DELLEMC

Dell EMC™ Mainframe Enablers AutoSwap™ for z/OS

Version 8.3

Product Guide

REV 02

DELLEMC

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PREFACE

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 product release notes provide the most up-to-date information about product features.

Contact your Dell EMC representative 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 on the Dell EMC Online Support website. Check the Dell EMC Online Support website to ensure that you are using the latest version of this document.

Purpose

This guide describes Dell EMC AutoSwap from the perspective of the AutoSwap for z/OS and Consistency Groups for z/OS users.

Coverage

This documents describes AutoSwap for z/OS when used in the following VMAX operating environments supported by Mainframe Enablers 8.3:

◆ PowerMaxOS 5978

◆ HYPERMAX OS 5977

◆ Enginuity™ 5876

Note: See prior versions of the *AutoSwap for z/OS Product Guide* for information pertaining to other Enginuity levels.

Audience

This guide is intended for the host system administrator, system programmer, or operator who is evaluating, planning for, managing, or using Dell EMC AutoSwap.

Related documentation

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

www.dellemc.com/en-us/documentation/vmax-all-flash-family.htm

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*
- *SRDF™ Host Component for z/OS Product Guide*
- *AutoSwap™ for z/OS Product Guide*
- *Consistency Groups for z/OS Product Guide*
- *TimeFinder™ SnapVX and zDP™ Product Guide*
- *TimeFinder/Clone Mainframe Snap Facility Product Guide*
- *TimeFinder/Mirror for z/OS Product Guide*
- *TimeFinder Utility 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.

Conventions used in this document

Dell EMC uses the following conventions for special notices:

⚠CAUTION

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.

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 supplied 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.

Dell EMC Live Chat—Open a Chat or instant message session with a Dell EMC Support Engineer.

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For help with missing or incorrect entitlements after activation (that is, expected functionality remains unavailable because it is not licensed), contact your Dell EMC Account Representative or Authorized Reseller.

For help with any errors applying license files through Solutions Enabler, contact Dell EMC Customer Support.

If you are missing a LAC letter, or require further instructions on activating your licenses through the Online Support site, contact Dell EMC's worldwide Licensing team at licensing@emc.com or call:

◆ North America, Latin America, APJK, Australia, New Zealand: SVC4EMC (800-782-4362) and follow the voice prompts.

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

Your comments

Your suggestions 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 AutoSwap

Dell EMC AutoSwap™ 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*

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1. zDP requires TimeFinder SnapVX but is a separately licensed product.

Introduction to AutoSwap

AutoSwap can move (swap) workloads from volumes in one set of storage systems to volumes in other storage systems without interruption of operations. Swaps can be initiated manually as planned events or automatically as unplanned events upon failure detection.

You can use AutoSwap in both shared and non-shared DASD environments. AutoSwap uses standard z/OS operating system services to ensure serialization and to affect swaps. AutoSwap uses the Cross System Communication (CSC) component of ResourcePak Base to coordinate swaps across multiple z/OS images in a shared DASD or parallel sysplex environment. Because AutoSwap uses SCF, the AutoSwap consistency environment can span multiple LPARs, within or outside parallel sysplexes, multiplexes, or combinations of these.

AutoSwap is available in two operation modes:

◆ CAX

◆ Basic AutoSwap

CAX

AutoSwap is primarily used with Consistency Groups for z/OS (ConGroup) to ensure uninterrupted operations while ConGroup maintain data consistency.

Note: The *Consistency Groups for z/OS Product Guide* describes ConGroup.

When used in conjunction with ConGroup, AutoSwap is referred to as CAX (ConGroup AutoSwap Extension).

CAX is the normal AutoSwap mode. In the CAX mode, AutoSwap functions are invoked:

◆ By you, through commands directed to the ConGroup address space

◆ Automatically, according to rules defined by ConGroup parameters

In a ConGroup environment, you use CAX for unplanned (automatic) swaps.

The *Consistency Groups for z/OS Product Guide* provides information about CAX.

Basic AutoSwap

In addition to CAX, some of the AutoSwap functionality is also available as part of ResourcePak Base.

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

This limited "basic" mode of AutoSwap does not require ConGroup. It is used in situations where ConGroup is not, or cannot be, active (for example, to return to the original configuration after an automatic swap).

Basic AutoSwap is required if you intend to use dynamic Auto-Swapping services while using z/OS Migrator.

Note: The *z/OS Migrator Product Guide* describes z/OS Migrator.

Basic AutoSwap only handles planned swaps.

Security

AutoSwap verifies all operator commands through the SAF interface.

The AutoSwap commands require UPDATE access to the resource, with the exception of DISPLAY, which only requires READ access to the resource.

Note: There is no SAF checking for commands that are read from the startup configuration file (CONFIGCA).

To change the security settings, see the *Mainframe Enablers Installation and Customization Guide* for instructions on how to customize the security interface.

The resource information includes the following:

Resource Name	EMC.ADMIN.CMD.AUTOSWAP[.*<autoswap_command>*]
Class	XFACILIT
Attribute	Update for commands that affect AutoSwap, or Read for commands that are display-only.

CHAPTER 2
Getting Started

This chapter covers the following topics:

Post-installation

After you install Mainframe Enablers, as described in the *Mainframe Enablers Installation and Customization Guide*, choose whether you want to use AutoSwap as an extension of ConGroup (CAX) or through ResourcePak Base (Basic AutoSwap).

Note: "Introduction to AutoSwap" on page 13 describes AutoSwap operation modes.

◆ To use CAX, follow the procedures provided in the *Consistency Groups for z/OS Product Guide* for the following steps:

- Configure the ConGroup environment.

- Enable and set up CAX.

- Start the ConGroup task with the SUB=MSTR parameter.

◆ To use basic AutoSwap, follow the procedures provided in the *ResourcePak Base for z/OS Product Guide* for running AutoSwap in the SCF address space.

Configuring AutoSwap

For CAX, see the *Consistency Groups for z/OS Product Guide*.

For Basic AutoSwap, see the *ResourcePak Base for z/OS Product Guide*.

Running AutoSwap

AutoSwap runs as part of ConGroup (CAX) or ResourcePak Base (Basic AutoSwap), as described in the *Consistency Groups for z/OS Product Guide* and *ResourcePak Base for z/OS Product Guide*. No special arrangements are required.

CONFIGCA DD statement

When AutoSwap runs as part of ConGroup, you can use the CONFIGCA DD statement of the ConGroup started task to run AutoSwap commands, as described in the *Consistency Groups for z/OS Product Guide*.

Swap service messages

Swap Services is a basic component in a number of the Mainframe Enablers products.

Message format

AutoSwap can generate swap services messages in the following format:

prefyyyz (*rrrrr*)(PID *ppppp*)

If messages are routed from a non-owner LPAR to the owner LPAR through the RouteMessageToOwner option described in "ROUTEMeSsaGetoowner" on page 86, the following format is used:

prefyyyz (>*hhhh*)(PID *ppppp*)

Where:

pref

> Identifies the message prefix. To make it easier to determine which application generated the message, Swap Services uses a message prefix that identifies the application that is the source of the message.
>
> Some of the prefixes are as follows:
>
> - ESWP for AutoSwap for z/OS
> - CGRS for Consistency Groups for z/OS
> - SCFS for ResourcePak Base for z/OS
> - FMMS for Migrator for z/OS
>
> For definition of other prefixes, use Dell EMC Support as described in "Where to get help" on page 9.

yyy

> The message code.

z

> The message postfix, such as E for errors and W for warnings.

rrrrr

> The request sequence number that identifies the AutoSwap command request on a particular host. This value is incremented each time a new command request is made. All messages associated with the same request on the same host are prefixed by the same request sequence number.

>hhhh

> The SMF ID of the host where the message was routed. If the RouteMessagetoOwner option is specified as described in "ROUTEMeSsaGetoowner" on page 86, messages routed from the non-owner LPAR to the owner LPAR contain the issuing host ID instead of a request sequence number. The format is >*hhhh*, where *hhhh* is the SMF ID.
>
> For example, >HIC3 indicates the message was routed from host HIC3.

ppppp

> A process ID (PID) that is a unique incrementing value for each swap validation or swap process (that is, device pair) for the same swap group definition. This value always follows the request sequence number or host ID to uniquely identify the messages relating to the same device pair swap within the same swap group.
>
> When a cross-system validation or swap is performed, the same PID is used on all hosts. The PID is set by the AutoSwap owner host when the swap group is created and will remain the same for the life of the swap group.

Verbosity

Some messages are only produced when the currently set verbosity level is greater than or equal to the verbosity level of the message.

Note: You set the required verbosity level using the SET VERBOSE command described in "SET VERBOSE" on page 70.

Error messages and most warning messages are always produced no matter what verbosity level is set. Verbosity levels are listed in Table 1.

Table 1 Verbosity levels

Verbosity level	Description
0	Messages that are basic summaries of a condition or state. Such messages are initially interesting, but describe a condition that occurs regularly, and thus generates a large number of messages.
	For example, message 238I indicates that a device is available for AutoSwap. Message 238I might be interesting initially but it becomes a nuisance under normal operation.
	Generally, level 0 messages are messages that were not originally verbose, but are now verbose because of the volume of such messages that are generated.
1	Messages relating to the initiation and termination of a swap and/or device validation
2	Messages relating to the initiation of a swap/validation phase
3	Inter-phase informational messages
4	Non-SRDF swap processing informational messages
10	Swap request initiation/termination messages

Typographical conventions

Within a message, single quotes (' ') are used around the FROM and TO device specification to denote and prevent confusion with the usage of the words FROM and TO.

The default for messages is mixed-case. Use the SET CAPS command for uppercase format.

The convention of [ ] indicates optional information is added to a message. A | indicates an either (or) condition.

Message substitution fields

Swap services messages use standard symbols for substitution fields. The symbols are listed in Table 2.

Table 2 Substitution symbols

Symbol	Description
sdddd (or dddd)	The device number consisting of the subchannel set number (*s*) and the 4 digit z/OS device number (*dddd*).
	If the set number is not visible, and the number reads *dddd*, the set is automatically assumed as the active set number.
ccccc,ssssssss	The format used where an z/OS device number (CCUU) could not be located.
	ccccc = The storage system serial number.
	ssssssss = The PowerMax/VMAX device number. The leading 2 digits are suppressed when zero.
ccccc	Storage system ID
ssssssss	PowerMax/VMAX device number. The leading 2 digits are suppressed when zero.
ppppp	Process ID (PID)
rrrrr	Request sequence number
gg	SRDF group
xxxxxxx	RC
yyyyyyyy	RS
zzzzzzzz	Extended RS
uuuuuuuu	UCB address
xxxxxxxxxxxxxxx	The host identifier (*xxxxxxxxxxxxxxx*) is a 16-digit hexadecimal value describing the SCF host which responded to the request. The value is interpreted as:
	`ttccxxxxxxxxaaaa`
	Where:
	tt is the operating system type. Valid values include:
	• 01 indicates z/OS.
	• '- -' indicates that SCF is not active or the host type is unknown. This is only displayed where path groups are defined to a device and an active SCF CSC cannot be located.
	cc is the CPU address of LPAR identifier (when in LPAR mode).
	xxxxxxxx is the CPU identifier and machine type (model number).
	aaaa is the address space identifier (ASID) of SCF on that host.
	'- - - -' indicates that SCF is not active. This is only displayed where path groups are defined to a device and an active SCF CSC session cannot be located.

CHAPTER 3
Swapping Workloads

This chapter covers the following topics:

Overview

AutoSwap switches the application workload from *source (FROM) devices* to *target (TO) devices*. Source and target devices are in a SRDF relationship (R1 and R2).

Note: AutoSwap requires SRDF synchronous mode.

To specify devices that are eligible for a swap, you create a *swap group* and fill it with the required devices. Devices that you add to a swap group are the source (FROM) devices. The corresponding target (TO) devices are determined automatically based on the existing SRDF relationship.

Note: "What you can swap" on page 24 lists types of devices that can be included in a swap group.

AutoSwap monitors the swap group and performs a swap when an outage (host I/O or R1 device failure) occurs or as a result of the operator command.

Note: "Planned and unplanned swaps" on page 26 discusses *planned* (manual) swaps and *unplanned* (automatic) swaps. "Swap process" on page 31 describes the process of swapping.

After a swap has occurred, resulting in I/O being redirected to R2s, you can choose either of the following options:

◆ Return I/O to R1s. To do this, you swap back to R1s immediately after the original swap.

◆ Keep the new configuration for a while with ConGroup and AutoSwap protection re-enabled and then return I/O to the R1s.

Resuming operations after a swap may require creating a new group of devices associated with the original swap group. This group is called a *complement group*.

Note: The *Consistency Groups for z/OS Product Guide* describes how to resume operations after a swap and create a complement group.

Dependent write consistency

AutoSwap performs swaps while maintaining *dependent write consistency*.

Note: The *Consistency Groups for z/OS Product Guide* provide information about dependent write consistency and the technology used to maintain it.

This type of swap is called *consistent swap*. A consistent swap results in a restartable image, even if single or multiple failures occur during the swap process.

Consistent swaps ensure that the swap is a unique, atomic operation that maintains dependent write consistency. Consistent swaps use Dell EMC consistency technology to temporarily "freeze" write operations to the entire swap group during the swap.

Consistency technology honors a guaranteed sequence of updates in the I/O stream to a group of devices that are remotely mirrored. Consistency technology is provided by ConGroup.

Applications, database systems, and system components (such as VTOC processing) require and ensure sequence integrity by waiting for successful completion of one update before requesting the next.

In a remote disk copy environment, data consistency cannot be ensured if a later update was remotely mirrored when its predecessor was not. This can happen when remote link failure(s) affect only a subset of the disk controllers that are performing the remote copy function.

When a transmission to a remote storage system fails, ConGroup halts subsequent (possibly dependent) writes to all remote DASD systems containing members of the group of devices. The synchronous relationship is suspended on all subsystems until recovery action is taken. ConGroup ensures that all LPARs are aware of these changes. Should the local system fail, the remote system is in a restartable condition.

System users may notice slight performance degradation during a consistent swap. This usually lasts no more than a few seconds. The degree of impact depends upon factors, such as the number of volumes being swapped, overall workload, and write content.

Note: The *Consistency Groups for z/OS Product Guide* describes the technology used to maintain data consistency.

What you can swap

You can swap the following items:

◆ SRDF volumes

◆ Page datasets

◆ Couple datasets

◆ PAV devices

◆ MIDAW

◆ HRO-controlled devices

SRDF volumes

Any volumes you swap must be in a valid SRDF /Synchronous relationship.

Usually, volumes to be swapped are defined as members of named groups, and the swap function applies to the entire group. When a group is swapped, all volumes in the group are swapped at the same time. AutoSwap briefly suspends I/O to all volumes in the group during the swap process. This ensures that the destination volumes contain current data at the completion of the swap.

Page datasets

To use page datasets, the following requirements must be met:

◆ Both source (FROM) and target (TO) devices must reside on storage systems with PowerMaxOS 5978, HYPERMAX OS 5977, or Enginuity 5876.

◆ The started task that performs the swap runs with the SUB=MSTR parameter.

> **Note:** The *Consistency Groups for z/OS Product Guide* discusses use of the SUB=MSTR parameter.

◆ Each device must be dedicated to page dataset usage, and only online to one host. Each device can have more than one page dataset.

If the device is configured this way, you may use the z/OS PAGEADD and PAGEDEL commands to add and delete page datasets on volumes in groups under AutoSwap control.

◆ A volume containing page datasets must not be shared and must be dedicated to those page datasets.

This is required to enable special checkpoint processing that AutoSwap uses for page datasets.

Normally, a swap involves many checkpoints. However, to avoid negative system impact, AutoSwap uses fewer checkpoints for page datasets and OPS/MVS DIV datasets.

◆ Swap groups that contain devices with page datasets must also include at least one non-page dataset device. The additional checkpoints for the non-page dataset device are necessary for complete processing of the AutoSwap group.

◆ AutoSwap only performs an R1-to-R2 swap for paging devices. R2-to-R1 swaps are not supported. Therefore, a return swap must be preceded by an SRDF personality swap. Personality swaps require Dynamic SRDF.

Note: The *SRDF Host Component for z/OS Product Guide* describes SRDF personality swaps.

Couple datasets

The only supported type of couple datasets are LOGR.

Do not configure sysplex couple datasets on SRDF devices or define sysplex couple datasets in a swap group. AutoSwap does not support active XCF couple datasets.

PAV devices

You can use PAV devices while keeping the following points in mind:

◆ Only use the addresses of base PAV devices in the groups. Do not use the addresses of aliases.

◆ To continue using the PAV mode after a swap, you should have the PAV enabled for the target (TO) device in the Bin file.

MIDAW

If MIDAWs [1] are enabled on a source device, they must be enabled on the target (TO) device.

HRO-controlled devices

It is possible to configure HRO (Host Read-Only) devices and make them available to a swap group. In addition, an online target read-only R2 can remain read-only following a swap on the selected LPARs.

The *ResourcePak Base for z/OS Product Guide* describes HRO-controlled devices and configuration parameters required to use them.

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1. Modified Indirect Data Address Words. See *IBM z/Architecture Principles of Operation*, publication number SA22-7832.

Planned and unplanned swaps

There are two types of swaps that AutoSwap can perform:

◆ Planned swaps

◆ Unplanned swaps

Planned swaps

Planned swaps are swaps that are staged at the direction of site personnel when certain planned events must take place. Planned swaps can facilitate many functions such as non-disruptive building maintenance, power reconfiguration, DASD relocation, and channel connectivity reorganization.

You can use planned swaps to eliminate the impact of short-term unavailability of storage system DASD at the source side. Such a reason may be as simple as:

◆ The need to move systems as part of a computer room reconfiguration

◆ The need to reconfigure power systems or channel connectivity

In addition to establishing SRDF mirrors of data, consider creating an extra dependent write consistent copy of data on TimeFinder BCVs for added protection during this period.

Planned swaps have different needs. They can usually be deferred if failures occur during the swap setup. For example, if an LPAR becomes unavailable during a swap, it is generally safer to abort the swap and attend to the problem. Swapping may make the situation worse.

You generally perform planned swaps through ConGroup (CAX). The *Consistency Groups for z/OS Product Guide* provides information about performing planned swaps in a ConGroup environment.

Unplanned swaps

Unplanned swaps are automatically initiated when certain situations are detected. Unplanned swaps can protect systems against outages of various kinds. Examples include failures occurring to power supply, building infrastructure, air conditioning, channel connectivity or entire DASD subsystems, operator error or the consequences of intended or unintended sprinkler discharge.

Unplanned swaps provide continuity of operation in the event of certain failures. For example, if device(s) become unreachable by the host, AutoSwap attempts to switch access to devices at the other end of the SRDF/S (synchronous) links. This is always a group swap covering all devices in the group.

An unplanned swap should not be a total surprise. In fact, most unplanned swaps should be caused by "anticipated" events. Anticipated events are those you would prefer did not happen, but for which you must plan. An example would be a power failure for which you already had procedures in place.

The objective of an unplanned swap is continuity of operation of the z/OS system(s). In some cases, the triggering reasons which call for a swap may involve such a serious loss of resources that the swap fails. Even if operational continuity is not achieved, ConGroup is there to ensure dependent write consistency. This ensures that you have a restartable image.

Unplanned swaps handle emergencies. In emergency cases, you expect errors or unusual conditions to occur. For example, an LPAR may lose connectivity with other LPARs in the complex. You generally choose parameter settings that force the swap to continue in an emergency.

You should consider what you want to happen when you restore the original source system to an operational state. One of the requirements you should keep in mind is the need to reestablish protection of data quickly with two copies across the SRDF/S links. Until this occurs, you have a reduced level of data protection.

While the original source system was unavailable, the z/OS systems were updating the target storage systems, creating differences between this copy of the data and the copy in the original source. The storage systems can handle these differences. They use this information to resynchronize the copies differentially.

You set up the conditions under which you want an unplanned swap to occur in ConGroup (CAX). Then, when such a situation does occur, CAX executes the swap on your settings.

The *Consistency Groups for z/OS Product Guide* provides information about configuring unplanned swaps in a ConGroup environment.

Avoid unnecessary swaps

You should always keep in mind what a swap means for your data. Online swaps involve suspension of SRDF and ConGroup operations.

When a swap starts, the primary copy is frozen at that point in time. Only the secondary copy is updated. Until SRDF and ConGroup are operational again, there is reduced duplication and protection of the data in the SRDF configuration. After the swap at the site, the applications may still be running and the target (R2) devices have become the new primary devices.

For these reasons, you should only initiate swaps when you have a good reason to do so; for example, as a necessary planned outage requiring a swap.

Resuming operations after swap

The *Consistency Groups for z/OS Product Guide* describes how to resume operations after a swap.

Summary of operations

Managing swap groups

Table 3 lists operations for managing swap groups.

Table 3   Managing swap groups

Operation	Control
Create swap group	DEFINE GROUP command
Set AutoSwap options for a swap group	DEFINE GROUP command
Create complement group to swap group	DEFINE GROUP command, COMPLEMENT parameter
Fill swap group with devices	DEFINE GROUP command
Replace swap group	DEFINE GROUP command, REPLACE parameter
Delete swap group	DELETE GROUP command
View swap groups	DISPLAY GROUP command
View AutoSwap options set for swap group	DISPLAY GROUP command, SDASOPTions parameter

Validating swap groups

Table 4 lists operations for swap group validation.

Table 4   Validating swap groups

Operation	Control
Validate swap group prior to swapping	SWAP GROUP command, VALIDATE parameter
Validate swap group	VALIDATE GROUP command
Enable/disable prevalidation of swap groups	PREVALidate AutoSwap option
Enable periodic swap group validation and set interval	ValidateINTerval AutoSwap option
Display alternate subchannel configuration issues for a swap group	DISPLAY GROUP command, ALTSSMissing parameter

Verifying devices

Table 5 lists device verification settings.

Table 5   Device verification settings

Operation	Control
Allow/prohibit swap of devices with Concurrent Copy sessions	AllowConcurrentCopy AutoSwap option
Bypass verification of devices with Concurrent Copy sessions	NOCHECKConcurrentCopy AutoSwap option
Allow/prohibit swap of devices with Snap or FlashCopy sessions	AllowSnapSession AutoSwap option
Bypass verification of devices with Snap or FlashCopy sessions	NOCHECKSnapSessions AutoSwap option
Allow/prohibit use of online target (TO) devices	AllowOnlineToDevice AutoSwap option
Allow/prohibit use of undefined source (FROM) devices	AllowOnlineUndefinedDevice AutoSwap option
Allow/prohibit swap of devices with couple datasets	ALLOWCOUPLEDATASETS AutoSwap option
Verify volsers of source (FROM) and target (TO) devices	VOLserCHeck AutoSwap option

Performing swaps

Table 6 lists operations for performing swaps.

Table 6   Performing swaps

Operation	Control
Enable/disable swapping	SETSWAP command
Allow/prohibit immediate swaps	SWAPimmediate AutoSwap option
Swap a swap group	SWAP GROUP command
Swap individual devices in swap group	SWAP command
Set AutoSwap options for a swap	SWAP command
Define number of concurrent group swaps	PROCESSCOUNT AutoSwap option
Determine whether to retain a swap group	RETAIN AutoSwap option
Control use of Cache Fast Write	CFW AutoSwap option
Sets the quiesce timeout	QUIESCETimeout AutoSwap option
Force swap when source (FROM) device is unaccessible	FORCE AutoSwap option, NOLINK parameter
Force swap when LPAR is lost	FORCE AutoSwap option, LOSTSYStem parameter

Post-swap processing

Table 7 list operations for post-swap treatment of source (FROM) devices.

Table 7   Post-swap processing

Operation	Control
Determine post-swap state of source (FROM) devices	CHANGESOURCEdevice AutoSwap option
Apply volser prefix to source (FROM) devices after swap	CHANGESOURCEdevice AutoSwap option, COLUMEPrefix parameter

Setting up AutoSwap

Table 8 lists operations for setting up AutoSwap.

Table 8   Setting up AutoSwap

Operation	Control
View global AutoSwap options in effect	• DISPLAY SDASOPTIONS command • DISPLAY OPTIONS command
Set AutoSwap options globally	SET SDASOPTIONS command
Reprocess commands in CONFIGCA DD file	SET PARMS command
Set maximum return code	MAXRC AutoSwap option

Setting up AutoSwap LPARs

Table 9 lists operations for setting up AutoSwap LPARs.

Table 9   Setting up AutoSwap LPARs

Operation	Control
Set cross-host timeout	CROSSSYSTEMTIMEOUT AutoSwap option
Set cross-system communication timeout	SETSWAP command, CommanDTimeout parameter
View current LPAR	• DISPLAY STARTPARMS command • DISPLAY OPTIONS command
Allow/prohibit LPAR/group path count mismatch	AllowSystemsCountMismatch AutoSwap option

Setting up AutoSwap messages

Table 10 lists operations for setting up AutoSwap messages.

Table 10   Setting up AutoSwap messages

Operation	Control
View global debugging and diagnostics	• DISPLAY GLOBALOPTIONS command • DISPLAY OPTIONS command
Enable/disable debugging	SET DEBUG command
Enable/disable routing AutoSwap messages to SYSLOG	ROUTEMeSsaGetoowner AutoSwap option

Table 10 Setting up AutoSwap messages

Operation	Control
Enable/disable verbose messaging	SET VERBOSE command
Set verbose level	SET VERBOSE command
Set maximum count of lines for AutoSwap displays	SET MAXLINECOUNT command
Set default count of lines for AutoSwap displays	SET DEFAULTLINECOUNT command
Convert AutoSwap output to upper case	SET CAPS command

Swap process

Process steps

Whenever a swap needs to take place, AutoSwap goes through a series of steps:

1. AutoSwap temporarily suspends I/O to the swap group.

   AutoSwap holds all I/O during the swap process to ensure dependent write consistency. This step protects data and ensures restartability in the swap group, should failures occur in the infrastructure during the swap.

2. AutoSwap conditions the SRDF devices to disable access to the source devices and enable access to the target devices.

   During the time I/O to the devices is being queued, AutoSwap reconfigures the SRDF pair to allow the application I/O stream to be serviced by the target SRDF device.

3. AutoSwap transfers reserves to the target devices.

4. AutoSwap switches the contents of the Unit Control Blocks (UCBs) of the source and target pairs.

   Because the contents of the UCBs are swapped, the redirection of I/O is transparent to the applications running. The redirection of I/O persists until the next IPL.

5. AutoSwap releases the halted I/O.

Handling high-priority devices

Particular devices within a swap group are automatically recognized by AutoSwap as requiring preferential treatment.

These types of swap devices are known as *high priority*. These can be identified using the DISPLAY GROUP command described in "DISPLAY GROUP" on page 62 to find all high-priority swap device pairs. For example:

```
DISPLAY GROUP swapgrp DET FIND *HP*
```

Page and OPS/MVS datasets

Devices containing page datasets and OPS/MVS[1] DIV (Data In Virtual) datasets for OPSLOG and SYSCHK1 are treated as high-priority devices because of their critical nature and the need to ensure system availability during the swap process.

Volumes containing page and OPS/MVS data swap ahead of other volumes. If regular data are on these volumes, the result may be an inconsistent swap.

High-priority swap process

Due to the need to swap high-priority devices very quickly, AutoSwap uses a streamlined version of the normal swap (described in "Process steps" on page 31) that is independent of the group but also done as part of the group.

- During a planned swap, the high-priority device pairs are swapped prior to the normal-priority devices.

- During an unplanned swap, the high-priority and normal priority devices are swapped concurrently.

High-priority devices have a number of restrictions that limit normal application (non-high priority) data or shared data from being placed on these devices:

- CAX swaps are always consistent, however data on the "streamlined" volumes may not be consistent with other volumes in the group.

- Reserve transfer processing is not applicable to these device which means that a RESERVE may be lost if it is held at the time the swap occurs.

- To allow these devices to be swapped quickly, the normal cross-system checkpoint processing is not performed. High-priority R1s are set to a NRDY state early in the swap, which prevents any other system updating the device. This might cause a false unplanned event due to "intervention required" to be detected on other hosts.

- In order to allow SRDF reconfiguration processing to complete quickly, AutoSwap verifies during swap group validation that high-priority devices are always in the R1->R2 direction and that they are part of a CAX group. AutoSwap fails validation if this is not the case.

- As checkpoint processing is eliminated with high-priority devices, normal priority devices must be part of the swap group.

---

1. OPS/MVS is a product of Computer Associates International Inc.

Handling couple datasets

You can allow or prohibit swaps of devices that contain couple datasets. To do so, use the ALLOWCOUPLEDATASETS option described in "ALLOWCOUPLEDATASETS" on page 78.

The only couple datasets that should be processed are LOGR, as explained in "Couple datasets" on page 25.

The *Consistency Groups for z/OS Product Guide* discusses use of couple datasets in CAX groups.

Handling unknown online FROM devices

You can specify whether to allow or prohibit use of unknown online source (FROM) devices in a swap group.

Unknown devices are those excluded or not discovered by ResourcePak Base, for example, due to I/O timeouts or some other access issue.

AutoSwap checks for unknown online FROM devices during swap group validation. If unknown online FROM devices are not allowed, the error message is issued and group validation fails.

To allow or prohibit use of unknown online FROM devices, use the AllowOnlineUndefinedDevice option described in "AllowOnlineUndefinedDevice" on page 79.

> **⚠ CAUTION**
>
> **Use AllowOnlineUndefinedDevice with caution, as it could result in loss of access to a device after a swap.**

Handling HRO online TO devices

You can specify whether to allow to prohibit use of HRO (Host Read-Only) online target (TO) devices in a swap group.

◆ When online TO devices are not allowed, the AutoSwap validation process fails the group activation if the group contains an online TO device.

◆ When online TO devices are allowed, an online TO device can be present in the group only if the device is in the list of HRO-managed devices specified in ResourcePak Base.

> **Note:** The list of HRO-managed devices is specified using the SCF.DEV.ATTR.HRO.INCLUDE configuration parameter of ResourcePak Base, as described in the *ResourcePak Base for z/OS Product Guide*.

Where the R2 is online prior to a swap, the storage system ensures the Read-Only (R/O) state of the device. However, after a swap the R2 becomes Read-Write (R/W). Specifying the TO device in the list of HRO-managed devices ensures that the Read-Only state is preserved after the swap. HRO is local to the host where the list is specified and prevents any write processing occurring to the TO device.

- If the online TO device is in the list of HRO-managed devices, the CGRS617I message is issued to confirm that the device is acceptable.

- If the online TO device is not included in the list of HRO-managed devices, swap group validation fails with the CGRS274E message.

To allow or prohibit use of online TO devices, use the AllowOnlineToDevice option described in "AllowOnlineToDevice" on page 78.

Handling devices with Concurrent Copy, Snap and FlashCopy sessions

Concurrent Copy, Snap, and FlashCopy create sessions in which a local point-in-time copy of data is created. The location of this data depends on whether the data has been updated or not and the mapping of the source and target data locations is kept only in the local storage system. Remote storage systems (at the other end of SRDF links) have no knowledge of these sessions and the point-in-time copy of the data does not exist on the remote storage system until the copy data is sent across the links. If you swap devices involved in Concurrent Copy, Snap or FlashCopy sessions, these sessions are not propagated to the remote storage system, and the copy data not yet sent across the link will not be on the remote storage system.

⚠️**WARNING**

ALLOWING CONCURRENT COPY, SNAP, OR FLASHCOPY SESSIONS (INCLUDING FLASHCOPY FOR DEFRAG) ON SRDF PRIMARY VOLUMES IN THE SWAP GROUP CAN CAUSE THE LOSS OF POINT-IN-TIME COPY DATA ON THE SRDF SECONDARY VOLUMES, POTENTIALLY RESULTING IN LOSS OF DATA INTEGRITY ON THOSE VOLUMES.

Note: FlashCopy is implemented using Snap sessions in the storage system, so AutoSwap controls for Snap apply to FlashCopy as well.

If you do not want to lose these sessions and risk losing the point-in-time copy data, it is recommended not to use Concurrent Copy, Snap, or FlashCopy on swappable devices.   While AutoSwap cannot prevent use of Concurrent Copy, Snap, or FlashCopy sessions, it can identify their existence for planned swaps and allow or disallow swaps.

Note: You can use the VALIDATE command described in "VALIDATE GROUP " on page 76 to detect and report on the existence of Concurrent Copy, Snap, and FlashCopy sessions.

You can allow or prohibit swaps of devices that have an open Concurrent Copy, Snap, or FlashCopy session. To do this, use the AllowConcurrentCopy option described in "AllowConcurrentCopy" on page 78 or the AllowSnapSession option described in "AllowSnapSession" on page 79.

If EMCSNAP is to be run on AutoSwap devices, the TimeFinder/Clone Parallel Clone feature can be used in two-site synchronous SRDF configurations to eliminate the risk of data integrity loss. Parallel Clone performs dataset- and volume-level EMCSNAP operations simultaneously on both sides of an SRDF/S link.

If FlashCopy must be run on AutoSwap devices, run a SETSWAP DISABLE command against the group to prevent swaps during the FlashCopy operation. A SETSWAP ENABLE command can be run when the background copy completes to re-enable AutoSwap protection.

However, if you intend to allow unplanned swaps, then you can allow swaps for devices with active Concurrent Copy, Snap, or FlashCopy sessions to ensure that the accidental use of Concurrent Copy, Snap, or FlashCopy does not inhibit unplanned swapping.

Bypassing verification

In addition, you can make AutoSwap bypass verification of such devices by using the NOCHECKConcurrentCopy option described in "NOCHECKConcurrentCopy" on page 83 or the NOCHECKSnapSessions option described in "NOCHECKSnapSessions" on page 83.

Bypassing verification helps you reduce the overhead of verifying sessions. In this case, the additional per-device I/O required to determine that sessions are active is not performed. This means that no messages will be displayed where there are active sessions on the devices in the swap group. For this reason, bypass verification only if the outcome of the processing is not important.

Checking LPAR/path group counts

AutoSwap determines the number of participating LPARs and path groups first during validation and then at swap time.

Note: If LPARs and path groups for LPARs cannot be found at validation time, the ESWP195 (or CGRS195I for ConGroup) message is displayed.

By default, the LPAR count at swap time does not have to match the count at validation time. This means that a swap proceeds regardless of the LPAR count.

However, you can prohibit swaps with an LPAR/group path count mismatch by setting the AllowSystemsCountMismatch option to NO, as described in "AllowSystemsCountMismatch" on page 80. In this case, the LPAR counts at swap time must be equal to or greater than the number of path groups for the device established at validation time. If the LPAR count is less than the number of established path groups for the device, the swap cannot proceed. The devices must be individually validated across all hosts to be certain that all hosts with paths to the devices correctly validate the device. A message is output for each device mismatch with an associated CGRS19I message.

Recommendations are as follows:

◆ Allow count mismatch when you are using AutoSwap to protect against failure events or unplanned outages. This is because loss of communication with one or more LPARs may be part of the failure scenario. This should not disable AutoSwap.

◆ Allow count mismatch with SWAPCONTROL=BYRANGE or BYGROUP, when you validate a swap group before a swap. This lets AutoSwap optimize the validation processing.

◆ Prohibit count mismatch for planned swaps. If the swap is planned, and not a result of a failure, the number of LPARs involved should not change. If it does, there has been a failure or an operational error.

Forcing swap for lost LPAR

During swap processing, AutoSwap uses multiple checkpoints to synchronize the activity between all the LPARs involved in the swap.

You can allow a swap to proceed (instead of aborting) if an LPAR does not return status during checkpoint processing. To do this, specify FORCE=LOSTSYStem, as described in "FORCE" on page 82.

The LOSTSYStem option is complementary to the AllowSystemsCountMismatch option described in "AllowSystemsCountMismatch" on page 80 in that the AllowSystemsCountMismatch has meaning during the validation for path comparison processing and the FORCE=LOSTSYSTEM has meaning during the swap processing. Either, both, or neither option can be specified based on site requirements.

Verifying volsers

As part of swap group validation, AutoSwap can check if the volsers of the source (FROM) and target (TO) devices are equivalent.

In the synchronous R1→R2 environment this test is not required as the storage system ensures that the volsers are equal as the devices are always equivalent.

To enable or disable volser verification, use the VOLserCHeck option described in "VOLserCHeck" on page 87.

Note: The setting for the original swap group and its complement group does not have to be the same.

Handling alternate subchannel set configuration issues

AutoSwap and z/OS both expect that devices should be swapped where there is a device in the active subchannel set and a paired device 3390D in the target subchannel set. For example, device pairs (*sdddd*) such as 01234 and 11234. The active subchannel set can be displayed using the D IOS,CONFIG command. If the active subchannel set is 0, then the alternate subchannel set for devices in the AutoSwap group can only be to one of subchannel sets 1-3. If the active subchannel set is one of 1-3, then the alternate subchannel set must be 0; that is, you can only swap back to 0. In either case, you can always have devices being swapped from subchannel set 0 to subchannel set 0 along with other target devices in an alternate subchannel set.

Where an AutoSwap group contains target devices in an alternate subchannel set, additional verification is performed to prevent a partial subchannel set with in-use devices from undergoing swap processing. Such an AutoSwap group is one that does not contain all special 3390D devices in the target subchannel set.

If there are missing devices in the AutoSwap group and they are online or in use by a system component (those marked as F-SYS on a D U display) in the currently active subchannel set, AutoSwap will mark the group as not valid for planned swap processing. Unplanned swap processing is still possible in such a circumstance. If you do not intend to swap to a 3390D device in the target alternate subchannel set, then the 3390D should not be genned to HCD.

Message CGRS614E/W[1] indicates a subchannel set issue:

◆ If displayed as an error (E), this indicates there is a possibility of losing access to active online devices if a swap was to take place and then a subsequent IODF ACTIVATE performed. In this circumstance, new message CGRS683W is displayed to indicate planned swap processing is not available.

◆ If displayed as a warning (W), this indicates that planned swap processing will be allowed but there are a number of devices not contained in the group that might be lost following a IODF ACTIVATE. However, these devices are both offline and not in use by a system component (those marked as F-SYS on a D U display).

You can display any alternate subchannel configuration issues using message CGRS614 by specifying the ALTSSMissing keyword on the DISplay GRoup command described in "DISPLAY GROUP" on page 62.

---

1. ESWP614E | CGRS614E | FMMS614E | SCFS614E and ESWP614W | CGRS614W | FMMS614W | SCFS614W in the *Mainframe Enablers Message Guide.*

AutoSwap environment

AutoSwap gatekeepers

AutoSwap maintains a gatekeeper device on each storage system where target (TO) devices reside to allow I/O to the storage system devices in the swap group.

The gatekeeper is the same device as the currently used CSC gatekeeper.

Note: CSC (Cross System Communication) is part of ResourcePak Base. The *ResourcePak Base for z/OS Product Guide* describes CSC.

The gatekeeper is used to process storage system-level commands during the swap group validation and swap processing, in addition to facilitating CSC communications.

A UCB PIN is always maintained on this device during the life of a swap group and changes as the CSC gatekeeper device changes.

Note: The *Consistency Groups for z/OS Product Guide* provides more information about gatekeepers for CAX.

Using multiple subchannel sets

AutoSwap allows target (TO) devices in a swap group to be placed in an alternate subchannel set to provide device addressing constraint relief.

Note: The *Consistency Groups for z/OS Product Guide* provides details on using multiple subchannel sets in CAX.

Disabling/re-enabling swap groups

Generally, AutoSwap monitors devices included in the swap group and automatically performs a swap when a write failure occur.

However, sometimes you may need to disable swapping for a certain swap group for a short period of time. Typically, this would be done to avert an unplanned swap which may conflict with customer processing.

Disabling swap group

To disable swapping for a swap group, use the SETSWAP command with the DISABLE parameter, as described in "SETSWAP" on page 72.

The disable period should be kept to a minimum as no swap processing, planned or unplanned, is allowed during this period.

While SETSWAP DISABLE is in effect, all disabled swap groups indicate this at 30-second intervals with the CGRS599W message. This is a reminder message to indicate during this period of time that the group cannot be swapped, as shown in Figure 1.

```
F EMCCGRP,DAS,SETSWAP GRP * DISABLE

CGRS598I (00170) SETSWAP DISABLE completed: 151
Group SSA3 now DISABLED
Total groups processed : 1
Successful             : 1
Failed                 : 0

CGRS599W (00165) Group SSA3 has been SWAP DISABLED for 30 seconds.
```

Figure 1 Displaying disabled swap groups

Note: Using the SETSWAP DISABLE command does not affect the trip operation of a consistency group. Only the swap processing is disabled.

CAX devices in the disabled swap groups become AutoPend in the DISPLAY GROUP DETAILS output.

If an error condition occurs during disable processing, the swap group is returned to its original state through backout processing. The original state was likely *Enabled*; however, if the original state was *Disabled*, it remains *Disabled*. An additional MLWTO is issued to display the status of the backout process.

Re-enabling swap group

To re-enable swapping for a disabled swap group, run the SETSWAP command with the ENABLE parameter, as described in "SETSWAP" on page 72. This results in basic validation of the swap group. AutoSwap performs local host validation to ensure the configuration is still healthy and valid for swapping. If it validates successfully, then all devices can be swapped.

Disabling/re-enabling on all LPARs/current LPAR

You can enable or disable swap processing on all AutoSwap LPARs or on the current LPAR only. To do this, use the CROSSSYSTEM or LocalSTStem parameter of the SETSWAP command, as described in "SETSWAP" on page 72.

Setting LocalSTStem prevents a planned or unplanned swap from being initiated on this LPAR. Other AutoSwap LPARs that remain enabled still allow the swap to be initiated. In this case, the disabled LPARs also participate in the swap. However, where high-priority devices existed in the swap group prior to being disabled, these are no longer performed at a high priority until the swap group is enabled.

Example

1. The following example[1] disables and then enables a group.

```
F EMCCGRP,DAS,TS GRP PAGE DIS

CGRS598I (00104) SETSWAP DISABLE completed:
Group PAGE now DISABLED
Total groups processed : 1
Successful             : 1
Failed                 : 0
```

```
F EMCCGRP,DAS,TS GRP PAGE ENA

CGRS598I (00105) SETSWAP ENABLE completed:
Group PAGE now ENABLED
Total groups processed : 1
Successful             : 1
Failed                 : 0
```

2. The following example uses the DISPLAY GROUP command to display the state of the current group. In this example, the groups PAGE and PAGEC are disabled:

```
F EMCCGRP,DAS,D GRP PAGE%

CGRS162I (00106)
Group    ID   Owning System Host      Defined      Status
              Name    Identifier   MM/DD/YY HH:MM:SS
-------- ----- ---- ---------------- -------- -------- --------
PAGE     00005     Group Owner      09/20/08 20:29:29 Idle    *DISABLD
PAGEA    00006     Group Owner      09/20/08 20:29:29 Idle
PAGEB    00007     Group Owner      09/20/08 20:29:29 Idle
PAGEC    00008     Group Owner      09/20/08 20:29:29 Idle    *DISABLD
PAGE2    00009     Group Owner      09/20/08 20:29:29 Inactive
PAGE3    00010     Group Owner      09/20/08 20:29:29 Inactive
PAGE4    00037     Group Owner      09/20/08 20:29:29 Inactive
Groups Matched       :    7
```

3. The following example uses the DISPLAY GROUP command with the FIND parameter to display only the groups marked disabled. In this example, the groups PAGE and PAGEC are disabled:

```
F EMCCGRP,DAS,D GRP PAGE% FIND DIS

CGRS162I (00106)
Group    ID   Owning System Host      Defined      Status
              Name    Identifier   MM/DD/YY HH:MM:SS
-------- ----- ---- ---------------- -------- -------- --------
PAGE     00005     Group Owner      09/20/08 20:29:29 Idle    *DISABLD
PAGEC    00008     Group Owner      09/20/08 20:29:29 Idle    *DISABLD
Groups Matched       :    7 Find Excluded :    5
```

---

1. Because all the examples are ConGroup examples, the messages generated use the ConGroup prefix CGRS.

4. The following example disables and then enables a group using the DETAIL output:

```
F EMCCGRP,DAS,TS GRP PAGE DIS DET

CGRS598I (00107) SETSWAP DISABLE completed:
Group PAGE now DISABLED:
  X04  (010435DE2096002F) : Warning, AutoSwap not active
  X04  (010435DE20960062) : Request valid, RS 00
  X06  (010635DE20960052) : Request valid, RS 00
  X06  (010635DE20960054) : Warning, AutoSwap not active
  X06  (010635DE2096004A) : Warning, AutoSwap not active
Total groups processed : 1
Successful             : 1
Failed                 : 0
```

```
F EMCCGRP,DAS,TS GRP PAGE DIS DET

CGRS598I (00109) SETSWAP DISABLE completed:
Group PAGE now DISABLED:
  X04  (010435DE2096002F) : Warning, AutoSwap not active
  X04  (010435DE20960062) : Request valid, already in required state
  X06  (010635DE20960052) : Request valid, already in required state
  X06  (010635DE20960054) : Warning, AutoSwap not active
  X06  (010635DE2096004A) : Warning, AutoSwap not active
Total groups processed : 1
Successful             : 1
Failed                 : 0
```

```
F EMCCGRP,DAS,TS GRP PAGE ENA DET

CGRS598I (00107) SETSWAP ENABLE completed:
Group PAGE now ENABLED :
  X04  (010435DE2096002F) : Warning, AutoSwap not active
  X04  (010435DE20960062) : Request valid, RS 00
  X06  (010635DE20960052) : Request valid, RS 00
  X06  (010635DE20960054) : Warning, AutoSwap not active
  X06  (010635DE2096004A) : Warning, AutoSwap not active
Total groups processed : 1
Successful             : 1
Failed                 : 0
```

5. The following example attempts to disable a group where processing (validate or swap) is active on one of the AutoSwap hosts. This results in backout processing if necessary.

```
F EMCCGRP,DAS,TS GRP PAGE DIS DET

CGRS598E (00110) SETSWAP DISABLE completed: 980
Group PAGE DISABLE error :
 X06 (010635DE20960052) : Error, other processing active
Total groups processed : 1
Successful             : 0
Failed                 : 1
```

```
CGRS598I (00110) SETSWAP BACKOUT DISABLE completed:  983
Group PAGE now ENABLED
Total groups processed : 1
Successful             : 1
Failed                 : 0
```

Routing AutoSwap messages

You can have AutoSwap messages consolidated in a single place, the SYSLOG of the owner LPAR. AutoSwap enables you to specify whether you want a particular message type (warning or error) to be routed to the SYSLOG.

To set up message routing, use the ROUTEMESSAGEtoowner option, as described in "ROUTEMeSsaGetoowner" on page 86.

AutoSwap messages have the LPAR name contained in them where the request sequence number would normally be displayed. For example, the following message is routed from the non-owner LPAR X06 to the owner LPAR. The source system is indicated by the >X06.

```
CGRS274E (>X06)(PID 00001) 'TO' device C4B9 has an invalid state, RS 00000003
```

Controlling length of AutoSwap displays

You control the number of lines in AutoSwap displays by setting the default line count (using the SET DEFAULTLINECOUNT command described in "SET DEFAULTLINECOUNT" on page 71) and the maximum allowed line count (using the SET MAXLINECOUNT command described in "SET MAXLINECOUNT" on page 70).

The following explains how the line count settings affect displays of large numbers of devices:

◆ If a line count is specified, it is validated against the MAXLINECOUNT value. If the specified value is greater than the MAXLINECOUNT value, the value for MAXLINECOUNT is used.

◆ If a line count is not specified, the DEFAULTLINECOUNT value is used.

◆ In general, a summary line is always displayed. This does not undergo the line count restriction (this being a useful feature when you display swap group details using the DISPLAY GROUP DETAILS command).

◆ A fixed heading line that is part of the message (for example, the summary line displayed with the DISPLAY GROUP SUMMARY command is not included in the line count).

◆ Multiline output is generated (batched) in parts. To limit MLWTO memory usage/contention, the displays are produced in 32K batches. Each continuation is marked by a message line indicating continuation and a part number.

For example:

Note: The following output has been truncated.

```
F EMCCGRP,D GRP * DET

ESWP217I (00047)
Group:A, ID:00002, Mode:Inactive
Creation Date (DD/MM/YY):09/04/08
        Time (HH:MM:SS):14:18:14

Group:A1, ID:00003, Mode:Inactive
Creation Date (DD/MM/YY):09/04/08
        Time (HH:MM:SS):14:18:14
.....
.....
.....

Group:B, ID:00004, Mode:Inactive
Creation Date (DD/MM/YY):09/04/08
        Time (HH:MM:SS):14:18:14

ESWP217I (00047)  continued, part(2)
Group:C, ID:00005, Mode:Inactive
TO device subchannel set; Active:NONE, Alternate:SS1
Creation Date (DD/MM/YY):09/04/08
        Time (HH:MM:SS):14:18:14

Group:P, ID:00006, Mode:Idle
Creation Date (DD/MM/YY):09/04/08
        Time (HH:MM:SS):14:18:15
PID    Phase Volser|  0FROM/TO Device              |Counts   Status/
                   |Ty 0Devn CCA SSID  Symd   Ctrl#|Sys Pth  Mode
-----  ----- ------+-- ---- ---- -------- --- --+------ --------
00001  005   UGL068|R1 03068 ??  ????  000068 01175|001 001 Invalid
                   |R2 03468 ??  ????  000068 00399|         Idle
00002  005   UGL069|R1 03069 ??  ????  000069 01175|001 001 Valid
                   |R2 03469 ??  ????  000069 00399|         Idle
.....
.....
ESWP217I (00047)  continued, part(3)
03000  001   ??????|R1 0F06A ??  ????  ?????? ?????|000 000 Invalid
                   |?? 0F46A ??  ????  ?????? ?????|         Idle
03004  001   ??????|?? 0F06B ??  ????  ?????? ?????|000 000 Invalid
                                                              Idle
Total Group Devices: 3004
            Valid   : 3000 Invalid       :    4
            Swapped :    0 Failed Swap   :    0
            Offline :    0 Not Defined   :    0
```
and so on...

◆ If at least one group display cannot be produced because the value is too small, the following is appended to the associated message:

```
Line count too small. No groups displayed.
```

For example:

```
F EMCCGRP,D GRP T1 L 2 DET

ESWP217I (00033)
Line count too small. No groups displayed.
```

◆ If a group display is being truncated, then the "more..." line is added to the end of the MLWTO. The groups matched summary line indicates the number of groups displayed.

For example:

```
F EMCCGRP,D GRP * L 2

ESWP162I (00035)
Group    ID    Owning System Host         Defined      Status
               Name    Identifier   09/04/08 14:14:10
-------- ----- ---- ---------------- -------- -------- --------
A        00002      Group Owner      09/04/08 14:18:14 Inactive
A1       00003      Group Owner      09/04/08 14:18:14 Inactive
 More....
Groups Matched    :    2
```

Note: In the above example, the line count does not include the fixed header line since it is fixed; that is, it is only displayed once.

◆ Related parts of a message are excluded where the line count is reached for any of the related parts. This means that a complete coherent message is produced and not truncated.

For example:

Note: The following two groups can only be displayed if a line count of at least 27 is specified (since there are 27 lines).

```
F EMCCGRP,D GRP * OPT L 27

ESWP163I (00039)
Group:A, ID:00002, S/DAS options:
NoBypassOfflineDevices
  CFW=Resume
  ChangeSourceDevice=NRDY
                    NoVolumePrefix
  MAXRC=4
  NoPrevalidate
  ProcessCount=1
  NoRetain
  NoSwapImmediate
Group:A1, ID:00003, S/DAS options:
NoBypassOfflineDevices
  CFW=Resume
  ChangeSourceDevice=NRDY
                    NoVolumePrefix
  MAXRC=4
  NoPrevalidate
  ProcessCount=1
  Retain
  NoSwapImmediate
 More....
Groups Matched    :    2
```

The following shows that the second group is not displayed (and thus truncated) when a value lesser than 27 is given:

```
F EMCCGRP,D GRP * OPT L 26

ESWP163I (00040)
Group:A, ID:00002, S/DAS options:
NoPaths
  NoBypassOfflineDevices
  CFW=Resume
  ChangeSourceDevice=NRDY
                    NoVolumePrefix
  MAXRC=4
  NoPrevalidate
  ProcessCount=1
  NoRetain
  NoSwapImmediate
More....
Groups Matched    :    1
```

◆ If a detail group display (produced with the DISPLAY GROUP DETAIL command as described in "DISPLAY GROUP" on page 62) reaches the line count in the detail output, then the summaries are still produced and an indicator of the number of lines *lost* is output. The summary is still calculated as it would have been had the line count not been exceeded. This is useful because it allows you to use the FIND and EXCLUDE options of the DISPLAY GROUP command without having too much display. As for not truncating related data, the two lines which you normally get for the source (FROM) and target (TO) device is only displayed when both can be displayed. That is, if the line count is reached for the second line, then the first line is not done.

For example:

```
F EMCCGRP,D GRP P DET L 7 F ' VALID'

ESWP217I (00046)
Group:P, ID:00006, Mode:Idle
TO device subchannel set; Active:NONE, Alternate:SS1
Creation Date (DD/MM/YY):09/04/08
        Time (HH:MM:SS):14:18:15
PID   Phase Volser|  FROM/TO Device            |Counts   Status/
                  |Ty Devn CCA SSID  Symd Ctrl#|Sys Pth  Mode
----- ----- ------+-- ---- ---- -------- --- --+------ --------
Total Group Devices:    4 Missing Lines :    2
          Selected:    1 Find Excluded :    3
          Valid   :    1 Invalid       :    3
          Swapped :    0 Failed Swap   :    0
          Offline :    0 Not Defined   :    0

Groups Matched    :    1
```

Dynamic (IODF) configuration changes

What is dynamic configuration change?

A dynamic configuration change is requested by using the z/OS ACTIVATE IODF= operator command, or through the HCD ISPF interface.

The ACTIVATE can be a software-only change, or both software and hardware change.

A *software-only change* is requested using the ACTIVATE SOFT keyword, and only affects operating system structures. Where SOFT is not requested, then both a hardware and software change is performed. The IBM documented usage of software and hardware ACTIVATE is to perform the software-only activate on LPARs N-1 and then, finally, the software and hardware on LPAR N.

Hardware changes can affect LPARs, including the LPAR where the ACTIVATE is performed. IBM is explicit on the ordering of the software-only as opposed to a software and hardware change.

Additionally, a TEST keyword can be specified to exercise (or rehearse) the configuration change without actually doing any real work. This is to verify that the intended IODF ACTIVATE is likely to succeed. Its success does not mean that the real ACTIVATE will be successful, as certain blocking actions may only be present at the real ACTIVATE time.

Recognizing dynamic configuration changes

ENF 31-32 interfaces

AutoSwap interfaces with dynamic configuration processing in order to prevent unacceptable configuration changes. This is through the z/OS programmatic ENF 31/32 (CONFCHG CHGREQ/CHGCOMPL) interfaces that are documented for this usage:

◆ ENF 31 is equivalent to CONFCHG CHGREQ to notify changes that will be made by the ACTIVATE. ENF31 is called a second time if the configuration change is rejected due to affected device(s) and/or path(s) remaining pinned.

◆ ENF 32 is equivalent to CONFCHG COMPL to notify the completion (success) of the ACTIVATE.

ENQs

During AutoSwap validation and swapping, AutoSwap serializes processing with IODF ACTIVATE using the SYSZIOS/DYNAMIC ENQ. This prevents AutoSwap and dynamic configuration changes from interfering with each other:

◆ If an IODF ACTIVATE is performed at the time of an AutoSwap validation or swap, then AutoSwap waits before proceeding.

◆ If AutoSwap acquires the ENQ prior to the IODF ACTIVATE, then the ACTIVATE fails with the following message. If this occurs, retry the ACTIVATE following the completion of the current AutoSwap processing. The AutoSwap DISPLAY GROUP * command is used to get the current status of AutoSwap groups, as described in "DISPLAY GROUP" on page 62.

```
IOS500I ACTIVATE RESULTS 522
ACTIVATE FAILED - ERROR MESSAGE(S) ISSUED
REASON=0183,DYNAMIC I/O ENQUEUE COULD NOT BE OBTAINED
 COMPID=SC1C3
```

It is possible that a third party incorrectly serializes this ENQ as EXCL. If AutoSwap determines that an IODF ACTIVATE is not really in progress, then processing continues after a minimal wait period. The GRS operator command D GRS,RES=(SYSZIOS,DYNAMIC) can be used to show the current holders of this ENQ.

Device requirements

Devices added by a dynamic configuration change have no special requirements or preparation to AutoSwap. If a device was undefined to an LPAR and part of a swap group, it is known by its PowerMax/VMAX device details. However, if the device is subsequently added by an IODF ACTIVATE, then AutoSwap automatically recognizes the device definition by resolving them to the group following the ACTIVATE completion.

Unplanned swap groups

Only swap groups defined with an unplanned trigger are processed through ENF 31/32. If a swap group is defined with no unplanned triggers (a planned-only group), then AutoSwap does not prevent an unacceptable configuration change. AutoSwap verifies any unacceptable changes during the next validation or swap, and marks the group as invalid.

No pair deletions

AutoSwap does not remove any storage system device pairings automatically from the swap group where the FROM/TO devices are deleted from the configuration. AutoSwap cannot determine if this is the intention of the configuration change. The devices still exist within the group as undefined devices. If it is the intention of the ACTIVATE to remove the device pair from the swap group, then use appropriate operator commands to delete the devices prior to the ACTIVATE.

Qualifying dynamic configuration changes

AutoSwap qualifies dynamic configuration changes as acceptable or unacceptable.

◆ Acceptable configuration changes are defined and processed as described in "Acceptable configuration changes" on page 48.

◆ Unacceptable configuration changes are defined and processed as described in "Unacceptable configuration changes" on page 50.

Acceptable configuration changes

AutoSwap allows an acceptable configuration change in the following circumstances:

◆ A software-only change is deleting the UCB of a source (FROM) device.

◆ A software-only change is deleting the UCB of a target (TO) device while its source (FROM) device is offline, not defined, or is also being deleted.

Acceptable configuration changes are allowed, and the ACTIVATE is allowed to continue without the usage of SETSWAP DISABLE processing.

Note: "SETSWAP" on page 72 describes the SETSWAP DISABLE command.

If the ACTIVATE is completed successfully, AutoSwap performs a minimal (UCB only) validation on the local LPAR only to determine UCB changes.

Where device deletions have occurred, AutoSwap marks the device as now being undefined, and displays these deletions in the CGRS643W and CGRS644W messages.

Additionally, for an acceptable configuration change, AutoSwap temporarily marks the affected devices as not eligible for unplanned swap processing. This prevents AutoSwap from performing an unplanned swap during this period of time. The triggers are allowed after the ENF 31 (change rejected) or ENF 32 (change complete) is processed.

For example, in the configuration (software only) shown in Figure 2, ACTIVATE is deleting devices that are acceptable to the current swap group status. During the ACTIVATE, all swap triggers for only these devices are disabled. Following the ACTIVATE completion, group validation is automatically performed.

```
ACTIVATE CFID=UIFDEL6

CGRS646I AutoSwap ACTIVATE results
ACTIVATE permitted by AutoSwap
 'TO' AutoSwap device(s) being deleted:
    03980-03981
 'FROM' AutoSwap device(s) being deleted:
    Note:   UNPLANNED is now DISABLED
    01E00-01E02
Devices Affected        :    5
        Blocking        :    0
        Ranges displayed :   2
        Not displayed   :    0

IOS502I I/O CONFIGURATION CHANGED
INVOKER = *MASTER*
NEW IODF = SYS$X1.IODF03
EDT REBUILT, NEW EDT ID = 00
DEVICE(S) DELETED FROM SOFTWARE CONFIGURATION
 1E00-1E0F 3980-3981.

CGRS644W (00165)(PID 00005) 'TO' device 03980 UCB has been deleted.
CGRS644W (00165)(PID 00006) 'TO' device 03981 UCB has been deleted.
CGRS643W (00165)(PID 00001) 'FROM' device 01E00 UCB has been deleted.
CGRS643W (00165)(PID 00002) 'FROM' device 01E01 UCB has been deleted.
CGRS643W (00165)(PID 00003) 'FROM' device 01E02 UCB has been deleted.
CGRS614W (00165) Alternate SS1 has 444 devices not in group SSA3
CGRS292I (00165) Group SSA3   378

Total Devices        :    6 Highest PID  :    6
       Valid         :    6 Invalid      :    0
       Auto Swappable:    3 Auto Pending :    0
       Swapped       :    0 Failed Swap  :    0
       Offline       :    3 Not Defined  :    5
       Alternate SS 000:    4
```

Figure 2 Acceptable configuration change processing

Unacceptable configuration changes

AutoSwap blocks unacceptable configuration changes that could cause a swap group to become invalid or cause the triggering of an unplanned swap.

The blocking of a configuration change by AutoSwap does not mean that the configuration change cannot be performed, but does mean that additional actions may be required to allow the configuration change to proceed.

An unacceptable configuration change is blocked by AutoSwap in the following circumstances:

◆ A hardware- or software-only change is deleting the UCB of a target (TO) device while its source (FROM) device is online and therefore (presumably) in use.

This is indicated by the following "Reason" line in the CGRS646I message:

```
Reason: 'FROM' partner device is ONLINE and delete
        will result in an invalid AutoSwap group
```

◆ A hardware- or software-only change is deleting the gatekeeper used by AutoSwap on the storage system where the target (TO) device resides.

This is indicated by the following "Reason" line in the CGRS646I message:

```
Reason: 'TO' controller ACCESS device
```

Note: "AutoSwap gatekeepers" on page 38 describes AutoSwap gatekeepers.

◆ A hardware change is deleting the UCB of a source (FROM) device. This is to prevent an unplanned swap from occurring on another LPAR.

◆ A hardware change is deleting the UCB of a target (TO) device while its source (FROM) device is enabled for unplanned swap; specifically, the device status is AutoAble in the DISPLAY GROUP DETAIL output.

Note: "DISPLAY GROUP" on page 62 describes the DISPLAY GROUP DETAIL output.

This is to prevent a target (TO) device being unavailable on another LPAR which might have the source (FROM) device online.

Blocking of an unacceptable configuration change is performed by PINning an affected device UCB during the ENF 31 configuration change notify processing. Not all affected UCBs will be PINned, as only one UCB PIN is required to fail the ACTIVATE.

The PIN text displayed on the resulting IOS500I message indicates that deleting the device causes an issue with AutoSwap, as shown in Figure 3.

```
IOS500I ACTIVATE RESULTS
NOTE = 0100,SOFTWARE-ONLY CHANGE
REASON=0151,CAN NOT DELETE DEVICE 8000
 DESCTEXT=DEVICE PINNED, ASID = 0099
         Dynamic Configuration change blocked by AutoSwap
```

Figure 3 Unacceptable configuration change

In this example, the dynamic configuration change is blocked by AutoSwap.

In addition, a long-term PIN is held on the gatekeeper device on the storage system where the target (TO) device resides for the life of the swap group. Where this device is being deleted, its PIN text will, on z/OS 1.13 and later, be displayed during ACTIVATE TEST mode. An attempt to delete the gatekeeper is rejected, as shown in Figure 4.

```
IOS500I ACTIVATE RESULTS
ACTIVATE FAILED - ERROR MESSAGE(S) ISSUED
REASON=0151,CAN NOT DELETE DEVICE 3981
   DESCTEXT=DEVICE PINNED, ASID = 0068
             AutoSwap 'TO' controller access device
```

Figure 4 Rejecting deletion of gatekeeper

To clarify the reason for the rejection, AutoSwap displays the CGRS646I message. It also lists the devices that the ACTIVATE is attempting to delete and the reason why the delete is unacceptable.

The source (FROM) and target (TO) error device ranges (those blocking the configuration change) precede the source (FROM) and target (TO) informational and warning device ranges. For an unacceptable change, one or more reason lines describe why the change is not acceptable and is being rejected.

Disabling group to accept configuration change

Some configuration changes require that you disable the swap group before running ACTIVATE.

Such circumstances are indicated with the following "Reason" line in the CGRS646I message:

```
Reason: SETSWAP DISABLE required prior to ACTIVATE
```

When this reason is displayed, disable the swap group with the SETSWAP DISABLE command, as described in "Disabling/re-enabling swap groups" on page 39. Then retry the ACTIVATE.

Note: If you disable the swap group prior to ACTIVATE, AutoSwap does not block an unacceptable configuration change.

If ACTIVATE is successful, re-enable the swap group with the SETSWAP ENABLE command, as described in "SETSWAP" on page 72.

Note: When you enable the swap group, AutoSwap verifies any configuration changes through its normal minimal (UCB-level) validation. This could result in a group becoming invalid where the activated IODF does not satisfy AutoSwap requirements for acceptable configuration changes.

⚠ CAUTION

Do not disable the swap group to accept a configuration change when a different reason is displayed. Otherwise, the disabled swap group is marked invalid when you attempt to re-enable it.

Example

Figure 5 shows that AutoSwap qualifies the requested hardware change as unacceptable because the swap group is not disabled:

```
ACTIVATE IODF=0E,FORCE

CGRS646I AutoSwap ACTIVATE results
ACTIVATE rejected by AutoSwap
 'TO' AutoSwap device(s) in CSS 0 being deleted by hardware ACTIVATE:
    Reason: 'FROM' partner device UNPLANNED ENABLEd
    Reason: SETSWAP DISABLE required prior to ACTIVATE
    Reason: Device(s) are blocking the configuration change
    03980-03981
 'FROM' AutoSwap device(s) in CSS 0 being deleted by hardware
ACTIVATE:
    Reason: SETSWAP DISABLE required prior to ACTIVATE
    Reason: Device(s) are blocking the configuration change
    01E00-01E02
Devices Affected       :    5
       Blocking 00000000:    5
       Ranges displayed :    2
       Not displayed 00 :    0

IOS500I ACTIVATE RESULTS 127
ACTIVATE FAILED - ERROR MESSAGE(S) ISSUED
NOTE = A886,FOLLOWING DEVICES ARE TO BE DELETED FROM PROCESSOR X1:
        1.3980-1.3981,1.1E00-1.1E0F,0.3980-0.3981,0.1E00-0.1E0F
 COMPID=SC1XL
REASON=0151,CAN NOT DELETE DEVICE 3980
 DESCTEXT=DEVICE PINNED
          0Dynamic Configuration change blocked by AutoSwap
```

Figure 5 Unacceptable configuration change, disabling required

After disabling the swap group and retrying the ACTIVATE, AutoSwap accepts the configuration change. The text starting with 'Note' indicates that the swap group has been disabled, as shown in Figure 6:

```
ACTIVATE IODF=0E,FORCE

CGRS599W (00165) Group SSA3 has been SWAP DISABLED for 60 seconds.
CGRS599W (00165) Group SSA3 has been SWAP DISABLED for 90 seconds.
CGRS599W (00165) Group SSA3 has been SWAP DISABLED for 120 seconds.

CGRS646I AutoSwap ACTIVATE results 166
ACTIVATE permitted by AutoSwap
 'TO' AutoSwap device(s) in CSS 0 being deleted by hardware ACTIVATE:
    Note:   UNPLANNED had been DISABLED prior to ACTIVATE
    03980-03981
 'FROM' AutoSwap device(s) in CSS 0 being deleted by hardware
ACTIVATE:
    Note:   UNPLANNED had been DISABLED prior to ACTIVATE
    01E00-01E02
Devices Affected       00 :    5
       Blocking 000000000:    0
       Ranges displayed0 :  0 2
        Not displayed    : 0000

IOS502I I/O CONFIGURATION CHANGED 167
INVOKER = *MASTER*
NEW IODF = SYS$X1.IODF0E
EDT REBUILT, NEW EDT ID = 00
DEVICE(S) DELETED FROM SOFTWARE CONFIGURATION
 1E00-1E0F 3980-3981.
DEVICE(S) DELETED FROM CSS 0
 3980-3981 1E00-1E0F.
DEVICE(S) DELETED FROM CSS 1
 3980-3981 1E00-1E0F.
```

Figure 6 Retrying ACTIVATE

You can enable the swap group with the SETSWAP GROUP ENABLE command, as described in . This results in AutoSwap performing local system validation to ensure that the configuration still looks healthy. Any deleted devices are displayed in the CGRS644W and CGRS643W messages, as shown in Figure 7.

```
CGRS599W (00165) Group SSA3 has been SWAP DISABLED for 150 seconds.
CGRS599W (00165) Group SSA3 has been SWAP DISABLED for 180 seconds.

F EMCCGRP,DAS,SETSWAP GRP * ENABLE

CGRS595I (00165) Group SSA3 SWAP processing ENABLED from host X006
(010E01F7281800D0).
CGRS644W (00165)(PID 00005) 'TO' device 03980 UCB has been deleted.
CGRS598I (00171) SETSWAP ENABLE completed: 193
Group SSA3 now ENABLED
Total groups processed 0: 1
Successful          00: 1
Failed              0 : 0

CGRS644W (00165)(PID 00006) 'TO' device 03981 UCB has been deleted.
CGRS643W (00165)(PID 00001) 'FROM' device 01E00 UCB has been deleted.
CGRS643W (00165)(PID 00002) 'FROM' device 01E01 UCB has been deleted.
CGRS643W (00165)(PID 00003) 'FROM' device 01E02 UCB has been deleted.
CGRS614W (00165) Alternate SS1 has 444 devices not in group SSA3
CGRS292I (00165) Group SSA3 216
Total Devices       :   6 Highest PID  :    6
       Valid        :   6 Invalid      :    0
       Auto Swappable:   3 Auto Pending :    0
       Swapped      :   0 Failed Swap  :    0
       Offline      :   3 Not Defined  :    5
       Alternate SS :   4
```

Figure 7 Re-enabling swap group

Invalid disabling

If the "Reason" indicated in the CGRS646I message does not mention SETSWAP DISABLE, then it is *not* appropriate to use this command to make AutoSwap accept the configuration change.

For example, do not disable the swap group when the configuration change is unacceptable because of an online source (FROM) device. To make the change, first bring the source (FROM) device offline or delete the FROM/TO pair from the swap group.

Also, it is not appropriate to disable the swap group when the ACTIVATE would delete the AutoSwap gatekeeper, as shown in Figure 8. Note that deleting the gatekeeper might cause an issue for AutoSwap in both successfully completing a swap and also in the usage of SCF CSC:

```
ACTIVATE IODF=0E,FORCE

CGRS646I AutoSwap ACTIVATE results
ACTIVATE rejected by AutoSwap
 'TO' AutoSwap device(s) being deleted:
    Reason: 'FROM' partner device is ONLINE and delete
            will result in an invalid AutoSwap group
    Reason: Device(s) are blocking the configuration change
    03980
 'TO' AutoSwap device(s) being deleted:
    Reason: 'TO' controller ACCESS device
    Reason: Device(s) are blocking the configuration change
    03981
 'FROM' AutoSwap device(s) being deleted:
    Note:   UNPLANNED is now DISABLED
    01E00-01E02
Devices Affected        :     5
        Blocking        :     2
        Ranges displayed :    3
        Not displayed   :     0

CGRS646I AutoSwap ACTIVATE results
ACTIVATE was rejected
 'FROM' AutoSwap device(s) UNPLANNED re-ENABLEd:
    01E00-01E02
Devices Affected        :     3
        Blocking        :     0
        Ranges displayed :    1
        Not displayed   :     0

IOS500I ACTIVATE RESULTS
ACTIVATE FAILED - ERROR MESSAGE(S) ISSUED
REASON=0151,CAN NOT DELETE DEVICE 3980
 DESCTEXT=DEVICE PINNED
          Dynamic Configuration change blocked by AutoSwap
REASON=0151,CAN NOT DELETE DEVICE 3981
 DESCTEXT=DEVICE PINNED, ASID = 0068
          AutoSwap 'TO' controller access device
```

Figure 8 Deleting AutoSwap gatekeeper

Suppose that you make an attempt to invalidly disable the swap group. As soon as the DELETE actions are performed, CSC looses access to its gatekeeper. This prevents validation and swapping for the swap group. The source (FROM) device that is online is now issuing a warning that the swap group will be marked invalid when re-enabled, as shown in Figure 9.

```
F EMCCGRP,DAS,SETSWAP GROUP * DIS

CGRS595I (00158) Group SSA4 SWAP processing DISABLED from host X006
(010E01F7281800D0).
CGRS598I (00163) SETSWAP DISABLE completed: 116
Group SSA4 now DISABLED
Total groups processed : 1
Successful            : 1
Failed                : 0


CGRS646I AutoSwap ACTIVATE results 130
ACTIVATE permitted by AutoSwap
 'TO' AutoSwap device(s) in CSS 0 being deleted:
    Warn:   'FROM' partner device is ONLINE and delete
            will result in an invalid AutoSwap group
    Note:   UNPLANNED had been DISABLED prior to ACTIVATE
     03980
 'FROM' AutoSwap device(s) in CSS 0 being deleted by hardware
ACTIVATE:
    Note:   UNPLANNED had been DISABLED prior to ACTIVATE
     01E00-01E02
Devices Affected     00 0:    4
       Blocking      00 :    0
       Ranges displayed0 :    2
        Not displayed000 :     0


SCF0604E CSC (0001957-00079) UNABLE TO LOCATE A GATEKEEPER DEVICE
DURING PROCESSING


IOS502I I/O CONFIGURATION CHANGED 132
INVOKER = *MASTER*
NEW IODF = SYS$X1.IODF0E
EDT REBUILT, NEW EDT ID = 00
DEVICE(S) DELETED FROM SOFTWARE CONFIGURATION
 1E00-1E0F 3980-3981.
DEVICE(S) DELETED FROM CSS 0
 3980-3981 1E00-1E0F.
DEVICE(S) DELETED FROM CSS 1
 3980-3981 1E00-1E0F.
```

Figure 9 Invalid disable action

And now the SETSWAP ENABLE is performed, which results in the group now being marked as invalid, as shown in Figure 10.

```
F EMCCGRP,SETSWAP G * ENABLE

CGRS595I (00158) Group SSA4 SWAP processing ENABLED from host X006
(010E01F7281800D0).

CGRS644W (00158)(PID 00005) 'TO' device 03980 UCB has been deleted.

CGRS598I (00164) SETSWAP ENABLE completed:
Group SSA4 now ENABLED
Total groups processed : 1
Successful          0: 1
Failed      00000000 00: 0

CGRS648E (00158)(PID 00005) Cannot locate 'TO' device for 'FROM'
device 03A62. 'FROM' device is ONLINE.
CGRS244E (00158)(PID 00005) No 'TO' device configured for
RDFgrp/SymDV#/
Ctrl#/CUU: --/000CC0/000195700079/-----

CGRS239W (00158)(PID 00005) Device 3A62 (NDef) is no longer eligible
for unplanned AutoSwap.
```

Figure 10 Invalid swap group

To correctly process this configuration change, change the gatekeeper in the ResourcePak Base configuration file and run the INI,REFRESH command of ResourcePak Base, as described in the *ResourcePak Base for z/OS Product Guide*. This automatically results in AutoSwap unpinning and repinning the new access device.

CHAPTER 4
Command Reference

This chapter covers the following topics:

AutoSwap commands

You issue AutoSwap operator commands through the ConGroup operator console.

AutoSwap commands are passed as parameters of the DAS command of ConGroup, as described in the *Consistency Groups for z/OS Product Guide*.

Syntax conventions

The commands follow these syntax conventions:

- Keywords appear in uppercase (for example, SET). They must be spelled exactly as shown.

- For easy reference, command keywords are supplemented by lowercase letters to form a meaningful word (for example, VALidate). When typing a command, use only CAPITALIZED characters of any keyword.

- Variables appear in lowercase and italics (for example, *swapgrp*). They represent user-supplied names or values in the syntax.

- Square brackets [ ] indicate an optional entry (for example, *cuu*[-*cuu*]).

- The vertical bar | indicates alternative argument values (for example, RUN|NORUN).

- Curly brackets {} are used to group a series of alternative values that can be used with a single keyword, for example: {SUM|DET}.

- 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.

- Default values are indicated by an underline. For example, if the parameter has the following option, (CROSSSYSTEM|LocalSYStem), the underlined CROSSSYSTEM indicates the default value.

DEFINE GROUP

Creates a swap group.

Note: Use of this command is not recommended because it creates a group that is *not* managed by ConGroup. These groups have a significant limitation. Because they are not ConGroup-managed, they have no unplanned swap mode.

Syntax

```
DEFine GRouP swapgrp
   {INClude|EXClude}
   {CcUU=(device_list)|VOLumes=(volser_list)}
   [autoswap_options]

DEFine GRouP swapgrp RDFGRouP={srdfgrp|CONF}
   [autoswap_options]

DEFine GRouP swapgrp REPlace
   [autoswap_options]

DEFine GRouP cmpgrp COMPLEMENT swapgrp
   [autoswap_options]
```

Parameters

autoswap_options

A list of AutoSwap options set for the swap group.

Note: "AutoSwap options" on page 77 describes the AutoSwap options.

IMPORTANT

It is not recommended to use DEFINE GROUP to modify AutoSwap options because the command operates outside of ConGroup.

When used with the COMPLEMENT keyword, the AutoSwap options apply to the complement group, not the original consistency group. The AutoSwap options set for the original consistency group and its complement group do not have to be the same.

cmpgrp

The name of the complement group. The name can include from 1 to 8 alphanumeric and special characters.

COMPLEMENT

Creates a complement group to any currently defined swap group.

Note: The *Consistency Groups for z/OS Product Guide* discusses complement groups.

The options specified in this statement apply to the complement group, not the original swap group. The options for the original swap group and its complement group do not have to be the same.

device_list

A device, a comma-separated list or range of devices identified with their CUUs.

EXClude

Excludes the specified devices or volumes from the swap group.

INClude

Adds the specified devices or volumes to the swap group.

The INCLUDE argument only specifies volumes which are on the R1 side of an SRDF configuration. You do not have to identify the associated R2s to AutoSwap. This identification is automatic. By the time you issue the DEFINE GROUP command, SCF has performed a roll call and created an internal list of z/OS device addresses, their matching storage system ID and device numbers, and has a knowledge of the R1/R2 relationships.

RDFGRouP={*srdfgrp*|CONF}

This parameter is used for Concurrent SRDF devices to specify the R2s to swap to.

Note: describes Concurrent SRDF configurations.

srdfgrp

The SRDF group identified with its 2-character group ID.

The SRDF group must be valid for all Concurrent SRDF devices in the swap group.

CONF

Specifies that only one of the two R2s in the Concurrent SRDF configuration is defined to the host.

Note: CONF can be specified as CONFIGUREDDEVICE or CONFDEV.

REPlace

Replaces swap groups that have already been defined.

Note: The swap group to be replaced cannot be active (validated).

Use REPLACE when consistency group membership has changed. When a group is validated, AutoSwap communicates the group definition to all other LPARs, thus achieving a global knowledge of group membership.

If a group with this group name is already active (validated and not subsequently deleted), the validation with the new group definition fails.

You may change the definition of active groups using DELETE followed by DEFINE GROUP.

swapgrp

The name of the swap group. The name can include from 1 to 8 alphanumeric and special characters.

volser_list

A volser, a comma-separated list or range of volsers.

Alternatively, you can use a volser mask, where:

- "∗" represents any number of characters (including a null string).
- "%" or "?" matches a single character.

If a volser contains special characters that conflict with the masking characters, the volser must be contained in quotes; for example: VOLUMES='VOL%01'.

DELETE GROUP

Deletes swap groups.

You can also use the DELETE GROUP command to delete an active group that cannot be replaced with the REPLACE command.

Syntax

```
DELete GRouP swapgrp
```

Parameters

swapgrp

The name of the swap group. The name can include from 1 to 8 alphanumeric and special characters.

Alternatively, you can use a swap group mask, where:

- "∗" represents any number of characters (including a null string).
- "%" or "?" matches a single character.

Example

To delete the swap group named PROD:

```
DEL GRP PROD
```

DISPLAY GROUP

Displays swap groups that have been successfully defined.

Syntax

```
DISplay GRouP swapgrp
[SDASOPTions]
[ALTSSMissing]
[DIAG]
[FIND search_string]
[EXCLUDE search_string]
{SUMmary|DETails [SORT [sort_options]] [FILTer filter_options]]}
```

Note: You can abbreviate DISplay as D.

Parameters

ALTSSMissing

Displays any alternate subchannel configuration issues using message CGRS614E/W[1].

DETails

Displays detailed information about the swap group.

DIAG

Displays diagnostic information about a swap group.

FILTER

Filters the display according to the specified *filter_options* described in "Filter options" on page 65.

FIND *search_string*

Displays swap group definitions that contain *search_string*.

- For a DISPLAY GROUP DETAILS command, the FIND and EXCLUDE arguments apply to the device pair entries. The *search_string* applies to both lines.

- For a DISPLAY GROUP SUMMARY command, the FIND and EXCLUDE arguments apply to the group entry display.

EXCLUDE *search_string*

Hides swap group definitions that contain *search_string*.

---

1. ESWP614E | CGRS614E | FMMS614E | SCFS614E and ESWP614W | CGRS614W | FMMS614W | SCFS614W in the *Mainframe Enablers Message Guide.*

- For a DISPLAY GROUP DETAILS command, the FIND and EXCLUDE arguments apply to the device pair entries. The *search_string* applies to both lines.

- For a DISPLAY GROUP SUMMARY command, the FIND and EXCLUDE arguments apply to the group entry display.

SDASOPTions

Displays the AutoSwap options used to define the group, or the AutoSwap default values.

Note: "AutoSwap options" on page 77 lists AutoSwap options.

You can abbreviate SDASOPTions as SOPT, OPTIONS, or OPT.

SORT

Sorts the display according to the specified *sort_options* described in "Sort options" on page 63.

SUMmary

Displays a high-level view of the swap group.

swapgrp

The name of the swap group. The name can include from 1 to 8 alphanumeric and special characters.

Alternatively, you can use a swap group mask, where:

- "*" represents any number of characters (including a null string).
- "%" or "?" matches a single character.

Sort options

{PID|PHASE|VOLSER|FROMDEVN|TODEVN|FROMSYMD|TOSYMD|NO}
{ASCENDING|DESCENDING}

Where:

ASCENDING

(**Default**) Displays the entries in the ascending order.

DESCENDING

Displays the entries in the descending order.

FROMDEVN

Sorts the display by CUU of the source (FROM) device.

FROMSYMD

Sorts the display by PowerMax/VMAX device number of the source (FROM) device.

NO

Produces an unsorted display.

Phase

Sorts the display by phase.

PID

(**Default**) Sorts the display by process ID.

TOSYMD

Sorts the display by PowerMax/VMAX device number of the target (TO) device.

Volser

Sorts the display by volser.

Filter options

```
{FROMDEVN(cuu-cuu) |
TODEVN(cuu-cuu) |
FROMSYMDEV(symdv#-symdv#)[,CTRLID(SymmID)] |
TOSYMDEV(symdv#-symdv#)[,CTRLID(SymmID)] |
PID(pid-pid) |
VOLSER(mask) |
CTRLID(SymmID) |
ALTSS |
BASESS}
```

Where:

`ALTSS`

Displays only the device pairs with target (TO) devices that are in the alternate subchannel set.

`BASESS`

Displays only the device pairs with target (TO) devices that are in the active base subchannel set.

CTRLID(*SymmID*)

Filters the display by 12-digit storage system serial number.

`FROMDEVN(cuu-cuu)`

Filters the display by CUU of the source (FROM) device.

You can specify a single value or a range.

`FROMSYMDEV(symdv#-symdv#)`

Filters the display by PowerMax/VMAX device number of the source (FROM) device.

You can specify a single value or a range.

`PID(pid-pid)`

Filters the display by process ID.

You can specify a single value or a range.

`TODEVN(cuu-cuu)`

Filters the display by CUU of the target (TO) device.

You can specify a single value or a range.

`TOSYMDEV(symdv#-symdv#)`

Filters the display by PowerMax/VMAX device number of the target (TO) device.

You can specify a single value or a range.

`VOLSER(mask)`

Filters the display by volser mask.

Example

1. To display summary values for a swap group:

   ```
   DIS GRP * DET F TOTAL
   ```

2. To sort the display by volser in the ascending order:

   ```
   DIS GRP PROD DET SORT VOLSER ASCENDING
   ```

3. To filter the display by PowerMax/VMAX FROM device numbers 9C-9F:

   ```
   DIS GRP PROD DET FILT FROMSYMD(00009C-00009F)
   ```

4. To find all devices marked as invalid to all swap groups:

   ```
   DISPLAY GRP * DET F INVALID
   ```

5. To find all devices with UGL* volsers, but display those devices which are also invalid:

   ```
   DISPLAY GRP * DET F UGL*INVALID
   ```

6. To find all devices with UGL* volsers, but display those that are valid:

   ```
   DISPLAY GRP * DET F UGL*VALID
   ```

7. To find all devices with UGL* volsers, but display those that are not invalid:

   ```
   DISPLAY GRP * DET X UGL*VALID
   ```

8. To display all devices for PL* swap groups where they are not volser UGL*:

   ```
   DISPLAY GRP PL* DET X UGL*
   ```

9. To display all devices for PL* swap groups where they are not volser U????1:

   ```
   DISPLAY GRP PL* DET X U????1
   ```

10. To display all devices where it is an R1>R2 pair:

    ```
    DISPLAY GRP * DET F R1*R2
    ```

11. To display all devices where it is an R2>R1 pair:

    ```
    DISPLAY GRP * DET F R2*R1
    ```

12. To display all devices where it is an R2>R1 pair and a swap is in progress:

    ```
    DISPLAY GRP * DET F R2*SWAP*R1
    ```

13. To display all devices where the volser is not resolved:

    ```
    DISPLAY GRP * DET F '??????'
    ```

14. To display all swap groups that are idle:

    ```
    DISPLAY GRP * F IDLE
    ```

15. To display all swap groups that are swapping:

    ```
    DISPLAY GRP * F SWAP
    ```

16. To display all swap groups that are not swapping:

    ```
    DISPLAY GRP * X SWAP
    ```

DISPLAY SDASOPTIONS

Displays the default AutoSwap options in effect globally.

"Setting AutoSwap options" on page 77 describes global and group-specific AutoSwap options. "AutoSwap options" on page 77 lists the available AutoSwap options.

Syntax

```
DISPLAY SDASOPTions|SOPT
```

Note: You can abbreviate SDASOPTions as SOPT.

DISPLAY OPTIONS

Displays all relevant options (those that can be displayed using the DISPLAY SDASOPTions, DISPLAY GLOBALOPTions, and DISPLAY STARTPARMS commands) in a single display.

Syntax

```
DISPLAY OPTions
```

DISPLAY GLOBALOPTIONS

Displays global debugging and diagnostics in use.

Syntax

```
DISPLAY GLOBALOPTions|GOPT
```

Note: You can abbreviate GLOBALOPTions as GOPT.

DISPLAY STARTPARMS

Displays the current subsystem (LPAR) name.

Syntax

```
DISPLAY STARTPARMS|SPARMS
```

Note: You can abbreviate STARTPARMS as SPARMS.

SET SDASOPTIONS

Sets AutoSwap options globally for swap groups or for individual swaps.

Note: "AutoSwap options" on page 77 lists AutoSwap options. "Setting AutoSwap options" on page 77 discusses setting the options globally or within a swap.

You can specify the SET SDASOPTIONS command in the CONFIGCA DD statement, as described in "CONFIGCA DD statement" on page 16.

Syntax

```
seT SDASOPTions autoswap_options
```

Note: You can abbreviate SDASOPTions as SOPT.

Parameters

autoswap_options

One or more AutoSwap options listed in "AutoSwap options" on page 77.

Example

```
SET SOPT CFW=RES
DEF GRP PROD INC CUU=312C-312F -
    CFW=RES PREVAL PROCCNT=3 RETAIN REPLACE
DEFINE GRP PROD2 INC CUU=(B66C-B66F,A06A) RDFGRP=0 REPLACE AO ASCM
DEFINE GRP PROD3 INC VOL=(UGL*,UGM*) PV NOAO NOASCM
```

SET PARMS

Reprocesses the statements specified in the CONFIGCA DD statement.

You can use the SET PARMS command to bring in groups that have been deleted because of a swap or an operator command.

Syntax

```
seT PARMS
```

Example

You can use the following ConGroup command to reprocess statements in the CONFIGCA DD:

```
F emccgrp,DAS T PARMS
```

Where *emccgrp* is the name of the ConGroup started task.

SET DEBUG

Enables or disables debugging.

> **⚠ CAUTION**
>
> **Enable debugging only when requested by Dell EMC Customer Support.**

Syntax

```
seT DEBUG|NODEBUG
```

Parameters

DEBUG

Enables debugging.

NODEBUG

Disables debugging.

Example

To disable debugging:

```
T NODEBUG
```

SET CAPS

Determines whether mixed case or only upper case is used in AutoSwap displays.

Syntax

```
seT CAPS|NOCAPS
```

Parameters

CAPS

Outputs AutoSwap displays in upper case.

NOCAPS

(**Default**) Outputs AutoSwap displays in mixed case.

Example

To output AutoSwap displays in upper case:

```
T CAPS
```

SET VERBOSE

Enables or disables verbose messaging, and also sets the message verbosity level.

IMPORTANT

It is recommended to have verbose messages disabled unless requested by Dell EMC Customer Support.

Note: "Verbosity" on page 18 describes standard verbosity values.

Syntax

```
seT {VERBose verbose_level|NOVERBose}
```

Parameters

NOVERBose

> (**Default**) Disables verbose messaging.

VERBose

> Enables verbose messaging.

verbose_level

> Sets the level of detail (and indirectly the amount) of messages produced.
>
> The level can be set from zero (0) to 255, where zero is the least (terse) and 255 is the most (verbose).

SET MAXLINECOUNT

Limits the length of AutoSwap displays to a certain count of lines.

Note: "Controlling length of AutoSwap displays" on page 42 discusses dealing with long AutoSwap displays.

Using "0" (zero) or no value resets the parameter to the default.

Syntax

```
seT MAXLinecount line_count
```

Parameters

line_count

> A numeric value that specifies the maximum number of lines to be produced on AutoSwap displays. The maximum allowed value is 99999. The default value is 1000.

SET DEFAULTLINECOUNT

Sets the default number of lines for AutoSwap displays.

Note: "Controlling length of AutoSwap displays" on page 42 discusses dealing with long AutoSwap displays.

The DEFAULTLINECOUNT value cannot exceed the MAXLINECOUNT value. Thus, you need to examine the current MAXLINECOUNT value before you change the DEFAULTLINECOUNT value.

Using "0" (zero) or no value resets the parameter to the default.

Syntax

```
seT DEFAULTLinecount line_count
```

Parameters

line_count

A numeric value that specifies the default number of lines to be produced on AutoSwap displays. The maximum allowed value is 99999. The default value is 100.

SETSWAP

Enables or disables swapping.

Note: "Disabling/re-enabling swap groups" on page 39 discusses enabling and disabling of swap processing.

Syntax

```
seTSwap GRouP swapgrp {ENAble|DISable}
[,CoMmanDTimeout timeout]
[{CROSSSYSTEM|LocalSYStem}]
[,{RUN|NORUN}]
[,{SUMmary|DETail}]
```

Parameters

CoMmanDTimeout *timeout*

Sets the cross-system communication timeout value in seconds. The default value is 60 seconds. If the command is not completed in this period of time, command completion is forced.

CROSSSYSTEM

(**Default**) Process the request across all AutoSwap LPARs.

Note: You can abbreviate CROSSSYSTEM as XSYS.

DETail

Outputs a summary line and a host line to show the status change for that host.

DISable

Disables swap processing for a swap group or groups.

ENAble

Enables swap processing for a swap group or groups.

GRouP *swapgrp*

The name of the swap group.

Alternatively, you can use a mask. The masking characters are * or %. For example, GROUP * includes all swap groups.

Only active swap groups are applicable. If a group is marked "inactive," it is not processed.

LocalSYStem

Processes the request on the local (command issuing) LPAR only.

NORUN

Only checks to see if the command is applicable. No active processing is performed.

```
RUN
```

(**Default**) Checks to see if the command is applicable and performs the required processing.

```
SUMmary
```

(**Default**) If the command completes successfully, AutoSwap only generates output showing the status change of the swap group.

If an error condition occurs, AutoSwap additionally generates output showing the hosts that failed and the failure reason.

Example

1. To disable swap processing for a swap group:

```
F EMCCGRP,DAS,TS GRP PAGE DIS DET
```

1. To enable swap processing for a swap group:

```
F EMCCGRP,DAS,TS GRP PAGE ENA
```

SWAP GROUP

Swaps the UCBs of the devices in the specified swap group.

The swap group does not need to be prevalidated. The group is validated as it is swapped.

Note: You can use the keyword G instead of SWAP.

Syntax

```
SWAP GRouP swapgrp [VALidate][CROSSSYSTEM]
```

Parameter

CROSSSYSTEM|XSYS

When the swap group is owned by another LPAR, you must specify the CROSSSYSTEM keyword on hosts other than the owner LPAR in order to initiate the request.

Note: You can abbreviate CROSSSYSTEM as XSYS.

swapgrp

The name of the swap group. The name can include from 1 to 8 alphanumeric and special characters.

VALidate

Validates the swap group before the swap.

Note: Validation is always performed unless the swap group contains the PREVALIDATE specification described in "PREVALidate" on page 83. If you issue the VALIDATE command for a swap group, AutoSwap considers the swap group to have had the PREVALIDATE specification. This means that if you issue the SWAP command for such a swap group, it is not validated again, unless you specify this VALidate option of the SWAP command.

SWAP

Swaps individual devices or ranges of devices.

You can also use the SWAP command to set AutoSwap options, as described in .

Syntax

```
SWAP from-cuu to-cuu count [autoswap_options]
```

Note: G is an alias of SWAP.

Parameters

autoswap_options

A list of AutoSwap options set for the swap.

Note: describes the AutoSwap options.

count

The number of devices to be swapped. The default value is 1.

from-cuu to-cuu

from-cuu and *to-cuu* are SRDF mirrors of each other. Concurrent devices may be specified here since primary and secondary devices are explicitly stated.

Example

The following example lists the *from-cuu* (312E) and the *to-cuu* (34AE) and indicates that four devices are to be swapped:

```
SWAP 312E 34AE 4
```

VALIDATE GROUP

Validates swap groups explicitly to ensure that devices are still in their intended state.

Note: After you issue the VALIDATE command for a swap group, AutoSwap considers the swap group to have had the PREVALIDATE specification. This means that if you issue the SWAP command for such a group, it is not validated again, unless you specify the SWAP VALIDATE option.

Syntax

```
VALidate GRouP swapgrp
```

Parameters

swapgrp

The name of the swap group. The name can include from 1 to 8 alphanumeric and special characters.

Alternatively, you can use a mask, where:

- "*" represents any number of characters (including a null string).

- "%" or "?" matches a single character.

Example

```
VAL GRP X
```

AutoSwap options

Setting AutoSwap options

AutoSwap options are the parameters that define AutoSwap behavior.

You can set AutoSwap options as follows:

◆ Globally

To make global settings, use the SET SDASOPTIONS command described in "SET SDASOPTIONS" on page 68.

To view global settings currently in effect, use the DISPLAY SDASOPTions command described in "DISPLAY SDASOPTIONS" on page 67 .

◆ For a specific swap group

To make group-specific settings, use the DEFINE GROUP command described in "DEFINE GROUP " on page 59.

> IMPORTANT
>
> It is not recommended to use DEFINE GROUP to modify global AutoSwap options because the command operates outside of ConGroup.

AutoSwap options set with the DEFINE GROUP command override global settings.

◆ For a specific swap

To make swap-specific settings, use the SWAP command described in "SWAP" on page 75.

AutoSwap options set with the SWAP command override global settings.

Separate each AutoSwap option with a space.

ALLOWCOUPLEDATASETS

Allows or prohibits swaps of couple datasets.

Note: "Handling couple datasets" on page 33 discusses handling of couple datasets.

Syntax

{ALLOWCOUPLEDATASETS | NOALLOWCOUPLEDATASETS}

Where:

- ◆ ALLOWCOUPLEDATASETS allows swaps of couple datasets.
- ◆ (**Default**) NOALLOWCOUPLEDATASETS prohibits swaps of couple datasets.

AllowConcurrentCopy

Allows or prohibits swaps of devices with Concurrent Copy sessions.

Note: "Handling devices with Concurrent Copy, Snap and FlashCopy sessions" on page 34 discusses processing of devices with Concurrent Copy sessions.

The AllowConcurrentCopy option is mutually exclusive with the NOCHECKConcurrentCopy option described in "NOCHECKConcurrentCopy" on page 83.

Syntax

{AllowConcurrentCopy | NOAllowConcurrentCopy}

Where:

- ◆ (**Default**) AllowConcurrentCopy allows swaps of devices with Concurrent Copy sessions.
- ◆ NOAllowConcurrentCopy prohibits swaps of devices with Concurrent Copy sessions.

AllowOnlineToDevice

Allows or prohibits using HRO (Host Read-Only) online target (TO) devices in a swap group.

Note: "Handling HRO online TO devices" on page 33 discusses processing of HRO online TO devices.

Syntax

{AllowOnlineToDevice | NOAllowOnlineToDevice}

Where:

- ◆ AllowOnlineToDevice allows using online TO devices in swap groups.
- ◆ (**Default**) NOAllowOnlineToDevice prohibits using online TO devices in swap groups.

Note: You can abbreviate AllowOnlineToDevice as AllOnTo.

AllowOnlineUndefinedDevice

Allows or prohibits use of source (FROM) devices, which are online but excluded or not discovered by ResourcePak Base, in a swap group.

Note: "Handling unknown online FROM devices" on page 33 discusses handling of unknown online FROM devices.

> ⚠️ **CAUTION**
>
> **Use AllowOnlineUndefinedDevices with caution, as it could result in loss of access to a device after a swap.**

Syntax

```
{AllowOnlineUndefinedDevice|NOAllowOnlineUndefinedDevice}
```

Where:

- AllowOnlineUndefinedDevice allows using undefined FROM devices in a swap group.

- (**Default**) NOAllowOnlineUndefinedDevice prohibits using undefined FROM devices in a swap group. When an online undefined device is present in the group, the group fails validation, and the CGRS587E message is displayed.

Note: You can abbreviate AllowOnlineUndefinedDevice as ALLONUNDEFDEV.

AllowSnapSession

Allows or prohibits swaps of devices with target Snap or FlashCopy sessions.

Note: "Handling devices with Concurrent Copy, Snap and FlashCopy sessions" on page 34 discusses processing of devices with Snap or FlashCopy sessions.

The AllowSnapSession option is mutually exclusive with the NOCHECKSnapSessions option described in "NOCHECKSnapSessions" on page 83.

Syntax

```
{AllowSnapSession|NOAllowSnapSession}
```

Where:

- (**Default**) AllowSnapSession allows swaps of devices with target Snap or FlashCopy sessions.

- NOAllowSnapSession prohibits swaps of devices with target Snap or FlashCopy sessions.

Note: You can abbreviate AllowSnapSession as ALLSNAP.

AllowSystemsCountMismatch

Allows or prohibits mismatches in the count of participating LPARs at swap time and the count of path groups for the device established at validation time.

Note: "Checking LPAR/path group counts" on page 35 describes LPAR/path group count mismatches.

Syntax

`{AllowSystemsCountMismatch|NOAllowSystemsCountMismatch}`

Where:

- ◆ (**Default**) AllowSystemsCountMismatch allows system count mismatch. In case of mismatch, the swap continues.

- ◆ NOAllowSystemsCountMismatch prohibits system count mismatch. In case of mismatch, the swap fails.

CFW

Controls Cache Fast Write (CFW).

> ⚠ **CAUTION**
>
> **Do not use CFW on devices that may be swapped. When you use CFW, additional integrity checks may be involved. In some cases, the subsystem ID is checked. If the device has been swapped, the SSID is different and the job is terminated.**

Syntax

`CFW={OFFVALidation|NO|ALLOW|OFF|RESume}`

Parameters

ALLOW

CFW is checked during ConGroup validation processing. However, no change in the device CFW state is made. If a CAX swap occurs, jobs using CFW fail. You must rerun these jobs after the swap.

NO

Prohibits swapping if CFW is active. If CFW is active on any devices in the consistency group, validation of the consistency group fails and CAX processing is disabled.

OFF

Turns off CFW.

OFFVALidation

(**Default**) CFW is disabled during ConGroup validation processing.

No CFW processing is attempted during a CAX swap. If you subsequently reactivate CFW, and a CAX swap occurs, jobs using CFW fail. You must rerun these jobs after the swap.

It is recommended to use CFW=OFFVAL, followed by the VALIDATE command. CFW=OFFVAL turns off CFW for the devices in the group. VALIDATE detects and warns you about any pre-existing CFW usage.

RESume

> After the swap, turns on CFW on the storage system where the target (TO) device resides.

CHANGESOURCEdevice

Determines the post-swap state of the source devices and optionally applies a volser prefix.

Note: You can abbreviate CHANGESOURCEdevice as CSD.

Syntax

```
CHANGESOURCEdevice=
[{NRDY|USRNRDY|NONRDY|NRDYAFTER}]
[{NOVOLP|VOLUMEPrefix=volser_prefix}]
```

Parameters

NRDY

> (**Default**) Sets the source device to NRDY status during the swap (at checkpoint 2) to prevent access to the source device.

NONRDY

> Leaves the device in a RDY status upon the swap.

NRDYAFTER

> Changes the device to NRDY following checkpoint 4 at the successful completion of the swap.

USRNRDY

> Sets the source device to USR-NRDY status during the swap (at checkpoint 2) to prevent access to the source device.

VOLUMEPrefix=volser_prefix

> Changes the volser prefix of the source device.

> The volume prefix must be 1 or 2 characters in length. If NRDY is specified, then it will be changed to NRDYAFTER.

> **Note:** You can abbreviate VOLUMEPrefix as VOLP.

NOVOLP

> (**Default**) No volume prefix.

CROSSSYSTEMTIMEOUT

Sets the cross-host timeout value.

This is the time CAX waits for acknowledgment from other CAX instances on other hosts.

Note: You can abbreviate CROSSSYSTEMTIMEOUT as XSYSTO.

Syntax

```
CROSSSYSTEMTIMEOUT=time_interval
```

Parameters

time_interval

Number of seconds. Valid values are from 60 to 9999. The default value is 300.

FORCE

Allows to swap in extreme circumstances.

The FORCE options are not merged with the global options.

Syntax

```
FORCE={NOLINK|LOSTSYStem}
```

Parameters

NOLINK

Allows the swap to occur if the source (FROM) device cannot be accessed on the local or remote link.

The NOLINK option is not merged with the global options.

LOSTSYStem

Allows the swap to occur when an LPAR is lost during swap processing.

Note: "Forcing swap for lost LPAR" on page 36 describes forced swaps with a lost LPAR.

MAXRC

Sets the maximum allowed return code.

Syntax

```
MAXRC=max_return_code
```

Parameters

max_return_code

The maximum allowed return code.

NOCHECKConcurrentCopy

Bypasses verification of devices with Concurrent Copy sessions.

Note: "Handling devices with Concurrent Copy, Snap and FlashCopy sessions" on page 34 discusses processing of devices with Concurrent Copy sessions.

The NOCHECKConcurrentCopy option is mutually exclusive with the AllowConcurrentCopy option described in "AllowConcurrentCopy" on page 78.

Syntax

```
NOCHECKConcurrentCopy
```

Note: You can abbreviate NOCHECKConcurrentCopy as NOCHKCC.

NOCHECKSnapSessions

Bypasses verification of devices with target Snap or FlashCopy sessions.

Note: "Handling devices with Concurrent Copy, Snap and FlashCopy sessions" on page 34 discusses processing of devices with Snap or FlashCopy sessions.

The NOCHECKSnapSessions option is mutually exclusive with the AllowSnapSession option described in "AllowSnapSession" on page 79.

Syntax

```
NOCHECKSnapSessions
```

Note: You can abbreviate NOCHECKSnapSessions as NOCHKSNAP.

PREVALidate

Enables or disables pre-validation of the swap group.

Pre-validation means performing the first seven steps of the swap process, thus allowing the full swap to process in a much shorter time.

Syntax

```
{PREVALidate|NOPREVALidate}
```
Where:

◆ (**Default**) NOPREVALidate disables pre-validation. Disabling pre-validation allows AutoSwap to validate the group fully in the event of a manual swap.

Note: You can abbreviate NOPREVALidate as NOPV.

◆ PREVALidate enables pre-validation.

Note: You can abbreviate PREVALidate as PV.

PROCESSCOUNT

Defines the number of swaps processed concurrently within a swap group.

You can abbreviate PROCESSCOUNT as PROCCNT or PCNT.

Note: This value cannot be changed with CAX. CAX always uses a PROCESSCOUNT of zero.

Syntax

PROCESSCOUNT=*n*

Parameters

n

The number of concurrent swaps. The default value is 64. The value of 0 (zero) sets the maximum process count.

QUIESCETimeout

Sets the quiesce timeout.

During I/O halt processing, this is the time that AutoSwap waits for any outstanding I/O to complete on a device. If I/O is still active on the device following this timeout, then a swap backout occurs.

Note: You can abbreviate QUIESCETimeout as QTimeo.

Syntax

QUIESCETimeout={<u>MIH</u>|*time_interval*}

Parameters

MIH

(**Default**) Makes AutoSwap use the z/OS Missing Interrupt Handler (MIH) timeout interval.

time_interval

Number of seconds. Valid values are from 0 to 300. A value of zero (0) is equivalent to specifying MIH.

If the resolved timeout value is less than 15 seconds, then 15 seconds is used.

RETAIN

Determine whether to retain a swap group.

Syntax

```
RETAIN={SWAPCmplt|NORETAIN}
```

Parameters

NORETAIN

Prevents a group, its device definitions and AutoSwap options from being kept.

This is the default value for normal consistency groups.

SWAPCmplt

Allows a swap group to remain active until all devices in the group have been swapped successfully.

This is the default value for complement groups.

Note: The *Consistency Groups for z/OS Product Guide* discusses complement groups.

You cannot specify RETAIN=SWAPCmplt to CAX.

ROUTEMeSsaGetoowner

Enables or disables routing of AutoSwap messages to the SYSLOG of the owner system.

Note: "Routing AutoSwap messages" on page 42 describes routing AutoSwap messages.

If you use ROUTEMeSsaGEtoowner with no keywords, only error (E) messages are routed to the owner system SYSLOG.

Note: You can abbreviate ROUTEMeSsaGEtoowner as ROUTEMSG.

Syntax

```
{ROUTEMeSsaGetoowner|NOROUTEMeSsaGetoowner}
[ALL|Warn|Error]
```

Where:

◆ ROUTEMeSsaGetoowner enables AutoSwap message routing.

◆ NOROUTEMeSsaGetoowner disables AutoSwap message routing.

Parameters

`ALL`

All non-owner AutoSwap messages are routed to the owner system SYSLOG.

`Error`

Only error (E) messages are routed to the owner system SYSLOG.

`Warn`

Only warning (W) and error (E) messages are routed to the owner system SYSLOG.

SWAPimmediate

Allows or prohibits swapping the UCBs in a group immediately after the group has been defined and validated.

Syntax

```
{SWAPimmediate|NOSWAPimmediate}
```

Where:

◆ SWAPimmediate allows swapping the UCBs in a swap group as soon as the group is defined and validated.

◆ (**Default**) NOSWAPimmediate prohibits immediate swapping.

ValidateINTerval

Sets the validation interval for the swap group. This allows for periodic group validation as the server is running.

By default, no interval is set because validation is not performed at any regular interval.

Syntax

```
ValidateINTerval=interval
```

Parameters

interval

The interval of time in seconds.

VOLserCHeck

Determines whether to perform volser verification.

Note: "Verifying volsers" on page 36 describes volser verification.

Note: The arguments for the original group and its complement do not have to be the same.

Syntax

```
{VOLserCHeck|NOVOLserCHeck}
```

Where:

- ◆ VOLserCHeck enables volser verification.

- ◆ (**Default**) NOVolserCHeck disables volser verification.

Command Reference

APPENDIX A
Configuration Worksheet

This appendix covers the following topics:

Introduction

You can use this worksheet to gather the information you need for the AutoSwap installation. You can also use this information when you enable and customize AutoSwap.

CAX configuration worksheet

The following worksheet allows you to collect CAX option values. Make a photocopy of the blank worksheet for each CAX option you need to specify.

Host: _____

CAX option	Default value	Value used
CFW	OFFVAL	
CROSSSYSEMTIMEOUT	300 seconds	
LOSTownerpolicy	OPERATOR	
AllowSystemsCountMismatch	AllowSystemsCountMismatch	
QUIESCETimeout	MIH	
ROUTEMeSsaGEtoowner	ERROR	
UNPLANNEDCONDitions	none	

Other global configuration parameters

The following work table allows you to collect information for other AutoSwap configuration parameters.

Host: _____

Configuration parameter	Default value	Value used
CAX		
COUPLEDS_ALLOWED	NO	
GLOBAL		
PAGEDEV_ALLOWED	NO	