILE=EMC.VALIDATE.ACCESS
VERIFY_INTERVAL=0
Work Pool Size: 10 Free: 10 Busy: 0
5 Second Request History: 1 2 2 2 2
Gatekeeper Queue HWM: 0
 DSK_RECVPORT=122

ConGroup is executing in MULTI mode

```
This is the owning system
AutoSwap Ownerid=X006, LOCAL SYSTEM IS X006
```

4. Issue an `MSC,TAKEOVER` command to initiate the takeover.

```
F emcscf,MSC,TAKEOVER
```

SCF1390I MSC,TAKEOVER,MSGC(MSFTMSC4)
SCF1391D MSC - TAKEOVER COMMAND ACCEPTED.
SCF1564I MSC - GROUP=MSFTMSC4 TIME OF DAY FOR CYCLE 00000038 IS 17:57:06.31
SCF15641 MSC - GROUP=MSFTMSC4 TIME OF DAY FOR CYCLE 00000039 IS 17:57:22.09
SCF1553I MSC - GROUP=MSFTMSC4 SDDF TAKEOVER - SDDF B1 DEACTIVE AND SDDF B2 ACTIVE
SCF1345I MSC - GROUP=MSFTMSC4 MOTHER TASK FUNCTION TIMER
SCF1343I MSC - GROUP=MSFTMSC4 PROCESS_FC04-TIME FOR SWITCH
SCF1382I MSC - GROUP=MSFTMSC4 (5118,47) PROCESS_FC04-CAN WE SWITCH?
SCF1382I MSC - GROUP=MSFTMSC4 (9A01,D3) PROCESS_FC04-CAN WE SWITCH?
SCF1382I MSC - GROUP=MSFTMSC4 (510B,97) PROCESS_FC04-CAN WE SWITCH?
SCF1382I MSC - GROUP=MSFTMSC4 (510B,97) PROCESS_FC04-CAN WE SWITCH?
SCF1344I MSC - GROUP=MSFTMSC4 PROCESS_FC05-ALL BOXES CAN SWITCH
SCF1383I MSC - GROUP=MSFTMSC4 (9A01,D3) PROCESS_FC05-OPEN AND SWITCH
SCF1383I MSC - GROUP=MSFTMSC4 (9A60,D4) PROCESS_FC05-OPEN AND SWITCH
SCF1383I MSC - GROUP=MSFTMSC4 (5118,47) PROCESS_FC05-OPEN AND SWITCH
SCF1383I MSC - GROUP=MSFTMSC4 (510B,97) PROCESS_FC05-OPEN AND SWITCH
SCF1346I MSC - GROUP=MSFTMSC4 PROCESS_FC06-ALL BOXES OPENED WINDOW AND CYCLE SWITCHED
SCF1564I MSC - GROUP=MSFTMSC4 TIME OF DAY FOR CYCLE 0000003A IS 17:57:36.19
SCF1384I MSC - GROUP=MSFTMSC4 (9A01,D3) PROCESS_FC06-CLOSE WINDOW
SCF1384I MSC - GROUP=MSFTMSC4 (9A60,D4) PROCESS_FC06-CLOSE WINDOW
SCF1384I MSC - GROUP=MSFTMSC4 (5118,47) PROCESS_FC06-CLOSE WINDOW
SCF1384I MSC - GROUP=MSFTMSC4 (510B,97) PROCESS_FC06-CLOSE WINDOW
SCF1347I MSC - GROUP=MSFTMSC4 PROCESS_FC07-ALL BOXES CLOSED WINDOW
SCF1454I MSC - GROUP=MSFTMSC4 NEXT WAKE UP AT X'17575000'
SCF1496I MSC - GROUP=MSFTMSC4 PERFORM SDDF FUNCTION=ACTIVATE FOR SDDF J01
SCF1500I MSC - GROUP=MSFTMSC4 (9A60,D4) PERFORM SDDF FUNCTION FOR SDDF J01
SCF1515I MSC - GROUP=MSFTMSC4 (9A60,00) ACTIVATE SDDF SESSION 1
SCF1500I MSC - GROUP=MSFTMSC4 (5118,47) PERFORM SDDF FUNCTION FOR SDDF J01
SCF1515I MSC - GROUP=MSFTMSC4 (5118,40) ACTIVATE SDDF SESSION 1
SCF1500I MSC - GROUP=MSFTMSC4 (9A01,D3) PERFORM SDDF FUNCTION FOR SDDF J01
SCF1515I MSC - GROUP=MSFTMSC4 (9A01,99) ACTIVATE SDDF SESSION 1
SCF1454I MSC - GROUP=MSFTMSC4 NEXT WAKE UP AT X'17575000'
SCF1499I MSC - GROUP=MSFTMSC4 STAR RECOVERY IS NOW AVAILABLE
SCF1525I MSC - GROUP=MSFTMSC4 TAKEOVER processing completed
SCF1564I MSC - GROUP=MSFTMSC4 TIME OF DAY FOR CYCLE 0000003B IS 17:57:51.18
5. Issue an MSC,RESTARTTOSEC to restart on the new secondary MSC.

F emcscf,MSC,RESTARTTOSEC

SCF1390I MSC,RESTARTTOSEC,MSCG(MSFTMSC4)  
SCF1391I MSC - RESTARTTOSEC COMMAND ACCEPTED.  
SCF15C2I MSC - GTF USR Tracing enabled for Event Id 0067  
SCF1592I MSC - GROUP=MSFTMSC4 CYCLE TIME WARN AFTER = 5 MIN(S)  
SCF1323I MSC - ALLOW OVERWRITE OF SCRATCH AREA AND BOXLIST  
SCF1322I MSC - AUTO RECOVERY ENABLED  
SCF1367I MSC - ADCOPY-DISK on SRDFA DROP disabled due to AUTO_RECOVER  
SCF1568I MSC - GROUP=MSFTMSC4 WEIGHT FACTOR = 2  
SCF1569I MSC - GROUP=MSFTMSC4 STEAL LOCK AFTER = 2 MIN(S)  
SCF1452I MSC - GROUP=MSFTMSC4 (9A01,D3) EXISTING DEFINITION MATCH  
SCF1452I MSC - GROUP=MSFTMSC4 (9A60,D4) EXISTING DEFINITION MATCH  
SCF1452I MSC - GROUP=MSFTMSC4 (5118,47) EXISTING DEFINITION MATCH  
SCF1452I MSC - GROUP=MSFTMSC4 (510B,97) EXISTING DEFINITION MATCH  
SCF1451I MSC - GROUP=MSFTMSC4 EXISTING DEFINITION MATCH  
SCF1342I MSC - GROUP=MSFTMSC4 PROCESS_FC03-ALL BOXES ACTIVE
Operations and Examples
CHAPTER 6
Recovery Procedures

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Recovery Procedures

Introduction

Before attempting any of the procedures in this chapter, review the following:

- Note that cuu refers to the z/OS device number of the device and dev# refers to the PowerMax/VMAX device number.

- The following storage system 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

  **Note:** Contact your Dell 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 as detailed in this chapter.

**Note:** “SRDF/A recovery scenarios” on page 486 discusses SRDF/A recovery.

**CAUTION**

The specific recovery steps that are required are determined by your configuration, the specific nature of the outage, and any special circumstances that may exist. Always contact Dell EMC Customer Support for assistance in a recovery situation. Dell 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 provides sample procedures to be performed in an actual recovery situation.

The following site definitions are used throughout these procedures:

- **Operational site**—The host and storage system containing target (R2) volumes to be brought online.
- **Non-operational site**—The host and storage system containing source (R1) volumes that experienced an outage.

*Note:* This section provides an example of the procedures to be performed in an actual recovery situation. See the syntax rules for each command in Chapter 4, “Command Reference” for the various formats of the commands that could be used.

Making the operational site available

To write-enable all target (R2) volumes to the host at the operational site, complete the following steps:

1. Disable the links by disabling the remote link director (RLD) switches on both storage systems, disconnecting the link cables, or issuing the following command:

   #SC LINK, cuu, ALL, OFFLINE

2. Set all target (R2) volumes to a ready state to the operational host by issuing the following command:

   #SC VOL, cuu, RDY, ALL

3. Write-enable all volumes on the operational storage system with an R2 designation by issuing the following command:

   #SC VOL, cuu, R/W, ALL

   *Note:* 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.

   *Note:* “#SQ STATE” on page 242 provides more information.

4. Vary the devices online.

   All volumes at the operational storage system are now available for I/O operations with the host at that site.
When the non-operational site becomes available

When the host and storage system at the non-operational site are ready to be brought back online, perform this procedure.

**Note:** Remember that before read/write operations to the source (R1) volumes can be resumed, you must set target (R2) volumes to read-only.

At the operational site, complete the following steps:

1. Stop I/O operations with the operational storage system, and vary devices offline from the operational host.

2. Make all target (R2) volumes on the operational storage system read-only and optionally not-ready to the operational host (per the original configuration) by issuing 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 storage system by enabling the RLD switches on both storage systems, connecting the link cables, or issuing the following command:

   ```
   #SC LINK, cuu, ONLINE
   ```

At the site of the original outage (non-operational host and storage system), complete the following steps:

1. Disable the channel directors and RLDs on the non-operational storage system 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 storage system.

**Note:** At this point, the Dell EMC technician verifies that no invalid tracks exist, and that the storage system 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 storage systems begin synchronizing. When the links synchronize, the previously operational storage system begins copying its data to the newly operational storage system. After synchronization begins, the newly operational storage system 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 issuing the following command:

```
#SQ VOL, cuu, INV_TRKS
```
Recovery procedure concepts and testing

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, 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 procedure examples. SYNCH_DIRECTION is not saved in the storage system.

You can test recovery procedures by enabling write operations to the target (R2) volumes. The procedure examples in this section show how to do this task and how to resynchronize the SRDF pairs and resume normal operations when testing is completed.

**Note:** In concurrent or cascaded SRDF configurations, special considerations apply. The examples 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.

SRDF command syntax considerations

The example procedures use the r1cuu and r2cuu form of command syntax. This requires the commands to be issued from a host that has addressability to the r1cuu or r2cuu device number. When issued to a r1cuu in a concurrent SRDF configuration, some command actions are performed to both R2 partner devices.

The LCL(\textit{cuu,srdfgrp}) command syntax may be substituted, using the srdfgrp, to direct the command actions to the specific R2 partner device that is in that SRDF group.

The RMT(\textit{cuu,hoplist,srdfgrp}) command syntax may be substituted, using the srdfgrp, to direct command actions to a remote storage system that does not have host addressability for r1cuu or r2cuu syntax.

**Note:** Chapter 5, “Operations and Examples,” provides examples illustrating usage of the LCL and RMT command syntax.
Examples

The following procedure examples are provided:

- “Procedure 1: R2 read/write testing” on page 471
- “Procedure 2: Synchronization method selection” on page 475
- “Procedure 3: R1>R2 full volume resynchronization” on page 477
- “Procedure 4: R1<R2 full volume resynchronization” on page 479
- “Procedure 5: R1>R2 changed tracks resynchronization” on page 482
- “Procedure 6: R1<R2 changed tracks resynchronization” on page 484

Conventions

The following conventions are used in these procedure examples:

- dev# = PowerMax/VMAX device number
- R1 = source volume
- R2 = target volume
- r1cuu = z/OS address of an R1 device
- r2cuu = z/OS address of an R2 device
- srdfgrp = specifies the SRDF group through which you want to perform an operation. This must be a one or two-digit (hex) value, representing the SRDF group. For concurrent SRDF configurations, srdfgrp identifies the partner device for the operation to be performed.

Note: The LCL(cuu,srdfgrp) or RMT(cuu,hoplist,srdfgrp) syntax statements use the srdfgrp to specify the correct partner device for concurrent and cascaded configurations. The RMT(cuu,hoplist,srdfgrp) syntax is also used to reach a remote storage system when host addressability is not available to the r1cuu or r2cuu.
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.

Note: To ensure complete synchronization prior to suspending SRDF operations, adaptive copy mode must be disabled using the NADCOPY command, 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 before issuing the #SC VOL command with the RDF_SUSP action.

Complete the following steps:

1. Suspend SRDF operations for the pair(s) by issuing the following command at the host with access to the source (R1) volume(s):

   #SC VOL, r1cuu, RDF_SUSP[, dev#|ALL]

   Note: 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 issuing 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 issuing the following command at the host with access to the target (R2) volume(s):

   #SC VOL, r2cuu, R/W[, dev#|ALL]

   Note: 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 issuing the following command at the host with access to the target (R2) volume(s):

   V, r2cuu, ONLINE
Figure 36 is a representation of this procedure. 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 1

1. Suspend normal SRDF operations between the R1 and R2 volumes.
   - `#SC VOL,r1cuu,RDF-SUSP`

2. To suspend synchronization of tracks from the source to the target device, issue an `#SC VOL` command with the RDF-SUSP action from the host with access to R1.

3. Many installations run with the R2 volume set not ready to the host. Any attempt to perform I/O to the host in this mode, will result in an I/O error. By making the R2 volume ready, you will enable the host to issue I/O request to the device.
   - `#SC VOL,r2cuu,RDY`

4. Make the R2 volume ready to accept I/O from the host.
   - `#SC VOL,r2cuu,R/W`

5. Write-enable the R2 volume.

6. Check for RNR status.

7. Now that the R2 volume is accessible to the host, bring it online to MVS.
   - `V r2cuu,ONLINE`

8. Vary the R2 volume online to the (remote) host system.

9. Submit jobs to read and write to the R2 volume.

10. Perform your read/write testing. During this process, the R2 volume accumulates R1 invalid tracks. If write operations are going on at this point on the R1 side, the R1 volume accumulates R2 invalid tracks.

11. When R2 read/write testing is complete, the R2 volume is in a Read/Write state, ready to the host, and reflects R1 invalid tracks. During this process, the R1 volume has been available to its host and may reflect R2 invalid tracks. Go to Procedure 2 to determine the appropriate actions to resynchronize the SRDF pair.

Figure 36  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.

Note: If the R2 is not R/W to the host, the R1 will not drop back to a TNR state. As the R2 was previously set to N/R, the R1 state was not changed to TNR.

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 required number of invalid tracks is achieved, the R2 workload is stopped. The R2 is placed in an R/O state and optionally not ready.

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.

Note: Because the commands are usually issued from the operation host to which the R/W R2s are attached, the RMT formats of the commands are used in the examples.

The sequence of commands for each cycle are:

Cycle 1:

#SC CNFG,r2cuu,SYNCH_DIRECTION,R1<R2  Set synch_direction R1<R2
#SC VOL,RMT(r2cuu,srdfgrp),RDF_NRDY[,dev#][ALL]  Place the R1 into the RNR state
#SC VOL,RMT(r2cuu,srdfgrp),PREFRESH[,dev#][ALL]  Prepare to refresh from updated R2 tracks
#SC VOL,RMT(r2cuu,srdfgrp),PRE_RSUM[,dev#][ALL]  Commence synchronization R1<R2
Cycle 2:

**#SC CNFG,r2cuu, SYNCH_DIRECTION, R1<R2**  
Set synch_direction R1<R2

**#SC VOL,RMT(r2cuu,srdfgrp),RDF_NRDY(TDS)[,dev#|ALL]**  
Ensure that the R1 is in the RNR state

**#SC VOL,RMT(r2cuu,srdfgrp),PREFRESH[,dev#|ALL]**  
Prepare to refresh from updated R2 tracks

**#SC VOL,RMT(r2cuu,srdfgrp),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 issuing 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]**

**#SC VOL, RMT(r2cuu, srdfgrp), RDF_RDY[, ,dev#|ALL]**
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.

**Note:** The recovery procedure examples 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.

Complete the following steps:

1. Vary the target (R2) volume(s) offline, and make them read-only and optionally not ready by issuing 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 issuing the following command:

   ```
   #SQ VOL, cuu, INV_TRKS
   ```

3. Choose the synchronization procedure from Table 23, based on the state of the remotely mirrored pair and the required scope of the synchronization (in other words, changed tracks or full volume).

   **Table 23**  Synchronization procedure selections

<table>
<thead>
<tr>
<th>R1 indicates R2 invalid tracks</th>
<th>R2 indicates R1 invalid tracks</th>
<th>Discard updates to</th>
<th>Full volume</th>
<th>Changed tracks</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>N</td>
<td></td>
<td>Procedure 3</td>
<td>Procedure 5</td>
</tr>
<tr>
<td>Y</td>
<td>N</td>
<td>NONE</td>
<td>Procedure 3</td>
<td>Procedure 5</td>
</tr>
<tr>
<td>Y</td>
<td>Y</td>
<td>R1</td>
<td>Procedure 4</td>
<td>Procedure 6</td>
</tr>
<tr>
<td>Y</td>
<td>Y</td>
<td>NONE/R1</td>
<td>Procedure 4</td>
<td>Procedure 6</td>
</tr>
<tr>
<td>Y</td>
<td>Y</td>
<td>R2</td>
<td>Procedure 3</td>
<td>Procedure 5</td>
</tr>
</tbody>
</table>

**Note:** If issues occur during testing that prevent you from determining the correct procedure to follow, or if you experience unexpected results, contact Dell EMC Customer Support.
Figure 37 is a representation of the previous procedure. 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

The R2 volume is ready and read/write-enabled. The R1 is RDF-SUSP.

Does the R1 volume indicate any R2 invalid tracks?

Yes

Discard R1 updates?

No

Resumes normal SRDF operations. From the host with access to the R1 volume:

#SC VOL,r1cuu, RDF-RSUM

The R2 volume indicates no R1 invalid tracks. Any updates to R1 will be sent to R2.

Make the R2 volume read-only

#SC VOL,r2cuu,R/O

Make the R2 volume Not Ready

#SC VOL,r2cuu,NRDY

Does the R2 volume indicate any R1 invalid tracks?

No

You must choose whether you want to keep the updates made to the R1 device during RW testing. If you choose to keep the R2 updates, any updates that were made to the R1 volume after the RDF-SUSP will be discarded.

Discard R2 updates?

Yes

Is the scope full volume or only changed tracks?

Full volume

Procedure 4 uses the validate and invalidate actions to resynchronize R1<R2

Procedure 5 uses the refresh action to resynchronize R1>R2

Go to Procedure 4

Procedure 6 uses the refresh action to resynchronize R1<R2

Go to Procedure 6

No

Is the scope full volume or only changed tracks?

Full volume

Procedure 3 uses the validate and invalidate actions to resynchronize R1>R2

Go to Procedure 3

changed tracks

Procedure 5 uses the refresh action to resynchronize R1>R2

Go to Procedure 5

changed tracks

Procedure 6 uses the refresh action to resynchronize R1<R2

Go to Procedure 6

Figure 37  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 was performed are discarded, and any updates to the source (R1) volume are retained.

Note: See “SRDF command syntax considerations” on page 469 to determine if LCL(cuu,srdfgrp) or RMT(cuu,hoplist,srdfgrp) command syntax should be substituted for r1cuu or r2cuu syntax.

Complete the following steps:

1. Set the current synchronization direction from source to target (R1 > R2) by issuing the following command at the host with access to the source (R1) volumes:
   
   ```bash
   #SC CNFG,r1cuu,SYNCH_DIRECTION,R1>R2
   ```

   and issuing the following command at the host with access to the target (R2) volumes:
   
   ```bash
   #SC CNFG,r2cuu,SYNCH_DIRECTION,R1>R2
   ```

2. Determine which target (R2) volumes have a non-zero R1 INV_TRKS value by issuing the following command at the host with access to the target (R2) volume(s):
   
   ```bash
   #SQ VOL,r2cuu,INV_TRKS
   ```

3. For all target (R2) volumes with non-zero R1 INV_TRKS values, validate all invalid tracks for the source (R1) volume(s) on the target (R2) volume by issuing the following command at the host with access to the target (R2) volume:
   
   ```bash
   #SC VOL,r2cuu,VALIDATE[,dev#]|,ALL
   ```

   (dev# = target (R2) volume with an R1 INV_TRKS value greater than 0)

   Note: If ALL was not the specified parameter, repeat step 3 for each target (R2) volume with a non-zero 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 issuing the following command at the host with access to the target (R2) volume(s):
   
   ```bash
   #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 issuing the following command at the host with access to the source (R1) volume:
   
   ```bash
   #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 operation completes, the R2 invalid track count goes to maximum for the device, the TNR status disappears, and resynchronization begins.
SRDF Host Component monitors the process of invalidating all target tracks until complete.

6. Monitor the resynchronization process until complete by issuing the following command at the host with access the source (R1) volumes:

   `#SQ VOL, r1cuu, INV_TRKS`

Figure 38 is a representation of this procedure. 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**
  - The R2 volume is Not Ready and read-only.
  - The R1 is RDF-SUSP.
  - Use the `#SC CNFG, cuu, SYNCH_DIRECTION,R1>R2` command to set the current synchronization direction to R1>R2.

- **R2**
  - Determine which target (R2) volumes have accumulated R1 invalid tracks.
  - Use the `#SQ VOL, r2cuu, INV_TRKS` command to determine which R2 volumes have accumulated R1 invalid tracks.

- From the host with access to the R2 volume, enter the Validate action with the ALL option, or enter the Validate action for each R2 volume with accumulated R1 invalid tracks. This command clears the invalid track indicator.

- From the host with access to the R2 volume, use the `#SC VOL, r2cuu, VALIDATE` command to set all R1 tracks valid.

- Verify that all R1 volumes reflect zero R1 invalid tracks.

-Set the current synchronization direction to R1>R2.

-Go to the host with access to the R1 volumes, for each R1 whose partner R2 volume was validated above, set all R2 tracks invalid. SRDF Host Component monitors the process of invalidating all R2 tracks. This may take several minutes on a heavily loaded system. You can monitor the resynchronization process using the `#SQ VOL` command.

**Figure 38** R1>R2 full volume resynchronization
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 was performed are discarded, and any updates to the R2 device are kept.

**Note:** With Enginuity 5773 and earlier, you cannot use SRDF Host Component synchronization procedure examples 4 and 6 while TimeFinder/Clone or Clone Emulation restores are taking place. However, with PowerMaxOS 5978, HYPERMAX OS 5977 and Enginuity 5874 or later, you can use procedures 4 and 6 while Clone or Clone Emulation restores are taking place.

**Note:** See “SRDF command syntax considerations” on page 469 to determine if LCL(cuu,srdfgrp) or RMT(cuu,hoplist,srdfgrp) command syntax should be substituted for r1cuu or r2cuu syntax.

Complete the following steps:

1. Set the current synchronization direction from target to source (R1<R2) by issuing the following command at the host with access to the source (R1) volumes:
   
   ```
   #SC CNFG, r1cuu, SYNCH_DIRECTION, R1<R2
   ```

   and issuing 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 issuing 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 issuing 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 non-zero R1 INV_TRKS value by issuing 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 non-zero R1 invalid tracks, set the R1 invalid track count to max by issuing 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 non-zero R1 INV_TRKS values, set R2 invalid tracks to zero and prepare the source (R1) volume for synchronization by issuing the following command at the host with access to the source (R1) volume:

\[ \text{\#SC VOL, r1cuu,VALIDATE[,dev#|,ALL]} \]

\((\text{dev#} = \text{source (R1) volume whose target (R2) volume has an R1 INV_TRKS value greater than 0})\)

**Note:** If **ALL** was not the specified parameter, repeat Step 5 for each source (R1) volume with a non-zero 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 5x67 or earlier and if the devices are in the RNR state, make the source (R1) devices available to the host by issuing the following command:

\[ \text{\#SC VOL, r1cuu,RDF_RDY[,dev#|,ALL]} \]

Otherwise, proceed to step 8.

8. Vary the R1 device online to z/OS by issuing the following command at the host with access to the source (R1) volumes:

\[ \text{V r1cuu,online} \]

**Figure 39 on page 481** is a representation of this procedure. 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

The R2 device is Not Ready and read-only. The R1 is RDF-SUSP.

Set the current synchronisation direction to R1<R2:

```
#SC CNFG,ru1
SYNCH_DIRECTION,R1<R2
```

Vary the R1 device offline to MVS:

```
V r1cuu,OFFLINE
```

In order to prevent allocation to the R1 device, vary it offline to MVS.

From the host with access to the R1 device, make the R1 device RDF-NRDY. Any attempt to issue an I/O request to the device results in an intervention required status.

Determine which target (R2) volumes have accumulated R1 invalid tracks:

```
#SQ VOL,ru2 INV_TRKS
```

From the host with access to the R2 device, use the

```
#SC VOL,ru2,INVALIDATE
```

cmd to flag all R1 tracks invalid.

For each R2 volume that indicates R1 invalid tracks, set all R1 tracks valid:

```
#SC VOL,ru1VALIDATE
```

Make the R1 available to the host:

```
#SC VOL,ru1RDF-RDY
```

Make the R1 device not ready to the host:

```
#SC VOL,ru1RDF-NRDY
```

Vary the R1 device online to MVS:

```
V r1cuu,ONLINE
```

The R1 device can be brought back online to MVS.

Figure 39 R1<R2 full volume resynchronization
Procedure 5: R1>R2 changed tracks resynchronization

Any updates to the target (R2) volume that were made after the RDF_SUSP action was performed are discarded, and any updates to the source (R1) volume are retained.

Note: See “SRDF command syntax considerations” on page 469 to determine if LCL(cuu, srdfgrp) or RMT(cuu, hoplist, srdfgrp) command syntax should be substituted for r1cuu or r2cuu syntax.

Complete the following steps:

1. Set the current synchronization direction from source to target (R1>R2) by issuing the following command at the host with access to the source (R1) volumes:
   
   ```
   #SC CNFG, r1cuu, SYNCH_DIRECTION, R1>R2
   ```

   and issuing 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 non-zero R1 INV_TRKS value by issuing 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 issuing the following command at the host with access to the target (R2) volumes:

   ```
   #SC VOL, r2cuu, REFRESH[, dev#|, ALL]
   ```

4. Resume SRDF operation by issuing the following command at the host with access to the target (R2) volumes:

   ```
   #SC VOL, r2cuu, RFR_RSUM[, dev#|, ALL]
   ```

   Note: Only the tracks that were updated during R2 read/write testing are copied from R1>R2.

5. Monitor the resynchronization process until complete by issuing the following command at the host with access the source (R1) volumes:

   ```
   #SQ VOL, r1cuu, INV_TRKS
   ```

Figure 40 is represents this procedure. 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

The R2 device is Not Ready and read-only. The R1 is RDF-SUSP.

Set the current synchronization direction to NONE:
#SC CNFG, r1cuu, SYNCH_DIRECTION, NONE

From the host with access to the R2 volume, use the
#SQ VOL, cuu, INV_TRKS command to determine which R2 volumes have accumulated R1 invalid tracks.

The REFRESH action causes any updated tracks on either of the SRDF partners to be flagged as invalid R2 tracks and valid R1 tracks. No transfer of data occurs 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.

Set the current synchronization 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 40  R1>R2 changed tracks resynchronization

Note: Figure 40 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.
**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 was performed are discarded, and any updates to the target (R2) volume are retained.

With Enginuity 5773 and earlier, you cannot use SRDF Host Component synchronization procedure examples 4 and 6 while TimeFinder/Clone or Clone Emulation restores are taking place. However, with PowerMaxOS 5978, HYPERMAX OS 5977 and Enginuity 5874 or later, you can use procedures 4 and 6 while Clone or Clone Emulation restores are taking place.

**Note:** See “SRDF command syntax considerations” on page 469 to determine if LCL(cuu,srdfgrp) or RMT(cuu,hoplist,srdfgrp) command syntax should be substituted for r1cuu or r2cuu syntax.

Complete the following steps:

1. Set the current synchronization direction from target to source (R1<R2) by issuing the following command at the host with access to the source (R1) volumes:
   
   ```
   #SC CNFG,r1cuu,SYNCH_DIRECTION,R1<R2
   ```

   and issuing the following command at the host with access to the target (R2) volumes:

   ```
   #SC CNFG,r2cuu,SYNCH_DIRECTION,R1<R2
   ```

2. Vary the R1 devices offline.

3. Make the source (R1) device unavailable to the host by issuing the following command at the host with access to the source (R1) volumes:

   ```
   #SC VOL,r1cuu,RDF_NRDY[,dev#],ALL
   ```

4. Determine which source (R1) volumes have a non-zero R2 INV_TRKS value by issuing the following command at the host with access to the source (R1) volumes, and determine which target (R2) volumes have a non-zero R1 INV_TRKS value by typing the following command at the host with access to the target (R2) volumes:

   ```
   #SQ VOL,r2cuu,INV_TRKS
   ```

5. Flag any tracks that were updated on the target (R2) volume as valid on the R2 and invalid on the R1 by issuing the following command at the host with access to the source (R1) volumes:

   ```
   #SC VOL,r1cuu,REFRESH[,dev#],ALL
   ```

6. Resume SRDF operation by issuing the following command at the host with access to the source (R1) volumes:

   ```
   #SC VOL,r1cuu,RFR_RSUM[,dev#],ALL
   ```

   **Note:** Only the tracks that were updated during R2 read/write testing are copied from the R2 to the R1.

   After resynchronization is started, you can vary the R1 devices online.
7. Monitor the resynchronization process until complete by issuing the following command at the host with access the source (R1) volumes:

```bash
#SQ VOL, r1cuu, INV_TRKS
```

Figure 41 is a representation of this procedure. 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

- Set the current synchronization direction to R1<R2:
  ```bash
  #SC CNFG, r1cuu, SYNCH_DIRECTION, R1<R2
  ```

- Vary the R1 device offline to MVS:
  ```bash
  v r1cuu, OFFLINE
  ```

- Make the R1 device not ready to the host:
  ```bash
  #SC VOL, r1cuu, RDF-NRDY
  ```

- Determine which source (R1) volumes have invalid tracks:
  ```bash
  #SQ VOL, r1cuu, INV_TRKS
  ```

- For each R1 volume with R2 invalid tracks or whose partner device indicates R1 invalid tracks, refresh updated tracks from the R2:
  ```bash
  #SC VOL, r1cuu, REFRESH
  ```

- Resume normal SRDF operations:
  ```bash
  #SC VOL, r1cuu, RFR-RSMD
  ```

R2

- Set the current synchronization direction to NONE:
  ```bash
  #SC CNFG, r2cuu, SYNCH_DIRECTION, NONE
  ```

- Determine which target (R2) volumes have invalid tracks:
  ```bash
  #SQ VOL, r2cuu, INV_TRKS
  ```

- 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 R1.

Figure 41 R1<R2 changed tracks resynchronization
SRDF/A recovery scenarios

The following discusses SRDF/A recovery scenarios, including:

- Temporary link loss
- Permanent link loss
- Primary storage system 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 the 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 storage system 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. You may need to issue the #SC VOL command to put the devices into adaptive copy mode, depending on how the devices had been configured.

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 completes.

It is recommended to employ a method for preserving the data on the R2 volumes before commencing resynchronization. For example, you can do this using TimeFinder BCVs.

Primary storage system 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 storage system becomes full. The transmit and receive cycles consume all the available write cache in the storage system.

In this situation, you have a choice as to how SRDF/A will behave:

- The storage system 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 storage system 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 storage system 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. 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 storage systems.

SRDF/A MSC is deactivated or dropped

If SRDF/A is deactivated or dropped while in multisession mode, each R1-side storage system 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 SRDF mirror ("owed" to the R2 side).

Host software does not need to perform any special recovery on the R1-side storage system participating in the SRDF/A multisession group.

If SRDF/A is deactivated or dropped while in multisession mode, each R2-side storage system 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 storage system 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 storage systems participating in the multisession group must be considered before a decision can be made to commit or discard each one.

The host software must 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 multisession mode has been dropped when recovery is performed on the R2 side. This is where the host provided cycle tag and the list of all storage systems participating in the MSC group is used by SRDF/A MSC recovery software.

These cases are:

1. All R2 receive cycles have the same tag, and all R2 receive cycles are complete.
2. All R2 receive cycles have the same tag, but one or more (but not all) R2 receive cycles are complete.
3. Apply cycle tags of some R2 storage systems match receive cycle tags of one or more other R2 storage systems (not all R2 receive cycles were committed) and not all receive cycles may be complete.

If the SRDF links are operational on all pairs, this recovery is handled by the MSC host process.
SRDF/A MSC and SRDF/Star recovery considerations

SRDF Host Component includes a batch cleanup utilities for performing recovery for SRDF/A MSC or SRDF/Star. You can run the utility on the primary side or secondary side.

The EHCMSCME, EHCMSCM6, and EHCMSCM9 batch cleanup utilities are delivered with SRDF Host Component. The SAMPLIB member names are the same as the program names listed above.

You need to run the batch cleanup utility when the MSC environment of EMCSCF cannot perform the automatic cleanup. This occurs when the SRDF link for at least one SRDF/A session in an MSC or Star 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 storage systems in the MSC or Star group. If one or more storage systems have both the CLEANUP RUNNING and HOST INTERVENTION REQUIRED settings on (Y), then you need to run the batch cleanup utility.

Note that the batch cleanup utility cannot run if the SRDF/A session is active. This could happen if the MSC server is no longer cycle switching (the host is gone; this effectively issues the DROP command), or if the links have been lost and SRDF/A is in transmit idle (which effectively issues the DROP_SIDE command). If this situation occurs, run the EHCMSCM9 utility from the secondary side which brings the SRDF/A sessions down and clear any host intervention that occurred due to the drop.

Utility recovery requirements

Observe the following requirements when running the batch cleanup utility:

- EMCSCF must be running.
- The links for all SRDF/A sessions must be up and available to run the utility from the primary side. If one or more links cannot be made available, or if you are running the utility after a loss of the source site, 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 storage system in the MSC group.
- The parameter required to perform the recovery is the CUU or VOLSER of a device in a storage system containing an SRDF/A session participating in an MSC or Star group. The code then locates all of the other SRDF/A sessions participating in the MSC or Star group and produces a report written to the RPTOUT DD (samples are listed further in this section). Information about an MSC or Star group is kept in each storage system that has SRDF/A groups participating in the MSC or Star groups. This metadata is referred to as the box list and the scratch table area.
You can address the SRDF/A sessions in the following ways:

- If you can run the batch cleanup 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 batch cleanup utility to the secondary side, you can address the entire MSC group 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. When this occurs, the utility JCL gatekeeper parameter should be modified to run directly against each participating storage system.

Possible MSC group recovery cases

The SCFRDFME utility produces the B to C device pairing dataset, reports on cycle tags and other configuration information, and resolves cases 1, 2, and 3 at the SRDF/A target site.

Note: SCFRDFME does not clear SRDF/Star configuration information. It does execute the appropriate commit or discard actions to prepare the MSC or Star group for restart processing. This program can be run multiple times without affecting MSC device pairing information.

**Case 1:** All R2 receive cycles have the same tag, and all R2 receive cycles are complete.

**Case 2:** All R2 receive cycles have the same tag, but one or more (but not all) R2 receive cycles are complete.

**Case 3:** Apply cycle tags of some R2 storage systems match receive cycle tags of one or more other R2 storage systems (that is, not all R2 receive cycles were committed) and not all receive cycles may be complete.

Both SRDF group 1 and SRDF group 2 reside in the same MSC group:

<table>
<thead>
<tr>
<th>SRDF/A group 1</th>
<th>R2</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td></td>
</tr>
<tr>
<td>Active</td>
<td>Inactive</td>
</tr>
<tr>
<td>Capture</td>
<td>Transmit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SRDF/A group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
</tr>
<tr>
<td>R2</td>
</tr>
<tr>
<td>Active</td>
</tr>
<tr>
<td>Capture</td>
</tr>
</tbody>
</table>
Tables 24 through 27 list the R1 and R2 status for cases 1, 2, and 3.

### Table 24  Case 1 cycles

<table>
<thead>
<tr>
<th>SRDF/A group 1</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>R2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active</td>
<td>Inactive</td>
<td>Inactive</td>
<td>Active</td>
<td></td>
</tr>
<tr>
<td>Capture</td>
<td>Transmit</td>
<td>Receive</td>
<td>Apply</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Complete</td>
<td>RECEIVE TAG = E0000000000005D5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SRDF/A group 2</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>R2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active</td>
<td>Inactive</td>
<td>Inactive</td>
<td>Active</td>
<td></td>
</tr>
<tr>
<td>Capture</td>
<td>Transmit</td>
<td>Receive</td>
<td>Apply</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Complete</td>
<td>RECEIVE TAG = E0000000000005D5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 25  Case 2 cycles

<table>
<thead>
<tr>
<th>SRDF/A group 1</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>R2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active</td>
<td>Inactive</td>
<td>Inactive</td>
<td>Active</td>
<td></td>
</tr>
<tr>
<td>Capture</td>
<td>Transmit</td>
<td>Receive</td>
<td>Apply</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Incomplete</td>
<td>RECEIVE TAG = E0000000000005D5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SRDF/A group 2</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>R2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active</td>
<td>Inactive</td>
<td>Inactive</td>
<td>Active</td>
<td></td>
</tr>
<tr>
<td>Capture</td>
<td>Transmit</td>
<td>Receive</td>
<td>Apply</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Complete</td>
<td>RECEIVE TAG = E0000000000005D5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 26  Case 3 cycles (option 1)

<table>
<thead>
<tr>
<th>SRDF/A group 1</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>R2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active</td>
<td>Inactive</td>
<td>Inactive</td>
<td>Active</td>
<td></td>
</tr>
<tr>
<td>Capture</td>
<td>Transmit</td>
<td>Receive</td>
<td>Apply</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Complete</td>
<td>RECEIVE TAG = E0000000000005D5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SRDF/A group 2</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>R2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 26  Case 3 cycles (option 1)

<table>
<thead>
<tr>
<th>SRDF/A group 1</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Active</td>
<td>Inactive</td>
<td>Inactive</td>
<td>Active</td>
</tr>
<tr>
<td>Capture</td>
<td>Transmit</td>
<td>Receive</td>
<td>Apply</td>
</tr>
<tr>
<td>Complete</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RECEIVE TAG</td>
<td>E00000000000005D5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Or, the following:

Table 27  Case 3 cycles (option 2)

<table>
<thead>
<tr>
<th>SRDF/A group 1</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>R2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active</td>
<td>Inactive</td>
<td>Inactive</td>
<td>Active</td>
</tr>
<tr>
<td>Capture</td>
<td>Transmit</td>
<td>Receive</td>
<td>Apply</td>
</tr>
<tr>
<td>Incomplete</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RECEIVE TAG</td>
<td>E00000000000005D5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SRDF/A group 2</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>R2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active</td>
<td>Inactive</td>
<td>Inactive</td>
<td>Active</td>
</tr>
<tr>
<td>Capture</td>
<td>Transmit</td>
<td>Receive</td>
<td>Apply</td>
</tr>
<tr>
<td>Complete</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RECEIVE TAG</td>
<td>E00000000000005D5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Examples 1 through 6 on the following pages illustrate the batch cleanup utility RPTOUT for each of these cases on both the primary and secondary sides.

“SCFRDFME report output” on page 495 describes the batch cleanup utility.
CASE1 - COMMIT ALL CYCLES
SRDFA SESSION = 000187790072/00 COMMIT RECEIVE CYCLE
SRDFA SESSION = 000000006205/00 COMMIT RECEIVE CYCLE

Example 1  Batch cleanup utility 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 = 000000000000001E APPLY TAG = 000000000000001D
------------------------------------------------------------
000187990175/00
MSC IS ACTIVE
TRANSMIT CYCLE IS EMPTY
APPLY CYCLE IS EMPTY
HOST INTERVENTION REQUIRED
RECEIVE TAG = 000000000000001E APPLY TAG = 000000000000001D
------------------------------------------------------------
CASE1 - COMMIT ALL CYCLES
SRDFA SESSION = 000187900699/00 COMMIT RECEIVE CYCLE
SRDFA SESSION = 000187990175/00 COMMIT RECEIVE CYCLE

Example 2  Batch cleanup utility 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 = 000000000000000B APPLY TAG = 000000000000000A
------------------------------------------------------------
000000006205/00
MSC IS ACTIVE
APPLY CYCLE IS EMPTY
RECEIVE TAG = 000000000000000B APPLY TAG = 000000000000000A
------------------------------------------------------------
CASE2 - DISCARD ALL CYCLES
SRDFA SESSION = 000187790072/00 DISCARD RECEIVE CYCLE

Example 3  Batch cleanup utility 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 PRIMARY SIDE - 000000006205/00
------------------------------------------------------------
CASE2 - DISCARD ALL CYCLES
SRDFA SESSION = 000187790072/00 DISCARD RECEIVE CYCLE
Recovery Procedures

Example 4 Batch cleanup utility RPTOUT for case 2 from secondary side

Example 5 Batch cleanup utility RPTOUT for case 3 from primary side
### Recovery Procedures

---

**SRDF/A MSC and SRDF/Star recovery considerations**

---

**SRDFA SESSIONS IN MSC**

---

**Example 6**

Batch cleanup utility RPTOUT for case 3 from secondary side

---

**SCFRDFME report output**

This section describes the SCFRDFME utility report output. The left column shows the report output. The right column provides explanatory text relating to the report lines.

---

**INITIALIZATION**

<table>
<thead>
<tr>
<th>SCFR1315I</th>
<th>MSC MODULE= EHCMSCME VER= V5.4.0 PATCH=SR54001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debug ON</td>
<td>Debug option setting.</td>
</tr>
<tr>
<td>MSCPNAME=MSCPROD1</td>
<td>MSC group name.</td>
</tr>
<tr>
<td>CUU = 237E UCB ADDRESS = 021656C0</td>
<td>Device number and UCB address specified in ME cleanup utility JCL parameter. This device is used as the gatekeeper to a storage system to locate any MSC/Star environment through interrogation of all SRDF groups in that storage system.</td>
</tr>
</tbody>
</table>

**DISCOVERY**

<table>
<thead>
<tr>
<th>Running ON SITEC</th>
<th>States the site where this ME cleanup utility is executing.</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOUND STAR SRDFA SCRATCH AREA FOR MSCPNAME=MSCPROD1 RDFGRP = 20 RCV RDFGRP = 30</td>
<td>States MSC or SRDF/Star SRDF/A scratch area details found for an SRDF group.</td>
</tr>
<tr>
<td>FOUND STAR J0 SCRATCH AREA FOR MSCPNAME=MSCPROD1 RDFGRP = 10 RCV RDFGRP = 30</td>
<td>States SRDF/Star SYNC (J0) scratch area details found through the recovery SRDF group.</td>
</tr>
<tr>
<td>VALID RDFGRP FOUND 20</td>
<td>Verification of the SRDF/A group listed in the scratch area.</td>
</tr>
<tr>
<td>00000002 SRDFA SESSIONS IN MSC</td>
<td>States the number of SRDF/A groups that are defined to MSC/Star.</td>
</tr>
</tbody>
</table>
Recovery Procedures

000187700899/20 > 000187751120/20 List of storage system S/N and RDFGRP from mblist (multibox list) for the SRDF/A group.
000187751229/20 > 000187751076/20 States the storage system S/N where the ME cleanup utility JCL Parm device number is located.

OUR SESSION IS RUNNING ON SECONDARY SIDE - 000187751120/20 States the number of SYNC SRDF groups that are defined to Star.

000187700899/10 > 000187720744/10 List of storage system S/N and RDFGRP from mblist for the SYNC SRDF group.
000187751229/10 > 000187721688/10 Verification of the storage system S/N of other local storage systems defined to MSC/Star from the mblist.

FOUND CU = 000187751076 Verification of the SRDF/A group listed in this box scratch area.

VALID RDFGRP FOUND 20 States that there is a valid SRDF/A session (scratch area and mblist) on this storage system S/N.

FOUND SESSION = 000187751076/20 CUU= 3000 RDFGRP = 20

ANALYSIS

REMOTE SAI ERROR CUU = 237E RDFGRP = 20 GROUP ERROR DUE TO LINKS UNAVAILABLE States that the links are down to the remote storage system from the SRDF/A group in this storage system.
000187751120/20 1st local storage system S/N and RDFGRP from mblist to be analyzed.

MSC IS ACTIVE States that MSC is active for this SRDF group.
APPLY CYCLE IS EMPTY States that the apply cycle is empty for this SRDF group.
RECEIVE TAG = E0000000000005D5 APPLY TAG = E0000000000005D4 Shows the MSC/Star cycle tags for this SRDF group, including the flag byte ('E0').

REMOTE SAI ERROR CUU = 3000 RDFGRP = 20 GROUP ERROR DUE TO LINKS UNAVAILABLE States that the links are down to the remote storage system from the SRDF/A group in this storage system.
000187751076/20 2nd local storage system S/N and RDFGRP from MBLIST to be analyzed.

MSC IS ACTIVE States that MSC is active for this SRDF group.
TRANSMIT CYCLE IS EMPTY States that the transmit cycle is empty for this SRDF group.
APPLY CYCLE IS EMPTY States that the apply cycle is empty for this SRDF group.
HOST INTERVENTION REQUIRED States that host-initiated MSC cleanup is required.
RECEIVE TAG = E0000000000005D5 APPLY TAG = E0000000000005D4 Shows the MSC/Star cycle tags for this SRDF group, including the flag byte ('E0').

VALID RDFGRP FOUND 30 Verification of the SRDF/A recovery SRDF group listed in this box scratch area.

VALID RDFGRP FOUND 30 Verification of the SRDF/A recovery SRDF group listed in this box scratch area.

000187720744/ STAR J0 RDFGRP = 10 Star sync information.
SRDFA RCV RDFGRP = 30 J0 RCV RDFGRP = 30 Recovery SRDF group information in SRDF/A and SYNC(J0) target storage systems.

000187721688/ STAR J0 RDFGRP = 10 States sync information for Site A.
SRDFA RCV RDFGRP = 30 J0 RCV RDFGRP = 30 Recovery RDFGRP information in SRDF/A and SYNC(J0) target storage systems.

CLEANUP
CASE2 - DISCARD ALL CYCLES

SRDFA SESSION = 000187751076/20 DISCARD RECEIVE CYCLE

States cleanup case information.

Lists sessions (storage system S/N and RDFGRP) that had action taken and what action was actually taken (commit or discard). Note: Both sessions are not listed - 2nd session Receive Delta set was empty.

RECOVERY SUPPORT

DEVICE PAIRS TO CREATEPAIR FROM 000187751120 TO 000187720744 ON RDFGRP 30

Device pairing list header - storage system S/N for CREATEPAIR source and target.

LOCAL DEVICE = 0000 REMOTE DEVICE = 0000
LOCAL DEVICE = 0001 REMOTE DEVICE = 0001

Device pairing list for CREATEPAIR.

DEVICE PAIRS TO CREATEPAIR FROM 000187751076 TO 000187721688 ON RDFGRP 30

Device pairing list header - storage system S/N for CREATEPAIR source and target.

LOCAL DEVICE = 0000 REMOTE DEVICE = 0000
LOCAL DEVICE = 0001 REMOTE DEVICE = 0001

Device pairing list for CREATEPAIR.

OPEN FOR STARCNFG SUCCESSFUL

# OF SESSIONS: 00000002
WRITING $MSCRCV RECORD 00000000 00000000
WRITING SESSION RECORD 00000001 00000001
WRITING SESSION RECORD 00000002 00000002
WRITING SESSION RECORD 00000003 00000003
WRITING SESSION RECORD 00000004 00000004
WRITING DEVICE RECORD 00000002 00000002
SAVSTRCF_XIT0

Diagnostic messages for device pairing list processing when //STARCNFG DD present.
SRDF Automated Recovery

SRDF Automated Recovery eliminates the need for external automation or manual intervention by automatically restoring SRDF/A to operational status following a planned or unplanned outage. You can configure the software to prompt you for authorization before proceeding with automated recovery.

With PowerMaxOS 5978, HYPERMAX OS 5977 and Enginuity 5771 or later, SRDF/A is supported in configurations where there are multiple primary storage systems or multiple primary system SRDF groups connected to multiple secondary storage systems or multiple secondary system SRDF groups. This is referred to as SRDF/A Multi-Session Consistency (MSC). SRDF/A MSC configurations can also support mixed open systems and mainframe data controlled within the same SRDF/A MSC session.

SRDF Automated Recovery supports MSC environments. MSC provides consistency across multiple storage systems for SRDF/A groups.

The primary MSC server (with MSC_WEIGHT_FACTOR=0) performs the following functions:

- Detects that SRDF/A has dropped.
- Initiates the recovery automation sequence for each SRDF/A group in the MSC group. There is one independent sequence for each group.
- Waits for each of the recovery automation sequences to post completion to primary MSC.
- Performs an MSC restart.

Recovery automation tasks

The recovery automation sequence performs the following functions:

- If configured, preserves a consistent image of data at the remote site using TimeFinder/Mirror, based on policy defined in the SRDF Host Component initialization parameters. The TimeFinder/Mirror clone emulation facility can also be used.
  - Enhances BCV management performance by exploiting the multi-attach feature of TimeFinder/Mirror. (PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5771 and later is required.) Multi-attach allows multiple device pairs to be attached on the same ESTABLISH or RE-ESTABLISH command syscalls.
  - The output of the TimeFinder run is written to the EMCTF file (if allocated): $EMCTF DD SYSOUT=* $
- Validates that a user-specified minimum number of SRDF directors are online.
- Performs MSC cleanup.
- Automatically recovers SRDF/A at the SRDF group level once the invalid track count has reached a user-specified level (default is 30000).
- Optionally, based on policy settings, reestablishes BCVs upon successful MSC restart.
The recovery automation can also be manually initiated. For example, it can be initiated following an F emcsctf,MSC,PENDDROP command or after being deferred when the PROMPT option is specified in the SRDFA_AUTO_RECOVER initialization parameter.

Tracking the automated recovery process

SRDF Automated Recovery provides the ability to track the process using a LOCKDATA file to:

- Know what recovery REXX EXEC is the next in the chain to be executed.
- Know when the series of REXX EXECs in a recovery phase is complete.
- Produce the summary of recovery steps and their individual return codes that appears in the SYSTSPRT of the recovery address space.

Each recovery action is uniquely identified by the date and time it started, the LPAR and started task ID of the recovery address space in which it is running, and the initial parameter string.

Under normal circumstances the LOCKDATA file is self-cleaning. The records are deleted when the summary that is written to SYSTSPRT is produced.

However, if a recovery step abends, the records are left in the file as a means of tracing which steps were complete or if a bad return code in a prior step may have contributed to the abend situation.

The following SAMPLIB member defines the LOCKDATA dataset:

EMC.SRDF.Vxxx.SAMPLIB(EHCGLOCK)

Environment and system requirements

SRDF/A is supported starting with Enginuity 5670.

Restrictions

- SRDF Automated Recovery does not support SRDF/S or SRDF/Star configurations.
- SRDF Automated Recovery does not run from secondary MSCs in a high-availability environment. It runs only from the primary \( \text{WEIGHT\_FACTOR}=0 \) MSC task.
- SRDF Host Component synchronization direction must be set to R1>R2 for all groups to be recovered.
- For SRDF/A to activate successfully, the primary side devices must be all diskless or all non-diskless. In an MSC configuration, this requirement extends to all participating SRDF groups.

User interface

You can configure SRDF Automated Recovery functionality using the following initialization statements:

- SRDFA_AUTO_RECOVER—Enables/disables Automated Recovery.
Recovery Procedures

◆ SRDFA_AUTO_RECOVER_MINDIR—Specifies the minimum number of directors that must be online for the automation to begin execution.

◆ SRDFA_AUTO_RECOVER_ITRK—Specifies the SRDF/A activation threshold.

◆ SRDFA_AUTO_RECOVER_BCV—Specifies BCV management options.

◆ SRDFA_AUTO_RECOVER_PROC—Allows you to change the name of the JCL recovery procedure (default EMCRCVRY).

◆ MSC_INCLUDE_SESSION—Includes the SRDF/A group in the SRDF/A multisession group. Within this statement, you can specify optional ITRK, MINDIR, BCV, and JOBNAME parameters to override the global values used by the corresponding SRDFA_AUTO_RECOVER statements. These overrides apply to the jobs submitted to recover the specific MSC group—they do not apply to the first auto recovery job that is submitted to perform validation and cleanup.

Note: The automated recovery process does not recognize any changes made to the initialization parameters. Once MSC is running (as noted by the “time of cycle switch” messages in the ResourcePak Base job log), those specific parameters remain in effect until an MSC,REFRESH or MSC,DISABLE command is issued.

Chapter 3, “Configuration,” provides descriptions of these parameters.

Use the #SC RECOVER command to initiate SRDF Automated Recovery. “#SC RECOVER” on page 284 describes this command.

Implementing SRDF Automated Recovery

SRDF Automated Recovery is installed as part of the base SRDF Host Component product. If the SRDF Automated Recovery feature is to be implemented, perform the following steps to complete the installation:

1. Customize and submit the EHCGLOCK SAMPLIB member to allocate the global lock dataset used by the auto recovery procedure.
   See the EDIT instructions in the EHCGLOCK SAMPLIB member.

2. Customize the recovery PROC and copy it to the PROCLIB.
   See the EDIT instructions in the EMCRCVRY SAMPLIB member.

3. Specify the LOGONLY_FOR_TRACKED_COMMANDS initialization parameter.
   When LOGONLY_FOR_TRACKED_COMMANDS is specified, output for commands entered from the batch and REXX interfaces do not appear in the syslog or system consoles. This output is returned to the command submitter and appears in the SRDF Host Component log.
4. Configure the following initialization parameters to support SRDF Automated Recovery:
   - SRDFA_AUTO_RECOVER
   - SRDFA_AUTO_RECOVER_MINDIR
   - SRDFA_AUTO_RECOVER_ITRK
   - SRDFA_AUTO_RECOVER_BCV
   - SRDFA_AUTO_RECOVER_PROC

   Chapter 3, “Configuration,” describes how to set these parameters.

**SRDF Automated Recovery procedure**

SRDF Automated Recovery executes automatically in response to an SRDF/A drop or through an operator command.

The recovery process consists of the following steps:

1. Validate that the environment is suitable for recovery automation to begin execution. All checks must complete successfully.
   a. Obtain authorization to begin recovery automation if SRDFA_AUTO_RECOVER was set to PROMPT.
   b. Ensure that the SYNCH_DIRECTION_ALLOWED initialization parameter is set to R1>R2 and SYNCH_DIRECTION_INIT is set to NONE.

   **Note:** It is recommended to set SYNCH_DIRECTION_INIT to NONE. However, if you set SYNCH_DIRECTION_INIT to R1>R2 rather than NONE, then skip step c.

   c. For SRDF groups in the MSC environment, issue the 
      #SC RDFGRP, cuu, ra, SYNCH_DIRECTION, R1>R2 command to set both sides of the group to the correct direction.
   d. Check that SRDF links are available and the minimum number of SRDF directors specified in SRDFA_AUTO_RECOVER_MINDIR are operational.

      A WTOR message is issued indicating that recovery operations have started. Link status is continuously checked until links are available, at which point the message is deleted automatically, or until the operator cancels the operation.
   e. Ensure that the SORT_ORDER is set to SORT_BY_SYMDEV. If necessary, issue the #SC GLOBAL, SORT_BY_SYMDEV command.

2. Perform standard SRDF/A cleanup operations by running EHCMSCE.

3. *(Optional)* Perform gold copy management.
   If requested, a BCV copy of the R2 devices is created according to the policies indicated in the SRDFA_AUTO_RECOVER_BCV startup option.
4. Create one address space per SRDF/A group for execution of REXX-based automation which performs the following steps for each SRDF/A group:
   a. Execute RNG_REFRESH and RNG_RSUM command sequences to resume SRDF operation.
   b. Monitor SRDF R2 invalid tracks until the threshold set in SRDF_AUTO_RECOVER_ITRK is reached.
   c. Once R2 invalid tracks have reached the specified level, activate SRDF/A.
5. In MSC environments, pass control back to the MSC task which then activates MSC using an MSC RESTART.
6. (Optional) Perform gold copy management as specified in the SRDF_AUTO_RECOVER_BCV post-recovery option.

Resuming after an SRDF Automated Recovery failure

In the event that the recovery fails (for instance, if another link bounce occurs during the recovery process), resumption must be done manually.

If there is a link failure during auto recovery, the script pauses with a WTOR that indicates the failing SRDF Host Component command, as shown in the following example:

```
+EMCRX86E EMCMN001 SRDF-HC : (187) #SQ VOL,RMT(9566,01),RA(01) USER1
+EMCRX86E EMCPC10I ALL RDF LINKS ARE UNAVAILABLE FOR REQUESTED RAGROUP
+(CMD:187) USER1
@97 EMCRX95R Reply CONTinue or CANcel
```

Before replying to the WTOR, determine the state of the devices for that particular script and take the appropriate actions. To restart the MSC process, you must do the following:

- Clear the host intervention indicator.
- Perform BCV management (if necessary).
- Confirm that the devices are ready on the link.
- Activate SRDF/A.

Complete the following steps to recover from a link failure:

1. Issue #SQ SRDFA,RMT(cuu,ra). Or, if that particular SRDF group/link is down and there is another link to the remote system, issue #SQ SRDFA,RMT(cuu,ra-to-look-at) or issue #SQ SRDFA,RMT(cuu,ra,*). The wildcard "*" displays all of the SRDF groups that have SRDF/A active (or host intervention).
2. If the host intervention indicator is set to 'Y' for any of the SRDF groups in the MSC environment, run the EHCMSME utility.
3. If necessary, verify that the BCV management has taken place for each of the SRDF groups. If the BCV management has not been done, take the appropriate steps to ESTABLISH or SPLIT as necessary. Query the BCVs to determine that they are in the correct state. Use #TF QUERY 1,RMT(cuu[,srdfgrp]),count[symdv#], for example:

#TF QUERY 1,RMT(6C00,04),8,186

4. Issue the appropriate command
   #TF SPLIT 1,RMT(cuu,sym#bcv-sym#bcv[,srdfgrp]) or
   #TF RE-ESTABLISH 1,RMT(cuu,sym#bcv-sym#bcv[,srdfgrp]) as needed for the BCV management requirements.

5. Issue the #SQ VOL,cuu,RA(grp) command for each SRDF group in the MSC environment to determine the state of the devices.
   a. If the devices are not ready on the link, and in synchronous mode, configure them to ADCOPY-DISK mode. For example:

   #SC VOL,LCL(6C00,04),ADCOPY_DISK,ALL

   b. If the devices are Target Not Ready (or not ready on the link), then you must use the RDF_RSUM, RNG_REFRESH/RNG_RSUM actions. For example:

   #SC VOL,LCL(6C00,04),RDF_RSUM,ALL
   #SC VOL,RMT(6C00,04),RNG_REFRESH,ALL
   #SC VOL,RMT(6C00,04),RNG_RSUM,ALL

6. Once the devices are ready on the link, activate SRDF/A:

   #SC SRDFA,LCL(6C00,04),ACT

   **Note:** (Use the #SQ SRDFA command to check the SRDF/A status, for example:

   #SQ SRDFA,LCL(6C00,04).

7. If the devices are ready on the link, and SRDF/A is active, then nothing needs to be done for that set of devices. Check the next SRDF group:

   #SQ VOL,6C00,RA(04)

8. Once all of the SRDF groups participating in the MSC environment have been made SRDF/A-active, issue the MSC RESTART command:

   F MSFSCF8,MSC,RESTART

9. When global consistency has been reached, perform gold copy management as specified in the SRDFA_AUTO_RECOVER_BCV post-recovery option.
CHAPTER 7
REXX Interface

This chapter covers the following topics:

◆ Introduction ....................................................................................................... 506
◆ EMCSRDFR program ......................................................................................... 507
◆ Supported functions ........................................................................................... 511
◆ Return and reason codes ................................................................................... 530
◆ Sample programs ............................................................................................... 540
◆ Object reference ................................................................................................ 542
Introduction

The IBM REXX programming language is a versatile, general-purpose language that can be used by both novice and experienced programmers. Using the SRDF Host Component API support for REXX, you can control SRDF functionality rather than interact solely through a console. With REXX support, you can:

◆ Create scripts to automate procedures such as those found in the SRDF Host Component for z/OS Product Guide.
◆ Build your own automated composite commands.

The REXX interface provides a callable assembler interface which populates REXX variables for the calling REXX program. The purpose of the interface is to provide access through REXX programs to SRDF Host Component data. By providing clearly defined functions and sample code, a user interface can be developed in a short amount of time.

Note: SRDF Host Component 8.3 is required for use with version 8.3 of the REXX interface.

The REXX interface provides the following:

◆ An interface program named EMCSRDFR.
◆ A series of functions which can be used to populate raw data objects which can be interrogated or interpreted as needed.
◆ The ability to submit SRDF Host Component commands through the interface and receive the output associated with the command.

Use the REXX interface when:

◆ You need to build customized reports and/or commands.
◆ You need to automate procedures.
◆ You need custom decision making and command execution in a manual or automated environment.

What are SRDF Host Component objects?

The objects returned by the REXX interface are strings of data that can be interrogated or interpreted as needed. To do this, Dell EMC provides object interpretation code that is ready to be included in the REXX program. This code substrings the returned object and interprets various fields. The code can be found in the product SCF SAMPLIB. The members are listed as “OBJECT” followed by the function number. For example, to use the Function 01 object code, select OBJECT01.

You can use these interpretation objects directly, use only a portion of them, or not use them at all. If you choose not to use the interpretation code, you are responsible for interpreting the fields within the objects.

Since an object represents a string of data, you can select a single field or multiple fields to be interpreted or interrogated.
EMCSRDFR program

The REXX interface provides the EMCSRDFR interface program to retrieve object data. EMCSRDFR is called from a REXX program to build the SRDF Host Component data object. The EMCSRDFR interface program is installed in the product library at MFEvrm.LINKLIB.

Within the REXX program, you must set the appropriate REXX variables to values corresponding to the function you would like to invoke and call EMCSRDFR to retrieve the object output. “Supported functions” on page 511 lists the available functions.

EMCSRDFR function input variables

Table 28 lists the input variables for the supported functions.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMCSRDF_COMMAND</td>
<td>This variable is used to store the SRDF Host Component command to be executed. It is only used by Function 02 (Submit Host Component Command).</td>
</tr>
<tr>
<td>EMCSRDF_CPFX8</td>
<td>This variable contains the command prefix. The prefix must be left-justified, padded with blanks, and 8 characters in length.</td>
</tr>
<tr>
<td>EMCSRDF_DEVCOUNT</td>
<td>This variable represents the number of devices requested. It must be a decimal value from 1 to 9999.</td>
</tr>
<tr>
<td>EMCSRDF_DEVFLAG</td>
<td>This variable is used by Function 10 to request that the SRDF Mirror flags be populated. Set this variable to M to request the mirror flags. Since this request results in additional overhead, you should only use this option when necessary.</td>
</tr>
<tr>
<td>EMCSRDF_EXCLUDE_FBAMMBRS</td>
<td>This variable is used by Function 10 to include or exclude FBA meta members. Set this variable to Y to exclude or N to retrieve them. The default setting is Y.</td>
</tr>
<tr>
<td>EMCSRDF_FC</td>
<td>This variable contains the function number to execute.</td>
</tr>
<tr>
<td>EMCSRDF_INCLUDE_RD10MBRS</td>
<td>This variable is used by Function 10 to request that the RAID 10 member device objects be returned. Set this variable to Y to retrieve RAID 10 member devices.</td>
</tr>
<tr>
<td>EMCSRDF_RDFGRPS</td>
<td>This is an optional variable to be used for remote requests. It contains 1 or more multihop groups to a maximum of 8 (for example, 1.2.3.4.5.6.7.8).</td>
</tr>
<tr>
<td>EMCSRDF_REQ_TOKN</td>
<td>This variable is used as an input variable to Function 18 (Reply to Command). This variable will be set when Function 03 or 04 returns a code 92, which indicates the command is waiting for a reply.</td>
</tr>
<tr>
<td>EMCSRDF_SELGROUP</td>
<td>This is an optional variable used by Function 10 and Function 14 to return data for a single group. Specify a 2-digit hex value. If EMCSRDF_SELGROUP was previously set to something other than FF, you must &quot;DROP EMCSRDF_SELGROUP&quot; or set EMCSRDF_SELGROUP to FF to request all SRDF groups.</td>
</tr>
<tr>
<td>EMCSRDF_SELSYM</td>
<td>This variable must contain a 12-digit serial number or a 4-digit hex value representing a gatekeeper device. If this variable contains a serial number, the control unit must have at least one device online.</td>
</tr>
<tr>
<td>EMCSRDF_STARTDEV</td>
<td>This variable must contain a 4-digit hex value representing the starting PowerMax/VMAX device number.</td>
</tr>
</tbody>
</table>
Table 28 EMCSRDFR function input variables (page 2 of 2)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMCSRDF_TOKEN</td>
<td>This variable is set on return from Function 02 (Submit Host Component Command). If EMCSRDF_WAIT_FOR_COMMAND is set to Y, the token field is maintained internally. If EMCSRDF_WAIT_FOR_COMMAND is set to N, you will need to supply this variable when you issue Function 03 (Get Command Status). This variable must also be supplied for Function 04 (Retrieve Command Output) and Function 18 (Reply to Command).</td>
</tr>
<tr>
<td>EMCSRDF_TRK#</td>
<td>This command tracking variable is set on return from Function 02 (Submit Host Component Command). It must be supplied as an input variable for Function 18.</td>
</tr>
<tr>
<td>EMCSRDF_USER_VERIFY</td>
<td>When using Function 02 (Submit Host Component Command), set EMCSRDF_USER_VERIFY=Y to prevent the WTOR from appearing on the console and rerouting it to the application. When processing a command response in the application, if EMCSRDF_WAIT_FOR_COMMAND is set to Y, then EMCSRDFR will return code 92 from Function 02. If EMCSRDF_WAIT_FOR_COMMAND is not set to Y, EMCSRDFR will return code 92 from Function 03 or 04. When this happens, variable EMCSRDF_MSG will be set to the prompt that would have otherwise been sent in the WTOR. To reply: uto reply:</td>
</tr>
<tr>
<td></td>
<td>• set EMCSRDF_USER_VERIFY=Y to allow the command to continue, or</td>
</tr>
<tr>
<td></td>
<td>• set EMCSRDF_USER_VERIFY=N to deny the request</td>
</tr>
<tr>
<td></td>
<td>• issue Function 18 (Reply to Command).</td>
</tr>
<tr>
<td></td>
<td>To use this facility, the following must be specified in the SRDF Host Component initialization parameters:</td>
</tr>
<tr>
<td></td>
<td>• USER_VERIFICATION=YES</td>
</tr>
<tr>
<td></td>
<td>• USER_VERIFICATION_TIMEOUT=value</td>
</tr>
<tr>
<td></td>
<td>• OPERATOR_VERIFY=value</td>
</tr>
<tr>
<td>EMCSRDF_WAIT</td>
<td>This variable is only used by Function 13 (Wait Routine). It is used to specify the wait time in seconds.</td>
</tr>
<tr>
<td>EMCSRDF_WAIT_CMD_TIMEOUT</td>
<td>This is an optional variable for Function 02 (Submit Host Component Command). It can be set to hh:mm or to mmmm to specify a maximum amount of time to wait for the command to complete. When the time expires, Function 03 (Get Command Status) is executed and control is returned to the application with the return code value from Function 03.</td>
</tr>
<tr>
<td>EMCSRDF_WAIT_FOR_COMMAND</td>
<td>This is an optional variable for Function 02 (Submit Host Component Command). If set to Y, then Function 02 will wait for the command to complete. Upon completion of the command, Function 04 (Retrieve Command Output) will be executed internally. The return code to the application will reflect the return code from Function 04 and the EMCSRDF_LINE. variables will contain the command output.</td>
</tr>
</tbody>
</table>
**EMCSRDFR function output variables**

Table 29 lists the variables that may be set on return from the supported functions.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMCSRDF_CMD_RC</td>
<td>This variable contains the command return code. A non-zero return code indicates the command had an error.</td>
</tr>
<tr>
<td>EMCSRDF_DRDFRS</td>
<td>This variable contains the reason code returned from Function 19 (Submit Dynamic SRDF Command).</td>
</tr>
<tr>
<td>EMCSRDF_DRDFRTN_MESSAGE</td>
<td>This variable contains a text message indicating the reason for the DRDF (Dynamic RDF) error.</td>
</tr>
<tr>
<td>EMCSRDF_LINE.n</td>
<td>This is a stem variable, with EMCSRDF_LINE.0 containing the number of command line records returned.</td>
</tr>
<tr>
<td>EMCSRDF_MESSAGE.</td>
<td>This is a stem variable, with EMCSRDF_MESSAGE.0 containing the number of message records returned. It may contain data when EMCSRDF_RC is non-zero.</td>
</tr>
<tr>
<td>EMCSRDF_MSG</td>
<td>This variable will be set when a return code 92 is returned and will contain the prompt that would have otherwise been sent in the WTOR.</td>
</tr>
<tr>
<td>EMCSRDF_RC</td>
<td>This variable contains the return code from EMCSRDFR.</td>
</tr>
<tr>
<td>EMCSRDF_TRK#</td>
<td>This command tracking variable is set on return from Function 02 (Submit Host Component Command). It must be supplied as an input variable for Function 18 (Retrieve Command Output).</td>
</tr>
</tbody>
</table>

**Object headers**

To allow for expansion and modification of the objects without adversely affecting the applications using these objects, each object has an object header (OBJECTH). This header is used to identify the version of the object.

**Note:** OBJECTH in the product SAMPLIB contains the object interpretation code.

**OBJECTH**

Sample object interpretation code:

```
REXX - Object Header

hdr_0001 = SUBSTR(object_hdr,1,8) /* Object ID */
hdr_0002 = SUBSTR(object_hdr,9,2) /* Function Code */
hdr_0003 = X2D(C2X(SUBSTR(object_hdr,11,2))) /* Version */
hdr_0004 = X2D(C2X(SUBSTR(object_hdr,13,2))) /* Header Length */
hdr_0005 = X2D(C2X(SUBSTR(object_hdr,15,2))) /* Object Length */
hdr_0006 = X2D(C2X(SUBSTR(object_hdr,17,16))) /* Unused */
```

**VLOH headers**

The VLOH (Variable Length Object Header) allows for the return of multiple data structures of the same length and format. This header allows the object returned to be more compact, by removing the need to allocate space for unused list entries. This header precedes the data in select objects and is not present for every object. See the supported functions to determine if this header is present.
The format of the header is as follows:

+1   Length of the header
+5   Number of list entries
+9   Length of a list entry
+13  Offset to the variable data list

All VLOH headers have the same layout. Some variable length objects can have one or more fields between the header and the object data (after the offset_to_list at offset 17). The following code illustrates how to substring the VLOH. For an example illustrating how to use the VLOH, see the sample code for those functions that return a VLOH.

```
Substring_Header:
  len_of_head    = x2d(c2x(substr(ssidirec,1, 4)))
  #of_entries    = x2d(c2x(substr(ssidirec,5, 4)))
  len_of_entry   = x2d(c2x(substr(ssidirec,9, 4)))
  offset_to_list = x2d(c2x(substr(ssidirec,13,4)))

  current_offset = offset_to_list /* Step past the header */

  Say "***** Header information *****"
  Say "len_of_head   = " len_of_head
  Say "#of_entries  = " #of_entries
  Say "len_of_entry  = " len_of_entry
  Say "offset_to_list = " offset_to_list
  Say "current_offset = " current_offset
  Say "***************************"
```
Supported functions

The following functions are available via the REXX interface:

- Function 01—Retrieve Subsystem Object
- Function 02—Submit Host Component Command
- Function 03—Get Command Status
- Function 04—Retrieve Command Output
- Function 06—Retrieve Global Information Objects
- Function 07—Retrieve Serial# Objects
- Function 08—Retrieve SSID Objects
- Function 09—Retrieve Control Unit Objects
- Function 10—Retrieve Device Objects
- Function 11—Retrieve RDF Link Objects
- Function 12—Retrieve Director Objects
- Function 13—Wait Routine
- Function 14—Retrieve SRDF Group Object
- Function 15—Retrieve SRDF Group Statistics Objects
- Function 16—Retrieve SRDFA Session Objects
- Function 17—Retrieve Director Statistics Objects
- Function 18—Reply to Command
- Function 19—Dynamic RDF (DRDF)
- Function 20—Get Device Identification
- Function 22—Retrieve Pool General Object
- Function 23—Retrieve Pool Device Object
- Function 26—Retrieve FTS externally provisioned volumes
- Function 27—Retrieve FA Port Information

In all cases, EMCSRDF_FC must contain the function number. Any required parameters will be listed along with a sample portion of the object interpretation code. The complete object interpretation code is located in the SCF SAMPLIB distributed with ResourcePak Base.

Output is returned from the interface via REXX Stem variables:

- The .0 variables will contain the number of .i records that were returned.
- The .i records will contain the objects.

The object can be analyzed using the object interpretation code.
Function 01—Retrieve Subsystem Object

Variables

This function requires no input variables.

Returned objects

The returned objects are located in the following variables:

- EMCSRDF_SUBSYS.0
- EMCSRDF_SUBSYS.i

Sample object interpretation code

REXX - Function 01 - Subsys Object

```
sub_0001 =SUBSTR(subsys_rec, 1,4)  /* Subsystem Name */
sub_0002 =SUBSTR(subsys_rec, 5,2)  /* Command characters */
sub_0003 =SUBSTR(subsys_rec, 7,3)  /* HC VERSION (VVRRMM) */
sub_0004 =SUBSTR(subsys_rec,10,8)  /* 8 CHARACTER CMD PFX */
```

Function 02—Submit Host Component Command

Variables

This function requires the following additional variables to be set:

- EMCSRDF_CPFX8
- EMCSRDF_COMMAND

Optionally, the following variables may also be set:

- EMCSRDF_WAIT_FOR_COMMAND
- EMCSRDF_WAIT_CMD_TIMEOUT
- EMCSRDF_USER_VERIFY

On return, the following variables may be set:

- EMCSRDF_TOKEN
- EMCSRDF_LINE.

Returned objects

This function does not return an object. When EMCSRDF_WAIT_FOR_COMMAND is set to "Y", Function 02 waits for the command to complete. Upon completion of the command, Function 04 (Retrieve Command Output) is executed internally. The return code to the application reflects the return code from Function 04 and the output EMCSRDF_LINE. variables contain the command output.

The EMCSRDF_LINE. variables look identical to console output, but issuing the command does not utilize console services. Any SRDF Host Component command can be submitted using the REXX interface, provided the proper SRDF Host Component security has been granted.
Function 03—Get Command Status

Variables

This function requires the following variables to be set:

- EMCSRDF_CPFX8
- EMCSRDF_TOKEN

Returned objects

This function does not return an object. This is a control function that is used to test the completion of Function 02 (Submit Host Component Command). While this is a valid function, it is not used if EMCSRDF_WAIT_FOR_COMMAND is specified on Function 02. It is also not necessary if the application is designed to wait and issue Function 04. A return code of 0 from this function indicates the command is complete.

Function 04—Retrieve Command Output

Variables

This function requires the following variables to be set:

- EMCSRDF_CPFX8
- EMCSRDF_TOKEN

Returned objects

This function does not return an object. This is a control function that is used to retrieve the output generated by Function 02. Command output will be contained in the stem variable EMCSRDF_LINE.n, with EMCSRDF_LINE.0 containing the number of stem variables returned.

A return code of 8 from this function indicates the command is not yet complete. If you receive this return code, issue a wait request (Function 13) and retry this function. Upon completion (return code of 0), this function sets variable EMCSRDF_CMD_RC to the return code for the command. A return code of 0 means the command worked; non-zero means the command had an error.

Function 06—Retrieve Global Information Objects

Variables

This function requires the following variable to be set:

- EMCSRDF_CPFX8

Returned objects

The returned objects are located in the following variable:

- EMCSRDF_GLOBAL
Sample object interpretation code

**REXX - Function 06 - Global Object**

```rexx
glb_0001 = C2X(SUBSTR(global_rec, 1,3)) /* HostComp version (vvrrmm) */
glb_0002 = C2X(SUBSTR(global_rec, 4,3)) /* API version (vvrrmm) */
glb_0003 = X2D(C2X(SUBSTR(global_rec, 7,2))) /* Msg processing table size*/
glb_0004 = X2D(C2X(SUBSTR(global_rec, 9,2))) /* Max query */
```

**Function 07—Retrieve Serial# Objects**

**Variables**

This function requires the following variable to be set:

- EMCSRDF_CPFX8

**Returned objects**

The returned objects are located in the following variables:

- EMCSRDF_SERIAL.0
- EMCSRDF_SERIAL.i

**Sample object interpretation code**

```rexx
ser#_0001 = SUBSTR(serial_rec, 1,12) /* Symm Serial Number */
ser#_0002 = C2X(SUBSTR(serial_rec,13,2)) /* Major Micro Code Level */
ser#_0003 = C2X(SUBSTR(serial_rec,15,2)) /* Minor Micro Code Level */
```

**Function 08—Retrieve SSID Objects**

**Variables**

This function requires the following variable to be set:

- EMCSRDF_CPFX8

**Returned objects**

The SSID object contains multiple stems. The returned objects are located in the following variables:

- EMCSRDF_SSID.0

  This stem indicates the number of base (SSIDB) and information (SSIBI) stem pairs.

- EMCSRDF_SSIDB#

  This stem contains the base information. The # sign denotes the stem number reflected in the SSID.0 stem.
EMCSRDF_SSID#

This stem contains the SSID information. The # sign denotes the stem number reflected in the SSID.0 stem.

A Variable Length Object Header precedes the SSID data.

For example, if two base and information pairs are returned and EMCSRDF_SSID.0=2, the following stems will exist:

- EMCSRDF_SSIDB1
- EMCSRDF_SSIDI1
- EMCSRDF_SSIDB2
- EMCSRDF_SSIDI2

Sample object interpretation code

```rexx
/* REXX - Function 08 - SSID BASE (SSIDB) Object */
******************************************************************************
/* This is a new object for version 3. The SSID object now has 2 parts. */
/* The fixed portion below is similar to the version 2 object. Function 09 */
/* now returns multiple stem variables. The SSIDB and SSIDI are returned as a */
/* pair. */
/* * EMCSRDF_SSID.0 */
/* * EMCSRDF_SSIDB# */
/* * EMCSRDF_SSIDI# */
******************************************************************************
/* Base SSID Information */
/* * EMCSRDF_SSIDB# */
******************************************************************************
ssidb0001 = C2X(SUBSTR(ssidbrec, 1,2)) /* SSID */
ssidb0003 =X2D(C2X(SUBSTR(ssidbrec, 3,2)))/* number of devices */
ssidb0005 = SUBSTR(ssidbrec, 5,1) /* SSID Flags */.
.
******************************************************************************
/* This is a new for version 3. The SSIDI object will contain information */
/* about each SSID. */
******************************************************************************
/* EMCSRDF_SSIDI# */
/* * +0 length of the header */
/* * +4 #of list entries */
/* * +8 length of a list entry */
/* * +12 Offset to the variable data list */
/* * Variable list entries of the following format. */
******************************************************************************
ssidi0001 = C2X(SUBSTR(ssidrec, 1,2)) /* MVS CUU */
ssidi0003 = C2X(SUBSTR(ssidrec, 3,4)) /* Symmetrix Device number */
ssidi0007 = C2X(SUBSTR(ssidrec, 7,1)) /* Channel Address */
ssidi0008 = C2X(SUBSTR(ssidrec, 8,1)) /* LSS ID */
ssidi0009 = C2X(SUBSTR(ssidrec, 9,1)) /* Unit Address */
ssidi0010 = C2X(SUBSTR(ssidrec,10,1)) /* Reserved */
```

Function 09—Retrieve Control Unit Objects

Variables

This function requires the following variable to be set:

- EMCSRDF_CPFX8

Optionally, the following variable may be set:

- EMCSRDF_SELSYM
  
  Must contain a 12-digit serial number.

Returned objects

The CNTLUNIT object contains multiple stems. Each stem contains a different portion of the CNTLUNIT information. The # sign denotes the stem number reflected in the CNTLUNIT.0 stem.

- EMCSRDF_CNTLUNIT.0
  
  Contains the number of control unit records returned.

- EMCSRDF_CNTLUNIT.i
  
  Contains the base information.

- EMCSRDF_CNTLUNIT#_SSID.0
  
  Contains the number of SSID stems returned.

- EMCSRDF_CNTLUNIT#_SSID.#
  
  Contains the SSID list. A VLOH precedes this data.

- EMCSRDF_CNTLUNIT#_DIRLIST.0
  
  Contains the number of director list stems returned.

- EMCSRDF_CNTLUNIT#_DIRLIST.#
  
  Contains the list of directors. A VLOH and a 2-byte hex value describing the type of director precedes this data.

- EMCSRDF_CNTLUNIT#_GRP.0
  
  Contains the number of group stems returned.

- EMCSRDF_CNTLUNIT#_GRP.#
  
  Contains the base group information.

- EMCSRDF_CNTLUNIT#_GRP#_DIRLIST.0
  
  Contains the number of group director list stems returned.

- EMCSRDF_CNTLUNIT#_GRP#_DIRLIST.#
  
  Contains the group director list. A VLOH precedes this data. The list contains only one director entry.

- EMCSRDF_CNTLUNIT#_GRP#_DIRLISTOS.0
  
  Contains the number of group other-side director list stems returned.
REXX Interface

- EMCSRDF_CNTLUNIT#_GRP#_DIRLISTOS.#
  Contains the group other-side director list. A VLOH precedes this data. The list contains only one director entry.
- EMCSRDF_CNTLUNIT#_GRP#_DIRLIST#_PORT.0
  Contains the number of group director port list stems returned.
- EMCSRDF_CNTLUNIT#_GRP#_DIRLIST#_PORT.#
  Contains the group director port list. A VLOH precedes this data. The list contains only one port entry.
- EMCSRDF_CNTLUNIT#_GRP#_DIRLISTOS#_PORT.0
  Contains the number of group other-side port list stems returned.
- EMCSRDF_CNTLUNIT#_GRP#_DIRLISTOS#_PORT.#
  Contains the group other-side director port list. A VLOH precedes this data. The list contains only one port entry.

Sample object interpretation code

REXX - Function 09 - Cntlunit Object

```rexx
cntl_0001 = SUBSTR(cntlu_rec,1,12) /* Serial Number */
cntl_0013 =RIGHT(STRIP(X2D(C2X(SUBSTR(cntlu_rec,13,4))),'L','0'),8) /* Mem MB */
cntl_0017 = C2X(SUBSTR(cntlu_rec,17,2)) /* Control unit type */
cntl_0019 = C2X(SUBSTR(cntlu_rec,19,2)) /* Microcode level (Major) */
cntl_0021 = C2X(SUBSTR(cntlu_rec,21,2)) /* Microcode level (Minor) */
```

Function 10—Retrieve Device Objects

Variables

This function requires the following variables to be set:

- EMCSRDF_CPFX8
- EMCSRDF_SELSYM
- EMCSRDF_STARTDEV
- EMCSRDF_DEVCOUNT

Optionally, the following variables may be set:

- EMCSRDF_RDFGRPS
- EMCSRDF_SELGROUP
- EMCSRDF_INCLUDE_RD10MBRS
- EMCSRDF_EXCLUDE_FBAMMBRS
**Returned objects**

The DEVICE object contains multiple stems. Each stem contains a different portion of the DEVICE information. The # sign denotes the stem number reflected in the DEVICE.0 stem. EMCSRDF_DEVICE#.LMIR.0 denotes the number of BASE(LMIRB) and INFORMATION(LMIRI) stem pairs. Similarly, EMCSRDF_DEVICE#.RMIR.0 denotes the number of RMIRB#/RMIRI# stem pairs.

- **EMCSRDFDEVICE.0**
  Contains the number of device stems returned.

- **EMCSRDFDEVICE.#**
  Contains the device stem.

- **EMCSRDFDEVICE#.LMIR.0**
  Contains the number of Local Mirror Base/Local Mirror Information stem pairs.

- **EMCSRDFDEVICE#.LMIRB#**
  Contains the RAID device Local Mirror Base stem.

- **EMCSRDFDEVICE#.LMIRI#**
  Contains the RAID device Local Mirror Information stem. A VLOH precedes this data.

- **EMCSRDFDEVICE#.RMIR.0**
  Contains the number of Remote Mirror Base/Remote Mirror Information stem pairs.

- **EMCSRDFDEVICE#.RMIRB#**
  Contains the RAID device Remote Mirror Base stem.

- **EMCSRDFDEVICE#.RMIRI#**
  Contains the RAID device Remote Mirror Information stem. A VLOH precedes this data.

- **EMCSRDFDEVICE#.FBA.0**
  Contains the number of FBA stems.

- **EMCSRDFDEVICE#.FBA#**
  Contains the FBA stem.

- **EMCSRDFDEVICE#.BCV.0**
  Contains the number of BCV stems.

- **EMCSRDFDEVICE#.BCV#**
  Contains the BCV stem.

**Note:** Since storage allocation is determined by the number of devices requested, there is a possibility that memory can be exhausted for a large request, resulting in a 125 return code from EMCSRDFR. If this error occurs, decrease the number of devices requested or increase the region size.
Sample object interpretation code

REXX - Function 10 - Device Object

dev00001 = C2X(SUBSTR(devobj_rec, 1,4)) /* UCB address */
dev00005 = SUBSTR(devobj_rec, 5,1) /* Device flag byte 1 */
dev00006 = SUBSTR(devobj_rec, 6,6) /* Volume serial */
dev00012 = C2X(SUBSTR(devobj_rec, 12,1)) /* Device address on channel */

.
dev00151 = C2X(SUBSTR(devobj_rec, 151,1)) /* UNIT ADDRESS */

Function 11—Retrieve RDF Link Objects

Variables

This function requires the following variables to be set:

◆ EMCSRDF_CPFX8
◆ EMCSRDF_SELSYM

Optionally, the following variable may be set:

◆ EMCSRDF_RDFGRPS

Returned objects

The returned objects are located in the following variables:

◆ EMCSRDF_LINK.0
◆ EMCSRDF_LINK.i
◆ EMCSRDF_LINK#_PT
Contains the port statistics. A VLOH precedes this data.

◆ EMCSRDF_LINK#_PT.0
Contains the number of EMCSRDF_LINK#_PT records returned.

Sample object interpretation code

REXX - Function 11 - Link Object

lnk_0001 =X2D(C2X(SUBSTR(link_rec, 1,4))) /* Total # IOs */
lnk_0005 = C2X(SUBSTR(link_rec, 5,2)) /* Director */
lnk_0007 = SUBSTR(link_rec, 7,1) /* Director Type */
lnk_0008 = C2X(SUBSTR(link_rec, 8,2)) /* Other Side Director */

.
lnk_0031 = SUBSTR(link_rec, 31,1) /* Dir Connected */

Function 12—Retrieve Director Objects

Variables

This function requires the following variables to be set:

◆ EMCSRDF_CPFX8
◆ EMCSRDF_SELSYM
REXX Interface

Optionally, the following variable may be set:

- EMCSRDF_RDFGRPS

Returned objects

The returned objects are located in the following variables:

- EMCSRDF_DIRECTOR.0
- EMCSRDF_DIRECTOR.i
- EMCSRDF_DIRECTOR#_PT
  Contains the port statistics. A VLOH precedes this data.
- EMCSRDF_DIRECTOR#_PT.0
  Contains the number of EMCSRDF_DIRECTOR#_PT records returned.

Sample object interpretation code

REXX - Function 12 - Director Object

dir_0001 = SUBSTR(dir_rec,1,1)         /* Reserved                  */
dir_0002 = SUBSTR(dir_rec,2,1)         /* Director type             */
dir_0003 = SUBSTR(dir_rec,3,1)         /* Director Online flag      */
dir_0004 = SUBSTR(dir_rec,4,1)         /* Director Connected flag   */
dir_0005 = C2X(SUBSTR(dir_rec,5,2))    /* Director #                */
dir_0007 = C2X(SUBSTR(dir_rec,7,4))    /* PORT 0 NEGOTIATED SPEED    */
dir_0011 = C2X(SUBSTR(dir_rec,11,4))   /* PORT 1 NEGOTIATED SPEED    */
dir_0015 = C2X(SUBSTR(dir_rec,15,4))   /* PORT 0 CONFIGURED SPEED    */
dir_0019 = C2X(SUBSTR(dir_rec,19,4))   /* PORT 1 CONFIGURED SPEED    */

Function 13—Wait Routine

Variables

This function requires the following variable to be set:

- EMCSRDF_WAIT

Returned objects

This function does not return an object. This is a control function which is used to force a wait interval to be executed. The variable EMCSRDF_WAIT must be primed with the amount of seconds to wait. When using Function 2 (Submit Host Component Command), this function is essential to delay the command complete checking.
Function 14—Retrieve SRDF Group Object

Variables

This function requires the following variables to be set:

- EMCSRDF_CPFX8
- EMCSRDF_SELSYM

Optionally, the following variables may be set:

- EMCSRDF_RDFGRPS
- EMCSRDF_SELGROUP

Returned objects

The RDFGROUP object contains multiple stems. Each stem contains a different portion of the RDFGROUP information. The # sign denotes the stem number reflected in the RDFGROUP.0 stem.

- EMCSRDF_RDFGROUP.0
  Contains the number of SRDF group stems returned.
- EMCSRDF_RDFGROUP.#
  Contains the SRDF group stem.
- EMCSRDF_RDFGROUP#_STARLCL
  Contains the SRDF/Star local information.
- EMCSRDF_RDFGROUP#_STARRMT
  Contains the SRDF/Star remote information.
- EMCSRDF_RDFGROUP#_MSCLCL
  Contains the SRDF group MSC information.
- EMCSRDF_RDFGROUP#_BOXLIST.0
  Contains the number of boxlist stems.
- EMCSRDF_RDFGROUP#_BOXLIST.#
  Contains the boxlist stem.
- EMCSRDF_RDFGROUP#_DIRLIST.0
  Contains the number of SRDF group director list stems.
- EMCSRDF_RDFGROUP#_DIRLIST.#
  Contains the SRDF group director list stems. A VLOH precedes this data. The list contains only one director entry.
- EMCSRDF_RDFGROUP#_DIRLISTOS.0
  Contains the number of SRDF group other-side director list stems.
**EMCSRDF_RDFGROUP#_DIRLISTOS.#**

Contains the SRDF group other-side director list stems. A VLOH precedes this data. The list contains only one directory entry.

**EMCSRDF_RDFGROUP#_WPINFO.0**

Contains the number of Write Pacing Information stems.

**EMCSRDF_RDFGROUP#_WPINFO.#**

Contains the Write Pacing Information stem.

**Sample object interpretation code**

REXX - Function 14 - RDF Group Object

```rexx
/******************************************************************************/
grp_0001 =    C2X(SUBSTR(rdfgrp_rec,  1,2))        /* Reserved                */
grp_0003 =    C2X(SUBSTR(rdfgrp_rec,  3,2))        /* RDF Group               */
grp_0005 =    C2X(SUBSTR(rdfgrp_rec,  5,2))        /* Reserved                */
grp_0007 =    C2X(SUBSTR(rdfgrp_rec,  7,2))        /* Other Side RDF Group    */

grp_0157 =            SUBSTR(rdfgrp_rec,157,8)        /* Reserved             */
/******************************************************************************/
```

REXX - Function 14 - STAR Local object

```rexx
NUMERIC DIGITS 12
lcl_00001=        SUBSTR(starl_rec,  1,1)          /* SRDFA TYPE              */
lcl_00002=        SUBSTR(starl_rec,  2,1)          /* SRDFA ACTIVE            */
lcl_00003=        SUBSTR(starl_rec,  3,1)          /* SRDFA TOLERANCE         */
lcl_00004=        SUBSTR(starl_rec,  4,1)          /* CLEANUP RUNNING         */

lcl_00026=C2X(SUBSTR(starl_rec, 57,8))             /* TAG FRO MS TURN OFF     */

RXX - Function 14 - Group MSC Information

```rexx
/******************************************************************************/
msl_00001=         SUBSTR(mscl_rec,  1,1)          /* Version 0-MSC 1-MSC/STAR*/
msl_00002=         SUBSTR(mscl_rec,  2,1)          /* List complete           */
msl_00003=         SUBSTR(mscl_rec,  3,1)          /* MVS defined             */
msl_00004=         SUBSTR(mscl_rec,  4,1)          /* OS defined              */

msl_00041=C2X(SUBSTR(mscl_rec, 41,16))        /* Reserved                     */

RXX - Function 14 - Box List Information

```rexx
/******************************************************************************/
box_00001=            SUBSTR(box_rec,  1,12)       /* Primary side Ser#        */
box_00002=    C2X(SUBSTR(box_rec, 13,1))           /* Reserved                */
box_00003=            SUBSTR(box_rec, 14,12)       /* Secondary side Ser#      */
box_00004=    C2X(SUBSTR(box_rec, 26,1))           /* Reserved                */

box_00031=            SUBSTR(box_rec, 31,6)             /* Reserved           */

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**Function 15—Retrieve SRDF Group Statistics Objects**

### Variables

This function requires the following variables to be set:

- EMCSRDF_CPFX8
- EMCSRDF_SELSYM

Optionally, the following variable may be set:

- EMCSRDF_RDFGRPS

### Returned objects

The returned objects are located in the following variables:

- EMCSRDF_RGRPSTAT.0
- EMCSRDF_RGRPSTAT.i

#### Sample object interpretation code

```
REXX - Function 15 - Rgrpstat Object
grs_0001 = C2X(SUBSTR(rgrpst_rec, 1,1)) /* Reserved */
grs_0002 = C2X(SUBSTR(rgrpst_rec, 2,1)) /* Reserved */
grs_0003 = C2X(SUBSTR(rgrpst_rec, 3,1)) /* Config flags */
grs_0004 = C2X(SUBSTR(rgrpst_rec, 4,1)) /* Protocol */
  .
grs_0047 = C2X(SUBSTR(rgrpst_rec,47,4)) /* RDF Group */
```

**Function 16—Retrieve SRDFA Session Objects**

Function 16 is no longer supported. Use “Function 14—Retrieve SRDF Group Object” on page 521 to obtain SRDFA/STAR/MSC information.

**Function 17—Retrieve Director Statistics Objects**

### Variables

This function requires the following variables to be set:

- EMCSRDF_CPFX8
- EMCSRDF_SELSYM

Optionally, the EMCSRDF_RDFGRPS variable may be set.

### Returned objects

The returned objects are located in the following variables:

- EMCSRDF_DSTAT.0
  Contains the number of directors returned.
- EMCSRDF_DSTATB.#
  Contains the director information.
EMCSRDF_DSTAT#_PT

Contains the port statistics.

EMCSRDF_DSTAT#_PT.0

Contains the number of EMCSRDF_DSTAT#_PT records returned.

**Note:** Check the Format field to determine the format of the object.

**Sample object interpretation code**

```rexx
/* REXX - Function 17 - Director Statistics Object */
NUMERIC DIGITS 20 /* Allow for larger counters*/
st_a_0001 =X2D(C2X(SUBSTR(stat_rec, 1,1))) /* Format */
st_a_0002 = C2X(SUBSTR(stat_rec, 2,1)) /* Director Type */
st_a_0003 = C2X(SUBSTR(stat_rec, 3,4)) /* Director # */
st_a_0007 = SUBSTR(stat_rec, 7,10) /* Reserved */
st_a_rec  = SUBSTR(stat_rec,17,256)/" Director Statistics Info */

" /* Format 2 Director type EA */
e_a_0001 =X2D(C2X(SUBSTR(sta_rec, 1,4))) /* Number of writes */
  .
e_a_0007 =X2D(C2X(SUBSTR(sta_rec,25,4))) /* Device write pendings */

" /* Format 3 Director type SA */
s_a_0001 =X2D(C2X(SUBSTR(sta_rec, 1,4))) /* Number of writes */
  .
s_a_0011 =X2D(C2X(SUBSTR(sta_rec,41,4))) /* Device write pendings */

" /* Format 4 Director type FA */
fa_0001 =X2D(C2X(SUBSTR(sta_rec, 1,4))) /* Number of writes */
  .
fa_0011 =X2D(C2X(SUBSTR(sta_rec,41,4))) /* Device write pendings */

" /* Format 6 Director type DA */
da_0001 =X2D(C2X(SUBSTR(sta_rec, 1,4))) /* Number of I/O's */
  .
da_0013 =X2D(C2X(SUBSTR(sta_rec,49,4))) /* Average fall thru time */

" /* Format 7 Director type RF */
r_f_0001 =X2D(C2X(SUBSTR(sta_rec, 1,4))) /* Number of I/O's */
  .
r_f_0014 =X2D(C2X(SUBSTR(sta_rec,55,2))) /* Reserved */

" /* Format 11 Director type SE */
se_0001 =X2D(C2X(SUBSTR(sta_rec, 1,4))) /* Number of writes */
  .
se_0011 =X2D(C2X(SUBSTR(sta_rec,41,4))) /* Device write pendings */
NUMERIC DIGITS
```
**Function 18—Reply to Command**

This is a control function that does not produce an object. This function is used after a command has indicated that a reply is outstanding. If the variable EMCSRDF_USER_VERIFY is set to Y, the command will be executed. If EMCSRDF_USER_VERIFY is set to N, the command will be denied.

**Variables**

This function requires that the following variables be set:
- EMCSRDF_CPFX8
- EMCSRDF_TOKEN
- EMCSRDF_REQ_TOKN
- EMCSRDF_TRK#

**Function 19—Dynamic RDF (DRDF)**

This is a synchronous request and does not return control to the caller until the command is complete. It accepts an SRDF Host Component #SC VOL command with one of the following supported actions:
- CASCRE
- CASDEL
- CASRSUM
- CASSUSP
- CASSWAP
- CREATEPAIR
- DELETePAIR
- HDELETEPAIR
- HMOVEPAIR
- HSWAP
- MOVEPAIR
- RESUMEPair
- R22SWTCH
- SWAP
- USR_RDY
- USR_NRDY

**Note:** The *SRDF Host Component for z/OS Product Guide* provides information about the #SC VOL command and dynamic SRDF actions.

The actual dynamic RDF work is performed in SCF using a function in the mainframe Symmetrix API. This function requires that SRDF Host Component be active.

Issuing the command does not utilize console services. Only the #SC VOL (DRDF) command can be submitted using this function and proper SRDF Host Component security is required.
Variables

This function requires that the following variables be set:

- EMCSRDF_CPFX8
- EMCSRDF_COMMAND

Returned objects

This function does not return an object. It returns formatted command output. Command output will be contained in the stem variable EMCSRDF_LINE.n, with EMCSRDF_LINE.0 containing the amount of stem variables returned.

**Function 20—Get Device Identification**

This function returns object 20, which contains device-specific information.

Variables

This function requires that the following additional variables be set:

- EMCSRDF_CPFX8
- EMCSRDF_SELSYM

Must contain a 4-character z/OS cuu. Use of a storage system serial number is not supported.

There are no optional variables that can be used.

Returned objects

The returned objects are located in the following variables:

- EMCSRDFDEVICEID.0
- EMCSRDFDEVICEID.i

Sample object interpretation code

```rexx
/* REXX - Function 20 - Device Identification Object */
did_0001 = SUBSTR(didobj_rec,1,12) /* Symm Serial Number */
did_0013 = C2X(SUBSTR(didobj_rec,13,2)) /* Controller Type */
did_0015 = C2X(SUBSTR(didobj_rec,15,1)) /* Controller Model */
did_0016 = SUBSTR(didobj_rec,16,2) /* Symmetrix Type */
  .
did_0069 = SUBSTR(didobj_rec,69,8) /* Reserved */
```

**Function 22—Retrieve Pool General Object**

Variables

This function requires the following variables to be set:

- EMCSRDF_CPFX8
- EMCSRDF_SELSYM

Optionally, the following variable may be set:
**Function 23—Retrieve Pool Device Object**

**Variables**

This function requires the following variables to be set:
- EMCSRDF_CPFX8
- EMCSRDF_SELSYM

Optionally, the following variable may be set:
- EMCSRDF_RDFGRPS

**Returned objects**

The returned objects are located in the following variables:
- EMCSRDF_POOL_INFO.0
- EMCSRDF_PBASE_INFO.i.0
- EMCSRDF_PBASE_INFO.i.ii
- EMCSRDF_PSTAT_INFO.i.0
- EMCSRDF_PSTAT_INFO.i.ii
- EMCSRDF_PDEV_INFO.i.0
- EMCSRDF_PDEV_INFO.i.ii

**Function 26—Retrieve FTS externally provisioned volumes**

This function returns EMCSRDF_EPVOL, a stem variable.

**Variables**

This function requires the following variable to be set:
- EMCSRDF_CPFX8
- EMCSRDF_SELSYM
- EMCSRDF_STARTDEV
- EMCSRDF_DEVCOUNT

Optionally, the following variables may be set:
- EMCSRDF_RDFGRPS
REXX Interface

- **EMCSRDF_SELGROUP**

**Returned objects**

The returned objects are located in the following variables:

- **EMCSRDF_EPVOL.0**
  Contains the number of FTS externally provisioned devices returned

- **EMCSRDF_EPVOL.i**
  Contains the EPVOL information

**Sample object interpretation code**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>epvol_0001</td>
<td>C2X(SUBSTR(epvol_rec, 1, 8)) /* CAPACITY */</td>
</tr>
<tr>
<td>epvol_0002</td>
<td>C2D(SUBSTR(epvol_rec, 9, 8)) /* USED BLOCKS (Block alc)*/</td>
</tr>
<tr>
<td>epvol_0003</td>
<td>C2X(SUBSTR(epvol_rec,17,4)) /* SYMMETRIX DEVICE # */</td>
</tr>
<tr>
<td>epvol_0004</td>
<td>C2X(SUBSTR(epvol_rec,21,4)) /* Spindle ID */</td>
</tr>
<tr>
<td>epvol_0005</td>
<td>C2D(SUBSTR(epvol_rec,25,2)) /* DISK GROUP NUMBER */</td>
</tr>
<tr>
<td>epvol_0006</td>
<td>C2D(SUBSTR(epvol_rec,27,2)) /* Block Size */</td>
</tr>
<tr>
<td>epvol_0007</td>
<td>C2X(SUBSTR(epvol_rec,29,2)) /* DX # 1 */</td>
</tr>
<tr>
<td>epvol_0008</td>
<td>C2X(SUBSTR(epvol_rec,31,2)) /* DX # 2 */</td>
</tr>
<tr>
<td>epvol_0009</td>
<td>C2X(SUBSTR(epvol_rec,33,1)) /* PORT MASK FOR DX # 1 */</td>
</tr>
<tr>
<td>epvol_0010</td>
<td>C2X(SUBSTR(epvol_rec,34,1)) /* PORT Mask FOR DX # 2 */</td>
</tr>
<tr>
<td>epvol_0011</td>
<td>X2C(C2X(SUBSTR(epvol_rec,35,32))) /* DISK GROUP NAME */</td>
</tr>
<tr>
<td>epvol_0012</td>
<td>C2X(SUBSTR(epvol_rec,67,64)) /* WWID (WWN)*/</td>
</tr>
<tr>
<td>epvol_0013</td>
<td>C2D(SUBSTR(epvol_rec,131,1)) /* WWID (WWN) LENGTH*/</td>
</tr>
<tr>
<td>epvol_0014</td>
<td>C2X(SUBSTR(epvol_rec,132,1)) /* FLAG1*/</td>
</tr>
<tr>
<td>epvol_0015</td>
<td>C2X(SUBSTR(epvol_rec,133,1)) /* EMCSRDF_MISC_FLGS*/</td>
</tr>
<tr>
<td>epvol_0016</td>
<td>C2X(SUBSTR(epvol_rec,134,1)) /* EMCSRDF_TECHNLGY*/</td>
</tr>
<tr>
<td>epvol_0017</td>
<td>C2X(SUBSTR(epvol_rec,135,1)) /* EMCSRDF_FLAG2*/</td>
</tr>
<tr>
<td>epvol_0018</td>
<td>C2X(SUBSTR(epvol_rec,136,2)) /* Host CUU */</td>
</tr>
<tr>
<td>epvol_0019</td>
<td>C2X(SUBSTR(epvol_rec,138,1)) /* Channel Set id*/</td>
</tr>
<tr>
<td>epvol_0020</td>
<td>C2X(SUBSTR(epvol_rec,139,1)) /* Flag3 */</td>
</tr>
</tbody>
</table>

**Note:** FC 26 returns objects starting with the first externally provisioned volume found in the storage system at or after the requested starting device number.

**Function 27—Retrieve FA Port Information**

Function 27 only returns objects for devices that have the Write Prohibit bit ON The new function code 27 is added in EMCSRDFR.

Function 27 returns EMCSRDF_FADEVB.# base object and EMCSRDF_FADEV#.DIR segment object.

**Variables**

This function requires the following variables to be set:

- **EMCSRDF_CPFX8**
- **EMCSRDF_SELSYM**
- **EMCSRDF_STARTDEV**
- **EMCSRDF_DEVCOUNT**

Optionally, the following variables may be set:
- EMCSRDF_RDFGRPS
- EMCSRDF_SELGROUP

Returned objects

The returned objects are located in the following variables:

- EMCSRDF_FADEV.0
  Contains the number of FBA devices returned.

- EMCSRDF_FADEVB.i
  Contains the base information. Base information consists of a device number with write prohibited bit ON.

- EMCSRDF_FADEVI_DIR
  Contains the director segment information.

Sample object interpretation code

**FA device Base**

```plaintext
fadevb_0001= SUBSTR(fadev_rec,1,4) /* device Number*/
```

**Director Segment**

```plaintext
fadir_0001 = C2X(SUBSTR(fadir_rec,1,4)) /* SRDF Dir# */
fadir_0005 = SUBSTR(fadir_rec,5,4)      /* SymmWIN Dir# */
fadir_0009 = C2X(SUBSTR(fadir_rec,5,4)) /* DIRECTOR type */
fadir_0013 = SUBSTR(fadir_rec,13,1)    /* Flag1 */
```
Return and reason codes

This section provides a list of possible REXX return and reason codes. Check EMCSRDF_RC in addition to the return code from the call or link to EMCSRDFR.

EMCSRDFR return codes

<table>
<thead>
<tr>
<th>Return code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Success</td>
</tr>
<tr>
<td>4</td>
<td>Command complete</td>
</tr>
<tr>
<td>8</td>
<td>Command not complete</td>
</tr>
<tr>
<td>12</td>
<td>Command not found</td>
</tr>
<tr>
<td>16</td>
<td>Max commands queued</td>
</tr>
<tr>
<td>20</td>
<td>SRDF Host Component not accepting commands</td>
</tr>
<tr>
<td>24</td>
<td>Unable to locate SRDF Host Component subsystem command prefix. Check that this subsystem is running.</td>
</tr>
<tr>
<td>28</td>
<td>Bad function code passed</td>
</tr>
<tr>
<td>32</td>
<td>Invalid starting device</td>
</tr>
<tr>
<td>36</td>
<td>Unable to initiate cross memory interface</td>
</tr>
<tr>
<td>40</td>
<td>Unable to terminate cross memory interface</td>
</tr>
<tr>
<td>44</td>
<td>Getmain failed</td>
</tr>
<tr>
<td>48</td>
<td>Requested object failed validation</td>
</tr>
<tr>
<td>52</td>
<td>I/O error (API error)</td>
</tr>
<tr>
<td>56</td>
<td>Abend occurred in cross memory</td>
</tr>
<tr>
<td>58</td>
<td>Build variable object error</td>
</tr>
<tr>
<td>60</td>
<td>Request to queue command failed</td>
</tr>
<tr>
<td>64</td>
<td>Requested storage system is below minimum operating environment level</td>
</tr>
<tr>
<td>65</td>
<td>No links available</td>
</tr>
<tr>
<td>68</td>
<td>Unable to locate UCB</td>
</tr>
<tr>
<td>69</td>
<td>Selected storage system has invalid value</td>
</tr>
<tr>
<td>70</td>
<td>Null variable</td>
</tr>
<tr>
<td>71</td>
<td>Variable does not exist</td>
</tr>
<tr>
<td>72</td>
<td>Unexpected condition</td>
</tr>
<tr>
<td>73</td>
<td>Segment type invalid</td>
</tr>
<tr>
<td>74</td>
<td>No devices found</td>
</tr>
<tr>
<td>Return code</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>------------------------------------------------------------</td>
</tr>
<tr>
<td>76</td>
<td>SCF Not Found (Server Address Space)</td>
</tr>
<tr>
<td>80</td>
<td>EMCSRDF_COMMAND is equal to null or blank</td>
</tr>
<tr>
<td>81</td>
<td>The object compatibility variable is invalid</td>
</tr>
<tr>
<td>84</td>
<td>Version error</td>
</tr>
<tr>
<td>88</td>
<td>Bad RDFGRP passed</td>
</tr>
<tr>
<td>92</td>
<td>Command waiting to be verified</td>
</tr>
<tr>
<td>96</td>
<td>The UCB check for this device has failed</td>
</tr>
<tr>
<td>100</td>
<td>The SRDF group specified was not found</td>
</tr>
<tr>
<td>104</td>
<td>The SRDF group specified is invalid</td>
</tr>
<tr>
<td>105</td>
<td>DRDF parse error</td>
</tr>
<tr>
<td>108</td>
<td>Control unit not found</td>
</tr>
<tr>
<td>109</td>
<td>The remote control unit was not found</td>
</tr>
<tr>
<td>110</td>
<td>SSIDTBL address is 0</td>
</tr>
<tr>
<td>111</td>
<td>SSIDTBL eyecatch is invalid</td>
</tr>
<tr>
<td>112</td>
<td>Discover command timed out</td>
</tr>
<tr>
<td>113</td>
<td>CNTL eyecatch is invalid</td>
</tr>
<tr>
<td>114</td>
<td>SSID not found in any control unit</td>
</tr>
<tr>
<td>115</td>
<td>No control units were found</td>
</tr>
<tr>
<td>116</td>
<td>Bad command timeout specified</td>
</tr>
<tr>
<td>120</td>
<td>Error retrieving the REXX variables</td>
</tr>
<tr>
<td>124</td>
<td>Error setting the REXX variables</td>
</tr>
<tr>
<td>125</td>
<td>Out of memory during SET VAR</td>
</tr>
<tr>
<td>128</td>
<td>Error validating the REXX environment</td>
</tr>
<tr>
<td>132</td>
<td>Command parse error. See EMCSRDF_DRDFRS for the reason code. EMCSRDF_DRDFRTN_MESSAGE will contain the message text.</td>
</tr>
<tr>
<td>136</td>
<td>Access denied</td>
</tr>
<tr>
<td>140</td>
<td>Invalid command length</td>
</tr>
<tr>
<td>144</td>
<td>DRDF failed to change the SRDF relationship. See EMCSRDF_DRDFRS for the reason code. EMCSRDF_DRDFRTN_MESSAGE will contain the message text.</td>
</tr>
<tr>
<td>148</td>
<td>DRDF commands to sync SRDF pairs failed. See EMCSRDF_DRDFRS for the reason code. EMCSRDF_DRDFRTN_MESSAGE will contain the message text.</td>
</tr>
</tbody>
</table>
Table 30 Return codes from EMCSRDFR (page 3 of 3)

<table>
<thead>
<tr>
<th>Return code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>152</td>
<td>DRDF API error. See EMCSRDF_DRDFRS for the reason code. EMCSRDF_DRDFRTN_MESSAGE will contain the message text.</td>
</tr>
<tr>
<td>156</td>
<td>z/OS device number not specified</td>
</tr>
<tr>
<td>160</td>
<td>Remote request not allowed</td>
</tr>
<tr>
<td>164</td>
<td>SCF maintenance level too low</td>
</tr>
<tr>
<td>168</td>
<td>CREATEPAIR NOCOPY flag prohibited by initialization parameters</td>
</tr>
<tr>
<td>172</td>
<td>Unknown error code</td>
</tr>
<tr>
<td>176</td>
<td>UCB/VOLSER/CUU not found¹</td>
</tr>
<tr>
<td>180</td>
<td>SCF not ready (in discovery)</td>
</tr>
<tr>
<td>184</td>
<td>SCF not available</td>
</tr>
<tr>
<td>188</td>
<td>Device table locked - Retry</td>
</tr>
<tr>
<td>192</td>
<td>PC routine abend</td>
</tr>
<tr>
<td>193</td>
<td>PC call to EMCPFR01 failed</td>
</tr>
<tr>
<td>194</td>
<td>PC FAILED BEFORE ARR SETUP</td>
</tr>
<tr>
<td>195</td>
<td>Soft-fenced device passed</td>
</tr>
<tr>
<td>196</td>
<td>Invalid action, FBA Enabled</td>
</tr>
</tbody>
</table>

a. Applications using EMCSRDFR may receive return code 176 instead of return code 108. Return code 108 is returned by the invoked PC routine. Since the error is detected earlier, EMCSRDFR will not call the PC routine and return code 176 will be returned.

Dynamic RDF reason codes

The following reason codes will be reflected in the REXX variable EMCSRDF_DRDFRS as shown in Table 31.

Table 31 Dynamic RDF (DRDF) reason codes (page 1 of 8)

<table>
<thead>
<tr>
<th>Reason code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Invalid multihop list specified</td>
</tr>
<tr>
<td>2</td>
<td>Invalid SRDF group specified</td>
</tr>
<tr>
<td>3</td>
<td>Dynamic SRDF not supported on local storage system</td>
</tr>
<tr>
<td>4</td>
<td>Dynamic SRDF not supported on remote storage system</td>
</tr>
<tr>
<td>5</td>
<td>Local devices invalid</td>
</tr>
<tr>
<td>6</td>
<td>Remote devices invalid</td>
</tr>
<tr>
<td>7</td>
<td>Local device not capable</td>
</tr>
<tr>
<td>8</td>
<td>Remote device not capable</td>
</tr>
</tbody>
</table>
### Table 31 Dynamic RDF (DRDF) reason codes (page 2 of 8)

<table>
<thead>
<tr>
<th>Reason code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Local device neither R1 nor R2</td>
</tr>
<tr>
<td>10</td>
<td>Remote device neither R1 nor R2</td>
</tr>
<tr>
<td>11</td>
<td>Local and remote devices both R1 or both R2</td>
</tr>
<tr>
<td>12</td>
<td>Swap with different size devices</td>
</tr>
<tr>
<td>13</td>
<td>Swap with local concurrent R1</td>
</tr>
<tr>
<td>14</td>
<td>Swap with remote concurrent R1</td>
</tr>
<tr>
<td>15</td>
<td>TF/SNAP lock on local device</td>
</tr>
<tr>
<td>16</td>
<td>TF/SNAP lock on remote device</td>
</tr>
<tr>
<td>17</td>
<td>Local devices in use by another process</td>
</tr>
<tr>
<td>18</td>
<td>Remote devices in use by another process</td>
</tr>
<tr>
<td>19</td>
<td>FBA meta discovery overflow</td>
</tr>
<tr>
<td>20</td>
<td>FBA meta devs call failed</td>
</tr>
<tr>
<td>21</td>
<td>Device count is zero</td>
</tr>
<tr>
<td>22</td>
<td>Device status call failed</td>
</tr>
<tr>
<td>23</td>
<td>SRDF pair is ready on the link</td>
</tr>
<tr>
<td>24</td>
<td>Local device has invalid tracks, force not specified</td>
</tr>
<tr>
<td>25</td>
<td>Remote device has invalid tracks, force not specified</td>
</tr>
<tr>
<td>26</td>
<td>FBA meta local device CB invalid</td>
</tr>
<tr>
<td>27</td>
<td>FBA meta remote device CB invalid</td>
</tr>
<tr>
<td>28</td>
<td>FBA meta invalid run</td>
</tr>
<tr>
<td>29</td>
<td>FBA meta members are different sizes</td>
</tr>
<tr>
<td>30</td>
<td>FBA meta head not in run</td>
</tr>
<tr>
<td>31</td>
<td>FBA meta mismatched members</td>
</tr>
<tr>
<td>32</td>
<td>FBA meta stripe size mismatch</td>
</tr>
<tr>
<td>33</td>
<td>FBA meta too many runs generated</td>
</tr>
<tr>
<td>34</td>
<td>FBA meta CB is invalid</td>
</tr>
<tr>
<td>35</td>
<td>FBA meta member has invalid tracks, force not specified</td>
</tr>
<tr>
<td>36</td>
<td>Logic error</td>
</tr>
<tr>
<td>37</td>
<td>R2 is already SRDF</td>
</tr>
<tr>
<td>38</td>
<td>R1 is already SRDF and dynamic concurrent not supported</td>
</tr>
<tr>
<td>39</td>
<td>R1 is already SRDF in specified group</td>
</tr>
<tr>
<td>40</td>
<td>R1 is already concurrent SRDF</td>
</tr>
<tr>
<td>41</td>
<td>Local device not capable of becoming specified type</td>
</tr>
</tbody>
</table>
Table 31 Dynamic RDF (DRDF) reason codes (page 3 of 8)

<table>
<thead>
<tr>
<th>Reason code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>42</td>
<td>Remote device not capable of becoming specified type</td>
</tr>
<tr>
<td>43</td>
<td>Mismatched emulation</td>
</tr>
<tr>
<td>44</td>
<td>R2 cannot be larger than R1</td>
</tr>
<tr>
<td>45</td>
<td>All mirror positions in use for local device</td>
</tr>
<tr>
<td>46</td>
<td>All mirror positions in use for remote device</td>
</tr>
<tr>
<td>47</td>
<td>Group not specified for concurrent device</td>
</tr>
<tr>
<td>48</td>
<td>RDF-SUSPEND parameter error in run</td>
</tr>
<tr>
<td>49</td>
<td>RDF-SUSPEND failed</td>
</tr>
<tr>
<td>50</td>
<td>Remote serial# invalid</td>
</tr>
<tr>
<td>51</td>
<td>Device range is too large</td>
</tr>
<tr>
<td>52</td>
<td>Device number is invalid</td>
</tr>
<tr>
<td>53</td>
<td>Action failed for device</td>
</tr>
<tr>
<td>54</td>
<td>SRDF pair not suspended</td>
</tr>
<tr>
<td>55</td>
<td>Bad SRDF group specified</td>
</tr>
<tr>
<td>56</td>
<td>Device already SRDF</td>
</tr>
<tr>
<td>57</td>
<td>SRDF polarity error</td>
</tr>
<tr>
<td>59</td>
<td>Devices not dynamic</td>
</tr>
<tr>
<td>60</td>
<td>Undo action failed</td>
</tr>
<tr>
<td>61</td>
<td>Operating environment level too low</td>
</tr>
<tr>
<td>62</td>
<td>DYNRDF internal error</td>
</tr>
<tr>
<td>63</td>
<td>Concurrent SRDF devs found</td>
</tr>
<tr>
<td>64</td>
<td>Farpoint not allowed</td>
</tr>
<tr>
<td>65</td>
<td>Invalid flags requested</td>
</tr>
<tr>
<td>66</td>
<td>Device held for TF SNAP</td>
</tr>
<tr>
<td>67</td>
<td>Invalid multi-execute mask</td>
</tr>
<tr>
<td>68</td>
<td>Split CE+DE not allowed</td>
</tr>
<tr>
<td>69</td>
<td>PPRC copy direction not set</td>
</tr>
<tr>
<td>70</td>
<td>Pair mismatch</td>
</tr>
<tr>
<td>71</td>
<td>DRDF RAID_S not supported</td>
</tr>
<tr>
<td>72</td>
<td>PPRC reestablish no R1</td>
</tr>
<tr>
<td>73</td>
<td>PPRC R1 not TNR</td>
</tr>
<tr>
<td>74</td>
<td>Vault device cannot be R2</td>
</tr>
<tr>
<td>75</td>
<td>Config mismatch</td>
</tr>
</tbody>
</table>
### Table 31  Dynamic RDF (DRDF) reason codes (page 4 of 8)

<table>
<thead>
<tr>
<th>Reason code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>76</td>
<td>FBA meta mismatch</td>
</tr>
<tr>
<td>77</td>
<td>Duplicate device specification</td>
</tr>
<tr>
<td>78</td>
<td>Swap R2 is larger than R1</td>
</tr>
<tr>
<td>79</td>
<td>SYMPMPURGE active on device</td>
</tr>
<tr>
<td>80</td>
<td>Cannot swap PPRC devices</td>
</tr>
<tr>
<td>81</td>
<td>Device in consistency group</td>
</tr>
<tr>
<td>82</td>
<td>Already concurrent SRDF</td>
</tr>
<tr>
<td>83</td>
<td>SRDF mirror exists in group</td>
</tr>
<tr>
<td>84</td>
<td>SRDF flags mismatch</td>
</tr>
<tr>
<td>85</td>
<td>R2 already SRDF</td>
</tr>
<tr>
<td>86</td>
<td>Already SRDF device</td>
</tr>
<tr>
<td>87</td>
<td>Swap not allowed in SRDF group</td>
</tr>
<tr>
<td>88</td>
<td>Swap with write pendings</td>
</tr>
<tr>
<td>89</td>
<td>Tolerance or CEXMPT not set</td>
</tr>
<tr>
<td>90</td>
<td>SRDF/A mixed SRDF devices</td>
</tr>
<tr>
<td>91</td>
<td>No PPRC with SRDF/A</td>
</tr>
<tr>
<td>92</td>
<td>No concurrent SRDF/A mirrors</td>
</tr>
<tr>
<td>93</td>
<td>SRDF/A activation lock held</td>
</tr>
<tr>
<td>94</td>
<td>DEVICE is XRC</td>
</tr>
<tr>
<td>95</td>
<td>SRDF/A I/Os outstanding</td>
</tr>
<tr>
<td>96</td>
<td>R2 restore not complete</td>
</tr>
<tr>
<td>97</td>
<td>Cleanup running</td>
</tr>
<tr>
<td>98</td>
<td>No concurrent DRDF on BCV</td>
</tr>
<tr>
<td>99</td>
<td>SRDF/A state table locked</td>
</tr>
<tr>
<td>100</td>
<td>DEV# too high for RA</td>
</tr>
<tr>
<td>101</td>
<td>Group is Star mode</td>
</tr>
<tr>
<td>102</td>
<td>CKD meta mirror mask conflict</td>
</tr>
<tr>
<td>103</td>
<td>Inconsistent syscall run</td>
</tr>
<tr>
<td>104</td>
<td>R21 device will result but ADCOPY_DISK not specified</td>
</tr>
<tr>
<td>105</td>
<td>R21 dev will result but Cascaded SRDF not licensed</td>
</tr>
<tr>
<td>106</td>
<td>MOVEPAIR denied, SRDF/A active on target SRDF group</td>
</tr>
<tr>
<td>107</td>
<td>Invalid failover</td>
</tr>
<tr>
<td>108</td>
<td>Invalid PPRC reestablish</td>
</tr>
<tr>
<td>Reason code</td>
<td>Description</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>109</td>
<td>Invalid PPRC failback</td>
</tr>
<tr>
<td>110</td>
<td>No PPRC failover/failback</td>
</tr>
<tr>
<td>111</td>
<td>BCV with three mirrors</td>
</tr>
<tr>
<td>112</td>
<td>SRDF/A multiple CPGs</td>
</tr>
<tr>
<td>113</td>
<td>Flags invalid for cascading</td>
</tr>
<tr>
<td>114</td>
<td>Cascading invalid with ESCON</td>
</tr>
<tr>
<td>115</td>
<td>No cascaded PPRC devices</td>
</tr>
<tr>
<td>116</td>
<td>Invalid cascaded R1 mode</td>
</tr>
<tr>
<td>118</td>
<td>R21 device not valid for ESCON</td>
</tr>
<tr>
<td>119</td>
<td>R21 device cannot be PPRC</td>
</tr>
<tr>
<td>120</td>
<td>R21 dev will result, not ADCOPY-DISK mode</td>
</tr>
<tr>
<td>121</td>
<td>R22 dev will result, R22 devices not supported</td>
</tr>
<tr>
<td>122</td>
<td>Device in pair already has remote mirror in pair</td>
</tr>
<tr>
<td>123</td>
<td>Action denied, target group not online</td>
</tr>
<tr>
<td>124</td>
<td>SRDF group not defined</td>
</tr>
<tr>
<td>125</td>
<td>Differential specified but group not Star recovery</td>
</tr>
<tr>
<td>126</td>
<td>Cannot ascertain SRDF/A group status</td>
</tr>
<tr>
<td>127</td>
<td>R21 device will result, not supported</td>
</tr>
<tr>
<td>128</td>
<td>R21 not allowed &lt;5x73</td>
</tr>
<tr>
<td>129</td>
<td>R22 not allowed &lt;5x74</td>
</tr>
<tr>
<td>130</td>
<td>R22 not allowed, different base R1 devices</td>
</tr>
<tr>
<td>131</td>
<td>Partner of R1 not cascaded</td>
</tr>
<tr>
<td>132</td>
<td>R1 and R2 on same storage system</td>
</tr>
<tr>
<td>133</td>
<td>No table memory</td>
</tr>
<tr>
<td>134</td>
<td>Unable to set environment 2 devices</td>
</tr>
<tr>
<td>135</td>
<td>Local device not R1 as required</td>
</tr>
<tr>
<td>136</td>
<td>Suspend failed during CASSUSP</td>
</tr>
<tr>
<td>137</td>
<td>Resume failed during CASRSUM</td>
</tr>
<tr>
<td>138</td>
<td>Local device not R2 as required</td>
</tr>
<tr>
<td>165</td>
<td>Unrecognized VID</td>
</tr>
<tr>
<td>201</td>
<td>Other process lock query failed</td>
</tr>
<tr>
<td>202</td>
<td>TF/SNAP lock query failed</td>
</tr>
<tr>
<td>203</td>
<td>TF/SNAP lock free failed</td>
</tr>
</tbody>
</table>
### Table 31 Dynamic RDF (DRDF) reason codes (page 6 of 8)

<table>
<thead>
<tr>
<th>Reason code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>299</td>
<td>Syscall error</td>
</tr>
<tr>
<td>300</td>
<td>Invalid local device in range</td>
</tr>
<tr>
<td>301</td>
<td>Invalid remote device in range</td>
</tr>
<tr>
<td>302</td>
<td>Specified group does not match existing SRDF mirrors</td>
</tr>
<tr>
<td>303</td>
<td>Starting dev# for range is beyond CNTLUNIT boundary</td>
</tr>
<tr>
<td>304</td>
<td>Ending dev# for range is beyond CNTLUNIT boundary</td>
</tr>
<tr>
<td>305</td>
<td>Error checking device status</td>
</tr>
<tr>
<td>306</td>
<td>Device did not change to expected state</td>
</tr>
<tr>
<td>307</td>
<td>Existing SRDF mirror not TNR</td>
</tr>
<tr>
<td>308</td>
<td>Device range too high for config</td>
</tr>
<tr>
<td>310</td>
<td>Local device Has Active TimeFinder dataset snap</td>
</tr>
<tr>
<td>311</td>
<td>Remote device has active TimeFinder dataset snap</td>
</tr>
<tr>
<td>312</td>
<td>Number of SRDF groups exceeds max</td>
</tr>
<tr>
<td>313</td>
<td>Unable to determine remote group</td>
</tr>
<tr>
<td>314</td>
<td>CREATEPAIR with KEEP2, R2 not TNR</td>
</tr>
<tr>
<td>315</td>
<td>Device in use by LDMF</td>
</tr>
<tr>
<td>316</td>
<td>Group not Star, NOCOPY init parameter not YES</td>
</tr>
<tr>
<td>317</td>
<td>Path invalid or link down</td>
</tr>
<tr>
<td>318</td>
<td>CREATEPAIR with R2 smaller than R1</td>
</tr>
<tr>
<td>319</td>
<td>No R11 identified as source for R22 (neither of allowed configurations)</td>
</tr>
<tr>
<td>320</td>
<td>Invalid topology for creating R22 (attempt using SWAP)</td>
</tr>
<tr>
<td>321</td>
<td>Device not blocked</td>
</tr>
<tr>
<td>322</td>
<td>R22 mirror partners are mirrors on same R11</td>
</tr>
<tr>
<td>323</td>
<td>CREATEPAIR, SWAP, DELETEPAIR requested for a diskless device</td>
</tr>
<tr>
<td>324</td>
<td>CASCRE requested with R1 or R2 diskless</td>
</tr>
<tr>
<td>325</td>
<td>CREATEPAIR requested with R1 and R2 both diskless</td>
</tr>
<tr>
<td>326</td>
<td>MOVEPAIR source or target group not defined</td>
</tr>
<tr>
<td>327</td>
<td>MOVEPAIR remote SRDF groups on different storage systems</td>
</tr>
<tr>
<td>328</td>
<td>MOVEPAIR local or remote storage system not 5x73 or later</td>
</tr>
<tr>
<td>329</td>
<td>CREATEPAIR denied, SRDF/A active on specified SRDF group</td>
</tr>
</tbody>
</table>
### Table 31 Dynamic RDF (DRDF) reason codes (page 7 of 8)

<table>
<thead>
<tr>
<th>Reason code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>330</td>
<td>R22 device not validated, cannot be activated</td>
</tr>
<tr>
<td>331</td>
<td>Inline error</td>
</tr>
<tr>
<td>332</td>
<td>API caller error - return area too small</td>
</tr>
<tr>
<td>333</td>
<td>CASxxxx Env1-Env2 R21 eligible devices mismatch</td>
</tr>
<tr>
<td>334</td>
<td>R21 remote mirrors on same storage system</td>
</tr>
<tr>
<td>335</td>
<td>MOVEPAIR source and target groups the same</td>
</tr>
<tr>
<td>336</td>
<td>CASCRE device to be R21 has remote mirror</td>
</tr>
<tr>
<td>337</td>
<td>CREATEPAIR, NOCOPY/DIFFERENTIAL mutually exclusive</td>
</tr>
<tr>
<td>338</td>
<td>MOVEPAIR device has remote mirror in target group</td>
</tr>
<tr>
<td>339</td>
<td>Attempt to mix diskless/non-diskless devices in SRDF/A</td>
</tr>
<tr>
<td>340</td>
<td>Operator verification denied, required for action</td>
</tr>
<tr>
<td>341</td>
<td>Remote storage system mismatch, SCF refresh required</td>
</tr>
<tr>
<td>342</td>
<td>Cannot have two SRDF relationships between same devices</td>
</tr>
<tr>
<td>343</td>
<td>R2 device is write-enabled</td>
</tr>
<tr>
<td>344</td>
<td>No eligible devices found</td>
</tr>
<tr>
<td>345</td>
<td>Half action not allowed on SRDF/A group</td>
</tr>
<tr>
<td>346</td>
<td>CREATEPAIR invalid remote range break</td>
</tr>
<tr>
<td>347</td>
<td>SRDF/A on multiple remote mirrors</td>
</tr>
<tr>
<td>348</td>
<td>DELETEPAIR attempted while SRDF/A cleanup running</td>
</tr>
<tr>
<td>349</td>
<td>Group Star recovery but STAR option not specified</td>
</tr>
<tr>
<td>350</td>
<td>All local mirrors have invalid tracks</td>
</tr>
<tr>
<td>351</td>
<td>R1 invalid tracks on R2 remote partner</td>
</tr>
<tr>
<td>354</td>
<td>Cache partition group mismatch</td>
</tr>
<tr>
<td>355</td>
<td>Enginuity 5773 R22 support patch missing</td>
</tr>
<tr>
<td>356</td>
<td>Device is a RAID10 member, skipped</td>
</tr>
<tr>
<td>358</td>
<td>Local device skipped due to filter</td>
</tr>
<tr>
<td>362</td>
<td>Attempt to pair thin and thick devices</td>
</tr>
<tr>
<td>363</td>
<td>Attempt to pair unbound thin device</td>
</tr>
<tr>
<td>364</td>
<td>Attempt to pair backend thin device</td>
</tr>
<tr>
<td>365</td>
<td>MOVEPAIR to SRDF/A group has wrong polarity</td>
</tr>
<tr>
<td>366</td>
<td>CREATEPAIR into SRDF/A group has wrong polarity</td>
</tr>
<tr>
<td>367</td>
<td>R22SWITCH but R22 blocked on both mirrors</td>
</tr>
</tbody>
</table>
Table 31 Dynamic RDF (DRDF) reason codes (page 8 of 8)

<table>
<thead>
<tr>
<th>Reason code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>368</td>
<td>R22SWTCH(GRPONLY), R22 not blocked on mirror in specified SRDF group</td>
</tr>
<tr>
<td>369</td>
<td>Attempt to pair FBA meta striped with FBA meta non-striped</td>
</tr>
<tr>
<td>371</td>
<td>Operating environment levels of storage systems do not support SRDF pairs between them</td>
</tr>
<tr>
<td>372</td>
<td>Operating environment levels of storage systems require a patch for SRDF pairs between them</td>
</tr>
<tr>
<td>373</td>
<td>The operating environment level does not support half actions</td>
</tr>
<tr>
<td>375</td>
<td>R2 device not ready, cannot be set R/W</td>
</tr>
<tr>
<td>999</td>
<td>FC21 abend ESTAE recovery</td>
</tr>
</tbody>
</table>
Sample programs

The sample programs illustrate how to set up and call the SRDF Host Component REXX API. With the API, you can retrieve data objects for report or interrogation purposes and submit SRDF Host Component commands.

Before you can use the SRDF Host Component REXX API samples, you must copy them to the appropriate runtime datasets.

- Copy the following sample REXX EXECs to the ResourcePak Base ISPELIB: APIC, APIR, APIV, CALLAPIC, CALLAPID, CALLAPIR, CALLAPIV, and APITEST.

- Copy the following sample panels to the ResourcePak Base ISPPLIB: APIDP, APITP, and HAPIR.

- Optionally, the CLIST members can be copied to the user's PDS as defined by the SYSEXEC DD statement in the LOGON procedure.

**Note:** The CLIST and JCL members listed in Table 32 require site-specific tailoring. You will need to provide information such as the SRDF Host Component command prefix, the SRDF Host Component loadlib that contains EMCSRDRFR, the SCF prefix, and possibly others.

The CLIST members are actually short REXX setup programs which are used to invoke the sample programs. Each CLIST and JCL has its own unique requirements. The samples are documented in the members themselves.

Table 32 lists and briefly describes the sample programs. These examples can be found in the installed SAMPLIB. These samples provide code which illustrates how to use each function and how to process the data returned from each function.

**Table 32** Sample programs (page 1 of 2)

<table>
<thead>
<tr>
<th>Program</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>APIC</td>
<td>A sample CLIST which invokes CALLAPIC.</td>
</tr>
<tr>
<td>APID</td>
<td>A sample CLIST that invokes CALLAPID.</td>
</tr>
<tr>
<td>APIDP</td>
<td>A sample panel used to produce the input to CALLAPID.</td>
</tr>
<tr>
<td>APIR</td>
<td>A sample CLIST that invokes CALLAPIR.</td>
</tr>
<tr>
<td>APITEST</td>
<td>A sample program that uses the SRDF Host Component REXX API to illustrate how to build a user interface.</td>
</tr>
<tr>
<td>APITP</td>
<td>A sample panel used to produce the input to CALLAPIR.</td>
</tr>
<tr>
<td>APIV</td>
<td>A sample CLIST that invokes CALLAPIV.</td>
</tr>
<tr>
<td>APIVJ</td>
<td>A sample JCL member that invokes CALLAPIV.</td>
</tr>
<tr>
<td>CALLAPIC</td>
<td>A sample program which calls APITEST and uses Function 2 to submit a command and Function 18 to respond to a command prompt.</td>
</tr>
<tr>
<td>CALLAPID</td>
<td>A sample program that calls APITEST and uses the raw unformatted data to produce a custom object display command.</td>
</tr>
<tr>
<td>CALLAPIR</td>
<td>A sample program that calls APITEST and uses the raw unformatted data to produce the required results.</td>
</tr>
<tr>
<td>Program</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
</tr>
<tr>
<td>CALLAPIV</td>
<td>A sample program that builds a custom display command. This REXX can run online or batch.</td>
</tr>
<tr>
<td>EHCJAPIS</td>
<td>Sample JCL to invoke EHCXSEL.</td>
</tr>
<tr>
<td>EHCJSFxx</td>
<td>JCL to execute the EHCXSF## sample programs.</td>
</tr>
<tr>
<td>EHCJXCFG</td>
<td>Sample JCL to invoke EHCXSCFG.</td>
</tr>
<tr>
<td>EHCJXCFG</td>
<td>Help panel for EHCPSEL.</td>
</tr>
<tr>
<td>EHCJXF19</td>
<td>Invokes EHCXSF19 in batch mode.</td>
</tr>
<tr>
<td>EHCPSEL</td>
<td>A sample panel used to produce the input to EHCXSEL.</td>
</tr>
<tr>
<td>EHCXCSEL</td>
<td>A sample REXX CLIST used to invoke EHCXSEL.</td>
</tr>
<tr>
<td>EHCXSCFG</td>
<td>A sample program that shows how to build an auto configurator.</td>
</tr>
<tr>
<td>EHCXSEL</td>
<td>A sample REXX program to build a custom select command for display. It takes as input a statement to parse and calls EMCSRDFR to retrieve device records. The records are filtered based on the supplied criterion and displayed. This sample can be invoked using a panel, JCL, or directly.</td>
</tr>
<tr>
<td>EHCXSF01</td>
<td>Sample program to execute Function 01.</td>
</tr>
<tr>
<td>EHCXSF02</td>
<td>Sample program to execute Function 02.</td>
</tr>
<tr>
<td>EHCXSF06</td>
<td>Sample program to execute Function 06.</td>
</tr>
<tr>
<td>EHCXSF07</td>
<td>Sample program to execute Function 07.</td>
</tr>
<tr>
<td>EHCXSF08</td>
<td>Sample program to execute Function 08.</td>
</tr>
<tr>
<td>EHCXSF09</td>
<td>Sample program to execute Function 09.</td>
</tr>
<tr>
<td>EHCXSF10</td>
<td>Sample program to execute Function 10.</td>
</tr>
<tr>
<td>EHCXSF11</td>
<td>Sample program to execute Function 11.</td>
</tr>
<tr>
<td>EHCXSF12</td>
<td>Sample program to execute Function 12.</td>
</tr>
<tr>
<td>EHCXSF14</td>
<td>Sample program to execute Function 14.</td>
</tr>
<tr>
<td>EHCXSF15</td>
<td>Sample program to execute Function 15.</td>
</tr>
<tr>
<td>EHCXSF17</td>
<td>Sample program to execute Function 17.</td>
</tr>
<tr>
<td>EHCXSF19</td>
<td>Sample program to execute Function 19.</td>
</tr>
<tr>
<td>EHCXSF20</td>
<td>Sample program to execute Function 20.</td>
</tr>
<tr>
<td>EHCXSF22</td>
<td>Sample program to execute Function 22.</td>
</tr>
<tr>
<td>EHCXSF23</td>
<td>Sample program to execute Function 23.</td>
</tr>
<tr>
<td>EHCXSF26</td>
<td>Sample program to execute Function 26.</td>
</tr>
<tr>
<td>EHCXSF27</td>
<td>Sample program to execute Function 27.</td>
</tr>
<tr>
<td>HAPIR</td>
<td>The help panel for APIR.</td>
</tr>
</tbody>
</table>
Object reference

Overview

The REXX interface provides access to SRDF Host Component variables returned as string data called objects. The interface can process SRDF Host Component commands and replies. The ready-to-use APITEST application illustrates example command usage. The REXX code to interpret the returned object can be found in the OBJECT## members.

Use the 0 variable to determine how many records were generated. The value in this field is used to determine the number of the records in the stem as follows:

```
EMCSRDF_object_name.0
EMCSRDF_object_name.#
```

*object_name* is the object name and # is each instance of the object in the stem.

You can use the object interpretation code to format your own variables using these records.

You can use the object interpretation members (OBJECTXX) in the product SAMPLIB in conjunction with this cross-reference to build custom applications.

The following sections in this chapter list the offset within the returned object along with the length of the field, the type of field (C=character, X=binary), and a brief description of the field.

**Function ALL, Object name: HEADER**

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8</td>
<td>C</td>
<td>Object ID</td>
</tr>
<tr>
<td>9</td>
<td>2</td>
<td>C</td>
<td>Function code</td>
</tr>
<tr>
<td>11</td>
<td>2</td>
<td>X</td>
<td>Version</td>
</tr>
<tr>
<td>13</td>
<td>2</td>
<td>X</td>
<td>Header length</td>
</tr>
<tr>
<td>15</td>
<td>2</td>
<td>X</td>
<td>Object length</td>
</tr>
<tr>
<td>17</td>
<td>16</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td>32</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td></td>
<td></td>
<td>Object length</td>
</tr>
</tbody>
</table>
Function 01, Object name: SUBSYS

Table 34  Function 01, Object name: SUBSYS

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>C</td>
<td>Subsystem name</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>C</td>
<td>Command characters</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
<td>X</td>
<td>SRDF Host Component version (vvrrmm)</td>
</tr>
<tr>
<td>10</td>
<td>8</td>
<td>C</td>
<td>8-character command prefix</td>
</tr>
<tr>
<td>18</td>
<td>7</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td>24</td>
<td></td>
<td></td>
<td>Object length</td>
</tr>
</tbody>
</table>

Function 06, Object name: GLOBAL

Table 35  Function 06, Object name: GLOBAL (page 1 of 2)

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>SRDF Host Component version (vvrrmm)</td>
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<td>API version (vvrrmm)</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>X</td>
<td>Message processing table size</td>
</tr>
<tr>
<td>9</td>
<td>2</td>
<td>X</td>
<td>Max query</td>
</tr>
<tr>
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<td>2</td>
<td>X</td>
<td>Maxcmdq</td>
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<td>C</td>
<td>Subsystem name</td>
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<td>2</td>
<td>X</td>
<td>Reserved</td>
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<td>19</td>
<td>8</td>
<td>C</td>
<td>SAF class name</td>
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<td>27</td>
<td>44</td>
<td>C</td>
<td>SAF resource name</td>
</tr>
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<td>71</td>
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<td>X</td>
<td>Config security level</td>
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<td>1-SAF</td>
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<td></td>
<td></td>
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<td>3-MASTER</td>
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<td></td>
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<td>4-SAF,MASTER</td>
</tr>
<tr>
<td>72</td>
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<td>X</td>
<td>Query security level</td>
</tr>
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<td></td>
<td></td>
<td>1-SAF</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2-ANY</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3-MASTER</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4-SAF,MASTER</td>
</tr>
<tr>
<td>73</td>
<td>1</td>
<td>C</td>
<td>Extended SAF flag (Y</td>
</tr>
<tr>
<td>74</td>
<td>1</td>
<td>X</td>
<td>Current synch direction</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0-NONE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1-R1&gt;R2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2-R1&lt;R2</td>
</tr>
</tbody>
</table>
### Table 35  Function 06, Object name: GLOBAL (page 2 of 2)

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
</table>
| 75     | 1      | X    | Allowed synch direction  
|        |        |      | 0-NONE  
|        |        |      | 1-R1>R2  
|        |        |      | 2-R1<R2  
|        |        |      | 3-R1<>R2 |
| 76     | 1      | C    | Message processing (Y|N|L)  
|        |        |      | **Note:** L stands for Log. |
| 77     | 1      | C    | Operator verify  
|        |        |      | A-ALL  
|        |        |      | N-NO  
|        |        |      | C-CRITICAL |
| 78     | 1      | C    | Config FBA (Y|N) |
| 79     | 1      | C    | Message labels  
|        |        |      | S-SYMM SERIAL#  
|        |        |      | M-MVS CUU  
|        |        |      | C-COMMAND#  
|        |        |      | N-NOT SPECIFIED |
| 80     | 1      | C    | Show command on EMCMN00I (Y/N) |
| 81     | 1      | C    | Abort command if subtask busy (Y/N) |
| 82     | 1      | C    | Command details (Y/N) |
| 83     | 1      | C    | Sort by  
|        |        |      | 0-DFLT (BY SYMDV#)  
|        |        |      | 1-SORT_BY_MVSCUU  
|        |        |      | 2-SORT_BY_VOLSER  
|        |        |      | 3-SORT_BY_COMMAND |
| 84     | 8      | C    | Command prefix characters |
| 92     | 1      | C    | Command prefix registered (Y/N) |
| 93     | 1      | C    | User command verification (Y/N) |
| 94     | 5      | C    | User command verify timeout MM:SS |
| 99     | 4      | C    | Maximum SRDF Host Component PTF |
| 103    | 4      | C    | Maximum SCF/API PTF |
| 107    | 1      | X    | 4BYTE ON/OFF  
|        |        |      | x'00'=4-byte device numbers off  
|        |        |      | x'80'=4-byte device numbers on |
| 108    | 3      | X    | Reserved |
| 110    |        |      | Object length |
Function 07, Object name: SERIAL

<table>
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<tr>
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<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>12</td>
<td>C</td>
<td>Storage system serial number</td>
</tr>
<tr>
<td>13</td>
<td>2</td>
<td>X</td>
<td>Major operating environment level</td>
</tr>
<tr>
<td>15</td>
<td>2</td>
<td>X</td>
<td>Minor operating environment level</td>
</tr>
</tbody>
</table>

Function 08, Object name: SSID

SSID Base: EMCSRDF_SSIDB#

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<th>Description</th>
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<tbody>
<tr>
<td>1</td>
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<td>X</td>
<td>SSID</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>X</td>
<td>Number of devices</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>X</td>
<td>SSID Flags</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>01 - 2105 CONTROLLER</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10 - PHY DEV# VALID</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20 - 3990 CONTROLLER</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>40 - 2107 CONTROLLER</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>80 - EMC CONTROLLER</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>X</td>
<td>SSID Flags2</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>02 - EMC SYM9</td>
</tr>
<tr>
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<td></td>
<td></td>
<td>04 - EMC SYM8</td>
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<tr>
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<td></td>
<td></td>
<td>08 - EMC SYM7</td>
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<tr>
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<td></td>
<td></td>
<td>10 - EMC SYM6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20 - EMC SYM5</td>
</tr>
<tr>
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<td></td>
<td></td>
<td>40 - EMC SYM4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>80 - EMC SYM3</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>X</td>
<td>z/OS device number of 1st device found</td>
</tr>
<tr>
<td>9</td>
<td>2</td>
<td>X</td>
<td>z/OS device number of last device found</td>
</tr>
<tr>
<td>11</td>
<td>2</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td>13</td>
<td>4</td>
<td>X</td>
<td>4-byte PowerMax/VMAX device number of first found</td>
</tr>
<tr>
<td>17</td>
<td>4</td>
<td>X</td>
<td>4-byte PowerMax/VMAX device number of last found</td>
</tr>
<tr>
<td>21</td>
<td>12</td>
<td>C</td>
<td>PowerMax/VMAX serial number</td>
</tr>
</tbody>
</table>

Table 36 Function 07, Object name: SERIAL

Table 37 Function 08, Object name: SSID, SSID Base: EMCSRDF_SSIDB#
SSID Information: EMCSRDF_SSIDI#

**Note:** A variable length object header precedes this data.

<table>
<thead>
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<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>X</td>
<td>z/OS CUU</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>X</td>
<td>PowerMax/VMAX device number</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>X</td>
<td>Channel address</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>X</td>
<td>LSS ID</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>X</td>
<td>Unit address</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td>Object Length</td>
</tr>
</tbody>
</table>

**Function 09, Object name: CNTLUNIT**

Base Control Unit Information: EMCSRDF_CNTLUNIT.#

<table>
<thead>
<tr>
<th>Offset</th>
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<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12</td>
<td>C</td>
<td>Serial number</td>
</tr>
<tr>
<td>13</td>
<td>4</td>
<td>X</td>
<td>Memory size in megabytes</td>
</tr>
<tr>
<td>17</td>
<td>2</td>
<td>X</td>
<td>Control unit type</td>
</tr>
<tr>
<td>19</td>
<td>2</td>
<td>X</td>
<td>Operating environment level (major)</td>
</tr>
<tr>
<td>21</td>
<td>2</td>
<td>X</td>
<td>Operating environment level (minor)</td>
</tr>
<tr>
<td>23</td>
<td>2</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td>25</td>
<td>2</td>
<td>X</td>
<td>Number of RAID groups</td>
</tr>
<tr>
<td>27</td>
<td>1</td>
<td>X</td>
<td>Flag byte</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>80-MAID SPIN DOWN</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Note: not supported in V7.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>08-MAID</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Note: not supported in V7.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>04-LINKS-DOMINO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>02-T3 (EXTENDED) LINK</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>01-DARE</td>
</tr>
<tr>
<td>28</td>
<td>1</td>
<td>X</td>
<td>Storage system type</td>
</tr>
</tbody>
</table>

80-MAID SPIN DOWN       Note: not supported in V7.2
08-MAID                  Note: not supported in V7.2
04-LINKS-DOMINO          
02-T3 (EXTENDED) LINK    
01-DARE
### Table 39  Function 09, Object name: CNTLUNIT, Base Control Unit Information: EMCSRDF_CNTLUNIT.#

<table>
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<th>Description</th>
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<tbody>
<tr>
<td>29</td>
<td>1</td>
<td>C</td>
<td>Synch direction</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0-NONE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1-R1&gt;R2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2-R1&lt;R2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4-GLOBAL</td>
</tr>
<tr>
<td>30</td>
<td>1</td>
<td>C</td>
<td>RAID 5 Configured Y/N</td>
</tr>
<tr>
<td>31</td>
<td>1</td>
<td>C</td>
<td>RAID 6 Configured Y/N</td>
</tr>
<tr>
<td>32</td>
<td>1</td>
<td>C</td>
<td>SRDF/A Supported Y/N</td>
</tr>
<tr>
<td>33</td>
<td>4</td>
<td>X</td>
<td>Number of volumes</td>
</tr>
<tr>
<td>37</td>
<td>5</td>
<td>C</td>
<td>Last 5 digits of the alpha serial number</td>
</tr>
<tr>
<td>42</td>
<td>1</td>
<td>C</td>
<td>Ficon accelerator enabled Y/N</td>
</tr>
<tr>
<td>43</td>
<td>1</td>
<td>C</td>
<td>ALL FLASH Supported Y/N</td>
</tr>
<tr>
<td>44</td>
<td>2</td>
<td>X</td>
<td>Reserved</td>
</tr>
</tbody>
</table>

Control Unit SSID List: EMCSRDF_CNTLUNIT#_SSID.#

**Note:** A variable length object header precedes this data.

### Table 40  Function 09, Object name: CNTLUNIT, Control Unit SSID List: EMCSRDF_CNTLUNIT#_SSID.#

<table>
<thead>
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<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>X</td>
<td>SSID</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>X</td>
<td>Reserved</td>
</tr>
</tbody>
</table>

| 4      |        |      | Object length |
Control Unit Director List: EMCSRDF_CNTLUNIT#_DIRLIST.# - VLOH

Note: A variable length object header precedes this data. The director type field is between the header and the variable data list. It is a 2-byte hex field.

Table 41  Function 09, Object name: CNTLUNIT, Control Unit Director List: EMCSRDF_CNTLUNIT#_DIRLIST.#

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<th>Description</th>
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<tbody>
<tr>
<td></td>
<td>2</td>
<td>X</td>
<td>Director type</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>03-CA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>04-EA</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>05-DA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>06-SA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>07-RA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>08-RA1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>09-RA2</td>
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<td>10-EF</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>11-SF</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>12-FIBRE GIGE (RA MODE)</td>
</tr>
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<td></td>
<td></td>
<td>13-RA FIBER</td>
</tr>
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<td></td>
<td>14-SAE</td>
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<td></td>
<td>15-FCOE</td>
</tr>
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<td></td>
<td>19-IM</td>
</tr>
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<td></td>
<td>20-ED</td>
</tr>
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<td></td>
<td></td>
<td>22-NVME</td>
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<td></td>
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<td></td>
<td>BLANK-UNUSED DIRECTOR</td>
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<table>
<thead>
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<th>Length</th>
<th>Type</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>1</td>
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<td>X</td>
<td>Director number</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td>Object length</td>
</tr>
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</table>

Control Unit Group Base Information: EMCSRDF_CNTLUNIT#_GRP.#

Table 42  Function 09, Object name: CNTLUNIT, Control Unit Group Base Information: EMCSRDF_CNTLUNIT#_GRP.#

<table>
<thead>
<tr>
<th>Offset</th>
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<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>X</td>
<td>My group number</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>X</td>
<td>Other side group number</td>
</tr>
<tr>
<td>9</td>
<td>12</td>
<td>C</td>
<td>Other side serial number</td>
</tr>
<tr>
<td>21</td>
<td>10</td>
<td>C</td>
<td>Group name</td>
</tr>
<tr>
<td>31</td>
<td>1</td>
<td>X</td>
<td>Flag1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>80 - ONLINE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>40 - FIBER</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20 - ESCON</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>10 - IP</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>08 - SRDFA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>04 - DYNRDGP</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>02 - VALID</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>-----</td>
</tr>
</tbody>
</table>
| 32 | 1 | X | Flag2 - Sync direction  
|    |   |   | 80 - R1>R2  
|    |   |   | 40 - R1<R2  
|    |   |   | 20 - NONE  
|    |   |   | 10 - CNTL  
|    |   |   | 00 - GLOBAL  
| 33 | 1 | X | Flag3 - RDFGRPE FLAG2  
|    |   |   | 80 - FARPOINT  
|    |   |   | 40 - FASTRAX  
|    |   |   | 20 - ESCON PRIMARY  
|    |   |   | 10 - SRDFA  
|    |   |   | 08 - NO AUTO LINK RCVRY  
|    |   |   | 04 - LINKS DOMINO  
|    |   |   | 02 - SRDFA LIMBO  
| 34 | 1 | X | Flag4 - RDFGRPE FLAG2  
|    |   |   | 80 - THIS ENTRY IS VALID  
|    |   |   | 40 - OFFLINE RDFGRP  
|    |   |   | 20 - DYNAMIC RDFGRP  
|    |   |   | 10 - GROUP IN SRDF/A LIMBO  
| 35 | 2 | X | Other side major release  
| 37 | 2 | X | Other side minor release  
| 38 |   |   | Object length  

Table 42 Function 09, Object name: CNTLUNIT, Control Unit Group Base Information: EMCSRDF_CNTLUNIT#_GRP#.
Control Unit Group Director List: EMCSRDF_CNTLUNIT#_GRP#_DIRLIST.# - VLOH

Note: A variable length object header precedes this data.

Table 43  Function 09, Object name: CNTLUNIT, Control Unit Group Director List: EMCSRDF_CNTLUNIT#_GRP#_DIRLIST.#

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<tr>
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<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>X</td>
<td>Director number</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td>Object length</td>
</tr>
</tbody>
</table>

Control Unit Group Other Side Director List: EMCSRDF_CNTLUNIT#_GRP#_DIRLISTOS.# - VLOH

Note: A variable length object header precedes this data.

Table 44  Function 09, Object name: CNTLUNIT, Control Unit Group Other Side Director List: EMCSRDF_CNTLUNIT#_GRP#_DIRLISTOS.#

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>X</td>
<td>Director number</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td>Object length</td>
</tr>
</tbody>
</table>

Control Unit Group Director Port List: EMCSRDF_CNTLUNIT#_GRP#_DIRLIST#_PORT.# - VLOH

Note: A variable length object header precedes this data.

Table 45  Function 09, Object name: Control Unit Group Director Port List: EMCSRDF_CNTLUNIT#_GRP#_DIRLIST#_PORT.#

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>X</td>
<td>Port number</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td>Object length</td>
</tr>
</tbody>
</table>
Control Unit Group Other Side Director Port List:
EMCSRDF_CNTLUNIT#_GRP#_DIRLISTOS#_PORT.# - VLOH

**Note:** A variable length object header precedes this data.

**Table 46** Function 09, Object name: CNTLUNIT, Control Unit Group Other Side Director Port List: EMCSRDF_CNTLUNIT#_GRP#_DIRLISTOS#_PORT.#

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>X</td>
<td>Port number</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td>Object length</td>
</tr>
</tbody>
</table>
Function 10, Object name: DEVICE

Device Record: EMCSRDF DEVICE.#

<table>
<thead>
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<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>X</td>
<td>UCB address</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Note:</strong> You can test this field to determine if the z/OS device number (at offset 45,2) is valid. If the field is 0, then there is no corresponding z/OS device.</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>X</td>
<td>Device flag byte 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>80-DEVICE ENTRY IS VALID</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10-UCB IS VALID</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>04-VALIDATE COMMAND ISSUED</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>02-REFRESH COMMAND ISSUED</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>01-RFR_RSUM COMMAND ISSUED</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>C</td>
<td>Volume Serial.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>For FBA devices, the following values are possible:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• <em>FBA</em>—FBA devices (that are not in an FBA meta group) on all systems with Enginuity 5771 and earlier.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• <em>F64</em>—FBA devices (that are not in an FBA meta group) on systems with Enginuity 5772 and later.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• <em>F128</em>—FBA devices with 128KB track size available on systems with PowerMaxOS 5978 or HYPERMAX OS 5977.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• <em>FBAM</em>—FBA meta head devices on all systems with Enginuity 5771 and earlier.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• <em>FBAM$</em>—FBA striped meta head devices on all systems with Enginuity 5771 and earlier.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• <em>F64M</em>—FBA meta head devices on all systems with Enginuity 5772 and later.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• <em>F64M$</em>—FBA striped meta head devices on all systems with Enginuity 5772 and later.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• <em>FBX</em>—FBA externally provisioned devices (that are not in an FBA meta group).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• <em>FBXM</em>—FBA meta externally provisioned devices.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• <em>FBE</em>—FBA encapsulated devices (that are not in an FBA meta group).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• <em>FBEM</em>—FBA meta encapsulated devices.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• <em>FBX$</em>—FBA externally provisioned devices - striped (that are not in an FBA meta group).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• <em>FBXM$</em>—FBA meta externally provisioned devices - striped.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>For XtremCache devices, the following values are possible:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• <em>L64</em>—XtremCache devices that are actively caching.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• <em>L64</em>—XtremCache devices that are not actively caching.</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>X</td>
<td>Device address on channel</td>
</tr>
<tr>
<td>13</td>
<td>4</td>
<td>X</td>
<td>Number of M1 invalids</td>
</tr>
<tr>
<td>Function</td>
<td>Object Reference</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>------------------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>4</td>
<td>X</td>
<td>Number of M2 invalids</td>
</tr>
<tr>
<td>21</td>
<td>4</td>
<td>X</td>
<td>Number of M3 invalids</td>
</tr>
<tr>
<td>25</td>
<td>4</td>
<td>X</td>
<td>Number of M4 invalids</td>
</tr>
<tr>
<td>29</td>
<td>4</td>
<td>X</td>
<td>Number of R1 invalid tracks</td>
</tr>
<tr>
<td>33</td>
<td>4</td>
<td>X</td>
<td>Number of R2 invalid tracks</td>
</tr>
<tr>
<td>37</td>
<td>4</td>
<td>X</td>
<td>Write-pending count</td>
</tr>
<tr>
<td>41</td>
<td>4</td>
<td>X</td>
<td>Max adcopy skew</td>
</tr>
<tr>
<td>45</td>
<td>2</td>
<td>X</td>
<td>z/OS device number</td>
</tr>
<tr>
<td>47</td>
<td>4</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td>51</td>
<td>2</td>
<td>X</td>
<td>Interface address of M1</td>
</tr>
<tr>
<td>53</td>
<td>2</td>
<td>X</td>
<td>Interface address of M2</td>
</tr>
<tr>
<td>55</td>
<td>2</td>
<td>X</td>
<td>Interface address of M3</td>
</tr>
<tr>
<td>57</td>
<td>2</td>
<td>X</td>
<td>Interface address of M4</td>
</tr>
</tbody>
</table>

**Note:** The format of the interface fields are as follows for Enginuity 5773 and earlier: DDXI - Where DD is the director number, X is C,D,E or F, and I is X'0'-X'F'. If M2 is not 0, the device is locally mirrored. For Enginuity 5874 or later, see the mirror records.

<table>
<thead>
<tr>
<th>Function</th>
<th>Object Reference</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>59</td>
<td>1</td>
<td>X</td>
</tr>
<tr>
<td>60</td>
<td>1</td>
<td>X</td>
</tr>
<tr>
<td>61</td>
<td>1</td>
<td>X</td>
</tr>
<tr>
<td>62</td>
<td>1</td>
<td>X</td>
</tr>
<tr>
<td>63</td>
<td>2</td>
<td>X</td>
</tr>
<tr>
<td>65</td>
<td>1</td>
<td>X</td>
</tr>
<tr>
<td>66</td>
<td>1</td>
<td>X</td>
</tr>
<tr>
<td>67</td>
<td>1</td>
<td>X</td>
</tr>
<tr>
<td>68</td>
<td>1</td>
<td>X</td>
</tr>
</tbody>
</table>
### Table 47 Function 10, Object name: DEVICE, Device Record: EMCSRDF_DEVICE.

<table>
<thead>
<tr>
<th>Function Value</th>
<th>Object flag</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>69</td>
<td>X</td>
<td>Mirror 1 - Disk flag 2</td>
</tr>
<tr>
<td>70</td>
<td>X</td>
<td>Mirror 2 - Disk flag 2</td>
</tr>
<tr>
<td>71</td>
<td>X</td>
<td>Mirror 3 - Disk flag 2</td>
</tr>
<tr>
<td>72</td>
<td>X</td>
<td>Mirror 4 - Disk flag 2</td>
</tr>
<tr>
<td>73</td>
<td>X</td>
<td>Mirror 1 - Disk flag 3</td>
</tr>
<tr>
<td>74</td>
<td>X</td>
<td>Mirror 2 - Disk flag 3</td>
</tr>
<tr>
<td>75</td>
<td>X</td>
<td>Mirror 3 - Disk flag 3</td>
</tr>
<tr>
<td>76</td>
<td>X</td>
<td>Mirror 4 - Disk flag 3</td>
</tr>
<tr>
<td>77</td>
<td></td>
<td>Reserved</td>
</tr>
<tr>
<td>78</td>
<td>X</td>
<td>Disk flag 7</td>
</tr>
<tr>
<td>79</td>
<td>X</td>
<td>Device status flag 1</td>
</tr>
</tbody>
</table>

**Note:** Storage systems running PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 57xx and later will report all mirror positions as CURRENTLY CONFIGURED for Virtual Devices.
<table>
<thead>
<tr>
<th>Code</th>
<th>Length</th>
<th>Tab</th>
<th>Description</th>
</tr>
</thead>
</table>
| 80   | 1      | X   | Device status flag 2  
|      |        |     |  80-M1 NOT READY      
|      |        |     |  40-M1 WR DISABLED    
|      |        |     |  20-M2 NOT READY      
|      |        |     |  10-M2 WR DISABLED    
|      |        |     |  08-M3 NOT READY      
|      |        |     |  04-M3 WR DISABLED    
|      |        |     |  02-M4 NOT READY      
|      |        |     |  01-M4 WR DISABLED    |
| 81   | 1      | X   | Device status flag 3  
|      |        |     |  20-RAID DEVICE       
|      |        |     |  02- If set, JOURNAL 1 MODE. If not set, JOURNAL 0 MODE. If the device is an R1 and JOURNAL 0 MODE, the device is SYNC. If the device is an R1 and JOURNAL 1 MODE, the device is SEMI-SYNC.  
|      |        |     |  01-RDF ITRK MODE    |
| 82   | 1      | X   | Device status flag 4  
|      |        |     |  80-BCV NR            
|      |        |     |  40-DEV IN CONGROUP   
|      |        |     |  20-SPIN UP W/DD      
|      |        |     |  08-FIXE SNAP DEV (SRC) 
|      |        |     |  04-FIXE SNAP DEV (TGT)
|      |        |     |  02-MIRROR NOT READY (USER) 
|      |        |     |  01-CGROUP NOT READY (TRIPPED) |
| 83   | 1      | X   | Device flag 2         
|      |        |     |  08-SOURCE NOT RDY    
|      |        |     |  04-TARGET NOT RDY    
|      |        |     |  02-SRC WR-DISABLED   
|      |        |     |  01-TGT WR-DISABLED   |
| 84   | 1      | X   | R2 state flags        
|      |        |     |  20-R2 IN R/W MODE    
|      |        |     |  10-R2 NRDY           |
| 85   | 1      | X   | FLAGR - RAID10 and meta flags  
|      |        |     |  80-RAID10 HEAD DEV   
|      |        |     |  40-RAID10 MEMBER DEV 
|      |        |     |  20-META HEAD DEV     
|      |        |     |  10-META MEMBER DEV   |
| 86   | 1      | X   | Miscellaneous device flags  
|      |        |     |  80-M1 IS SYNCH'D     
|      |        |     |  40-M2 IS SYNCH'D     
|      |        |     |  20-M3 IS SYNCH'D     
|      |        |     |  10-M4 IS SYNCH'D     
|      |        |     |  08-FILE SNAP DEV (SRC) 
|      |        |     |  04-FILE SNAP DEV (TGT) 
|      |        |     |  02-DEVICE IS IN A CONGROUP 
|      |        |     |  01-R1 DEVICE IS SYNCHRONIZED |
### Table 47  Function 10, Object name: DEVICE, Device Record: EMCSRDF_DEVICE.

<table>
<thead>
<tr>
<th>Code</th>
<th>Count</th>
<th>Status</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>87</td>
<td>1</td>
<td>X</td>
<td>Device status flag 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>80-WRITE &amp; VERIFY MODE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>40-BCV DEVICE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20-PREFETCH TAIL CUT DISABLE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10-PREFETCH MODE ENABLED</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>08-DISABLE SCSI TAG COMMAND</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>04-DISABLE AUTO BUFR RATIO ALGOR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>02-WRITE VERIFY COMPARE MODE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>01-DEVICE IN RAID GRP</td>
</tr>
<tr>
<td>88</td>
<td>1</td>
<td>X</td>
<td>Device status flag 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>80-HA NON-EXCLUSIVE ACCESS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>40-FILE SYSTEM DEVICE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20-ORACLE CHECKSUM DEV</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10-DYNAMIC R2 DEVICE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>08-DYNAMIC R1 DEVICE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>04-DATA STRIPING DEV</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>02-520 BYTES/BLOCK LOW-LVL FMT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>01-REAL TIME BEHAVIOR</td>
</tr>
<tr>
<td>89</td>
<td>1</td>
<td>X</td>
<td>Device flag 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20-OPERATING IN PPRC MODE</td>
</tr>
<tr>
<td>90</td>
<td>1</td>
<td>X</td>
<td>Device status flag 7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>80-BOUND THIN DEVICE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>40-THIN DEVICE (BACK END)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20-THIN DEVICE (FRONT END)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10-DISKLESS DEVICE release 74+</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>08-POWER VAULT DEVICE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>04-COVD DEVICE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>02-BACK-END STRIPED DEV</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>01-DUMMY DEVICE ENTRY</td>
</tr>
<tr>
<td>91</td>
<td>1</td>
<td>X</td>
<td>Config mist flag2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20-META HEAD DEVICE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10-META DEVICE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>08-ECA DEFINED</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>04-LOG DEVICE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>02-VIRTUAL DEVICE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>01-STRIPED CKD DEVICE</td>
</tr>
<tr>
<td>92</td>
<td>1</td>
<td>C</td>
<td>SRDFA Device (Y/N)</td>
</tr>
<tr>
<td>93</td>
<td>1</td>
<td>C</td>
<td>SRDFA Device Act (Y/N)</td>
</tr>
<tr>
<td>94</td>
<td>1</td>
<td>X</td>
<td>Device Status flag 11</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>40-Device expansion is ongoing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20-Device in SRDF/Metro mode</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10-Device in GCM mode</td>
</tr>
<tr>
<td>95</td>
<td>1</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td>96</td>
<td>4</td>
<td>X</td>
<td>SRDFA Device Slots Active</td>
</tr>
<tr>
<td>100</td>
<td>4</td>
<td>X</td>
<td>SRDFA Device Slots InActive</td>
</tr>
</tbody>
</table>
### Table 47  Function 10, Object name: DEVICE, Device Record: EMCSRDF_DEVICE.

<table>
<thead>
<tr>
<th>Function</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
</table>
| 104 | 1 | X | Device emulation code  
| | | | 40 - DEVICE IS FBA DEVICE  
| | | | 20 - DEVICE IS 3380 DEVICE  
| | | | 00 - DEVICE IS 3390 DEVICE  
| 105 | 1 | X | Reserved  
| 106 | 1 | X | RDF M1 FLAG2  
| 107 | 1 | X | Reserved  
| 108 | 1 | X | RDF M2 FLAG2  
| 109 | 1 | X | Reserved  
| 110 | 1 | X | RDF M3 FLAG2  
| 111 | 1 | X | Reserved  
| 112 | 1 | X | RDF M4 FLAG2  

**Note:** You must specifically request the SRDF Mirror Flag fields. See the input variable EMCSRDF_DEVFLAG for more information. The following definition is for the above FLAG2 fields: 04 - ConGroup is enabled.

<table>
<thead>
<tr>
<th>Function</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
</table>
| 113 | 4 | X | Number of cylinders  
| 117 | 4 | X | PowerMax/VMAX device number  
| 121 | 2 | X | Reserved - SVSS#  
| 123 | 1 | X | Reserved  
| 124 | 1 | X | MISCFLG  
| | | | 80-SPACE EFF FLASH  
| | | | 40-FTS device  
| | | | 20-FTS encapsulated device  
| | | | 10-Flexible geometry  
| | | | 08-Capacity limited  
| | | | 04-VFCache attached device  
| | | | 02-VFCache device caching  
| 125 | 4 | X | Reserved - SVLG#  
| 129 | 4 | X | RAID10 Member #1 device number  
| 133 | 4 | X | RAID10 Member #2 device number  
| 137 | 4 | X | RAID10 Member #3 device number  
| 141 | 4 | X | RAID10 Member #4 device number  

---

**Note:**
### Table 47  Function 10, Object name: DEVICE, Device Record: EMCSRDF_DEVICE.#

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
</table>
| 145    | 1      | X    | Miscellaneous device flag2 DEVSCMF2  
|        |        |      | 80-CONSISTENT ASSIST IS ACTIVE  
|        |        |      | 40-META HEAD  
|        |        |      | 20-META DEVICE  
|        |        |      | 10-Reserved  
|        |        |      | 08-Multiple protection types  
|        |        |      | 04-FAST MIRROR DEVICE  
|        |        |      | 02-USER NR  
|        |        |      | 01-WRITE PROTECT IS ACTIVE  |
| 146    | 1      | X    | CEXEMPT - mirror mask  
|        |        |      | 80-MIRROR 1  
|        |        |      | 40-MIRROR 2  
|        |        |      | 20-MIRROR 3  
|        |        |      | 10-MIRROR 4  |
| 147    | 2      | X    | SSID  |
| 149    | 1      | X    | Channel address  |
| 150    | 1      | X    | LSSID  

**Note:** LSSID and Unit Address make up the complete LSSID.

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>151</td>
<td>1</td>
<td>X</td>
<td>Unit address</td>
</tr>
<tr>
<td>152</td>
<td>4</td>
<td>X</td>
<td>SVSTD</td>
</tr>
<tr>
<td>156</td>
<td>4</td>
<td>X</td>
<td>Reserved</td>
</tr>
</tbody>
</table>

### Local Mirror Base Record - RAID: EMCSRDF_DEVICE#_LMIRB#

#### Table 48  Function 10, Object name: DEVICE, Local Mirror Base Record - RAID: EMCSRDF_DEVICE#_LMIRB#

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
</table>
| 1      | 2      | C    | Mirror MR value  
|        |        |      | PL - Protected locally  |
| 3      | 1      | X    | Mirror type flag  
|        |        |      | 80-Some type of RAID  |
| 4      | 1      | X    | Mirror position 1-4  |
| 5      | 1      | X    | RAID type  
|        |        |      | 00-RAID 0  
|        |        |      | 01-RAID 1  
|        |        |      | 05-RAID 5  
<p>|        |        |      | 06-RAID 6  |</p>
<table>
<thead>
<tr>
<th>Column</th>
<th>Data Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>1</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RAID device ready state</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N-NOT READY</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1-DEGRADED MODE 1 DEV RDY 1 MBR NRDY, SPARE NRDY</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-DEGRADED MODE 2 DEV RDY, 1 MBR NRDY, SPARE RDY</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R-DEVICE READY DEV RDY, MBRS RDY, SPARE NRDY</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S-DEV &amp; SPARE READY DEV RDY, MBRS RDY, SPARE RDY</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RAID device read write state</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D-DEV WRT DISABLED SPARE WRT DISABLED</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1-DEV WR ENABLED ONE MBR WR DISABLED</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-DEV WR ENABLED 1 MBR WR DISABLED SPARE WR ENABLED</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E-DEVICE AND MEMBERS WR ENABLED SPARE WR DISABLED</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S-DEVICE, MEMBERS</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spare info valid (Y/N)</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spare invoked (Y/N)</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MBR number of device for which spare invoked (0-7)</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MIR number of device for which spare invoked (0-3)</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MIR number of spare (0-3)</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Director for spare</td>
</tr>
<tr>
<td>14</td>
<td>1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Copy direction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 - Copy to spare</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 - Copy from spare</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MEM# failing dev - FF if no failing dev</td>
</tr>
<tr>
<td>16</td>
<td>1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MIR# for RAID5 device</td>
</tr>
<tr>
<td>17</td>
<td>1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MIR# HLD for RAID5 DEV</td>
</tr>
<tr>
<td>18</td>
<td>2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stripe width</td>
</tr>
<tr>
<td>20</td>
<td>4</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PowerMax/VMAX device number</td>
</tr>
<tr>
<td>24</td>
<td>4</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RAID group number Enginuity 5874 or later</td>
</tr>
<tr>
<td>28</td>
<td>1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Primary mirror mask Enginuity 5874 or later</td>
</tr>
<tr>
<td>29</td>
<td>1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of parity devices</td>
</tr>
<tr>
<td></td>
<td>29</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Object length</td>
</tr>
</tbody>
</table>
Local Mirror Information Record - RAID: EMCSRDFDEVICE#_LMIRI# - VLOH

Note: A variable length object header precedes this data.

Table 49 Function 10, Object name: DEVICE, Local Mirror Information Record - RAID: EMCSRDFDEVICE#_LMIRI# - VLOH

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
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<th>Description</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>C</td>
<td>Member ready</td>
<td>(Y/N)</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>C</td>
<td>RAID 5 spare ready</td>
<td>(Y/N)</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>C</td>
<td>Member R/W</td>
<td>(Y/N)</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>C</td>
<td>RAID 5 spare R/W</td>
<td>(Y/N)</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>X</td>
<td>Director number</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>X</td>
<td>Target number</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>X</td>
<td>IF ADDR (0C/0D)</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>X</td>
<td>Device address on IF</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>X</td>
<td>Open</td>
<td></td>
</tr>
</tbody>
</table>

Remote Mirror Base Information Record: EMCSRDFDEVICE#_RMIRB#

Table 50 Function 10, Object name: DEVICE, Remote Mirror Base Information Record: EMCSRDFDEVICE#_RMIRB#

<table>
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<th>Length</th>
<th>Type</th>
<th>Description</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>X</td>
<td>Mirror position</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>X</td>
<td>Mirror flag 80-MIRROR POSITION VALID</td>
<td></td>
</tr>
</tbody>
</table>

Remote Mirror Information Record: EMCSRDFDEVICE#_RMIRI# - VLOH

Note: A variable length object header precedes this data.

Table 51 Function 10, Object name: DEVICE, Remote Mirror Information Record: EMCSRDFDEVICE#_RMIRI#

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>X</td>
<td>Remote mirror state devs flag 80-NOT READY 40-WRITE DISABLED 20-ADAPTIVE COPY DISK MODE 10-ADCOPY WRITE PENDING MODE</td>
<td></td>
</tr>
</tbody>
</table>
### Table 51 Function 10, Object name: DEVICE, Remote Mirror Information Record: EMCSRDF_DEVICE#_RMIRI#

<table>
<thead>
<tr>
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<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1</td>
<td>X</td>
<td>Copy of dev mirror flag 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>80-R1 MIRROR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>40-R2 MIRROR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20-R2 WRITE ENABLED</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10-R2 N/R</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>08-COPY OF DEVSRL_LNKBLK</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>04-SRDF/A TRASMIT IDLE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>02-ADAPTIVE COPY DISK</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>01-ADAPTIVE COPY WRITE PENDING</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>X</td>
<td>Copy of dev mirror flag 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>80-TARGET NOT READY</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>40-TARGET WRITE DISABLED</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20-SRDFA ON THIS MIRROR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10-CG PROTECTING MIRROR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>08-SYNC DIRECTION R1&gt;R2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>04-SYNC DIRECTION R2&gt;R1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>02-SYNC DIRECTION NONE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>01-UNEQUAL SIZE R1/R2</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>X</td>
<td>10-HyperWrite is or was active</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>X</td>
<td>SRDF device group</td>
</tr>
<tr>
<td>9</td>
<td>4</td>
<td>X</td>
<td>Remote PowerMax/VMAX device number</td>
</tr>
<tr>
<td>13</td>
<td>4</td>
<td>X</td>
<td>Remote device invalid track count</td>
</tr>
<tr>
<td>17</td>
<td>4</td>
<td>X</td>
<td>Current ADC write pend count</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td>Object length</td>
</tr>
</tbody>
</table>

### FBA Information Record: EMCSRDFDEVICE#_FBA#

### Table 52 Function 10, Object name: DEVICE, FBA Information Record: EMCSRDFDEVICE#_FBA#

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>C</td>
<td>FBA user not ready (Y/N)</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>X</td>
<td>FBA stripe size</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>X</td>
<td>FBA number of members</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>C</td>
<td>FBA META previous device valid (Y/N)</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>C</td>
<td>FBA META next device valid (Y/N)</td>
</tr>
<tr>
<td>11</td>
<td>2</td>
<td>C</td>
<td>Reserved</td>
</tr>
<tr>
<td>13</td>
<td>4</td>
<td>X</td>
<td>FBA META previous member device number</td>
</tr>
</tbody>
</table>
Table 52 Function 10, Object name: DEVICE, FBA Information Record: EMCSRDFDEVICE##_FBA#

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>4</td>
<td>X</td>
<td>FBA META next member device number</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td>Object length</td>
</tr>
</tbody>
</table>
### Table 53 Function 10, Object name: DEVICE, BCV Information Record: EMCSRDF DEVICE#_BCV#

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>X</td>
<td>Open</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>X</td>
<td>Open</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>X</td>
<td>Open</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>C</td>
<td>Multiple LCL mirrors (Y/N)</td>
</tr>
</tbody>
</table>
| 8      | 1      | C    | BCV SRDF type  
1=R1 2=R2 |
| 9      | 1      | C    | BCV RAID10 (Y/N) |
| 10     | 1      | C    | BCV RAID5 (Y/N) |
| 11     | 1      | C    | Pair Attached(Y) Split(N) |
| 12     | 1      | C    | Established/Restored (E/R) |
| 13     | 1      | C    | Synchronized (Y/N) |
| 14     | 1      | C    | BCV is/was attached (Y/N) |
| 15     | 1      | C    | SDDF session exists (Y/N) |
| 16     | 1      | C    | Reverse split allowed (Y/N) |
| 17     | 1      | C    | NRML split in progress (Y/N) |
| 18     | 1      | C    | INST split in progress (Y/N) |
| 19     | 1      | C    | CTR#3- 2nd pass (Y/N) |
| 20     | 1      | C    | BCV synch'ing (Y/N) |
| 21     | 1      | C    | Split before sync on BCV |
| 22     | 1      | C    | Sync to/from moving mirror (T/F)  
Blank if offset 11 is Y, offset 20 is N, or offset 7 is N. |
| 23     | 1      | C    | Protected restore (Y/N) |
| 24     | 1      | C    | SMMF held file (Y/N) |
| 25     | 1      | C    | Invalid BCV (Y/N) |
| 26     | 1      | C    | Both BCV mirrors attach (Y/N) |
| 27     | 1      | C    | STD ready for establish (Y/N)  
Blank if offset 11 is Y |
| 28     | 1      | C    | STD knows another BCV (Y/N) |
| 29     | 1      | C    | Background split>1 mirror (Y/N)  
Blank if offset 11 is N |
| 30     | 1      | C    | STD held for SNAP (Y/N) |
| 31     | 4      | X    | CTR#1 number of tracks left to sync |
| 35     | 4      | X    | CTR#2 number of tracks to sync next |
### Function 11, Object name: LINK

**Table 54** Function 11, Object name: LINK

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>X</td>
<td>Total number of I/Os</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>X</td>
<td>Director number</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>C</td>
<td>Director type</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1-RA1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2-RA2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>F-FIBER RA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>G-GIGE RA</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>X</td>
<td>Other-side director number. x&quot;FFFF&quot; - Unknown</td>
</tr>
<tr>
<td>10</td>
<td>12</td>
<td>C</td>
<td>Other-side storage system serial number</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Note:</strong> This field may contain all periods. If so, this value indicates a switched director and this field will not be accurate. Use the SRDF group object to obtain a more complete picture of the SRDF relationships between the storage systems. For statistics, use the DSTAT object.</td>
</tr>
<tr>
<td>22</td>
<td>4</td>
<td>X</td>
<td>SRDF group</td>
</tr>
<tr>
<td>26</td>
<td>4</td>
<td>X</td>
<td>Other side SRDF group</td>
</tr>
<tr>
<td>30</td>
<td>1</td>
<td>C</td>
<td>Director Online Flag (Y/N)</td>
</tr>
<tr>
<td>31</td>
<td>1</td>
<td>C</td>
<td>Director Connected Flag (Y/N)</td>
</tr>
</tbody>
</table>

**Note:** The following interval fields are not available for Enginuity 5771 and earlier.

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>1</td>
<td>X</td>
<td>Short Interval % busy</td>
</tr>
</tbody>
</table>
### Table 54  Function 11, Object name: LINK

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>33</td>
<td>2</td>
<td>X</td>
<td>Short Interval I/O rate</td>
</tr>
<tr>
<td>35</td>
<td>1</td>
<td>X</td>
<td>Short Interval time - MM</td>
</tr>
<tr>
<td>36</td>
<td>1</td>
<td>X</td>
<td>Short Interval time - SS</td>
</tr>
<tr>
<td>37</td>
<td>1</td>
<td>X</td>
<td>Long Interval %busy</td>
</tr>
<tr>
<td>38</td>
<td>2</td>
<td>X</td>
<td>Long Interval I/O rate</td>
</tr>
<tr>
<td>40</td>
<td>1</td>
<td>X</td>
<td>Long Interval time - DD</td>
</tr>
<tr>
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<td>1</td>
<td>X</td>
<td>Long interval time - HH</td>
</tr>
<tr>
<td>42</td>
<td>1</td>
<td>X</td>
<td>Long interval time - MM</td>
</tr>
<tr>
<td>43</td>
<td>1</td>
<td>X</td>
<td>Long interval time - SS</td>
</tr>
<tr>
<td>44</td>
<td>8</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
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<td>X</td>
<td>Reserved</td>
</tr>
<tr>
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<td>Reserved</td>
</tr>
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<td>2</td>
<td>X</td>
<td>Reserved</td>
</tr>
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<td>59</td>
<td>128</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td>187</td>
<td>2</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td>189</td>
<td>128</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td>317</td>
<td>8</td>
<td>X</td>
<td>Total number of I/Os (64-bit value)</td>
</tr>
<tr>
<td>325</td>
<td>4</td>
<td>X</td>
<td>Total number of ports</td>
</tr>
<tr>
<td>329</td>
<td></td>
<td></td>
<td>Object length</td>
</tr>
</tbody>
</table>

**LINK Port Information:** EMCSRDF_LINK#_PT

**Note:** A variable length object header precedes this data.

### Table 55  Function 11, Object name: LINK, LINK Port Information: EMCSRDF_LINK#_PT

<table>
<thead>
<tr>
<th>Offset</th>
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<th>Type</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>X</td>
<td>Port number</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>X</td>
<td>Port negotiated speed</td>
</tr>
</tbody>
</table>
### Table 55 Function 11, Object name: LINK, LINK Port Information: EMCSRDF_LINK#_PT

<table>
<thead>
<tr>
<th>Field</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
</table>
| 6     | 1      | X    | Port configured speed:  
|       |        |      | 00 - Speed unknown  
|       |        |      | 01 - 1 Gigabyte  
|       |        |      | 02 - 2 Gigabyte  
|       |        |      | 03 - 3 Gigabyte  
|       |        |      | 04 - 4 Gigabyte  
|       |        |      | 06 - 6 Gigabyte  
|       |        |      | 08 - 8 Gigabyte  
|       |        |      | 0A - 10 Gigabyte  
|       |        |      | 0C - 12 Gigabyte  
|       |        |      | 10 - 16 Gigabyte  
|       |        |      | 32 - 2 Gigabyte max  
|       |        |      | 34 - 4 Gigabyte max  
|       |        |      | 38 - 8 Gigabyte max  
|       |        |      | 41 - Infiniband SDR  
|       |        |      | 42 - Infiniband DDR  
|       |        |      | 43 - Infiniband QDR  
| 7     | 1      | X    | Port status:  
|       |        |      | 02 - Virtual port  
|       |        |      | 04 - Actual port online  
|       |        |      | 08 - Port failed  
|       |        |      | 10 - Request port online  
|       |        |      | 20 - Link online  
| 8     | 1      | X    | Reserved  
| 9     | 8      | X    | Port I/O  
| 17    | 8      | X    | Port throughput  
| 25    | 8      | X    | Port I/O read count  
| 33    | 8      | X    | Port I/O write count  
| 41    | 8      | X    | Port KB read  
| 49    | 8      | X    | Port KB written  
| 57    | 8      | X    | Port KB read throughput  
| 65    | 8      | X    | Port KB write throughput  
| 73    | 8      | X    | Port idle time accumulated  
| 81    | 8      | X    | Port busy time accumulated  
| 89    | 8      | X    | Port busy time count  
| 97    | 8      | X    | Port time update  
| 105   | 8      | X    | Port ISCSI checksum error count  
| 112   |       |      | Object length  |
Function 12, Object name: DIRECTOR

Table 56  Function 12, Object name: DIRECTOR

<table>
<thead>
<tr>
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<th>Type</th>
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<td>1</td>
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<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>C</td>
<td>Director type</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 - RA1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 - RA2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A - FIBRE SA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C - CA DIRECTOR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>D - DA DIRECTOR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E - EA DIRECTOR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>F - FIBER RA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>G - GIGE (RA MODE)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>H - SAS backend director</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>I - FICON DIRECTOR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>M - IM director</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N - ED director</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>O - FCOE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>P - NVME director</td>
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<tr>
<td></td>
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<td></td>
<td>S - SA DIRECTOR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>T - SE DIRECTOR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>W - FIBRE DISK</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>X - 2 PORT FIBRE RA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y - 2 PORT FIBRE SA</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>C</td>
<td>Director Online flag (Y/N/D)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Note: D = disabled</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>C</td>
<td>Director Connected flag (Y/N/D)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Note: D = disabled</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>X</td>
<td>Director number</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>X</td>
<td>PORT 0 NEGOTIATED SPEED</td>
</tr>
<tr>
<td>11</td>
<td>4</td>
<td>X</td>
<td>PORT 1 NEGOTIATED SPEED</td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>X</td>
<td>PORT 0 CONFIGURED SPEED</td>
</tr>
<tr>
<td>19</td>
<td>4</td>
<td>X</td>
<td>PORT 1 CONFIGURED SPEED</td>
</tr>
<tr>
<td>22</td>
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Function 14, Object name: RDFGROUP

Base Group object: EMCSRDF_RDFGROUP.

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<th>Offset</th>
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<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>X</td>
<td>SRDF group</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>X</td>
<td>Other side SRDF group</td>
</tr>
<tr>
<td>9</td>
<td>12</td>
<td>C</td>
<td>Other side serial number</td>
</tr>
<tr>
<td>21</td>
<td>2</td>
<td>X</td>
<td>Other side major release</td>
</tr>
<tr>
<td>23</td>
<td>2</td>
<td>X</td>
<td>Other side minor release</td>
</tr>
<tr>
<td>25</td>
<td>2</td>
<td>C</td>
<td>Other side model</td>
</tr>
<tr>
<td>27</td>
<td>4</td>
<td>X</td>
<td>Other side features</td>
</tr>
<tr>
<td>31</td>
<td>1</td>
<td>C</td>
<td>Sync direction</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0-NONE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1-R1&gt;R2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2-R1&lt;R2</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>3-CNFG</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>?-Unable to determine sync direction</td>
</tr>
<tr>
<td>32</td>
<td>1</td>
<td>C</td>
<td>Online or Offline (Y/N)</td>
</tr>
<tr>
<td>33</td>
<td>1</td>
<td>C</td>
<td>Fiber protocol (Y/N)</td>
</tr>
<tr>
<td>34</td>
<td>1</td>
<td>C</td>
<td>Escon protocol (Y/N)</td>
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<td>C</td>
<td>IP protocol (Y/N)</td>
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<tr>
<td>36</td>
<td>1</td>
<td>C</td>
<td>SRDFA group (Y/N)</td>
</tr>
<tr>
<td>37</td>
<td>1</td>
<td>C</td>
<td>Dynamic group (Y/N)</td>
</tr>
<tr>
<td>38</td>
<td>1</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td>39</td>
<td>10</td>
<td>C</td>
<td>Label</td>
</tr>
<tr>
<td>49</td>
<td>2</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td>51</td>
<td>8</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td>59</td>
<td>12</td>
<td>C</td>
<td>This side serial number</td>
</tr>
<tr>
<td>71</td>
<td>2</td>
<td>X</td>
<td>Operating environment major level</td>
</tr>
<tr>
<td>73</td>
<td>2</td>
<td>X</td>
<td>Operating environment minor level</td>
</tr>
<tr>
<td>75</td>
<td>66</td>
<td>C</td>
<td>MSCCB - BCV GNS GROUP NAME</td>
</tr>
<tr>
<td>141</td>
<td>1</td>
<td>X</td>
<td>MSCCB - Auto Restart policy-1</td>
</tr>
<tr>
<td>142</td>
<td>1</td>
<td>X</td>
<td>MSCCB - Auto Restart policy-2</td>
</tr>
<tr>
<td>143</td>
<td>4</td>
<td>X</td>
<td>MSCCB - Auto Restart invalid track count</td>
</tr>
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</table>
Table 57 Function 14, Object name: RDFGROUP, Base Group object: EMCSRDF_RDFGROUP.

<table>
<thead>
<tr>
<th></th>
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<th>X</th>
</tr>
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<tbody>
<tr>
<td>147</td>
<td>1</td>
<td>MSCCB - Auto Restart minimum number of SRDF directors</td>
</tr>
<tr>
<td>148</td>
<td>1</td>
<td>MSCCB - Auto Restart flag 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>80 - DROP ALL SRDF/A SESSIONS ON FAILURE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40 - REMOVE FAILING SESSION ON FAILURE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20 - DISABLE MSC ENVIRONMENT ON FAILURE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 - IF MSC VALIDATION FINDS PROBLEMS ONLY WARN ON THE ERROR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>08 - DO NOT PERFORM VALIDATION</td>
</tr>
<tr>
<td></td>
<td></td>
<td>04 - STAR AUTOSWAP REQUESTED</td>
</tr>
<tr>
<td></td>
<td></td>
<td>02 - ONE OR MORE SESSIONS ARE DEFINED VIA GNS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>01 - REMOTE CYCLE SWITCHING</td>
</tr>
<tr>
<td>149</td>
<td>1</td>
<td>Auto Restart session SRDF group. This is the synchronous group in a cascaded R21 configuration.</td>
</tr>
<tr>
<td>150</td>
<td>1</td>
<td>MSC session minimum number of directors</td>
</tr>
<tr>
<td>151</td>
<td>4</td>
<td>MSC session number of invalid tracks</td>
</tr>
<tr>
<td>155</td>
<td>1</td>
<td>MSC session policy flag</td>
</tr>
<tr>
<td>156</td>
<td>1</td>
<td>Reserved</td>
</tr>
<tr>
<td>157</td>
<td>8</td>
<td>Reserved</td>
</tr>
<tr>
<td>165</td>
<td>1</td>
<td>C STAR/SQAR mode</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N - not configured</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 - STAR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - SQAR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 - STAR-A</td>
</tr>
<tr>
<td>166</td>
<td>1</td>
<td>C SDRF/Metro flags</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N - R/M feature not configured</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 - R/M CONFIGURED</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - R/M SYNCING</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 - R/M ACTIVE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 - R/M STALLED</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 - R/M QUORUM ENABLED</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6 - R/M QUORUM PROTECTED</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7 - R/M QUORUM FAILED</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th></th>
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<th>C Object length</th>
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</table>
### REXX Interface

**STAR Local/Remote Object:** `EMCSRDF_RDFGROUP#_STARLCL, EMCSRDF_RDFGROUP#_STARRMT`

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>C</td>
<td>SRDFA type (1=R1, 2=R2)</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>C</td>
<td>SRDFA active (Y/N)</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>C</td>
<td>SRDFA tolerance (Y/N)</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>C</td>
<td>Cleanup running (Y/N)</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>C</td>
<td>Host managed const (Y/N)</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>C</td>
<td>STAR mode (Y/N)</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>C</td>
<td>Consistent deact if cycle switch is immediate S - Succeed F - Fail</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>C</td>
<td>Freeze state</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>X</td>
<td>State at transition to J0 0 - NOSTATE 1 - START 2 - GOOD 3 - ALMOST DONE</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>X</td>
<td>Status of last transition to J0 0 - NOT IN PROGRESS 1 - IN PROGRESS 2 - SUCCESSFUL 3 - FAILED</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>X</td>
<td>Priority for drop policy</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>X</td>
<td>The percentage of the system write-pending limit at which SRDFA will drop</td>
</tr>
<tr>
<td>13</td>
<td>4</td>
<td>X</td>
<td>Active cycle size R1 side: Capture R2 side: Apply</td>
</tr>
<tr>
<td>17</td>
<td>4</td>
<td>X</td>
<td>Inactive cycle size R1 side: Transmit R2 side: Receive</td>
</tr>
<tr>
<td>21</td>
<td>2</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td>23</td>
<td>2</td>
<td>X</td>
<td>Number of seconds duration of last cycle</td>
</tr>
<tr>
<td>25</td>
<td>2</td>
<td>X</td>
<td>Current cycle number active on R1 inactive on R2</td>
</tr>
<tr>
<td>27</td>
<td>2</td>
<td>X</td>
<td>Maximum throttle time</td>
</tr>
<tr>
<td>29</td>
<td>2</td>
<td>X</td>
<td>Minimum cycle length</td>
</tr>
<tr>
<td>31</td>
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<td>Secondary delay</td>
</tr>
<tr>
<td>33</td>
<td>4</td>
<td>X</td>
<td>Last cycle size</td>
</tr>
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### Table 58 Function 14, Object name: RDFGROUP, STAR Local/Remote Object:
EMCSRDF_RDFGROUP#_STARLCL, EMCSRDF_RDFGROUP#_STARRMT

<table>
<thead>
<tr>
<th></th>
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<th>Description</th>
</tr>
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<tbody>
<tr>
<td>37</td>
<td>4</td>
<td>X</td>
<td>Number of Consistency Exempt</td>
</tr>
<tr>
<td>41</td>
<td>4</td>
<td>X</td>
<td>Average cycle time (secs)</td>
</tr>
<tr>
<td>45</td>
<td>4</td>
<td>X</td>
<td>Average cycle size (slots)</td>
</tr>
<tr>
<td>49</td>
<td>8</td>
<td>X</td>
<td>Tag for MS turn on</td>
</tr>
<tr>
<td>57</td>
<td>8</td>
<td>X</td>
<td>Tag for MS turn off</td>
</tr>
<tr>
<td>65</td>
<td>1</td>
<td>C</td>
<td>MS window open? (Y/N)</td>
</tr>
<tr>
<td>66</td>
<td>1</td>
<td>C</td>
<td>Remote consistent? (Y/N)</td>
</tr>
<tr>
<td>67</td>
<td>1</td>
<td>C</td>
<td>Pure ready state? (Y/N)</td>
</tr>
</tbody>
</table>
| 68 | 1 | X | R1 Flag 1  
 02 - Transmit is Idle  
 04 - Transmit Idle Enabled  
 08 - DSE Active |
| 69 | 4 | X | Number of tracks written by HA |
| 73 | 4 | X | Number of repeat writes by HA |
| 77 | 4 | X | Number of duplicated slots by HA |
| 81 | 1 | C | Restore done? (Y/N) |
| 82 | 1 | C | R2 suspended? (Y/N) |
| 83 | 1 | X | R2 Flag 1  
 02 - Transmit is Idle  
 04 - Transmit Idle Enabled  
 08 - DSE Active |
| 84 | 1 | C | Reserved |
| 85 | 4 | X | Number of slots restored by DA |
| 89 | 4 | X | Number of slots merg by DA |
| 93 | 4 | X | Number of secs for last restore |
| 97 | 4 | X | Average restore time |
| 101 | 4 | X | SUSP/RSUM token created when cycle switch was suspended |
| 105 | 1 | C | SRDFA active? (Y/N) |
| 106 | 1 | C | R1 inactive cycle empty (Y/N) |
| 107 | 1 | C | R2 active cycle empty (Y/N) |
| 108 | 1 | C | Inactive cycle on R2 requires intervention R2 side only (Y/N) |
| 109 | 1 | C | Force option must be (Y/N) |
| 110 | 1 | C | 1st consistent cycle (Y/N) |
### Table 58  Function 14, Object name: RDFGROUP, STAR Local/Remote Object: EMCSRDF_RDFGROUP#_STARLCL, EMCSRDF_RDFGROUP#_STARRMT

<p>| | | | | |</p>
<table>
<thead>
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</tr>
</thead>
<tbody>
<tr>
<td>111</td>
<td>1</td>
<td>C</td>
<td>2nd consistent cycle (Y/N)</td>
<td>Note: To check for global consistency, do the following from the R1 side: Check the remote consistent field at offset 66. If it is Y, check the 1st consistent cycle and 2nd consistent cycle fields. If they are both Y, global consistency exists.</td>
</tr>
<tr>
<td>112</td>
<td>1</td>
<td>C</td>
<td>STAR mode ahead (Y/N)</td>
<td></td>
</tr>
<tr>
<td>113</td>
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<td>X</td>
<td>Number of cycles JA ahead of J0</td>
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</tr>
<tr>
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<td>C</td>
<td>MSC is active (Y/N)</td>
<td></td>
</tr>
<tr>
<td>115</td>
<td>2</td>
<td>X</td>
<td>Cycle number</td>
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<td>Globally consistent</td>
<td></td>
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<tr>
<td>118</td>
<td>3</td>
<td>X</td>
<td>Reserved</td>
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<td>Active cycle tag</td>
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<td>80-FIRST CONSISTENT CYCLE</td>
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<td>40-SECOND CONSISTENT CYCLE</td>
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<td>20-STAR MODE</td>
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<td>10-SITE B IS NOT CONSISTENT</td>
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<td>Reserved</td>
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<td>Counter of the number of cycles site C is ahead of site B</td>
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<td>4</td>
<td>X</td>
<td>Active cycle</td>
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<td>X</td>
<td>Inactive cycle tag</td>
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<td>X</td>
<td>Number of seconds since the last cycle switch</td>
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<tr>
<td>141</td>
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<td>X</td>
<td>Duration in seconds of the last cycle</td>
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<td></td>
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**Group MSC Information: EMCSRDF_RDFGROUP#_MSCLCL**

**Table 59** Function 14, Object name: RDFGROUP, Group MSC Information:
EMCSRDF_RDFGROUP#_MSCLCL

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<td></td>
<td>1 - MSC/STAR</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>2 - MSC/SQAR</td>
</tr>
<tr>
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<td></td>
<td></td>
<td>3 - MSC/STAR-A</td>
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<td>1</td>
<td>C</td>
<td>List complete (Y/N)</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>C</td>
<td>z/OS defined (Y/N)</td>
</tr>
<tr>
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<td>1</td>
<td>C</td>
<td>OS defined (Y/N)</td>
</tr>
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<td>1</td>
<td>C</td>
<td>STAR/SQAR mode</td>
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<td>N - mode not configured</td>
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<td>C</td>
<td>Dynamic target cycle number</td>
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<tr>
<td>7</td>
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<td>C</td>
<td>Disable (Y/N)</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>C</td>
<td>J0 group (Y/N)</td>
</tr>
<tr>
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<td>1</td>
<td>C</td>
<td>Primary side (Y/N)</td>
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<td>X</td>
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<td>X</td>
<td>Target cycle time in seconds</td>
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<td>4</td>
<td>X</td>
<td>Reserved</td>
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<td>8</td>
<td>C</td>
<td>Group name</td>
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<td>X</td>
<td>SDDF Session 1 token</td>
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<td>4</td>
<td>X</td>
<td>SDDF Session 2 token</td>
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<td>33</td>
<td>2</td>
<td>X</td>
<td>My other side group</td>
</tr>
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<td>35</td>
<td>2</td>
<td>X</td>
<td>Corresponding R1 group</td>
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<tr>
<td>37</td>
<td>2</td>
<td>X</td>
<td>Corresponding R2 group</td>
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<td>39</td>
<td>2</td>
<td>X</td>
<td>New SRDF recovery group</td>
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<td>41</td>
<td>16</td>
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<td>57</td>
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<td>C</td>
<td>Cycle mode</td>
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<td></td>
<td></td>
<td>L - legacy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>M - MCM</td>
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<td>57</td>
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<td>Object length</td>
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</table>
Box List Information: EMCSRDF_RDFGROUP#_BOXLIST.#

Table 60  Function 14, Object name: RDFGROUP, Box List Information: EMCSRDF_RDFGROUP#_BOXLIST.#

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<td>12</td>
<td>C</td>
<td>Primary side serial number</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td>14</td>
<td>12</td>
<td>C</td>
<td>Secondary side serial number</td>
</tr>
<tr>
<td>26</td>
<td>1</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td>27</td>
<td>2</td>
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<td>Primary side group</td>
</tr>
<tr>
<td>29</td>
<td>2</td>
<td>X</td>
<td>Secondary side group</td>
</tr>
<tr>
<td>31</td>
<td>6</td>
<td>X</td>
<td>Reserved</td>
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<td>36</td>
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</table>

Write Pacing Information: EMCSRDF_RDFGROUP#_WPINFO.#

Table 61  Function 14, Object name: RDFGROUP, Write Pacing Information: EMCSRDF_RDFGROUP#_WPINFO.#

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<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>C</td>
<td>SRDF group for result record</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>C</td>
<td>Reserved for expansion</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>X</td>
<td>Mean pacing delay per track</td>
</tr>
<tr>
<td>9</td>
<td>4</td>
<td>X</td>
<td>Minimum pacing delay per track</td>
</tr>
<tr>
<td>13</td>
<td>4</td>
<td>X</td>
<td>Maximum pacing delay per track</td>
</tr>
<tr>
<td>17</td>
<td>8</td>
<td>X</td>
<td>Number of I/Os paced</td>
</tr>
<tr>
<td>25</td>
<td>4</td>
<td>X</td>
<td>Maximum delay (microsecs)</td>
</tr>
<tr>
<td>29</td>
<td>4</td>
<td>X</td>
<td>Device maximum delay (microsecs)</td>
</tr>
<tr>
<td>33</td>
<td>4</td>
<td>X</td>
<td>Pacing window size</td>
</tr>
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<td>37</td>
<td>4</td>
<td>X</td>
<td>Group disarm time</td>
</tr>
<tr>
<td>41</td>
<td>4</td>
<td>X</td>
<td>Device disarm time</td>
</tr>
<tr>
<td>45</td>
<td>4</td>
<td>X</td>
<td>Cache threshold in .1%</td>
</tr>
<tr>
<td>49</td>
<td>4</td>
<td>X</td>
<td>DSE threshold</td>
</tr>
<tr>
<td>53</td>
<td>4</td>
<td>C</td>
<td>Write Pacing autostart</td>
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<tr>
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**SRDF Group Director List: EMCSRDF_RDFGROUP#_DIRLIST.#**

*Note:* A variable length object header precedes this data.

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<td>1</td>
<td>2</td>
<td>X</td>
<td>Director number</td>
</tr>
<tr>
<td>2</td>
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<td></td>
<td>Object length</td>
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</table>

**SRDF Group Other Side Director List: EMCSRDF_RDFGROUP#_DIRLISTOS.#**

*Note:* A variable length object header precedes this data.

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<tr>
<td>1</td>
<td>2</td>
<td>X</td>
<td>Director number</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td>Object length</td>
</tr>
</tbody>
</table>

**SRDF Group Director Port List: EMCSRDF_RDFGROUP#_DIRLIST#_PORT.#**

*Note:* A variable length object header precedes this data.

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<th>Description</th>
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<tbody>
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<td>1</td>
<td>2</td>
<td>X</td>
<td>Port number</td>
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<tr>
<td>2</td>
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<td></td>
<td>Object length</td>
</tr>
</tbody>
</table>
**SRDF Group Other Side Director Port List: EMCSRDF_RDFGROUP#_DIRLISTOS#_PORT.**

**Note:** A variable length object header precedes this data.

**Table 65** Function 14, Object name: RDFGROUP, SRDF Group Other Side Director Port List: EMCSRDF_RDFGROUP#_DIRLISTOS#_PORT.

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<td>X</td>
<td>Port number</td>
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</tbody>
</table>

**Function 15, Object name: RGRPSTAT**

**Table 66** Function 15, Object name: RGRPSTAT

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<tr>
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<td>Reserved</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>X</td>
<td>Reserved</td>
</tr>
</tbody>
</table>
| 3      | 1      | X    | Config flags  
           |        | 80-MULTIPATH  
           |        | 40-PATH REASSIGNED FROM GROUP  
           |        | 20-GROUP DISBANDED  
           |        | 10-SINGLE PATH   |
| 4      | 1      | X    | Protocol    |
| 5      | 1      | X    | FC Topology 1 |
| 6      | 1      | X    | FC Topology 2 Flag  
           |        | 01-FC PRIVATE ARBRITRATED LOOP  
           |        | 02-FC PUBLIC ARBRITRATED LOOP  
           |        | 04-FC POINT TO POINT  
           |        | 08-FC SWITCHED  
           |        | 10-IP    |
| 7      | 8      | X    | World Wide Name |
| 15     | 4      | X    | Other side features |
| 19     | 2      | X    | Other side major code level |
| 21     | 2      | X    | Other side minor code level |
| 23     | 1      | X    | Other side model number |
| 24     | 1      | X    | This side port number |
| 25     | 1      | X    | Other side port state |
| 26     | 1      | X    | Other side port number |
| 27     | 8      | X    | Data in counter |
### Table 66  Function 15, Object name: RGRPSTAT

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<th>Description</th>
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<tbody>
<tr>
<td>1</td>
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<td>Director statistics format</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>X</td>
<td>Director type</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>X</td>
<td>Director number</td>
</tr>
<tr>
<td>7</td>
<td>10</td>
<td>X</td>
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</tr>
<tr>
<td>17</td>
<td>256</td>
<td>X</td>
<td>Director statistics info (See following records)</td>
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### Function 17, Object name: DSTAT

**Base Director Statistics: EMCSRDF_DSTATB.#**

### Table 67  Function 17, Object name: DSTAT, Base Director Statistics: EMCSRDF_DSTATB.#

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<td>35</td>
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<td>X</td>
<td>Data out counter</td>
</tr>
<tr>
<td>43</td>
<td>2</td>
<td>X</td>
<td>This side director number</td>
</tr>
<tr>
<td>45</td>
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<td>X</td>
<td>Other side director number</td>
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<tr>
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<td>4</td>
<td>X</td>
<td>SRDF group</td>
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<th>Description</th>
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</thead>
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<td>X</td>
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</tr>
<tr>
<td>2</td>
<td>1</td>
<td>X</td>
<td>Director type</td>
</tr>
<tr>
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<td>4</td>
<td>X</td>
<td>Director number</td>
</tr>
<tr>
<td>7</td>
<td>10</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
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<td>X</td>
<td>Director statistics info (See following records)</td>
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## Format 2: Director type EA

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<td>9</td>
<td>8</td>
<td>X</td>
<td>Number of total I/Os</td>
</tr>
<tr>
<td>17</td>
<td>8</td>
<td>X</td>
<td>Number of hits</td>
</tr>
<tr>
<td>25</td>
<td>8</td>
<td>X</td>
<td>Number of requests</td>
</tr>
<tr>
<td>33</td>
<td>8</td>
<td>X</td>
<td>Number of read misses</td>
</tr>
<tr>
<td>41</td>
<td>8</td>
<td>X</td>
<td>System write pendings</td>
</tr>
<tr>
<td>49</td>
<td>8</td>
<td>X</td>
<td>Device write pendings</td>
</tr>
<tr>
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## Format 3: Director type SA

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<td>X</td>
<td>Number of writes</td>
</tr>
<tr>
<td>9</td>
<td>8</td>
<td>X</td>
<td>Number of total I/Os</td>
</tr>
<tr>
<td>17</td>
<td>8</td>
<td>X</td>
<td>Number of hits</td>
</tr>
<tr>
<td>25</td>
<td>8</td>
<td>X</td>
<td>Number of requests</td>
</tr>
<tr>
<td>33</td>
<td>8</td>
<td>X</td>
<td>Number of read misses</td>
</tr>
<tr>
<td>41</td>
<td>8</td>
<td>X</td>
<td>System write pendings</td>
</tr>
<tr>
<td>49</td>
<td>8</td>
<td>X</td>
<td>Device write pendings</td>
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## Format 4: Director type FA

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<th>Description</th>
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<td>X</td>
<td>Number of writes</td>
</tr>
<tr>
<td>9</td>
<td>8</td>
<td>X</td>
<td>Number of total I/Os</td>
</tr>
<tr>
<td>17</td>
<td>8</td>
<td>X</td>
<td>Number of hits</td>
</tr>
<tr>
<td>25</td>
<td>8</td>
<td>X</td>
<td>Number of requests</td>
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<td>Number of read misses</td>
</tr>
<tr>
<td>41</td>
<td>8</td>
<td>X</td>
<td>System write pendings</td>
</tr>
</tbody>
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Table 70  Function 17, Object name: DSTAT, Format 4: Director type FA

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<th>Type</th>
<th>Description</th>
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<td>8</td>
<td>X</td>
<td>Device write pendings</td>
</tr>
</tbody>
</table>

| 56     |        |      | Object length        |

Format 6: Director type DA

Table 71  Function 17, Object name: DSTAT, Format 6: Director type DA

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<th>Type</th>
<th>Description</th>
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<tr>
<td>1</td>
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<td>X</td>
<td>Number of total I/Os</td>
</tr>
<tr>
<td>9</td>
<td>8</td>
<td>X</td>
<td>Number of requests</td>
</tr>
<tr>
<td>17</td>
<td>8</td>
<td>X</td>
<td>Number of reads</td>
</tr>
<tr>
<td>25</td>
<td>8</td>
<td>X</td>
<td>Number of writes</td>
</tr>
<tr>
<td>33</td>
<td>8</td>
<td>X</td>
<td>Number of prefetched tracks</td>
</tr>
<tr>
<td>41</td>
<td>8</td>
<td>X</td>
<td>Number of prefetched tracks not used</td>
</tr>
<tr>
<td>49</td>
<td>8</td>
<td>X</td>
<td>Number of prefetched tracks used</td>
</tr>
<tr>
<td>57</td>
<td>8</td>
<td>X</td>
<td>Number of short misses</td>
</tr>
<tr>
<td>65</td>
<td>8</td>
<td>X</td>
<td>Number of long misses</td>
</tr>
<tr>
<td>73</td>
<td>4</td>
<td>X</td>
<td>Prefetch restarts</td>
</tr>
<tr>
<td>77</td>
<td>4</td>
<td>X</td>
<td>Number of prefetch mismatches</td>
</tr>
<tr>
<td>81</td>
<td>4</td>
<td>X</td>
<td>Number of perma cache requests</td>
</tr>
<tr>
<td>85</td>
<td>4</td>
<td>X</td>
<td>Average fall through time</td>
</tr>
</tbody>
</table>

| 88     |        |      | Object length                      |

Format 7: Director type RF

Table 72  Function 17, Object name: DSTAT, Format 7: Director type RF

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8</td>
<td>X</td>
<td>Number of I/Os</td>
</tr>
<tr>
<td>9</td>
<td>8</td>
<td>X</td>
<td>SRDF link util ctr</td>
</tr>
<tr>
<td>17</td>
<td>8</td>
<td>X</td>
<td>Time T1 link util ctr</td>
</tr>
<tr>
<td>25</td>
<td>8</td>
<td>X</td>
<td>Time T2 link util ctrl</td>
</tr>
<tr>
<td>33</td>
<td>4</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td>37</td>
<td>4</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td>41</td>
<td>8</td>
<td>X</td>
<td>SRDF kilobytes received</td>
</tr>
<tr>
<td>49</td>
<td>8</td>
<td>X</td>
<td>SRDF kilobytes sent</td>
</tr>
</tbody>
</table>
### REXX Interface

**Table 72** Function 17, Object name: DSTAT, Format 7: Director type RF

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>57</td>
<td>4</td>
<td>X</td>
<td>SRDF received</td>
</tr>
<tr>
<td>61</td>
<td>2</td>
<td>X</td>
<td>Received units</td>
</tr>
<tr>
<td>63</td>
<td>2</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td>65</td>
<td>4</td>
<td>X</td>
<td>SRDF sent</td>
</tr>
<tr>
<td>69</td>
<td>2</td>
<td>X</td>
<td>Sent units</td>
</tr>
<tr>
<td>71</td>
<td>2</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td>72</td>
<td></td>
<td></td>
<td>Object length</td>
</tr>
</tbody>
</table>

**Format 11: Director type SE**

**Table 73** Function 17, Object name: DSTAT, Format 11: Director type SE

<table>
<thead>
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<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8</td>
<td>X</td>
<td>Number of writes</td>
</tr>
<tr>
<td>9</td>
<td>8</td>
<td>X</td>
<td>Number of total I/Os</td>
</tr>
<tr>
<td>17</td>
<td>8</td>
<td>X</td>
<td>Number of hits</td>
</tr>
<tr>
<td>25</td>
<td>8</td>
<td>X</td>
<td>Number of requests</td>
</tr>
<tr>
<td>33</td>
<td>8</td>
<td>X</td>
<td>Number of read misses</td>
</tr>
<tr>
<td>41</td>
<td>8</td>
<td>X</td>
<td>System write pendings</td>
</tr>
<tr>
<td>49</td>
<td>8</td>
<td>X</td>
<td>Device write pendings</td>
</tr>
<tr>
<td>56</td>
<td></td>
<td></td>
<td>Object length</td>
</tr>
</tbody>
</table>

**DSTAT Port Statistics: EMCSRDF_DSTAT#_PT**

**Note:** A variable length object header precedes this data.

**Table 74** Function 17, Object name: DSTAT, DSTAT Port Statistics: EMCSRDF_DSTAT#_PT

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>X</td>
<td>Port#</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td>5</td>
<td>8</td>
<td>X</td>
<td>Port io</td>
</tr>
<tr>
<td>13</td>
<td>8</td>
<td>X</td>
<td>Port thru</td>
</tr>
<tr>
<td>21</td>
<td>8</td>
<td>X</td>
<td>Port read count</td>
</tr>
<tr>
<td>29</td>
<td>8</td>
<td>X</td>
<td>Port write count</td>
</tr>
<tr>
<td>37</td>
<td>8</td>
<td>X</td>
<td>Port KB_read</td>
</tr>
<tr>
<td>45</td>
<td>8</td>
<td>X</td>
<td>Port KB_write</td>
</tr>
</tbody>
</table>
### Table 74  Function 17, Object name: DSTAT, DSTAT Port Statistics: EMCSRDF_DSTAT#_PT

<table>
<thead>
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<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>53</td>
<td>8</td>
<td>X</td>
<td>Port read thru KB</td>
</tr>
<tr>
<td>61</td>
<td>8</td>
<td>X</td>
<td>Port write thru KB</td>
</tr>
<tr>
<td>69</td>
<td>24</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>92</td>
<td></td>
<td>Object length</td>
</tr>
</tbody>
</table>

### Function 20, Object name: DEVICE ID

### Table 75  Function 20, Object name: DEVICE ID

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12</td>
<td>C</td>
<td>Storage system serial number</td>
</tr>
<tr>
<td>13</td>
<td>2</td>
<td>X</td>
<td>Controller type (3880, 3990, 2105, or 2107)</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
<td>X</td>
<td>Controller model:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E8 - IBM internal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E9 - 3990 Mod 6 Enhanced Operating Mode 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>EC - 3990 Model 6 Basic</td>
</tr>
<tr>
<td>16</td>
<td>2</td>
<td>C</td>
<td>Storage system type:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>X'06'=SYM6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>X'07'=SYM7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>X'08'=SYM8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>X'09'=SYM9</td>
</tr>
<tr>
<td>18</td>
<td>2</td>
<td>X</td>
<td>Operating environment level (5072/76/77/78)</td>
</tr>
<tr>
<td>20</td>
<td>3</td>
<td>C</td>
<td>Manufacturer (IBM internal)</td>
</tr>
<tr>
<td>23</td>
<td>2</td>
<td>X</td>
<td>Subsystem ID</td>
</tr>
<tr>
<td>25</td>
<td>1</td>
<td>C</td>
<td>Partition ID</td>
</tr>
<tr>
<td>26</td>
<td>1</td>
<td>X</td>
<td>LSS</td>
</tr>
<tr>
<td>27</td>
<td>4</td>
<td>C</td>
<td>Reserved</td>
</tr>
<tr>
<td>31</td>
<td>4</td>
<td>X</td>
<td>PowerMax/VMAX device number 4 bytes</td>
</tr>
<tr>
<td>35</td>
<td>2</td>
<td>X</td>
<td>Device type</td>
</tr>
<tr>
<td>37</td>
<td>1</td>
<td>X</td>
<td>Device model:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>02/06/0C/0A - 3390</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>96/8A/9E - 3380</td>
</tr>
<tr>
<td>38</td>
<td>4</td>
<td>X</td>
<td>Device size (number of cylinders for a CKD device or number of blocks for an FBA device)</td>
</tr>
<tr>
<td>42</td>
<td>2</td>
<td>X</td>
<td>Physical block (FBA only)</td>
</tr>
<tr>
<td>44</td>
<td>1</td>
<td>X</td>
<td>Device class (IBM internal)</td>
</tr>
<tr>
<td>45</td>
<td>1</td>
<td>X</td>
<td>Device code (IBM internal)</td>
</tr>
<tr>
<td>46</td>
<td>1</td>
<td>X</td>
<td>UADDR - Device Unit Address</td>
</tr>
<tr>
<td>47</td>
<td>1</td>
<td>X</td>
<td>LADDR - LOGICAL DEVICE ADDR</td>
</tr>
</tbody>
</table>
Table 75  Function 20, Object name: DEVICE ID

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>48</td>
<td>1</td>
<td>X</td>
<td>PADDR - PHYSICAL DEVICE ADDR</td>
</tr>
<tr>
<td>49</td>
<td>1</td>
<td>C</td>
<td>PowerMax/VMAX device number is valid</td>
</tr>
<tr>
<td>50</td>
<td>1</td>
<td>C</td>
<td>Not at minimum operating environment level</td>
</tr>
<tr>
<td>51</td>
<td>1</td>
<td>C</td>
<td>FBA device</td>
</tr>
<tr>
<td>52</td>
<td>1</td>
<td>C</td>
<td>VIRTUAL device</td>
</tr>
<tr>
<td>53</td>
<td>1</td>
<td>C</td>
<td>CKD device</td>
</tr>
<tr>
<td>54</td>
<td>1</td>
<td>C</td>
<td>Meta head</td>
</tr>
<tr>
<td>55</td>
<td>1</td>
<td>C</td>
<td>Meta device</td>
</tr>
<tr>
<td>56</td>
<td>5</td>
<td>C</td>
<td>Reserved</td>
</tr>
<tr>
<td>61</td>
<td>1</td>
<td>C</td>
<td>PAV alias device</td>
</tr>
<tr>
<td>62</td>
<td>1</td>
<td>C</td>
<td>PAV base device</td>
</tr>
<tr>
<td>63</td>
<td>2</td>
<td>X</td>
<td>Reserved</td>
</tr>
<tr>
<td>65</td>
<td>4</td>
<td>X</td>
<td>Base device number for a PAV alias device</td>
</tr>
<tr>
<td>69</td>
<td>8</td>
<td>X</td>
<td>Reserved</td>
</tr>
</tbody>
</table>

| 76     |        |      | Object length                                                               |

Function 22, Object name: Pool General Information

Table 76  Function 22, Object name: Pool General Information

<table>
<thead>
<tr>
<th>Offset</th>
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<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12</td>
<td>C</td>
<td>Pool name</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>.NOPOOL indicates a bogus pool.</td>
</tr>
<tr>
<td>13</td>
<td>2</td>
<td>X</td>
<td>Index offset</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FFFF - Bogus pool</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
<td>X</td>
<td>Status</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 - Pool is undefined</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 - Pool is available</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3 - Pool is full</td>
</tr>
<tr>
<td>16</td>
<td>1</td>
<td>C</td>
<td>Device type</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A - AS400</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>B - 3380</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C - 3390</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>F - FBA</td>
</tr>
</tbody>
</table>
### Function 23, Object name: Pool Status Information

#### Table 77  Function 23, Object name: Pool Status Information

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>X</td>
<td>Number of devices</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>X</td>
<td>Number of free tracks</td>
</tr>
<tr>
<td>9</td>
<td>4</td>
<td>X</td>
<td>Number of used tracks</td>
</tr>
</tbody>
</table>

| 12 | Object length |

#### Pool Device Information Object

#### Table 78  Function 23, Object name: Pool Status Information, Pool Device Information Object

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>X</td>
<td>Device number</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>X</td>
<td>Free tracks</td>
</tr>
<tr>
<td>9</td>
<td>4</td>
<td>X</td>
<td>Used tracks</td>
</tr>
<tr>
<td>13</td>
<td>2</td>
<td>X</td>
<td>Pool offset</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
<td>C</td>
<td>Device type</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A - AS400</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>B - 3380</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C - 3390</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>F - FBA</td>
</tr>
<tr>
<td>16</td>
<td>1</td>
<td>X</td>
<td>Status</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 - Pool is undefined</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 - Pool is available</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3 - Pool is full</td>
</tr>
<tr>
<td>17</td>
<td>1</td>
<td>X</td>
<td>Drain status</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0 - Not Draining</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 - Draining</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 - Waiting for freespace</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4 - Protected</td>
</tr>
</tbody>
</table>

| 17 | Object length |
## Function 26, Object name: EPVOL

EPVOL record: EMCSRDF_EPVOL.#

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8</td>
<td>X</td>
<td>Capacity</td>
</tr>
<tr>
<td>9</td>
<td>8</td>
<td>X</td>
<td>Used blocks (Block alc)</td>
</tr>
<tr>
<td>17</td>
<td>4</td>
<td>X</td>
<td>PowerMax/VMAX device number</td>
</tr>
<tr>
<td>21</td>
<td>4</td>
<td>X</td>
<td>Spindle ID</td>
</tr>
<tr>
<td>25</td>
<td>2</td>
<td>X</td>
<td>Disk group number</td>
</tr>
<tr>
<td>27</td>
<td>2</td>
<td>X</td>
<td>Block size</td>
</tr>
<tr>
<td>29</td>
<td>2</td>
<td>X</td>
<td>External disk director (DX) # 1</td>
</tr>
<tr>
<td>31</td>
<td>2</td>
<td>X</td>
<td>External disk director (DX) # 2</td>
</tr>
<tr>
<td>33</td>
<td>1</td>
<td>X</td>
<td>Port mask for DX # 1</td>
</tr>
<tr>
<td>34</td>
<td>1</td>
<td>X</td>
<td>Port mask for DX # 2</td>
</tr>
<tr>
<td>35</td>
<td>32</td>
<td>C</td>
<td>Disk group name</td>
</tr>
<tr>
<td>67</td>
<td>64</td>
<td>X</td>
<td>WWID (WWN)</td>
</tr>
<tr>
<td>131</td>
<td>1</td>
<td>X</td>
<td>WWID (WWN) length</td>
</tr>
<tr>
<td>132</td>
<td>1</td>
<td>X</td>
<td>EMCSRDF_FLAG1 01-DV NOT READY 02-DV ENCAPSULATED</td>
</tr>
<tr>
<td>133</td>
<td>1</td>
<td>X</td>
<td>EMCSRDF_MISC_FLGS 01-FLEX GEOMETRY 02-VBE IMPORTED 04-SPACE EFFICIENT FLASH 08-FTS CAP LTD</td>
</tr>
<tr>
<td>134</td>
<td>1</td>
<td>X</td>
<td>EMCSRDF_TECHNLGY 04-TECH EXTERNAL</td>
</tr>
<tr>
<td>135</td>
<td>1</td>
<td>X</td>
<td>EMCSRDF_FLAG2 80-EXTERNAL 40-ENCAP-VP 20-ENCAP-DP 10-ENCAP-THIN-DATA 01-EXTERNAL-THIN-DATA</td>
</tr>
<tr>
<td>136</td>
<td>2</td>
<td>X</td>
<td>Host CUU</td>
</tr>
<tr>
<td>138</td>
<td>1</td>
<td>X</td>
<td>Channel set ID (for future use)</td>
</tr>
<tr>
<td>139</td>
<td>1</td>
<td>X</td>
<td>EMCSRDF_FLAG3 10-INVALID MVS CUU</td>
</tr>
<tr>
<td>140</td>
<td>1</td>
<td>X</td>
<td>RESERVED1</td>
</tr>
</tbody>
</table>
**Function 27, Object name: FADEV**

Base FA Device Information: EMCSRDF_FADEVB.#

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>X</td>
<td>Device number</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>Object length</td>
</tr>
</tbody>
</table>

FADEV Director Information: EMCSRDF_FADEV#_DIR

**Note:** A variable length object header precedes this data.

<table>
<thead>
<tr>
<th>Offset</th>
<th>Length</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>X</td>
<td>SRDF Director Number</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>C</td>
<td>SymmWin Director Number</td>
</tr>
<tr>
<td>9</td>
<td>4</td>
<td>C</td>
<td>Director Type</td>
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<tr>
<td>13</td>
<td>1</td>
<td>X</td>
<td>EMCSRDF_FADEV_FLAG1</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>80 – Port 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>40 – Port 1</td>
</tr>
<tr>
<td>14</td>
<td>1</td>
<td>X</td>
<td>Reserved 1</td>
</tr>
<tr>
<td>15</td>
<td>2</td>
<td>X</td>
<td>Reserved 2</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
<td>Object length</td>
</tr>
</tbody>
</table>
REXX Interface
APPENDIX 1
Director and Volume Status

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.

- Introduction ................................................................. 588
- Remote link director and the host .................................... 588
- SRDF volume statuses and the host ................................. 589
Introduction

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.

Remote link director and the host

Table 82 provides an explanation of remote link director statuses and their relationship with the host.

Table 82  Link status and recovery

<table>
<thead>
<tr>
<th>#SQ LINK</th>
<th>CONN</th>
<th>STATUS</th>
<th>Host impact</th>
<th>Probable cause</th>
<th>Actions to return to normal status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Y</td>
<td>ONLINE</td>
<td>Normal status.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>ONLINE</td>
<td>No synchronization can take place on this link; if all links are in this status, invalid R2 tracks accumulate on the source (R1) volume.</td>
<td>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 storage system.</td>
<td>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 storage system, if necessary.</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>OFFLINE</td>
<td>No synchronization can take place on this link; if all links are in this status, invalid R2 tracks accumulate on the source (R1) volume.</td>
<td>An #SC LINK, cuu, dir#, OFFLINE command was issued for the local storage system.</td>
<td>Issue an #SC LINK, cuu, dir#, ONLINE command for the local storage system.</td>
</tr>
</tbody>
</table>
SRDF volume statuses and the host

Table 83 provides an explanation of SRDF volume statuses and their relationship with the host.

<table>
<thead>
<tr>
<th>#SQ VOL</th>
<th>Device type</th>
<th>Host impact</th>
<th>Probable cause</th>
<th>Actions to return to normal status</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNTLUNIT STATUS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R/W-xx-x</td>
<td>R1</td>
<td>Normal status.</td>
<td>The default storage system configuration status for target (R2) volumes.</td>
<td>To set the target (R2) volume into recovery mode (host R/W), issue an #SC VOL, cuu, R/W command.</td>
</tr>
<tr>
<td>R/O-xx-x</td>
<td>R2</td>
<td>Normal R2 status.</td>
<td>An #SC VOL, cuu, R/O command was issued from the R2 host.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The host may read from the target (R2) volume, but all host write I/O receive a Unit Check error (write disabled).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NR-xx-x</td>
<td>R2</td>
<td>Optional R2 status.</td>
<td>A storage system configuration option for target (R2) volumes. An #SC VOL, cuu, NRDY command was issued from the R2 host.</td>
<td>Issue an #SC VOL, cuu, RDY command.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The target (R2) volume does not come online during host IPL.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If an I/O is attempted, an intervention required status is returned.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R/W-xx-x</td>
<td>R2</td>
<td>The host may write to the target (R2) volume.</td>
<td>An #SC VOL, cuu, R/W command was issued.</td>
<td>Issue an #SC VOL, cuu, R/O command.</td>
</tr>
<tr>
<td>LNR-xx-x</td>
<td>R1</td>
<td>Link not ready, no synchronization occurs, R2 invalid tracks accumulate on the source (R1) volume.</td>
<td>The link is disabled (see Table 82 on page 588).</td>
<td>Issue an #SQ LINK, cuu command. See Table 82 for recovery procedures.</td>
</tr>
<tr>
<td>TNR-xx-x</td>
<td>R1</td>
<td>Target not ready, no synchronization occurs, R2 invalid tracks accumulate on the source (R1) volume.</td>
<td>An #SC VOL, cuu, RDF_SUSP command was issued from the R1 host, 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.</td>
<td>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, “Recovery Procedures”.</td>
</tr>
</tbody>
</table>
### Table 83 Volume status and recovery (page 2 of 2)

<table>
<thead>
<tr>
<th>CNTLUNIT STATUS*</th>
<th>Device type</th>
<th>Host impact</th>
<th>Probable cause</th>
<th>Actions to return to normal status</th>
</tr>
</thead>
<tbody>
<tr>
<td>RNR-xx-x</td>
<td>R1 or R2</td>
<td>If I/O is attempted, an intervention required status is returned.</td>
<td>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.</td>
<td>Ensure that the links and the partner device are ready, and issue an #SC VOL_cuu,RDF_RDY command.</td>
</tr>
<tr>
<td>UNR-xx-x</td>
<td>User not ready.</td>
<td></td>
<td>1. A prior HOLD is on the BCV. There could be an active clone or snap to the device. Also, the status could be set by Dell EMC Solutions Enabler symconfigure to manage access to the device. 2. A ConGroup-managed RDF-ECA window has closed with a UNR device state. Most commonly, ConGroup management of FBA devices.</td>
<td>1. Issue a CONFIG (TARGET(UNIT(device))) READY(YES)RELEASE(YES) command from the TimeFinder/Clone Mainframe Snap Facility. 2. Use the ECGUTIL utility.</td>
</tr>
<tr>
<td>RWD-xx-x</td>
<td>R1</td>
<td>Source volume is disabled to the link, no synchronization occurs, R2 invalid tracks accumulate on the source (R1) volume.</td>
<td>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.</td>
<td>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. Note: 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, “Recovery Procedures.”</td>
</tr>
</tbody>
</table>

---

*a. Tables 8 through 11 provide a complete listing of CNTLUNIT status values that may display.*