EMC® MirrorView™/Synchronous

Command Line Interface (CLI) Reference
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EMC MirrorView/Synchronous Command Line Interface (CLI) Reference

As part of an effort to improve and enhance the performance and capabilities of its product lines, EMC periodically releases revisions of its hardware and software. Therefore, some functions described in this document may not be supported by all versions of the software or hardware currently in use. For the most up-to-date information on product features, refer to your product release notes.

If a product does not function properly or does not function as described in this document, please contact your EMC representative.

About this manual

This manual describes the CLI commands you use to set up, configure, and manage EMC® MirrorView™/Synchronous software. Each major section includes introductory and format information.

This manual refers to EMC MirrorView/Synchronous as *MirrorView/S*.

Audience

This manual is intended for those who will use the `naviseccli` command to create and manage remote mirrors on AX4-5 series, CX4 series, CX3 series, and CX series storage systems with the MirrorView/Synchronous (MirrorView/S) option. Readers of this guide should be familiar with the following topics:

◆ The operating system running on the servers you will manage

◆ Storage-system components and configurations

Storage systems no longer covered in this document

The table below lists the storage systems that are no longer covered in this document and the last revision of this document that included the storage systems.

Storage system removed	Last revision including the storage system
CX200, CX400, and CX600	Revision 11

Storage system removed	Last revision including the storage system
FC series; C series	Revision 11

Related documentation

Related documents include:

For AX4-5 series, CX4 series, CX3 series, and CX series storage systems, refer to the appropriate version of the *EMC Navisphere Command Line Interface (CLI) Reference* for your software revision.

For the most current management and security content for AX4-5 series, CX4 series, CX3 series, and CX series storage systems, refer to the Unisphere™ help, which is available from the Unisphere UI and in the Technical Documentation and Advisories section of the Powerlink website (http://Powerlink.EMC.com).

We recommend that you download the latest information before you run the CLI commands.

◆ EMC Unisphere Host Agent and CLI Release Notes

◆ EMC MirrorView/Synchronous Release Notes

◆ The version of this manual that is applicable to your software revision

Special notice conventions

EMC uses the following conventions for special notices:

⚠ CAUTION A caution contains information essential to avoid data loss or damage to the system or equipment.

Important: An important note contains information essential to operation of the software.

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

Hint: A note that provides suggested advice to users, often involving follow-on activity for a particular action.

Typographical conventions

EMC uses the following type style conventions in this document.

Type style	Used for
Normal	◆ Running text ◆ Names of resources, attributes, pools, clauses, functions, and utilities
Italic	◆ Titles of publications (citations) ◆ Variables, in running text
Courier italic	Variables, in syntax diagrams and user input (except Celerra)
Courier bold	Command names, options, and keywords
Helvetica bold	◆ User interface elements (what users specifically select, click, or press) ◆ Names of interface elements (such as names of windows, dialog boxes, buttons, fields, and menus)
Courier	URLs, email addresses, pathnames, filenames, directory names, computer names, links, groups service keys, file systems, command names (in running text), user input (such as commands), and notifications (system output, system messages, etc.)
[ ]	Optional selections
{ }	Required selections
|	Alternative selections. The bar means "or"
...	Nonessential information omitted from an example

Where to get help

EMC support, product, and licensing information can be obtained as follows.

Product information — For documentation, release notes, software updates, or for information about EMC products, licensing, and service, go to the EMC Powerlink website (registration required) at http://Powerlink.EMC.com.

Technical support — For technical support, go to Powerlink and choose **Support**. On the Support page, you will see several options, including one for making a service request. Note that to open a service request, you must have a valid support agreement. Please contact your EMC sales representative for details about obtaining a valid support agreement or with questions about your account.

Your comments

Your suggestions will help us continue to improve the accuracy, organization, and overall quality of the user publications.

Please send your opinion of this document to:

`techpubcomments@EMC.com`

About EMC MirrorView/S CLI

This chapter introduces the EMC® MirrorView™/Synchronous software and the EMC Navisphere® storage-system management configurations and architecture.

Note: If you are using the Classic CLI commands, refer to the earlier version of this manual on the EMC Powerlink® website.

This manual refers to the EMC MirrorView/Synchronous product as MirrorView/S.

Note: If you already familiar with MirrorView/S, you can skip to Chapter 2.

Major topics are:

- MirrorView/S overview on page 14
- Prerequisites on page 14
- Configuration guidelines on page 15
- MirrorView connection requirements on page 17
- MirrorView features and benefits on page 21
- Using online help on page 23

MirrorView/S overview

EMC® MirrorView™/S is a software application that maintains a copy image of a logical unit number(LUN) at separate locations in order to provide for disaster recovery, that is, to let one image continue if a serious accident or natural disaster disables the other. You can quickly restore operations when a catastrophic event, such as a fire, destroys the storage media at the primary data center. By mirroring critical data to a remote site, you not only retain vital data but can also quickly restore operations by switching over to the secondary storage system.

A remote mirror consists of a primary image and up to two secondary images. The production image (the one mirrored) is called the primary image; the copy image is called the secondary image. MirrorView/S supports up to two remote images, but since you operate on one image at a time, the examples in this manual show a single image. Each image resides on a separate storage system. The primary image receives I/O from a server called the production server; a separate storage system maintains the secondary image. This storage system can optionally have a failover/standby computer connected to it or can be connected to its own computer system. Both storage systems can be in different domains. The client that is managing the storage system containing the primary images can fail over to the secondary image if the primary image becomes inaccessible.

MirrorView/S supports MirrorView/S consistency groups, which this manual refers to as *consistency groups*. A consistency group is a set of synchronous mirrors whose secondary images need to be kept consistent with each other in order to be useful; that is, the data on the set of secondary images must have existed on the set of primary images previously. This allows an application to use the secondary images if the primary storage system fails.

Important: The primary images of mirrors in a MirrorView/S consistency group must reside on a single storage system, and the secondary images of the mirrors must reside on a single (but different) storage system. This contrasts with volumes in a Symmetrix® consistency group, which can reside on multiple storage systems.

Prerequisites

◆ You must have the MirrorView/S software installed and enabled on all AX4-5 series, CX4 series, CX3 series, and CX series storage systems you want to participate in a mirror. See the Unisphere™ help for information on installing software on the AX4-5 series, CX4 series, CX3 series and CX series storage systems.

◆ Data access control must be enabled.

◆ You must have Unisphere installed and enabled.

◆ SAN configurations must have qualified switches.

◆ WAN configurations must have qualified FC-to-IP devices.

Configuration guidelines

The following are configuration rules for MirrorView/S:

◆ Each mirror must have one primary image and zero, one, or two secondary image. Any single storage system can have only one image of a mirror.

◆ A storage system can have concurrent mirroring connections to a maximum of four other storage systems. (Mirroring connections are common between synchronous and asynchronous mirrors.)

◆ The following table lists the configuration limits for the supported platforms.

Platform	CX4-960 systems	CX4-480 system	CX4-240 systems	CX4-120 systems	CX700, CX3 model 40, and CX3 model 80 systems	CX500, and CX3 model 20 systems	AX4-5, CX3 model 10 systems
Primary or secondary mirror images							
Per storage system	1024	512	256	128	200	100	50
Secondary mirrors per primary	0, 1, or 2						
Primary mirrors with write intent log enabled							
Per storage system	1024	512	256	128	100	50	25

Note: A metaLUN is a single entity; therefore, it is counted as a single image. For example, if a mirrored metaLUN is composed of five components, it is counted as one image, not five.

The MirrorView/Asynchronous limits are separate from these; see the *EMC MirrorView/Asynchronous Command Line Interface (CLI) Reference*.

◆ To manage remote mirror configurations, the management workstation must have an IP connection to both the local and remote storage systems. The connection to the remote storage system should have an effective bandwidth of at least 128 Kbits/second. The storage systems can be in different domains. (See the Unisphere help.)

◆ MirrorView/S supports the new, larger LUNs that EMC FLARE® supports. (See the FLARE® release notes.)

◆ MirrorView/S supports thin LUNs only if Navisphere version 6.29.0 containing thin support for MirrorView is installed.

◆ You cannot combine thin LUNs from CX4 storage systems running FLARE version 04.29.000.5.xxx or later with pre-FLARE version 04.29.000.5.xxx traditional LUNs or with traditional LUNs from an uncommitted FLARE version 04.29.000.5.xxx. Therefore, you cannot mirror a thin LUN on a 04.29.000.5.xxx system to a system running a release prior to 04.29.000.5.xxx.

Note: If your system will include Enterprise Flash Drives (solid state disk drives with flash memory, or SSD drives), be sure to carefully plan your configuration using the *Best Practices and planning* documentation available on EMC Powerlink: Home ➤ Support ➤ Technical Documentation and Advisories ➤ White Papers > Configuration/Administration.

Sample configuration

shows a sample remote mirror configuration using either iSCSI networks or Fibre Channel switch fabrics. The configuration has two sites and a primary and secondary image that includes the database of four LUNs.
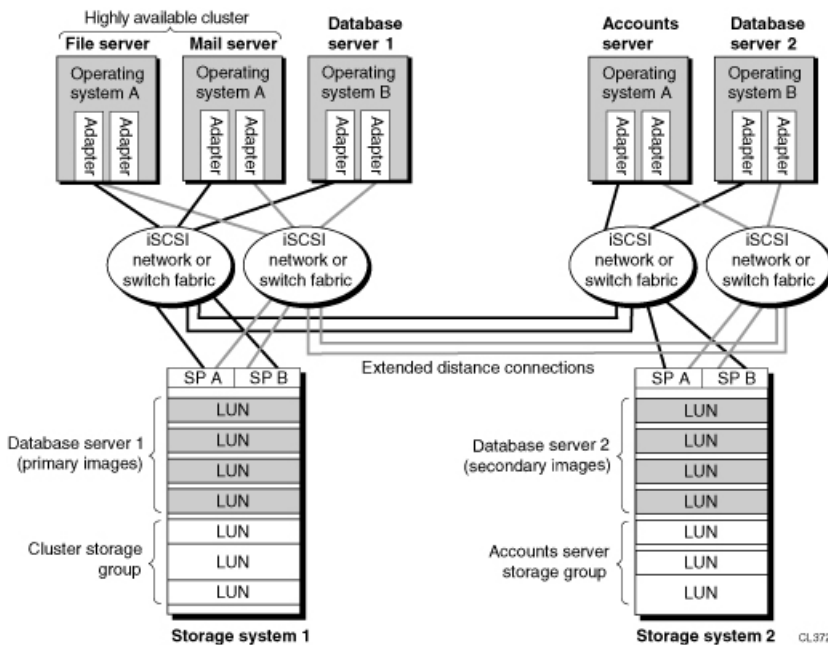
Figure 1. Sample remote mirror configuration

In , database server 1, which is the production server, executes customer applications. These applications access data on storage system 1, in the database server storage group. Storage system 2 mirrors the data on the database server storage group. The mirroring is synchronous, so that storage system 2 always contains all data modifications that are acknowledged by storage system 1 to the production server.

Note: Storage groups are different from consistency groups, which are described in Chapter 3. For more information about storage groups, see the Unisphere online help.

We recommend that you attach a secondary server to storage system 2, so that if a complete site failure occurs where storage system 1 and database server 1 are located, you can completely fail over to the secondary site, and thus minimize the outage window. The server at the standby site is not required, but because we recommend it, this example includes it in the overall configuration.

Each server has a path to each SP through each network or fabric to each storage system. If a failure occurs in a path, software installed on the server (for example, EMC PowerPath® software) switches to the path through the other SP and continues accessing the data, transparent to the applications on the server.

The production server sends a write request to an SP in storage system 1, which then writes data to the local LUN. The change to the primary LUN is recorded, and at an interval that you define, all changes are copied to the secondary storage system.

If a failure occurs in storage system 1, an administrator can use the client that is managing the storage system to promote the image on storage system 2 to the role of primary image.

Note: The mirrored data is inaccessible until the secondary image is promoted to a primary image.

Then, the appropriate applications can start on any connected server (here, database server 2) with full access to the data. The mirror can be accessible in minutes, although the time needed for applications to recover will vary.

Note: If you want to create a second secondary image, the configuration requires three storage systems.

MirrorView connection requirements

MirrorView requires the following:

◆ One server, connected to one of the storage systems (a second server, connected to the other storage system, is optional).

◆ A Fibre Channel connection (direct or switch) or an iSCSI connection between the two storage systems, shown on the following pages).

Note: The iSCSI connection is not supported on AX4-5 series storage systems with FLARE version 02.23.050.5.5xx.

Cable connections between SPs at the MirrorView sites

MirrorView uses a front-end port on each storage processor (SP) as a communication channel between the storage systems in a remote mirror configuration. This port is called the mirror port in this document.

Table 1 on page 18 shows the mirror ports for the CX4 series storage systems shipped from the factory without optional I/O modules. The MirrorView ports may vary depending on the type and number of I/O modules in the storage system. The *EMC Navisphere Command Line Interface (CLI) Reference* explains how to determine the ports available for MirrorView on storage systems shipped from the factory with optional I/O modules.

Note: For CX4 series systems, the port numbers listed are logical ports; therefore, these CX4 logical port numbers may not be the same as the physical port numbers that Navisphere displays.

Table 1. Mirror ports for the CX4 series storage systems shipped from the factory without optional I/O modules

Storage system	MirrorView Fibre Channel FE ports		MirrorView iSCSI FE ports	
	Logical port ID	Physical slot and port number	Logical port ID	Physical slot and port number
CX4-120, CX4-240	A-1	slot A0 port 3	A-3	slot A1 port 1
	B-1	slot B0 port 3	B-3	slot B1 port 1
CX4-480, CX4-960	A-3	slot A1 port 3	A-5	slot A4 port 1
	B-3	slot B1 port 3	B-5	slot B4 port 1

Table 2 on page 18 shows the mirror ports for storage systems other than the CX4 series systems. All port numbers referenced are front-end ports.

Table 2. Mirror ports for storage systems other than the CX4 series systems

Model	Fibre Channel MirrorView port	iSCSI MirrorView port
CX500	1	N/A
CX700	3	N/A
CX3-10c	3	1[a]
CX3-20, CX3-20f, CX3-40, CX3-40f	1	N/A
CX3-20c, CX3-40c	5	3[a]
CX3-80	3	N/A

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[a] Mirroring over iSCSI is supported for FLARE version 03.26.xxx.5.xxx or later.

Note: For information about determining what your MirrorView port is, see the *EMC Navisphere Command Line Interface (CLI) Reference*.

Although server I/O can share the front-end port with MirrorView, for performance reasons, we strongly recommend that server I/O use the front-end ports that MirrorView is not using.

⚠ CAUTION Currently, MirrorView and SAN Copy™ software cannot share the same SP port. Before installing the MirrorView enabler, you must deselect any MirrorView ports that a SAN Copy session is using. Otherwise, any SAN Copy sessions using the MirrorView port will fail.

For MirrorView to work correctly, the SP A mirror port at one site must be connected to the SP A mirror port on the other site and the SP B mirror port at one site must be connected to the SP B mirror port at the other site. The connections can be either direct or through a switch fabric.

Direct remote mirror connections

A direct mirror configuration consists of one primary storage system and one secondary storage system. The remote mirror connections must be between:

◆ SP A mirror ports on the primary and secondary storage systems

◆ SP B mirror ports on the primary and secondary storage systems

shows a sample direct remote mirror configuration.
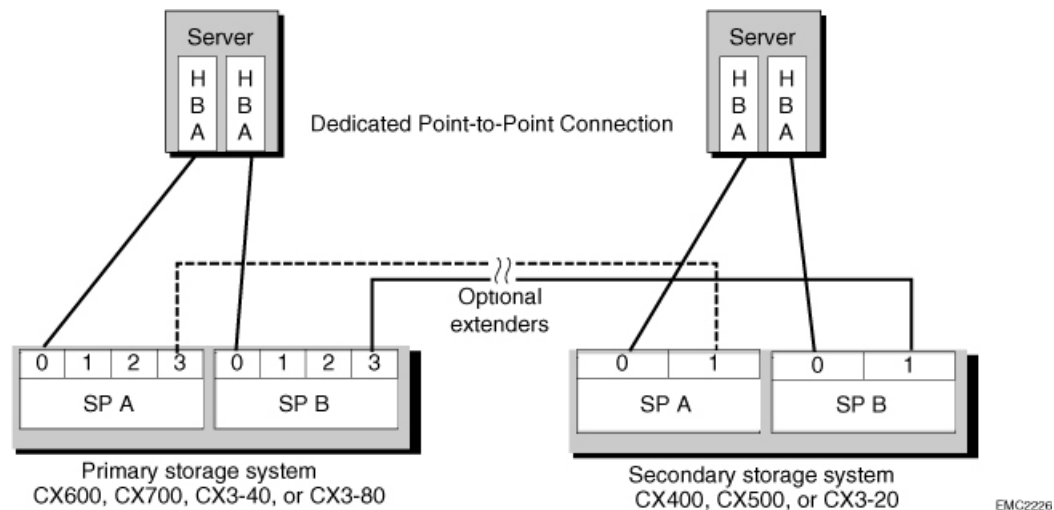
Figure 2. Sample direct remote mirror configuration

Fabric remote mirror connections

A fabric mirror configuration consists of one primary storage system and up to four secondary storage systems. The fabric connections must be as follows:

◆ SP A mirror port on the primary storage system must be connected to the same switch fabric as the SP A mirror port on the secondary storage system.

◆ SP B mirror port on the primary storage system must be connected to the same switch fabric as the SP B mirror port on the secondary storage system.

Note: The fabric to which SP A mirror ports are connected can be the same fabric or a different fabric than the one to which the SP B mirror ports are connected.

You must zone the mirror port switch connections as follows:

◆ A zone for each SP A mirror port on the primary storage system and the SP A mirror port on each secondary storage system.

◆ A second zone for each SP B mirror port on the primary storage system and the SP B mirror port on each secondary storage system.

For example, if you have primary storage system 1 and secondary storage systems 2 and 3, you need the following two zones:

◆ Zone 1—SP A mirror port on storage system 1 and SP A mirror ports on storage systems 2 and 3.

◆ Zone 2—SP B mirror port on storage system 1 and SP B mirror ports on storage systems 2 and 3.

You can use the same SP port for server data and MirrorView. Be careful when an IP distance connection is used because using the same SP port may cause a degradation in both replication and server application performance.

CAUTION MirrorView and SAN Copy software cannot share the same SP port. Before installing the MirrorView enabler, you must deselect any MirrorView ports that a SAN Copy session is using. Otherwise, any SAN Copy sessions using the MirrorView port will fail.

shows a sample remote mirror fabric configuration.
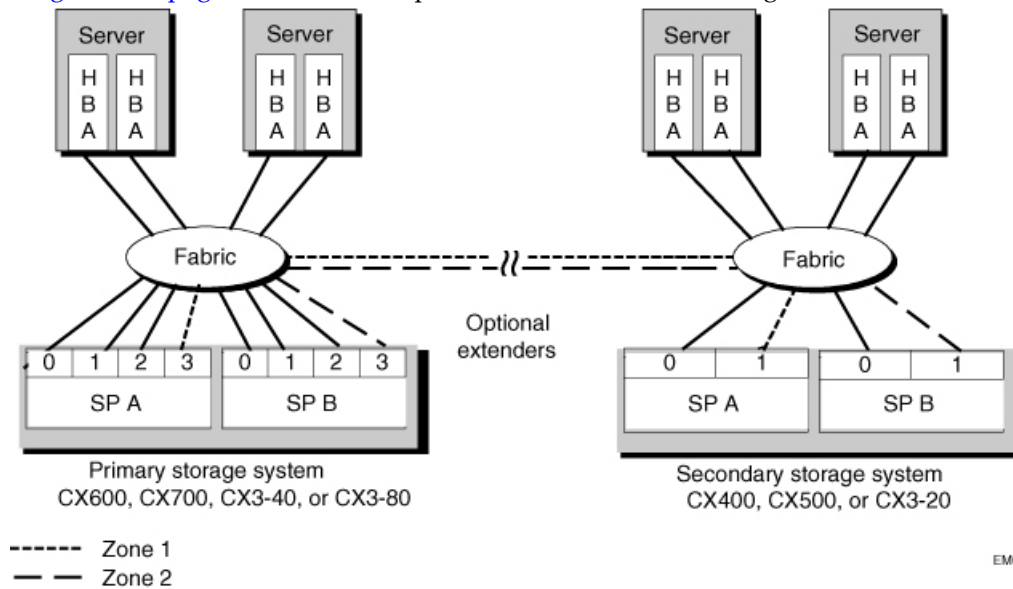
Figure 3. Sample remote mirror connection through a fabric

MirrorView features and benefits

MirrorView mirroring has the following features:

◆ Provision for disaster recovery with minimal overhead

◆ CLARiiON® environment

◆ Bidirectional mirroring

◆ Integration with EMC SnapView™ LUN copy software

◆ Integration with EMC SAN Copy software

Provision for disaster recovery with minimal overhead

Provision for disaster recovery is the major benefit of MirrorView mirroring. Destruction of the data at the primary site would cripple or ruin many organizations. After a disaster, MirrorView lets data processing operations resume with minimal overhead. MirrorView enables a quicker recovery by creating and maintaining a copy of the data on another storage system.

MirrorView is transparent to servers and their applications. Server applications do not know that a LUN is mirrored and the effect on performance is minimal.

MirrorView/S uses synchronous writes, which means that server writes are acknowledged only after all secondary storage systems commit the data. Most disaster recovery systems sold today use this type of mirroring.

MirrorView is not server-based; therefore, it uses no server I/O or CPU resources. The additional processing for mirroring is performed on the storage system.

CLARiiON MirrorView environment

MirrorView operates in a highly available environment, leveraging the dual-SP design of CLARiiON systems. If one SP fails, MirrorView running on the other SP will control and maintain the mirrored LUNs. If the server is able to fail over I/O to the remaining SP, then writes will continue to the primary image and synchronous mirroring of those writes will continue accordingly. The high-availability features of RAID protect against disk failure, and mirrors are resilient to an SP failure in the primary or secondary storage system.

Bidirectional mirroring

A single storage system may be primary (that is, hold the primary image) for some mirrors and secondary (that is, hold the secondary image) for others. This enables bidirectional mirroring.

Note: A storage system can never hold more than one image of a single mirror; that is, it cannot contain both the primary image and secondary image of a single mirror.

Integration with EMC SnapView software

SnapView software lets you create a snapshot of an active LUN at any point in time; however, do this only when the mirror is not synchronizing the secondary image. Since the secondary image is not viewable to any servers, you can use SnapView in conjunction with MirrorView/S to create a snapshot of a secondary image on a secondary storage system to perform data verification and run parallel processes, for example, backup.

Note: Before starting a SnapView session, make sure that the secondary image is in the synchronized or consistent state. Starting a SnapView session of a secondary LUN when MirrorView/S is synchronizing the secondary LUN will not give consistent data. Also note that data cached on the server, as well as data written to the primary storage system but waiting to be transferred to the secondary storage system on the next update, will not be included in the session of the secondary image.

You can clone either a primary or secondary image by creating a clone group on the same LUN as the mirror image and then adding clones to the group. For more information about using SnapView with MirrorView, see the Unisphere help.

Note: The clone of a mirror is not supported on AX4-5 series storage systems with FLARE version 02.23.050.5.5xx.

Note: Before fracturing a clone or starting a SnapView session, make sure that the secondary image is in the synchronized or consistent state. Fracturing a clone or starting a SnapView session of a secondary LUN when MirrorView/S is synchronizing the secondary storage system will not give consistent data. Also, note that data cached on the server, as well as data written to the primary storage system but waiting to be transferred to the secondary storage system on the next update, will not be included in the replica of the secondary image.

Integration with EMC SAN Copy software

SAN Copy software lets you create an intra- or inter-storage system copy of a LUN at any point in time. However, do this only when the image state is either Synchronized or Consistent and the mirror is not updating to the secondary image. The copy is a consistent image that can serve for other application purposes while I/O continues to the source LUN. The MirrorView secondary image is not viewable to any servers, but you can use SAN Copy to create a copy of the secondary image on a secondary storage system to perform data verification and run parallel processes.

Note: Related to the process of making the MirrorView secondary unavailable for server I/O, you cannot run SAN Copy full copy sessions on MirrorView secondary images. You can, however, run SAN Copy incremental sessions on MirrorView secondary images.

For more information about SAN Copy, see the Unisphere online help.

Using online help

The following online help is available from the Unisphere interface:

◆ A set of organized, linked help topics

To access the online help table of contents, select **Help ➤ Help Topics** on the menu bar in the application's main window, or click the help icon in the toolbar.

◆ Context-sensitive help topics

To display context-sensitive help, click the **Help** button displayed in each dialog box.

MirrorView/S Remote Mirroring Commands

This chapter explains the **naviseccli** commands and the commands for creating and managing remote mirrors on AX4-5 series, CX4 series, CX3 series, and CX series storage systems with the MirrorView/S option. These commands let you use MirrorView/S software to create a byte-for-byte copy of one or more local LUNs connected to a distant storage-system server.

Note: The commands in this chapter function only with a storage system that has the optional MirrorView/S software installed.

Note: Starting with the 02.26 and 03.26 version of FLARE, Classic CLI can be disabled through the Unisphere UI or a Secure CLI command. Only Secure CLI supports new features. Secure CLI is more secure than Classic CLI and is the preferred interface. Other than commands issued to host agents, version 6.26 of Secure CLI includes all the same commands as Classic CLI. If you plan to use Classic CLI commands, you must make sure that Classic CLI is enabled using the Unisphere UI or Secure CLI command. For a list of commands Secure CLI does not support, see the *EMC Navisphere Command Line Interface (CLI) Reference*. If you are currently using Classic or Java CLI to issue CLI commands, note that Secure CLI is replacing both Classic and Java CLI. See *EMC MirrorView/Synchronous Command Line Interface (CLI) Reference* for Java CLI support.

Major topics are:

MirrorView/S operations overview

This section provides an overview of MirrorView/S operations and how to manage the storage systems using the management software.

1. Connect the same management software to both storage systems and configure the software, so that you can manage both storage systems.

   Note: Optionally, you can perform this step at the secondary site as well.

   You must manage both storage systems, which can be in different domains (see the Unisphere online help).

2. If you want to use the write intent log, allocate the LUNs on all participating storage systems, so that if you promote, the write intent log is enabled.

   In the CLI, to designate the write intent log, use the `mirror -sync -allocatelog` command. You can specify any LUN that can be made a private LUN, that is, any LUN that is not part of a storage group and is not a hot spare.

3. Establish a usable, two-way connection between the MirrorView/S storage systems using the `mirror -enablepath` command (see mirror -enablepath on page 56).

4. If the primary LUN does not exist, bind it on its server's storage system. Wait for the LUN to finish binding and add it to the storage group.

5. If the secondary LUN does not exist, create a secondary image LUN.

   Note: The secondary LUN can be a different RAID type from the primary, as long as the block size matches.

6. Wait for the secondary LUN to finish binding.

7. On the host use the CLI to create the mirror using the `mirror -sync -create` function. You can specify write intent log information in the command. The `-create` function activates the mirror.

8. Create a consistency group and add the primary image to it (optional). See mirror -sync -creategroup on page 78.

9. With the CLI, add the secondary images you need with the `-addimage` function. You can list images with the `mirror -sync -list` function.

By default, when you use the **-addimage** command, the software starts synchronizing the secondary image with the primary. Unless the source LUN is freshly bound or similarly contains no meaningful data, a full synchronization is necessary.

If you do not want the default action when you add the image (perhaps because the source LUN is newly bound and synchronizing the mirror to it would be pointless), then you can tell the CLI that synchronization is not required – an option in the **-addimage** command.

After you add the image, all writes to the primary LUN will be duplicated to the secondary LUNs.

At any time in the previous sequence of steps, you can get remote mirror status with the CLI **mirror -sync -info** or **-list** command. You can also check the progress of synchronization with the **-listsyncprogress** command.

10. If a primary failure occurs, Navisphere reports the failure.

If the primary failure is minor, have the primary fixed and resume mirroring.

If the primary failure is catastrophic, the original client that is managing the storage system may be unusable and thus unable to report the failure. For such a failure, the administrator at the secondary site must set up a client to manage the storage system (if not already done), then promote the secondary to primary and take other recovery action as needed. This includes assigning the newly promoted LUN to a storage group, if it is not already the appropriate one.

When you use MirrorView/S on a VMware ESX Server, after you promote the secondary image to a primary image, perform the following steps:

a. If not already assigned, assign the newly promoted primary image to a storage group on the same or standby ESX Server.

b. Rescan the bus at the ESX Server level.

c. If not already created, create a virtual machine (VM) on the same or standby ESX Server. The VM is not powered up when you create it.

d. Assign the newly promoted primary to the VM.

e. Power up the VM.

If the VM is created and running and you have not already assigned the newly promoted primary to the VM, perform these steps:

a. Perform steps a and b above.

b. If you are running ESX Server 2.5.x, power it down.

c. To assign the newly promoted primary to the VM, use the virtual center interface for ESX Server 3.x and 2.5.x or the Management User interface for ESX Server 2.5.x.

Note: If you are running ESX Server 3.x, you do not need to power down the VM.

d. If you are running ESX Server 2.5.x, power up the VM.

Note: If you are running ESX Server 3.x, you do not need to power up the VM.

The primary image (which is now the secondary image) will not be accessible to the primary ESX Server.

Note: For configuration restrictions when using VMFS volumes, go to the E-Lab™ Navigator on the EMC Powerlink website, and under the PDFs and Guides tab, open the `VMware ESX server.pdf` file.

11. If access to the secondary storage image fails, the primary storage system will fracture the remote mirror. If the problem with the secondary is minor (for example, replacing a cable), then the administrator can fix it. Mirroring will recover and resynchronize the image, if the image recovery policy is Automatic.

Whenever you want to stop mirroring, you can first fracture and remove the secondary images, and then destroy the mirror. This does not affect any data on either image LUN, and access to the primary LUN is also unaffected. The LUN that held the secondary image now becomes accessible as a regular LUN.

MirrorView/S CLI functions

The Navisphere CLI provides one of the two interfaces to the MirrorView/S mirroring software. The Unisphere UI provides the other. You can use the **naviseccli mirror** command to set up and manage remote mirror sessions.

The mirror command functions are summarized in .

Table 3. naviseccli MirrorView/S command functions

Essential functions (in order performed)	
mirror -enablepath	Opens a path between the local and remote storage system. Only a single connection is required for synchronous and/or asynchronous mirroring.
mirror -sync -create	Creates a new remote mirror using an existing LUN. The LUN on which the **-create** command is executed becomes the primary image.

Table 3. naviseccli MirrorView/S command functions *(continued)*

Essential functions (in order performed)	
`mirror -sync -addimage`	Adds a secondary image to a mirror using a LUN on a remote storage system. Synchronization is optional — if specified, synchronization of the image begins automatically.
`mirror -sync -fractureimage`	Fractures a secondary image, suspending mirroring of data to that image. A fracture log is maintained, so that the image can be quickly resynchronized later.
`mirror -sync -removeimage`	Removes a secondary image from a mirror.
`mirror -sync -promoteimage`	Promotes a secondary image to primary, while simultaneously demoting the primary (if still accessible) to secondary. Required in order to access the data in the secondary image in the event of a failure of the primary.
`mirror -sync -syncimage`	Starts synchronization of the secondary image with the primary. Needed if automatic recovery is not on. I/O is allowed with the primary while the synchronization occurs. You can specify synchronization rate to avoid serious performance impact.
`mirror -sync -destroy`	Terminates remote mirroring of a LUN. This does not affect the data in the LUN, and the host continues to access it uninterrupted.
Optional status functions (alphabetically) (see also `getall -mirrorview` in EMC Navisphere CLI Reference)	
`mirror -sync -info`	Displays MirrorView/S information about a storage system.
`mirror -sync -list`	Displays information about existing mirrors.
`mirror -sync -listlog`	Displays write intent log information.
`mirror -sync -listsyncprogress`	Displays the percentage of synchronization.

Table 3. naviseccli MirrorView/S command functions *(continued)*

Essential functions (in order performed)	
Optional reconfiguration functions (alphabetically)	
`mirror -sync -allocatel-og`	Allocates LUNs as space for the write intent log. This is optional — it allows recovery through a partial resynchronization if a recoverable failure of the primary SP occurs.
`mirror -sync -change`	Changes remote mirror properties such as name and description.
`mirror -sync -changeim-age`	Changes secondary image properties such as recovery policy and synchronization rate.
`mirror -sync -deallo-catelog`	Removes the write intent log LUN that was allocated with the `-allocatel-og` function. Allowed only when the log is not active.
`mirror -disablepath`	Severs all paths between the local storage-system SPs and the remote storage-system SPs.
`mirror - setfeature`	Enables or disables mirroring to/from a LUN. Required in only a few specific cases where the software has insufficient information to do this automatically.

About Secure CLI

Secure CLI is a comprehensive Navisphere CLI solution that provides one application and one security model for all CLI commands. Secure CLI provides role-based authentication, audit trails of CLI events, and SSL-based data encryption. You do not need to install a JRE to run Secure CLI.

Note: Refer to the *Host Agent/CLI and Utilities Release Notes*, available on Powerlink, for a list of supported operating systems. You must be running FLARE® Operating Environment version 02.19.xxx.5.yyy or later.

Secure CLI commands run in a command window. Each command consists of the `naviseccli` command (and options) together with another subcommand (and its options).

Note: For commands that originated in Classic CLI, some command output may be enhanced; for example, Secure CLI can retrieve and display information from peer SPs. For Classic CLI commands that produce multiple warnings and require multiple confirmations, Secure CLI provides a single summary of warnings and a single confirmation. In general, Secure CLI preserves original command syntax and output for script compatibility.

Note: Secure CLI does not distinguish case of characters, so, regardless of the host operating system, you can use either uppercase, lowercase, or any combination of characters as you type commands.

If a Secure CLI command fails and the CLI does not generate its own error message, it displays an error message from the SP agent. Secure CLI generates errors about command line syntax for commands and options and their values.

Secure CLI commands return 0 if the command is successful, or a number greater than zero if the command is unsuccessful.

Getting started with Secure CLI

Before you begin to issue Secure CLI commands, you must create a user account on the storage system. To create the required user accounts using Navisphere CLI, refer to the *EMC Navisphere Command Line Interface (CLI) Reference*. For details on using Secure CLI, refer to the Unisphere online help.

You can also choose to configure Secure CLI to issue Secure CLI commands on the host (see Using Secure CLI on page 32). If you establish a security file, you do not need to include the switches **-user**, **-scope**, and **-password** (or the password prompt) in each command you issue.

Note: Establishing a security file to use commands that originated in Classic CLI ensures that other than the update from **navicli** to the **naviseccli** command, you do not need to modify any established scripts you may have. Secure CLI, unlike Classic CLI, requires the options **-user**, **-scope**, and **-password** (or the password prompt) in each command line; you do not need to provide these options in the command line if you establish a security file.

Using Secure CLI

A storage system will not accept a command from Secure CLI unless the user who issues the command has a valid user account on the storage system. You can specify a valid account username, password, and scope (global or local) for each command you issue, or, more conveniently, you can create a Unisphere security file.

The Unisphere security file is an encrypted file stored for each user on each host. You can add or delete a user security file using the **-AddUserSecurity** or **-RemoveUserSecurity** functions as arguments to the **naviseccli** command. You cannot copy a security file to

another host. You must issue the **-AddUserSecurity** function on the host for which you want to create the security file.

When you create a security file, the username you use to log in to the current host is automatically stored in the security file, or you can specify an alternative username for the security file in the **-AddUserSecurity** request using the optional **-user** switch. If you omit the **-user** switch, the security file uses your current username.

For example, to add yourself to the security file on the current host, given the alternative username **altusername**, the password **mypass** and the scope **0** (global scope), type:

```
naviseccli -AddUserSecurity -password mypass -scope 0 -user altusername
```

Then, on this host, you can enter CLI commands to any storage system on which you have an account that matches the username **altusername**, with password **mypass** and global scope (scope 0).

Note: Username and password are case sensitive.

The security file is stored in your default home directory. With Secure CLI, you can specify an alternative file path using the optional **-secfilepath** switch.

Note: If you specify an alternative location for the security file, you must specify the file path in every subsequent CLI command you issue to ensure the CLI locates the security file.

To save the example used above to the alternative location c:\altlocation\ type:

```
naviseccli -AddUserSecurity -password mypass -scope 0 -user altusername
-secfilepath c:\altlocation\
```

Then, for each subsequent command you issue, you must specify the **-secfilepath** switch with the security file path location c:\altlocation\ in the command line.

naviseccli

Sends status or configuration requests to a storage system through the command line.

PREREQUISITES

Anyone that can log in to the server running Navisphere CLI 6.X or later.

DESCRIPTION

The **naviseccli** command sends storage-system management and configuration requests to a storage system through the Internet.

SYNTAX

```
naviseccli -help

naviseccli [-address IPAddress | NetworkName | -h IPAddress | NetworkName]
[-AddUserSecurity]
[-f filename]
[-m]
[-nopoll | -np]
[-parse | -p]
[-password password]
[-port port]
[-q]
[-RemoveUserSecurity]
[-scope 0|1|2]
[-secfilepath]
[security -certificate]
[-timeout | -t timeout]
[-user username]
[-v]
[-xml]
CMD [optional-command-switches]
```

OPTIONS

-help

Displays the help screen and does not start the **naviseccli** process. To start the **naviseccli** process, use one or more of the switches that follows instead.

-address *IPAddress|NetworkName|***-h** *IPAddress|NetworkName*

Specifies the IP address or network name of the targeted SP on the desired storage system. The default, if you omit this switch, is **localhost**.

-AddUserSecurity

Directs the CLI to add user security information to the security file on this server. You must use the **-scope** switch to add scope information to the security file. You can use the **-password** switch or enter your password into the password prompt (see **-password**), to supply the required password information to the security file. The **-user** and **-secfilepath** switches are optional with this command.

Note: If you specify the **-user** switch, you can create an alternative username to your server login name in the security file you create on this server. If you use the **-secfilepath** switch, you can specify an alternative location to your default home directory, for the security file on this server. You must then use the **-secfilepath** switch in each subsequent command you issue.

-f *filename*

Stores the data in a file.

-m

Suppresses output except for values. This option is most useful when used as part of a script.

Note: This switch is supported only for commands that originated in Classic CLI.

-nopoll|-np

Directs the feature provider not to issue a poll request. This switch significantly increases performance when dealing with large or multiple storage systems. The feature provider is automatically issues a poll request unless this switch is specified.

Note: When the **-nopoll** switch is set, **get** commands may return stale data and **set** commands may erase previously changed settings. Use caution when the **-nopoll** switch is set.

-parse |-p

Directs the CLI to validate the command. The CLI verifies the command syntax and displays a message stating whether the command was valid. The CLI takes no other action.

-password *password*

Specifies the password on the storage system you want to log in to. The password is visible in the command line. Passwords are case-sensitive. If you want to mask the password, and you are not using a security file, you can omit this switch from the command line. The CLI then prompts you to enter a password. The information you enter into the password prompt is concealed.

Note: You can omit this switch if you are using a security file. See **-AddUserSecurity**.

-port *portnumber*

Sets the port number (type) of the storage system. The default is 443. If you choose to change the default port number, management port 2163 will be supported; however, you will need to specify the **-port** switch and number 2163 in every subsequent command you issue.

-q

Suppresses error messages. This switch is useful when included as part of a script.

Note: This switch is supported only for commands that originated in Classic CLI.

-RemoveUserSecurity

Directs the CLI to remove user security information about the current user from the security file on this server.

-scope 0|1|2

Specifies whether the user account on the storage system you want to log in to is local, global, or lightweight directory access protocol (LDAP). A 0 (default) indicates global, 1 indicates local, and 2 indicates LDAP. A global account is effective throughout the domain. When the administrator creates a global account, the software copies the definition of this account to the domain directory, which makes it accessible on all storage systems in the domain. A local account is effective only on the storage systems for which the administrator creates the account. You can log in only to those storage systems on which you have a local account. LDAP maps the username/password entries to an external LDAP or active directory server for authentication. Username/password pairs whose roles are not mapped to the external directory will be denied access.

-secfilepath *filename*

Stores the security file in a file path location you specify. When you create a security file on a server using the **-addusersecurity** command, the security file is saved to your default home directory. If you want to store the security file in an alternative location, you can use the optional **- secfilepath** switch with the **-addusersecurity** command.

Note: If you use the **-secfilepath** switch to set up an alternative path for your security file, you must use this switch in every subsequent CLI command you issue, to ensure the CLI locates the security file.

security -certificate

Saves the certificates to the certificate store. It also provides options like `-list`, `-remove`, `-add` to manage the certificate store.

`-timeout` | `-t` *timeout*

Sets the timeout value in seconds. The default is 600 seconds.

`-user` *username*

Specifies the username on the storage system you want to log in to. Usernames are case sensitive. You can omit this if your username has been added to the security file.

Note: You can use this switch when establishing a security file, to specify an alternative username. See `-AddUserSecurity`.

`-v`

Enables verbose error descriptions. This is the default unless `-q` is specified.

Note: This switch is supported only for commands that originated in Classic CLI.

`-xml`

Specifies command output in XML format. Use the `-o` (override switch) when specifying `-xml` with commands that require confirmation. Otherwise, the XML output will contain your confirmation string.

CMD

One of a set of commands used with the `naviseccli` command. The CMD switches are described on the pages that follow.

mirror -sync -addimage

Adds an image to a previously created mirror.

PREREQUISITES

You must have a user account on the storage system on which you want to execute the command.

Note: When you add a secondary image, MirrorView/S automatically allocates and retains additional memory. This additional memory counts against the total replication software memory budget.

DESCRIPTION

This command is used with **naviseccli** (see naviseccli on page 34) to add a secondary image to a mirror using a LUN on a remote storage system. The **-addimage** function is required if you want mirroring to occur. You must direct the command to the storage system that holds the primary image. This command lets you create primary and secondary images on thin LUNs, if all the participating storage systems support mirroring on thin LUNs.

Note: The Virtual Provisioning™ enabler must be installed to create thin LUNs.

You can use the **-info** function to display the UIDs of storage systems that have images that can be mirrored.

Note: To add a secondary image, you must have a working connection to the remote storage system, and the remote LUN must be exactly the same size (number of blocks) as the primary image.

Note: In this syntax "or" means that you can specify the switch, **-arrayhost** *sp-hostname* | **sp-IP-address -lun** *lun-number* | **-lunuid** *lun-uid* or you can specify the switch, **-arrayuid** *storage-system-uid* **-lunuid** *lun-uid*. The rest of the syntax is common to both.

SYNTAX

```
mirror -sync -addimage -name name| -mirroruid mirroruid
-arrayhost sp-hostname -lun lun-number -lunid lun-uid
[-recoverypolicy auto|manual]
[-syncrate high|medium|low][-nosyncrequired ]
```

or

```
mirror -sync -addimage -name  name | -mirroruid mirroruid
-arrayuid storage-system-uid -lunuid lun-uid
[-recoverypolicy auto|manual]
```

```
[-syncrate high|medium|low]
[-nosyncrequired]
```

OPTIONS

-name *name*

Specifies the name that you gave to the mirror with the **-create** command. Use either this name or the mirror unique ID (16-byte world wide name).

-mirroruid *uid*

Specifies the unique 16-byte primary image ID (World Wide Name) the software assigned when the mirror was created. For any letters in the ID, you must specify the same case as the software assigned when the mirror was created (use the function).

-arrayhost *sp-hostname*

Specifies the hostname or network address of the remote SP that will hold the secondary image. The secondary image will be added to the remote mirror connected to this host's SP. Use this switch or **-arrayuid**.

-lun *lun-number*

Specifies the LUN number that will serve as the secondary image of the mirror.

-arrayuid *storage-system-uid*

Specifies the unique 8-byte storage system ID of the remote SP. You can determine this by using the **mirror -info** command or the **getarrayuid** command (see the *EMC Navisphere Command Line Interface (CLI) Reference*). For any letters in the ID, use the same case that the software assigned when the mirror was created. Use this switch or **-arrayhost**.

-lunuid *lun-uid*

Specifies the unique 16-byte identification number (World Wide Name) of the LUN to be added as a secondary image. If you specified **-arrayuid**, then **-lunuid** is required. If you specified **-arrayhost**, then you can use either **-lun** or **-lunuid**.

Note: When you specify **-arrayuid** and **-lunuid**, you must add the mirror driver on the remote LUN using the **-setfeature** command before executing the **-addimage** command.

-recoverypolicy manual|auto

Specifies the policy for recovering the secondary mirror image after a system fracture. Values are:

manual: The administrator must explicitly start a synchronization operation to recover the secondary mirror image.

auto: Recovery automatically resumes as soon as the primary image determines that the secondary mirror image is once again accessible. This is the default.

`-syncrate high|medium|low`

Specifies a relative value (low, medium, or high) for the priority of completing updates. High completes updates faster, but may significantly affect storage-system performance for server I/O requests, particularly where there are multiple concurrent synchronizations occurring. Low completes updates much slower, but also minimizes impact on other storage system operations.

`-nosyncrequired`

Specifies that synchronization is not needed for the newly added secondary image. The image will not be useful until it is synchronized. If you omit this switch, a synchronization occurs.

EXAMPLE

Any of the following commands adds an image to a mirror. For SP ss1_spa, any of the above commands adds to the remote mirror **db_mirror** the LUN in storage system **50:06:06:10:00:FD:A1:69** (or a LUN on the remote storage system cpc426) whose unique LUN ID (world wide name, WWN) is **60:06:06:5A:62:02:00:00:92:95:DE:7C:E4:71:D4:11** or whose LUN number is **9**. See also the example in mirror -sync -create on page 48.

```
naviseccli -h ss1_spa mirror -sync -addimage
-name db_mirror -arrayuid 50:06:06:10:00:FD:A1:69
-lunuid 60:06:06:5A:62:02:00:00:92:95:DE:7C:E4:71:D4:11

naviseccli -h ss1_spa mirror -sync -addimage
-name db_mirror -arrayhost cpc426  -lun 9

naviseccli -h ss1_spa mirror -sync -addimage
 -name  db_mirror -arrayhost cpc426
-lunuid 60:06:06:5A:62:02:00:00:92:95:DE:7C:E4:71:D4:11
```

OUTPUT

If the version of FLARE software running on the SP does not support this command, a `Command is not supported` error message is printed to **`stderr`**. You may also receive other error messages.

mirror -sync -allocatelog

Allocates or re-allocates a LUN for use as a write intent log.

PREREQUISITES

You must have a user account on the storage system on which you want to execute the command.

DESCRIPTION

The **naviseccli mirror** command with **-allocatelog** assigns a LUN as the write intent log on each SP of the storage system. The recommended (and minimum) size for the log is 128 MB. The write intent log allows recovery with a partial resynchronization if a recoverable failure of the primary SP occurs. If you do not use the intent log, a full synchronization is always required in the event of a failure of the SP controlling the primary image.

You must specify both SPs in one command line.

SYNTAX

mirror -sync -allocatelog -spA *LUN-number* **-spB** *LUN-number* [**-unbind**] [**-o**]

OPTIONS

-spA *LUN-number* **and -spB** *LUN-number*

Identify the LUN to be used for the write intent log. It must hold at least 128 MB, must not be part of a storage group and must not be a hot spare.

-unbind

If write intent log LUNs are currently defined, unbinds the old LUNs after the write intent log function starts using the new LUNs.

-o

Executes the command without prompting for confirmation.

EXAMPLE

For SP **ss1_spa**, this command allocates as the write intent log for SP A the LUN with ID **122** and for SP B the LUN with ID **124**.

```
naviseccli -h ss1_spa mirror -sync -allocatelog -spA 122 -spB 124
```

OUTPUT

If the version of FLARE software running on the SP does not support this command, a `Command is not supported` error message is printed to `stderr`. You may also receive other error messages.

mirror -sync -change

Changes mirror properties.

PREREQUISITES

You must have a user account on the storage system on which you want to execute the command.

DESCRIPTION

This command is used with `naviseccli` (see naviseccli on page 34) to change one or more parameters of a previously created mirror.

You must direct the command to the storage system that holds the primary image. You must specify at least one of the optional switches with this command. If you omit the override option, then the CLI displays a message for each parameter to confirm the change.

Note: Always view and modify remote mirror properties from the primary storage system. Information displayed from the secondary storage system may not be up to date, especially if the primary storage system has lost contact with the secondary storage system.

Note: When you enable the write intent log on a mirror that did not previously use it, MirrorView/S automatically allocates and retains additional memory. This additional memory counts against the total replication software memory budget.

SYNTAX

```
mirror -sync -change -name name | -mirroruid uid
[-newname name]
[-description description]
[-requiredimages num_of_images] [-o]
[-qthresh qthresh] [-usewriteintentlog yes|no]
```

OPTIONS

`-name` *name*

Specifies the name the `-create` command gave the mirror. You can specify either the mirror name or unique ID (next).

`-mirroruid` *uid*

Specifies the unique 16-byte remote mirror ID assigned when the mirror was created. For any letters in the ID, you must specify the same case as the software assigned when the mirror was created (use the `mirror -list` command).

MirrorView/S Remote Mirroring Commands**

-newname *name*

Specifies the new name for the mirror. You can specify up to 64 characters.

-description *description*

Provides a meaningful title for the mirror (for example, Employee and Benefits Table for Human Resources). The software does not use the description to identify the mirror. You can specify up to 256 characters, but we suggest that you should not exceed the line length defined by the operating system.

-requiredimages *num_of_images*

Specifies the minimum number of secondary images that should be accessible to the mirror. The default value is 0. Allowed values are 0, 1, and all. If the number of accessible images goes below the specified value, the mirror goes into the Attention state and generates a log message. You can configure this to generate an appropriate warning (for example, e-mail message or page) to the administrator to enable the administrator to correct the problem.

-qthresh *qthresh*

Specifies the time delay, in seconds, after the last I/O is received before a mirror will automatically be transitioned to the synchronized state. The default is 60 seconds. Valid values are 10-3600.

-usewriteintentlog yes | **no**

Directs the software to use or not use the remote mirror write intent log. If you want to use the log, you must have allocated it with **-allocatelog**.

yes

Use or start using, the write intent log.

no

Do not use, or stop using, the write intent log.

-o

Executes the command without prompting for confirmation.

EXAMPLE

For the remote mirror **dbmirror** on SP **ss0_spa**, this command reduces the minimum number of accessible secondary images to **0**. Use the **-list** command to confirm that the changes were made.

```
naviseccli -h ss0_spa mirror -sync -change -name
dbmirror -requiredimages 0
```

** *EMC MirrorView/Synchronous Command Line Interface (CLI) Reference*

OUTPUT

If the version of FLARE software running on the SP does not support this command, a `Command is not supported` error message is printed to `stderr`. You may also receive other error messages.

mirror -sync -changeimage

Changes secondary image properties.

PREREQUISITES

You must have a user account on the storage system on which you want to execute the command.

DESCRIPTION

This command is used with **naviseccli** (see naviseccli on page 34) to change one or more parameters of a mirror image.

You must direct the command to the storage system that holds the primary image. You must specify at least one of the optional switches. If you omit the override option, then it displays a message similar to the following for each parameter to confirm the change.

        Do you want to change the sync rate from Medium to High (y/n)?

To change a parameter, enter `y`.

SYNTAX

```
mirror -sync -changeimage -name  name | -mirroruid uid
-imageuid image-uid
[-recoverypolicy manual|auto]
[-syncrate high|medium|low] [-o]
```

OPTIONS

-name *name*

Specifies the name you gave to the remote mirror in the **-create** command. You can specify either the mirror name or uid (next).

-mirroruid *uid*

Specifies the unique 16-byte ID assigned when the mirror was created. For any letters in the ID, you must specify the same case as the software assigned when the mirror was created (use the **mirror -list** command).

-imageuid *image-uid*

Specifies the unique 8-byte ID of the secondary image you want to change. For any letters in the ID, you must specify the same case that the software assigned to the image when the mirror was created (use the **mirror -list** command).

-recoverypolicy manual|auto

Specifies the policy for recovering the secondary mirror image after a system fracture. Values are:

manual: The administrator must explicitly start a synchronization operation to recover the secondary mirror image.

auto: Recovery automatically resumes as soon as the primary image determines that the secondary mirror image is once again accessible. This is the default.

-syncrate high|medium|low

Specifies a relative value (low, medium, or high) for the priority of completing updates. The default is **medium**. High completes updates faster, but may significantly affect storage system performance for server I/O requests, particularly where there are multiple concurrent synchronizations occurring. Low completes updates much slower, but also minimizes impact on other storage-system operations.

-o

Executes the command without prompting for confirmation.

EXAMPLE

For SP **ss1_spa**, mirror **db_mirror**, image **50:06:06:10:00:FD:A1:6**, this command changes the synchronization rate to high.

```
naviseccli -h ss1_spa mirror -sync -changeimage  -name
db_mirror -imageuid 50:06:06:10:00:FD:A1:6 -syncrate high
```

OUTPUT

If the version of FLARE software running on the SP does not support this command, a Command is not supported error message is printed to stderr. You may also receive other error messages.

mirror -sync -create

Creates a new mirror using an available LUN for mirroring.

PREREQUISITES

You must have a user account on the storage system on which you want to execute the command.

Since the write intent log is on by default, before creating a synchronous mirror, you must first allocate the write intent log (see).

DESCRIPTION

This command is used with `naviseccli` to create a new mirror using an existing LUN. The LUN on which you run the command becomes the primary LUN. But, for mirroring to occur, you must add an image with the `-addimage` function. Later, you can change some of the parameters you specify here with the `-change` function. This command supports thin LUNs after you install the latest Navisphere version, which contains thin LUN support for MirrorView.

If you specify a minimum number of required images (other than the default value zero) in the `-create` command, the mirror will start in the attention state, since you have not yet added the required secondary images. To avoid this problem, do not specify a minimum number of images with `-create`; instead, create the mirror, add the image, and then if you want a minimum number of required images, change the mirror with the `-change` command.

You can use the `-info` command to display the LUN numbers that can be mirrored.

Note: When you create a mirror, MirrorView/S automatically allocates and retains additional memory. This additional memory counts against the total replication software memory budget.

SYNTAX

```
mirror -sync -create -name  name
-lun lun_number
[-description description]
[-requiredimages  num_of_images]
[-qthresh qthresh]
[-nowriteintentlog ]
[-o]
```

OPTIONS

`-name` *name*

Lets you assign a meaningful name to the mirror; for example `"Employee Benefits"`. To include spaces in the name, enclose the entire string in quotation marks as in the example. You can use this name to manage the mirror. The name can include as many as 64 characters.

-lun *lun_number*

Specifies the LUN number that will serve as the primary image of the mirror you are creating.

-description *description*

Lets you assign a description for the mirror. The software does not use the description to identify the mirror. You can specify up to 256 characters, but we suggest that you should not exceed the line length defined by the operating system.

-requiredimages *num_of_images*

Specifies the minimum number of secondary images that should be accessible to this mirror. The default value is 0. Allowed values are 0, 1, 2 and all. If the number of accessible images goes below the specified value, the mirror goes into the Attention state and generates a log message. You can configure this to generate an appropriate warning (for example, e-mail message or page) to the administrator to enable the administrator to correct the problem.

-qthresh *qthresh*

This specifies the time delay, in seconds, after the last I/O is received before a mirror will automatically transition to the synchronized state. The default is 60 seconds. Valid values are 10-3600.

-nowriteintentlog

Lets you create a synchronous mirror with the write intent log off. When creating a synchronous remote mirror, the write intent log will be on for the mirror by default.

-o

Executes the command without prompting for confirmation.

EXAMPLE # 1

The mirror **-create** command creates the mirror named **db_mirror** on LUN **112**.

```
naviseccli -h ss1_spa mirror -sync -create -name db_mirror -lun 112
```

EXAMPLE # 2

The **-change** command sets a minimum of one secondary image for the mirror.

```
naviseccli -h ss1_spa mirror -sync -change
-name db_mirror -requiredimages 1
```

EXAMPLE # 3

The **-list** command confirms the change.

```
naviseccli -h ss1_spa mirror -sync -list
```

OUTPUT

If the version of FLARE software running on the SP does not support this command, a `Command is not supported` error message is printed to `stderr`. You may also receive other error messages.

mirror -sync -deallocatelog

Removes LUNs from service as write intent log LUNs.

PREREQUISITES

You must have a user account on the storage system on which you want to execute the command.

DESCRIPTION

The **naviseccli mirror** command with **-deallocatelog** deassigns the LUNs that have been used for the write intent log on this storage system. This command deallocates the LUNs used by both SPs of the storage system. The LUNs themselves and their contents are not affected by this command. If at least one mirror is still configured to use the write intent log LUNs, this command will fail with an error message.

If you omit the override option, it displays a message to confirm the deallocation of the intent log:

```
        Do you want to deallocate write intent log(y/n)?
```

To deallocate the log for both SPs, answer `y`; to take no action, enter `n`.

SYNTAX

mirror -sync -deallocatelog [**-unbind**] [**-o**]

OPTIONS

  -unbind

   Directs the software to unbind the LUNs used in write intent logs. (optional)

  -o

Executes the command without prompting for confirmation.

EXAMPLE

This command deallocates the LUNs used for the write intent log function on both**ss1_spa** and its peer. This command does not affect the LUNs themselves.

```
naviseccli -h ss1_spa mirror -sync -deallocatelog

Do you want to deallocate write intent log on SP A (y/n)?
```

OUTPUT

If the version of FLARE software running on the SP does not support this command, a `Command is not supported` error message is printed to `stderr`. You may also receive other error messages.

mirror -sync -destroy

Destroys a mirror.

PREREQUISITES

You must have a user account on the storage system on which you want to execute the command.

DESCRIPTION

This command is used with **naviseccli** (see naviseccli on page 34) to destroy a mirror. It is the counterpart of **-create**. It ends mirroring of the LUN that is part of the mirror. This does not affect the data in the LUN, and the server continues to access it.

Note: You cannot destroy a mirror while it is a member of a consistency group.

You must remove the secondary image in the mirror before issuing the command to the storage system holding the primary image. If you cannot remove the secondary image or access the primary image, you can use the **-force** option. You must direct the command to the storage system that holds the primary image unless **-force** is specified, in which case, you can direct it to either storage system.

⚠️ CAUTION Use **-force** only if all other options to remove an image and the mirror have failed.

If you omit the override option, a message to confirm the destruction of the mirror appears:

```
Do you really want to destroy the mirror <mirror-name> (y/n)?
```

To destroy the mirror, answer y; to take no action, enter n.

SYNTAX

```
mirror -sync -destroy -name  name | -mirroruid uid
[-force] [-o]
```

OPTIONS

-name *name*

Specifies the name you gave to the mirror with the **-create** command. You can also use the remote mirror ID.

-mirroruid *uid*

Specifies the unique 16-byte remote mirror ID assigned when the mirror was created. For any letters in the ID, you must specify the same case as the software assigned when the mirror was created (use the **`mirror -list`** command).

`-force`

Forcibly destroys the mirror. This option affects only the local storage system.

`-o`

Executes the command without prompting for confirmation.

EXAMPLE

For SP **`ss1_spa`**, this command destroys the remote mirror that was created with the name `db_mirror`.

```
naviseccli -h ss1_spa mirror -sync -destroy db_mirror

Do you really want to destroy the mirror
db_mirror?(y/n)? y
```

OUTPUT

If the version of FLARE software running on the SP does not support this command, a `Command is not supported` error message is printed to `stderr`. You may also receive other error messages if the command fails for some reason.

mirror -disablepath

Disables the communication paths created by **-enablepath** to remote mirror SPs.

PREREQUISITES

You must have a user account on the storage system on which you want to execute the command.

DESCRIPTION

Use this command with **naviseccli** (see) to sever the path established by **-enablepath** in the remote storage system.

When issued to any SP, the command severs paths for both SPs in both the primary and secondary storage systems; that is, it severs these paths if:

◆ SP A of the local storage system is connected to SP A of the remote storage system

◆ SP A of the remote storage system is connected to SP A of the local storage system

◆ SP B of the local storage system is connected to SP B of the remote storage system

◆ SP B of the remote storage system is connected to SP B of the local storage system

This means you can issue the command to either SP of either storage system to sever the paths between the storage systems you are targeting.

If you issue the command while a mirror exists, the CLI issues a warning message; if you continue, any mirror connected over the specified path will be fractured.

Note: If both asynchronous and synchronous mirrors are installed, you need to run the command only once. It will take effect for both mirrors.

If you omit the override option, the CLI displays a message to confirm the disabling of the path. To disable the path, answer y; to take no action, enter n.

SYNTAX

mirror -disablepath *connected-SP-hostname* [**-connectiontype fibre**|**iscsi**] [**-o**]

OPTIONS

connected-SP-hostname

Specifies the hostname of SP A or SP B of a connected storage system to disconnect.

-connectiontype fibre | iscsi

Specifies the connection type as fibre or iSCSI for the path you are disabling. If you do not specify the **-connectiontype** switch, the system first tries to find a fibre connection; if it does not find one, it looks for an iSCSI connection.

-o

Executes the command without prompting for confirmation. Without this switch, the CLI displays a confirmation message for each SP.

EXAMPLE # 1

For SP **ss1_spa**, this command and confirmation remove the paths between the local SPs and the remote mirror SPs.

```
naviseccli -h ss1_spa mirror -disablepath ss27_spa -connectiontype fibre

Disabling of the path will stop mirroring of data to all

images if any among these arrays. A system fracture of

all mirrors between two arrays on following storage

processors will occur due to this action.

128.221.39.29

10.14.20.154

Do you want to continue (y/n)? y
```

EXAMPLE # 2

The **mirror -info** command displays the updated status.

```
naviseccli -h ss1_spa mirror sync -info
```

OUTPUT

If the version of FLARE software running on the SP does not support this command, a `Command is not supported` error message is printed to `stderr`.

mirror -enablepath

Establishes a path for remote mirroring between a local and remote storage system.

PREREQUISITES

You must have a user account on the storage system on which you want to execute the command.

DESCRIPTION

This command is used with **naviseccli** (see naviseccli on page 34) to create a path between the specified SP and its peer SP to a remote SP and its peer. These paths will serve as paths for remote mirroring. A remote mirror requires a path between the primary and secondary storage systems.

When issued to any SP, the command creates paths for both SPs in both storage systems; that is, it creates these paths:

◆ SP A of the local storage system to SP A of the other storage system

◆ SP A of the other storage system to SP A of the local storage system

◆ SP B of the local storage system to SP B of the other storage system

◆ SP B of the other storage system to SP B of the local storage system

The SP As or the SP Bs in both storage systems must be physically connected.

If you cannot enable paths on one SP due to some error, an informational message appears and the paths are enabled for the other SP. To obtain status information, run the **mirror -info -systems** command.

Note: If both asynchronous and synchronous mirrors are installed, you will need to run the command only once. It will take effect for both mirrors.

SYNTAX

mirror -enablepath *SP-hostname* [**-connectiontype fibre**|**iscsi**]

OPTIONS

SP-hostname

Specifies the hostname of SP A or SP B of the remote storage system on which you want to enable remote mirroring.

-connectiontype fibre | iscsi

Specifies the connection type as fibre or iSCSI for the path you are enabling. If you do not specify the **-connectiontype** switch, the system first tries to find a fibre connection; if it does not find one, it looks for an iSCSI connection.

Note: To change the connection type, you must first disable the current enabled path. To modify, test, or delete connections or change the credentials, see the *EMC Navisphere Command Line Interface (CLI) Reference.*

EXAMPLE

For SP **ss1_spa**, this command enables the paths between **ss1_spa** and its peer SP and **ss27_spa** and its peer SP. The **mirror -sync -info** command that follows displays the updated status.

```
naviseccli -h ss1_spa mirror -enablepath ss27_spa -connectiontype
iscsi

naviseccli -h ss1_spa mirror -sync -info
```

OUTPUT

If the version of FLARE software running on the SP does not support this command, a `Command is not supported` error message is printed to `stderr`.

mirror -sync -fractureimage

Fractures an image in a mirror.

PREREQUISITES

You must have a user account on the storage system on which you want to execute the command.

DESCRIPTION

This command is used with **naviseccli** to start an administrative fracture of a secondary image. It also prevents scheduled updates from starting in the future. You must direct the command to the storage system that holds the primary image.

(An automatic fracture, called a system fracture, occurs if a secondary image becomes inaccessible to the primary image. After a system fracture, the system periodically tries to communicate with the secondary image and — if it succeeds — starts synchronization based on the fracture log. If you issue the **-fractureimage** command while the mirror is system fractured, the system will not try to communicate or resynchronize until you issue a **-syncimage** command.)

The software displays a message to confirm the fracture:

```
Warning! If the Write Intent Log is not enabled for this mirror, a
full mirror sync of the secondary image will be required in the event
of a failure on the primary image.
Do you want to fracture the image image UID (y/n)?
```

To fracture the mirror, answer y; to take no action, enter n.

SYNTAX

mirror -sync -fractureimage -name *name* | **-mirroruid** *uid*
-imageuid *uid*
[**-o**]

OPTIONS

-name *name*

Specifies the name you gave to the mirror with the **-create** command.

-mirroruid *uid*

Specifies the unique 16-byte mirror ID (World Wide Name) that the software assigned when it created the mirror.For any letters in the ID, see comments under **-imageuid** below.

-imageuid *uid*

Specifies the unique 8-byte image ID of the secondary image to be fractured. For any letters in the ID, you must specify the same case as the software assigned to the image when the mirror was created (use **mirror -list** function).

-o

Executes the command without prompting for confirmation.

EXAMPLE

For SP **ss1_spa** of the mirror named db_mirror, this command fractures the secondary image with the unique ID shown.

```
naviseccli -h ss1_spa mirror -sync -fractureimage -name
db_mirror  -imageuid  50:06:06:10:00:FD:A1:6

Warning! If the Write Intent Log is not enabled for this
mirror, a full mirror sync of the secondary image will be
required in the event of a failure on the primary image.
Do you really want to fracture the image(y/n)? y
```

OUTPUT

If the version of FLARE software running on the SP does not support this command, a Command is not supported error message is printed to stderr. You may also receive other error messages.

mirror -sync -info

Displays general information about synchronous mirroring in a storage system.

PREREQUISITES

You must have a user account on the storage system on which you want to execute the command.

DESCRIPTION

This command, when used with `naviseccli` and no other switches, lists all general information for remote mirror support. Issuing this command with one or more options displays the information based on the option issued. See the example for sample output.

For information on existing mirrors, use the `-list` function. For synchronization status information, use the `-listsyncprogress` function.

SYNTAX

```
mirror -sync -info [-cancreate]
[-maxmirrors]
[-mirroredluns]
[-mirrorableluns]
[-systems [-connectiontype]]
[-logs]
```

OPTIONS

-cancreate

Indicates whether an remote mirror can be created in this storage system: yes or no.

-maxmirrors

Displays the maximum number of mirrors that can be created in this storage system.

-mirroredluns

Lists the LUN numbers of LUNs that are mirrored in this storage system. The list includes LUNs used as both secondary and primary images.

-mirrorableluns

Lists LUNs that can be mirrored in this storage system but are not mirrored at present.

-systems

Lists remote storage systems that can be used for a secondary image.

-connectiontype

Displays the connection type (fibre or iSCSI) for the enabled mirror. For unexpected error cases, it displays the value, unknown.

-logs

Lists LUNs that have been assigned for the write intent log on this storage system.

EXAMPLE

For SP ss1_spa, this command displays potential and current remote mirror information.

```
naviseccli -h ss1_spa mirror -sync -info
Can a mirror be created on this system:YES
Logical Units that are mirrored in Primary Images:82 76
Logical Units that are mirrored in Secondary Images:75 5
72
Logical Units that can be mirrored:10 6 18 74 16 9 85 11
87 77 19 14 250
78 4 15 7 83 17 12 88 100 71 13 89 81
Is Write Intent Log Used: NO
Remote systems that can be enabled for mirroring:
Remote systems that are enabled for mirroring:
Array UID: 50:06:01:60:20:04:A1:6B
Status: Enabled on both SPs
Array UID: 50:06:01:60:90:20:33:54
Status: Enabled on both SPs
Array UID: 50:06:01:60:20:02:C1:A3
Status: Enabled on both SPs
Enabled Connection Type(s): iSCSI
Disabled Connection Type(s): Fibre
Maximum number of possible Mirrors:50
```

OUTPUT

If the version of FLARE software running on the SP does not support this command, a `Command is not supported` error message is printed to `stderr`.

mirror -sync -list

Displays information about existing mirrors.

PREREQUISITES

You must have a user account on the storage system on which you want to execute the command.

DESCRIPTION

The **naviseccli -sync mirror** command with **-list** and no other switches lists all information for all mirrors on the storage system. Issuing this command with one or more options displays the information based on the option(s) issued. You can direct the command to any storage system; however, only the storage system holding the primary image of a mirror will always have the latest information about the mirror. Status obtained from other storage systems may be stale; do not use it unless the primary storage system is unavailable. See the example for sample output.

For synchronization status information, use the **-listsyncprogress** function.

SYNTAX

```
mirror -sync -list [-name [[name]] [-mirroruid] [uid]
[-description]
[-faulted]
[-images]
[-imagecount]
[-imagesize]
[-lun]
[-qthresh]
[-requiredimages]
[-state]
[-transition]
[-usewriteintentlog]
```

OPTIONS

-name *name*

Specifies the name you gave the mirror with the **-create** function. You can use the mirror name or unique ID to obtain information on a mirror.

-mirroruid *uid*

Specifies the unique 16-byte remote mirror ID (World Wide Name) the software assigned when it created the mirror.

-description

Lists the meaningful title for the mirror, if any. The software does not use the description to identify the mirror.

-faulted

Lists whether the remote mirror is faulted: yes or no. If it is faulted, the mirror is either fractured or in the attention state.

-images

Displays image information, such as the role of the image (primary or secondary), image ID, WWN of the LUN containing the image, recovery policy, sync rate, image state, image condition, and image transitioning.

-imagecount

Lists the current number of images that compose the mirror. This count includes the primary image.

-imagesize

Lists the size of the image (capacity of the LUN containing the image) in user blocks.

-lun

Lists the LUN number of the local image.

-qthresh

Lists the time delay, in seconds, after the last I/O is received before a mirror will automatically transition to the synchronized state. The default is 60 seconds.

-requiredimages

Lists the minimum number of secondary images required for the mirror.

-state

Describes the operational state of the mirror. Values are: inactive, active and attention.

-transition

Specifies whether the mirror is in a changing state.

-usewriteintentlog

Lists whether the mirror uses the write intent log. You cannot use the log unless you first allocate it.

EXAMPLE

naviseccli -h ss1_spa mirror -sync -list

```
      MirrorView Name: pbc sync on 82
      MirrorView Description:
      MirrorView UID:
      50:06:01:60:90:20:29:85:01:00:00:00:00:00:00:00
      Logical Unit Numbers: 82
      Remote Mirror Status: Mirrored
      MirrorView State: Active
      MirrorView Faulted: YES
      MirrorView Transitioning: NO
      Quiesce Threshold: 60
      Minimum number of images required: 0
      Image Size: 204800
      Image Count: 2
      Write Intent Log Used: NO
      Images:
          Image UID: 50:06:01:60:90:20:29:85
          Is Image Primary: YES
          Logical Unit UID:
      60:06:01:60:57:A0:0E:00:56:7D:92:1C:37:73:D8:11
          Image Condition: Primary Image
          Preferred SP: A
      Image UID: 50:06:01:60:90:20:33:54
      Is Image Primary: NO
      Logical Unit UID:
      60:06:01:60:B7:7C:0E:00:02:DB:F3:EF:36:73:D8:11
      Image State: Consistent
      Image Condition: System fractured
      Recovery Policy: Automatic
      Preferred SP: A
      Synchronization Rate: Medium
      Image Faulted: YES
      Image Transitioning: NO
      Synchronizing Progress (%): N/A
```

OUTPUT

If the version of FLARE software running on the SP does not support this command, a `Command is not supported` error message is printed to `stderr`. You may also receive other error messages.

mirror -sync -listsyncprogress

Displays the percentage of synchronization that has occurred.

PREREQUISITES

You must have a user account on the storage system on which you want to execute the command.

DESCRIPTION

The **naviseccli mirror** command with **-listsyncprogress** and no other switches lists all information for all remote mirrors. Issuing this command with one or more options displays the information based on the option included.

If you omit arguments, the CLI displays information on all mirrors.

You must direct the command to the storage system that holds the primary image; if not, the progress will display as N/A. Similarly, if an image is synchronized, the progress will display as 100. See the example for sample output.

SYNTAX

mirror -sync -listsyncprogress [**-name** *name* | **-mirroruid** *uid*]

OPTIONS

-name *name*

Specifies the name given to the mirror with the **-create** command. You can use the mirror name or unique ID to obtain information on a particular mirror.

-mirroruid *uid*

Specifies the 16-byte mirror unique ID (world wide name) assigned when the mirror was created. If you specify this switch, information on the particular mirror appears.

EXAMPLE

```
naviseccli -h ss1_spa mirror -sync -listsyncprogress


MirrorView Name: pbc sync on 82
Has Secondary Images: YES
Image UID: 50:06:01:60:90:20:33:54
Image State: Consistent
Synchronizing Progress(%): N/A


MirrorView Name:  pbc sync on LUN 75
Has Secondary Images: YES
Image UID: 50:06:01:60:90:20:29:85
Image State: Out-of-Sync
Synchronizing Progress(%): N/A
```

OUTPUT

If the version of FLARE software running on the SP does not support this command, a Command is not supported error message is printed to stderr. You may also receive other error messages.

mirror -sync -listlog

Displays write intent log information.

PREREQUISITES

You must have a user account on the storage system on which you want to execute the command.

DESCRIPTION

The **naviseccli mirror** command with **-listlog** lists the write intent log LUN numbers. If a write intent log is not allocated, then it displays nothing. You can direct this command to any storage system that has MirrorView/S installed.

Format of the display is:

```
SP:A/B
```

LUN-number (Number of LUN used as write-intent log)

SYNTAX

mirror -sync -listlog

EXAMPLE

For both **ss1_spa** and its peer SP, this command lists the write intent log LUN information. If the write intent log is allocated, example output may be as follows:

```
naviseccli -h ss1_spa mirror -sync -listlog


Storage Processor: SP A
LUN Number: 129
Storage Processor: SP B
LUN Number: 128
```

OUTPUT

If the version of FLARE software running on the SP does not support this command, a `Command is not supported message` is written to `sterr`.

mirror -sync -promoteimage

Promotes a secondary image to primary.

PREREQUISITES

You must have a user account on the storage system on which you want to execute the command.

DESCRIPTION

This command promotes a secondary image to the role of the primary image. The command is successful if it can promote the secondary to a primary that is server-accessible. You must direct this command to a storage system that holds the secondary image — never to the storage system that holds the primary. The command will fail if you issue it to the storage system that holds the primary image.

You can promote a secondary image if the secondary is in a synchronized or consistent state. If the original primary is available, the software does a full resynchronization unless it confirms that the two images were synchronized.

Use **-promoteimage** carefully. The software will prompt for confirmation as follows before processing the command:

```
Warning! This command is a very powerful and unforgiving command like
formatting a disk. An improper use of this command can create
unexpected results. If you have not done any of the following steps
then answer 'n' and fulfil these steps and re-issue the command. Did
you put primary image in a quiescent state? Is image synchronized? It
does not have to be synchronized but it is better to be synchronized
to avoid any kind of loss of data. Do you want to continue (y/n)?
```

Answering **yes** will continue with processing of promote command. Answering **no** stops the command execution.

When you promote a secondary image to primary, the software assigns a new mirror UID to the promoted image to distinguish it from the old mirror. The new status of the old primary image depends on whether the old primary image is accessible when promotion occurs.

◆ If the original primary image is not accessible when you issue the promote command, the software creates a new mirror with the original secondary image as the primary image, and the original primary is not part of the new mirror. If the original mirror had a second secondary, it is added as a secondary to the new mirror if it is accessible. If the original primary image becomes available later, you should destroy the original mirror using the Unisphere **force destroy**, or Navisphere CLI **mirror -sync -destroy -force** option. After destroying the original mirror, you can (if desired) add the LUN that held the original primary image to the new mirror as its secondary image. This secondary image requires a full synchronization before it provides data protection.

◆ If the original primary is accessible when you issue the promote command, then the promoted image becomes primary and the original primary becomes secondary (that is, the images swap). The software then tests to see if the two images are *synchronized*. If it finds the images are *synchronized*, then it proceeds with mirrored I/O as usual. If the mirror is not in the *synchronized* state, then the mirror will be out-of-sync and waiting on admin. The recovery policy is changed to manual during the promotion, so that you must initiate the synchronization. If you choose to synchronize the mirror, it will be a full synchronization.

Note: A promotion changes the mirror's recovery policy to manual.

After promoting an image, you must explicitly add the newly promoted image to an appropriate storage group. EMC recommends that you also remove the old primary from its storage group, if possible.

Note: You cannot issue this command on a mirror that is part of a consistency group.

Note: Promoting when I/O is going to the primary image can cause data loss. Any I/Os in progress during the promotion may not be recorded to the secondary image and will be unavailable after the secondary image is promoted. It will also probably require a full synchronization of the new secondary image after the promotion.

In normal operation when there is no failure, you can (but probably would not want to) promote a secondary image. If you do so, the primary image is demoted to secondary. The new primary image inherits the mirror properties of the demoted primary image. Before issuing this command consider the following:

◆ If possible, the secondary image should be synchronized (synchronized state) with the primary image. If the secondary image is in the consistent state (not synchronized state) when you promote it to primary image, data will probably be lost during the promotion process. If possible, the secondary image should be synchronized (synchronized state) with the primary image. If the secondary image is in the consistent state (not synchronized state) when you promote it to primary image, data will probably be lost during the promotion process.

The secondary image to be promoted must be in a consistent or synchronized state. If the secondary image is out-of-sync or synchronizing, then you cannot promote it; an error will result.Also, a full synchronization of data is required from the new primary to the original one if the image is not synchronized when the promotion occurs.

◆ You must stop I/O to an accessible primary image before you issue this command. If I/O continues to the original primary, data may be lost as the software demotes the primary to secondary and/or an SP may reboot unexpectedly during the attempted promotion.

◆ If the primary system has a write intent log, ensure that the secondary system does also.

SYNTAX

```
mirror -sync -promoteimage -name name | -mirroruid uid
-imageuid imageuid
[-o]
```

OPTIONS

-name *name*

Specifies the name you gave the mirror with the **-create** command. You can use the mirror name or unique ID to promote a secondary image.

-mirroruid *uid*

Specifies the unique 16-byte mirror ID (World Wide Name) that was assigned when the mirror was created. For any letters in the ID, see comments under **-imageuid** below.

-imageuid *uid*

Specifies the unique 8-byte image ID of the secondary image you want to promote. For any letters in the ID, you must specify the same case as the software assigned to the image when it created the mirror (use the **mirror -list** function).

-o

Runs the command without prompting for confirmation.

EXAMPLE

For SP **ss1_spa**, the owner of the remote mirror named **db_mirror**, this command promotes the secondary image with the unique ID shown.

```
naviseccli -h ss1_spa mirror -sync -promoteimage
-name db_mirror -imageuid 50:06:06:10:00:FD:A1:6
```

OUTPUT

If the version of FLARE software running on the SP does not support this command, a `Command is not supported` error message is printed to `stdout`. You may also receive other error messages.

mirror -sync -removeimage

Removes a secondary image from a mirror.

PREREQUISITES

You must have a user account on the storage system on which you want to execute the command.

DESCRIPTION

This command is used with **naviseccli** to remove a secondary image from the remote mirror. You must issue this command to a storage system that holds the primary image.

An image can be removed even if it is an active image. However, you can remove a secondary image only if it is in the synchronized state or you have fractured the mirror.

If you omit the **-override** option, the software displays a message to confirm the remove operation:

```
Removing of the image will stop mirroring of data to the specified
image. It may cause the minimum number of images required parameter
to be violated that will cause the mirror to go into attention state.
Do you really want to remove the image(y/n)?
```

Answering yes will remove the image.

Note: You cannot issue this command on a mirror that is part of a consistency group.

SYNTAX

```
mirror -sync -removeimage -name name | -mirroruid mirroruid
-arrayhost sp-hostname | -imageuid imageuid [-o]
```

OPTIONS

-name *name*

Specifies the name you gave the mirror with the **-create** command. You can use the mirror name or unique ID to remove a secondary image.

-mirroruid *uid*

Specifies the unique 16-byte remote mirror ID (World Wide Name) assigned when the software created the mirror. For any letters in the ID, see comments under **-imageuid** below.

-arrayhost *sp-hostname*

Specifies the hostname or network address of the remote SP that holds the secondary image you want to remove. If you specify this switch, the driver(s) from the secondary LUN stack is removed.

-imageuid *image-uid*

Specifies the unique 8-byte image ID of the secondary image you want to remove. For any letters in the ID, you must specify the same case as the software assigned to the image when it created the mirror (use the **mirror -list** command). If you specify this switch, you must explicitly remove the driver(s) from the secondary LUN stack using the **-setfeature** command.

-o

Executes the command without prompting for confirmation.

EXAMPLE

For SP address **ss1_spa**, the owner of the mirror named db_mirror, this command removes the image with the unique ID shown.

```
naviseccli -h ss1_spa mirror -sync -removeimage
-name db_mirror -imageuid 50:06:06:10:00:FD:A1:6

Removing the image will stop mirroring of data to the
specified image. It may cause the minimum number of
images required parameter to be violated that will cause
the mirror to go into attention state. Do you really want
to remove the image (y/n)? y
```

OUTPUT

If the version of FLARE software running on the SP does not support this command, a Command is not supported error message is printed to stderr. You may also receive other error messages.

mirror -sync -setfeature

Adds or removes an mirror driver to or from the LUN stack.

PREREQUISITES

You must have a user account on the storage system on which you want to execute the command.

DESCRIPTION

Use this command with **naviseccli** (see naviseccli on page 34) to add the mirror driver to or remove it from the LUN stack depending on whether you specify the **-on** or **-off** option. You must issue this command to the storage system where the LUN resides.

This command is required after you remove a secondary image from a mirror, using the **-imaguid** switch to specify the image. In this case, Navisphere has insufficient information to automatically remove the MirrorView/S driver from the stack of the secondary image LUN, and you must use this command to do this manually.

Note: When you add a synchronous mirror driver to the LUN stack using the **-on** switch, MirrorView/S automatically allocates and retains additional memory. This additional memory counts agains the total replication software memory budget.

SYNTAX

mirror -sync -setfeature -on | **-off -lun** *lun_number* | **-lunuid** *uid*

OPTIONS

-on

Adds the driver to the LUN stack.

-off

Removes the driver from the LUN stack.

-lun *lun_number*

Specifies the LUN number to which you want to add or from which you need to remove the driver.

-lunuid *uid*

Specifies the unique 16-byte identification number (World Wide Name) of the LUN to which you will add the driver or from which you will remove the driver.

EXAMPLE

For SP **ss1_spa**, this command starts adding the driver to LUN 112.

```
naviseccli -h ss1_spa mirror -sync -setfeature -on
-lun 112
```

OUTPUT

If the version of FLARE software running on the SP does not support this command, a `Command is not supported` error message is printed to `stderr`. You may also receive other error messages.

mirror -sync -syncimage

Starts an update of the secondary image.

PREREQUISITES

You must have a user account on the storage system on which you want to execute the command.

DESCRIPTION

Use this command with **naviseccli** (see naviseccli on page 34) to begin the synchronization operation on a secondary image that was previously administratively fractured or on one where the mirror image condition is normal. You must issue this command to the storage system that holds the primary image. The secondary image should be fractured when performing this operation. If you specify a secondary image that is not fractured, an internal error message will be returned.

If **-o** is not specified, the software displays a message asking you to confirm:

```
During synchronization, array performance will be impacted and data
is vulnerable to a failure of the primary image. Do you want to sync
the image (y/n)?
```

Answering y will start synchronization.

Note: You cannot issue this command on a mirror that is part of a consistency group.

SYNTAX

mirror -sync -syncimage -name *name* | **-mirroruid** *mirroruid* **-imageuid** *imageuid*
[**-o**]

OPTIONS

-name *name*

Specifies the name given to the mirror with the **-create** command. You can use the mirror name or unique ID to update a secondary image.

-mirroruid *uid*

Specifies the unique 16-byte remote mirror ID (World Wide Name) assigned when the software created the mirror. For any letters in the ID, see comments under **-imageuid** below.

-imageuid *imageuid*

Specifies the unique 8-byte image ID of the secondary image you will synchronize. For any letters in the ID, you must specify the same case as the software assigned to the image when the software created the mirror (use the **mirror -list** command).

-o

Executes the command without prompting for confirmation.

EXAMPLE

For SP **ss1_spa**, the owner of the mirror named **db_mirror**, this command starts synchronizing the image with the unique ID shown.

```
naviseccli -h ss1_spa mirror -sync -syncimage
-name db_mirror -imageuid 50:06:06:10:00:FD:A1:6

During synchronization, array performance will be
impacted and data is vulnerable to a failure of the
primary image. Do you want to sync the image (y/n)? y
```

OUTPUT

If the version of FLARE software running on the SP does not support this command, a Command is not supported error message is printed to stderr. You may also receive other error messages.

MirrorView/S Consistency Group Commands

This chapter explains the commands for creating and managing groups of mirrors on CX4 series, CX3 series, CX series, and AX4-5 series storage systems with the EMC MirrorView/S option. This manual refers to groups of mirrors as *consistency groups*.

Note: The LUNs in a MirrorView/S consistency group must reside on the same storage system, unlike the volumes in a Symmetrix consistency group, which can reside on multiple storage systems.

Major topics are:

mirror -sync -creategroup

Establishes a consistency group to which you can later add mirrors.

PREREQUISITES

You must have a user account on the storage system on which you want the command executed.

DESCRIPTION

This command is used with **naviseccli** to create a consistency group to which you can add mirrors with subsequent commands. You must direct the command to the storage system on which you are creating the MirrorView/S group.

Note: On AX4-5, CX500, CX3 model 10, and CX3 model 20 systems, you can have 8 consistency groups, and each consistency group can have up to 8 mirrors. On CX700, CX3 model 40, and CX3 model 80 systems, you can have 16 consistency groups, and each consistency group can have up to 16 mirrors. On CX4 storage systems, you can have 64 consistency groups, which can be a combination of synchronous and asynchronous consistency groups. For example, if you have 4 asynchronous consistency groups, the maximum number of synchronous consistency groups you can create is 60. On CX4-120 and CX4-240 storage systems, each consistency group can have up to 32 mirrors. On CX4-480 and CX4-960 storage systems, each consistency group can have up to 64 mirrors.

When you create a consistency group, MirrorView/S automatically allocates and retains additional memory. This additional memory counts against the total replication software memory budget.

SYNTAX

```
mirror -sync -creategroup -name name
[-description description]
[-recoverypolicy policy][-o]
```

OPTIONS

-name *name*

Specifies the name of the consistency group. Use only alphanumeric characters for the consistency group name. The name can be up to 32 characters.

-description *description*

Specifies a textual description of the consistency group.

-recoverypolicy *policy*

Specifies the policy for recovering the mirrors in a group after a failure causes a system fracture. Values are:

manual: Update of the secondary image does not begin until you explicitly issue a **synchronize** command.

auto: Update of the secondary image automatically begins as soon as the connection between the two storage systems is again operational.

 -o

Executes the command without prompting for confirmation.

EXAMPLE

For SP ss1_spa, this command creates a consistency group with the name **dbgroup**.

```
naviseccli -h ss1_spa mirror -sync -creategroup -name dbgroup
```

OUTPUT

If the version of FLARE software running on the SP does not support this command, a Command is not supported error message is printed to stdout. You may also receive other error messages.

mirror -sync -destroygroup

Destroys a consistency group.

PREREQUISITES

You must have a user account on the storage system on which you want to execute the command.

DESCRIPTION

This command is used with **naviseccli** (see) to destroy a consistency group. It is the counterpart of **-creategroup**.

Note: Make sure that the consistency group is empty before destroying it.

If you omit the override option, the system displays a message to confirm the destruction of the consistency group:

```
    Do you really want to destroy the group <group-name>? (y/n)?
```

To destroy the consistency group, answer y; to take no action, enter n.

SYNTAX

```
mirror -sync -destroygroup -name  name | -groupid id
[-force] [-o]
```

OPTIONS

-name *name*

Specifies the name you gave the mirror with the **-creategroup** command. You can also use the consistency group ID.

-groupid *id*

Specifies the consistency group unique ID assigned when the consistency group was created.

-force

Destroys the consistency group even if it is not empty. Force destroy destroys only the group on the local system; you must also destroy the group on the other system.

-o

Executes the command without prompting for confirmation.

EXAMPLE

For SP `ss1_spa`, this command destroys the consistency group that was created with the name **dbgroup**.

```
naviseccli -h ss1_spa mirror -sync -destroygroup dbgroup

Do you really want to destroy the group dbgroup?(y/n)? y
```

OUTPUT

If the version of FLARE software running on the SP does not support this command, a `Command is not supported` error message is printed to `stdout`. You may also receive other error messages if the command fails.

mirror -sync -addtogroup

Adds a mirror to a previously created consistency group.

PREREQUISITES

You must have a user account on the storage system on which you want to execute the command.

DESCRIPTION

This command is used with **naviseccli** (see naviseccli on page 34) to add one mirror at a time to a consistency group.

Note: The mirror you specify must have its primary image on the storage system. No two secondary images of mirrors in the consistency group can be on different storage systems.

When you add a mirror to a consistency group, MirrorView/S automatically allocates and retains additional memory. This additional memory counts against the total replication software memory budget.

SYNTAX

```
mirror -sync -addtogroup -name  name | -groupid id
-mirrorname name | -mirroruid id
```

OPTIONS

-name *name*

Specifies the name of the consistency group to which you want to add the mirror.

-groupid *id*

Specifies the unique ID of the consistency group to which you want to add the mirror.

-mirrorname *name*

Specifies the name of the mirror you want to add to the consistency group.

-mirroruid *id*

Specifies the World Wide Name of the mirror you want to add to the consistency group.

EXAMPLE

For SP `ss1_spa`, this command adds the mirror, **`Sales Accounts Mirror to Europe`**, to the consistency group, **`dbgroup`**.

```
naviseccli -h ss1_spa mirror -sync -addtogroup
-name dbgroup -mirrorname "Sales Accounts Mirror to Europe"
```

OUTPUT

If the version of FLARE software running on the SP does not support this command, a `Command is not supported` error message is printed to `stdout`. You may also receive other error messages.

mirror -sync -removefromgroup

Removes a mirror from a consistency group.

PREREQUISITES

You must have a user account on the storage system on which you want to execute the command.

DESCRIPTION

This command is used with **naviseccli** (see) to remove one mirror at a time from the consistency group.

Note: The mirror you specify must have its primary image on the storage system. This does not apply if you use the **-force** switch.

If you omit the **-o** option, the software displays a message to confirm the remove operation. Answering yes will remove the mirror.

SYNTAX

mirror -sync -removefromgroup -name *name* | **-groupid** *id*
-mirrorname *name* | **-mirroruid** *id*[**-force**] [**-o**]

or

mirror -sync -removefromgroup -name *name* | **-groupid** *id*
-localLunUid *uid* | **-localLunnumber** *number*[**-force**] [**-o**]

OPTIONS

 -name *name*

Specifies the name of the consistency group from which you want to remove the mirror.

 -groupid *id*

Specifies the unique ID of the consistency group to which you want to add the mirror.

 -mirrorname *name*

Specifies the name of the mirror you want to remove from the consistency group.

 -mirroruid *id*

Specifies the World Wide Name of the mirror you want to remove from the consistency group.

-localLunUid *uid*

Specifies the world wide name of the local LUN belonging to the local image, which participates in the consistency group. You can use this switch to remove group members only in the failure scenario.

-localLunnumber *number*

Specifies the LUN number of the local LUN belonging to the local image, which participates in the consistency group. You can use this switch to remove group members only in the failure scenario.

Note: Failure scenarios may occur where a mirror may no longer exist, but is still considered to be a member of the consistency group. In this case, the consistency group is in an incomplete state. A mirror can be missing from the consistency group if the promotion fails between destroying the original mirror and creating a new one. In this case, all the properties of the missing mirrors, except the **local LUN uid** and **local LUN number** appear as **unknown** in the **-listgroups** command. You can remove the mirror from the consistency group only by specifying the group name or group ID and the local LUN uid or local LUN number. Use the local LUN uid or local LUN number only in this failure case. Removing a regular mirror in a group by specifying **-locallunnumber** or **-locallunuid** returns an error. Removing the missing mirror by specifying the **-mirrorname** or **-mirroruid** also returns an error.

If a mirror is missing only on the secondary side, then issuing the **removefromgroup** command on the primary side will remove the missing member on the secondary side also.

-force

Removes the mirror even if the connection with the remote storage system is not functioning.If you direct this command at the secondary storage system with this switch, only the secondary member is removed; the primary system is not contacted.

-o

Executes the command without prompting for confirmation.

EXAMPLE

For SP **ss1_spa**, the owner of the consistency group named **dbgroup**, this command removes the mirror with the unique ID shown.

```
naviseccli -h ss1_spa mirror -sync -removefromgroup
-name dbgroup -mirroruid

83:5A:20:90:60:01:06:50:01:00:00:00:00:00:00:00
```

OUTPUT

If the version of FLARE software running on the SP does not support this command, a `Command is not supported` error message is printed to `stdout`. You may also receive other error messages.

mirror -sync -changegroup

Changes consistency group properties.

PREREQUISITES

You must have a user account on the storage system on which you want to execute the command.

DESCRIPTION

This command is used with **naviseccli** to change one or more parameters of a consistency group.

You must specify at least one of the optional switches. If you omit the override option, then it displays a message similar to the following for each parameter to confirm the change.

```
Do you want to change the group synchronization rate from Medium to
High (y/n)?
```

To change a parameter, enter `y`.

SYNTAX

mirror -sync -changegroup -name *name* | **-groupid** *id*
[**-newname** *newname*]
[**-description** *description*]
[**-recoverypolicy** *policy*] [**-o**]

OPTIONS

 -name *name*

Specifies the name of the consistency group you want to change. You can specify either the consistency group name or ID (next).

 -groupid *id*

Specifies the unique ID of the consistency group you want to change.

 -newname *newname*

Specifies the new name of the synchronous consistency group. The name can be up to 32 characters. You can change the name, but not the ID.

 -description *description*

Specifies a textual description for the consistency group.

 -recoverypolicy *policy*

Specifies the policy for recovering the mirrors in a group after a failure causes a system fracture. Values are:

manual: Update of the secondary image does not begin until you explicitly issue a **synchronize** command.

auto: Update of the secondary image automatically begins as soon as the connection between the two storage systems is again operational.

-o

Executes the command without prompting for confirmation.

EXAMPLE

For storage system `ss1_spa`, consistency group `dbgroup`, this command automatically starts synchronization..

```
naviseccli -h ss1_spa mirror -sync -changegroup -name
dbgroup -recoverypolicy auto
```

OUTPUT

If the version of FLARE software running on the SP does not support this command, a `Command is not supported` error message is printed to `stdout`. You may also receive other error messages.

mirror -sync -syncgroup

Synchronizes all members of the consistency group.

PREREQUISITES

You must have a user account on the storage system on which you want to execute the command.

DESCRIPTION

The **naviseccli mirror -sync** command with **-syncgroup** synchronizes all members of a consistency group. When one member of the group is fractured, all will be fractured; therefore, it is necessary to synchronize the group. You cannot synchronize an individual image whose primary image is part of a consistency group. The **-syncgroup** command returns successfully that all members of the consistency group have been queued for synchronization.

SYNTAX

mirror -sync -syncgroup -name *name* | **-groupid** *id*
[**-o**]

OPTIONS

-name *name*

Specifies the name of the consistency group you want to update or synchronize. You can specify either the consistency group name or id (next).

-groupid *id*

Specifies the unique ID of the consistency group you want to update or synchronize.

-o

Executes the command without prompting for confirmation.

EXAMPLE

For SP ss1_spa, the owner of the consistency group named dbgroup, this command starts synchronizing the consistency group

```
naviseccli -h ss1_spa mirror -sync -syncgroup -name dbgroup
```

OUTPUT

If the version of FLARE software running on the SP does not support this command, a `Command is not supported` error message is printed to `stdout`. You may also receive other error messages.

mirror -sync -fracturegroup

Fractures all image(s) in a consistency group.

PREREQUISITES

You must have a user account on the storage system on which you want to execute the command.

DESCRIPTION

The **naviseccli mirror -sync** command with **-fracturegroup** starts an administrative fracture of all images in the consistency group, even if they are already system fractured. You must direct this command to the primary system.

SYNTAX

```
mirror -sync -fracturegroup -name name | -groupid id
[-o]
```

OPTIONS

-name *name*

Specifies the name of the consistency group you want to fracture. You can specify either the consistency group name or ID (next).

-groupid *id*

Specifies the unique ID of the consistency group you want to fracture.

-o

Executes the command without prompting for confirmation.

EXAMPLE

For SP **ss1_spa**, with the consistency group named **dbgroup**, this command fractures all the images in the consistency group.

```
naviseccli -h ss1_spa mirror -sync -fracturegroup
-name dbgroup
```

OUTPUT

If the version of FLARE software running on the SP does not support this command, a `Command is not supported` error message is printed to `stdout`. You may also receive other error messages.

mirror -sync -promotegroup

Promotes all secondary images in a consistency group to primary images.

PREREQUISITES

You must have a user account on the storage system on which you want to execute the command.

Before promoting, perform the following steps:

1. Stop all I/O.

2. If possible, make sure that the group is in a synchronized state.

3. Before running a force promote, first perform a normal promotion and, if possible, fix any error conditions that it returns.

CAUTION After force promoting a consistency group that is out-of-sync after the promotion, use caution before synchronizing the consistency group. If the group was fractured before the promotion, the new primary system may have data that is much older than the original primary (now secondary) system. Synchronizing the group may overwrite newer data on the original primary system.

DESCRIPTION

This command promotes all secondary images to the role of the primary images. You must direct this command to a secondary system. This command is used with **naviseccli** (see naviseccli on page 34).

Note: To promote a consistency group, the group on the secondary side must be Consistent or Synchronized. When the primary system is not reachable, the group may not be in a Consistent or Synchronized state.

CAUTION Promoting when I/O is going to the primary image can cause data loss. Any I/Os in progress during the promotion may not be recorded to the secondary image and will be unavailable after the secondary image is promoted. It will also probably require a full synchronization of the new secondary image after the promotion.

SYNTAX

```
mirror -sync -promotegroup -name name | -groupid id
[-type type] [-o]
```

OPTIONS

-name *name*

Specifies the name of the consistency group you want to promote. You can specify either the consistency group name or ID (next).

-groupid *id*

Specifies the unique ID of the consistency group you want to promote.

-type *type*

Specifies the type of promotion. Values are:

normal (default), which promotes each mirror in the consistency group. Otherwise, it will destroy the original mirrors and create new ones with the targeted secondaries as primaries and the original primaries as secondaries.

local, which creates only the new primary image. If the original primary system can be contacted, then the secondary image is removed from the mirror on the original primary system. Thus, both systems will have a mirror with primary images only.

force, which continues the promotion despite most errors that may occur. We recommend that before using force promote, first use normal promote and, if possible, fix any errors that it returns.

-o

Runs the command without prompting for confirmation.

EXAMPLE

For SP **ss1_spa**, the owner of the consistency group named **dbgroup**, this command promotes all secondary images:

```
naviseccli -h ss1_spa mirror -sync -promotegroup -name
dbgroup
```

OUTPUT

If the version of FLARE software running on the SP does not support this command, a Command is not supported error message is printed to stdout. You may also receive other error messages.

mirror -sync -listgroups

Displays information about existing consistency groups.

PREREQUISITES

You must have a user account on the storage system on which you want to execute the command.

DESCRIPTION

The `naviseccli mirror -sync` command with `-listgroups` and no other switches lists all information for all synchronous consistency groups on the storage system. Issuing this command with one or more options displays the information based on the option(s) issued. This command is used with `naviseccli` (see navisecli on page 34).

SYNTAX

```
mirror -sync -listgroups [-name[name]] [-groupid[-id]]
[-feature][-state][-role][-mirrors]
[-condition][-recoverypolicy][-canbeaddedtogroup]
```

OPTIONS

-name *name*

Specifies the name of the consistency group whose information you want to display. If you do not specify the name of the consistency group with this switch, that piece of information will be provided for the consistency group(s) being displayed.

-groupid *id*

Specifies the unique ID of the consistency group whose information you want to display.

-feature

Displays the maximum number of consistency groups allowed on the storage system and the maximum number of members per consistency group.

-state

Displays Synchronized, Out-of-Sync, Synchronizing, Consistent, Scrambled, Incomplete, Local Only, or Empty.

-role

Displays Primary, Secondary, or Unknown.

-mirrors

Displays the mirror name, mirror uid, the IDs of both images in the pair, and the storage system ID of the paired image.

`-condition`

Displays the consistency group condition as Active, Admin Fractured, System Fractured, Waiting on Sync, Inactive, or Invalid.

`-recoverypolicy`

Displays either manual or automatic to describe whether the system will wait for you to restart updates in the event of a system fracture, after the problem is corrected.

`-description`

Displays the description associated with the consistency group.

`-canbeaddedtogroup`

Displays all the mirrors that you can add to a group. A mirror appears in the list only if it is consistent or synchronized and not fractured. Also, the consistency group must be in-sync or consistent and not fractured.

EXAMPLE

```
naviseccli -h 10.14.5.200 mirror -sync -listgroups


Maximum Number of Groups Allowed: 16
Maximum Number of Mirrors per Group: 16

Group Name: vid
Group ID: 50:06:01:60:90:60:2D:03:00:00:00:00
Description:
State: Synchronized
Role: Secondary
Condition: Active
Recovery Policy: Manual
Mirror Name: vid
Mirror WWN:
50:06:01:60:90:60:2C:BA:01:00:00:00:00:00:00:00
Primary WWN: 50:06:01:60:90:60:2C:BA
Secondary WWN: 50:06:01:60:90:60:2D:03
Array hosting remote image: 50:06:01:60:90:60:2C:BA
Local LUN ID:
60:06:01:60:8B:53:10:00:A0:FF:D5:30:DE:B4:D8:11
Local LUN Number: 0
Remote LUN ID:
60:06:01:60:90:53:10:00:A3:58:04:80:DE:B4:D8:11
Mirrors can be added to group:
Mirror Name: djp1
Mirror WWN:
50:06:01:60:90:60:2C:BA:03:00:00:00:00:00:00:00
```

OUTPUT

If the version of FLARE software running on the SP does not support this command, a `Command is not supported` error message is printed to `stdout`. You may also receive other error messages.

This appendix describes how MirrorView/S and consistency groups handle failures.

Topics include:

- How MirrorView/S handles failures on page 100
- How consistency groups handle failures on page 111
- iSCSI-related failure conditions on page 115

How MirrorView/S handles failures

When a failure occurs during normal operations, MirrorView/S lets you perform several actions to recover.

In recovering from failures, MirrorView/S achieves two goals:

- Preserves data integrity
- Minimizes the amount of time that data is unavailable to the user

Access to the primary SP fails

If an SP that owns mirrored LUNs on the primary system fails, MirrorView/S on the other SP takes ownership of those mirrored LUNs by trespassing them when something on the server (like PowerPath) initiates the trespass. This allows mirroring to continue, provided the server is set up properly to handle the failover (for example, a Windows server with PowerPath). When the primary LUN is trespassed, MirrorView/S sends a trespass request to any secondary images when the next update starts. Therefore, you may notice that the mirrored LUNs on the secondary system have moved from SP A to SP B, or vice versa. MirrorView/S keeps the SP ownership the same on the primary and secondary systems during updates. If the primary image is on SP A, then the secondary image will be on SP A. This may not occur until the start of the next update.

Primary image fails

If the storage system controlling the primary image fails, access to the mirror stops until you either repair the storage system or promote a secondary image of the mirror to primary. If the mirror has two secondary images and you promote one, the other secondary image becomes a secondary image to the promoted mirror.

You can recover with a promotion, or you can wait until the primary image is repaired and then continue where you left off.

Promoting a secondary image to primary

In situations where you must replace the primary storage system due to a catastrophic failure, you can use a promotion to access data on the secondary storage system. To recover and restore I/O access, you must promote a secondary mirror image to the role of primary mirror image, so that a server can access it.

Note: You can also promote a secondary image even if there has not been a catastrophic failure.

If the primary image and secondary image can communicate with each other, then when the secondary image is promoted, the former primary image is demoted to a secondary image.

To promote a secondary image, the following conditions must be true:

◆ You must direct the **naviseccli mirror** commands to the storage system holding the secondary image.

◆ The state of the secondary image you will promote must be either Consistent or Synchronized.

Note: If you promote a consistent secondary image, you must perform a full synchronization to re-establish the mirror after promotion.

CAUTION

Promoting when I/O is going to the primary image can cause data loss. Any I/Os in progress during the promotion may not be recorded to the secondary image and will be unavailable after the secondary image is promoted. It will also probably require a full synchronization of the new secondary image after the promotion.

In a failure situation, before promoting a secondary image to a primary image:

◆ If the existing primary image is accessible, remove the primary image from any storage groups before promoting the secondary image to avoid I/O and therefore inconsistent data.

◆ Ensure that no I/O, either generated from a server or by an update in progress, is occurring in the mirror.

◆ If the existing primary is available, make sure that it lists the secondary image that is to be promoted as "synchronized."

To promote a secondary image to a primary image:

1. Issue the **mirror -sync -promoteimage** command. See mirror -sync -promoteimage on page 67

2. Add the newly promoted image to a storage group if necessary.

If you have two secondary images, the other secondary will also be added to the new mirror if it can be contacted. If there are two secondary images and one is promoted, but the other secondary cannot be contacted, then the other secondary remains part of a mirror for which there is no primary image. You must remove this orphaned image by using the **force destroy** option.

At some point later, you can also perform the following steps:

1. Verify that the failed storage system is not the master of the domain.

If it is, assign another storage system to be the master. See the *EMC Navisphere Command Line Interface (CLI) Reference.*

2. Verify that the failed storage system is not a portal.

   If it is a portal, remove the portal and configure a different storage system as a portal. See the *EMC Navisphere Command Line Interface (CLI) Reference*.

Note: If a planned promotion of a secondary (for example, for disaster recovery testing) occurs, make sure that the image you are promoting is in the synchronized state to avoid a full resynchronization.

Starting MirrorView/S on a running VMware ESX Server

When you use MirrorView/S on a VMware ESX Server, after you promote the secondary image to a primary, perform the following steps:

1. Assign the newly promoted primary image to a storage group of the same or standby ESX Server.

2. Rescan the bus at the ESX Server level.

3. Create a Virtual Machine (VM) on the same or standby ESX Server.

4. Assign the newly promoted primary to the VM. Assign it to a different VM unless you remove the failed primary, in which case you can assign it to the same VM.

5. Power up the VM.

After you finish

If the VM is created and running, perform these steps:

1. Power it down.

2. Use the Service Console on the ESX Server to assign the newly promoted primary to the powered-down VM.

3. Power up the VM.

The primary image (which is now the secondary image) will not be accessible to the primary ESX Server.

Recover by promoting a secondary image

When you promote the secondary image, the software assigns a new mirror ID to the promoted image to distinguish it from the original mirror, even though the mirrors have the same name. The new image condition of the original primary image depends on whether the original primary image is accessible at the time of promotion.

If the existing primary image is accessible when you promote, the software attempts to add the original primary image as a secondary image of the promoted mirror; that is, the images swap roles.

If the primary image is not accessible when you promote, the software creates a new mirror with the former secondary image as the new primary image and no secondary image, as shown in the example below. The mirror on the original primary storage system does not change. If the MirrorView/S connection between the storage systems is not working during a promotion, the storage system that holds the original primary image still has a record of the secondary image that was promoted. The original primary image is unable to communicate with the promoted secondary image even if the MirrorView/S connection between the storage systems is restored (since the secondary was promoted to a primary image).

Mirror before promotion	Mirror after promotion
mirror ID = aaa primary image = LUN xxxx secondary image = LUN yyyy	mirror ID = bbb secondary image = LUN yyyy primary image = none

Restore the original mirror configuration after recovery of a failed primary image

If the original mirror becomes accessible following a failure and the mirror's secondary image has been promoted, the original mirror will be unable to communicate with the new one. To restore your mirrors to their original configuration, use the following process. Note that this process overwrites the contents of the original primary LUN. If you want to retain any data on the original primary LUN, copy it to another LUN before continuing or alternatively, you can create a LUN that will become the primary LUN.

1. Remove the original primary LUN from any storage groups of which it is a member.

2. Destroy the original mirror using the `mirror -sync -destroy -force` command.

Original mirror	New mirror
Original mirror is destroyed. Original LUN used for primary image remains (LUN xxxx)	primary image = LUN yyyy secondary image = none

⚠️ CAUTION Data from the promoted LUN will overwrite all the data on the secondary image (original primary) LUN if the administrator synchronizes the mirror.

3. Add a secondary image to the new mirror using the LUN that was the primary image for the original mirror.

4. Synchronize the secondary image.

New mirror
primary image = LUN yyyy
secondary image = LUN xxxx

5. Allow the image to transition to the Synchronized state following the synchronization.

   If the image is in the Consistent state when you promote it, another full resynchronization is required, and data may be lost.

6. Promote the secondary image in the new mirror to primary.

   The new mirror has the same configuration as the original mirror.

New mirror
primary image = LUN xxxx
secondary image = LUN yyyy

   During a promotion, the recovery policy for a secondary image is always set to manual. This prevents a full synchronization from starting until you want it to.

7. If required, reset the recovery policy back to automatic.

Recover without promoting a secondary image

If the primary storage system fails, but can be readily repaired, recovery is simpler. MirrorView/S records any writes that had been received before the failure and can transfer them to the remote image when the primary storage system is repaired, thus synchronizing the secondary with the primary. Any writes that were sent to the storage system but that are not yet acknowledged may be lost, but application-specific recovery techniques, such as `chkdsk` or `fsck` for file systems, can usually correct any issues. If you did not use the write intent log, you must perform a full resynchronization of the secondary image.

To recover without promoting a secondary image, follow these steps:

1. Repair the primary storage system and/or server.

2. Fracture the mirror(s).

3. Complete any necessary application-specific recovery of the data on the primary image.

4. Make sure that the data is flushed from the server to the storage system.

5. Synchronize the mirror(s).

Failure of the secondary image

When a primary image cannot communicate with a secondary image, it marks the secondary as unreachable and will system or administratively fracture the secondary image. Verify the Last Image Error field for details about the cause of the failure and take the appropriate action to fix it. The secondary image is marked System Fractured. The loss of communication may be due to a link between storage systems, an SP failure on the secondary storage system, or some other failure on the secondary storage system. In the event of the communication failure, the secondary image remains a member of the mirror.

The primary image also attempts to minimize the amount of work required to synchronize the secondary after it recovers. It does this by fracturing the mirror. This means that while the secondary is unreachable (fractured), the primary storage system keeps track of write requests to the mirror, so that only areas that were modified need to be copied to the secondary during recovery.

When the secondary is repaired, a synchronization operation brings the image up to date. The primary recognizes that the secondary is alive and restarts writes to that image if the recovery mode is set as automatic.

Promoting a secondary image when there is no failure

You may want to promote your secondary image even if no failure occurs on the storage systems. For example, you may want to test your disaster recovery procedure before a real failure occurs, or perhaps the server attached to the primary storage system failed, and you must resume operations using the server attached to the secondary storage system.

If the original primary is accessible when you promote the secondary, the software verifies whether the images are identical. If possible, the secondary image should be in the Synchronized state (stop application I/O, flush data from the servers, start and update and wait for it to complete). If the images are identical, they swap roles, resynchronization is not necessary, and the promotion is complete. If the images are potentially different (that is, the secondary image is not in the Synchronized state), then you must specify the type of promotion. As part of a promotion, any secondary images in the new mirror are set to manual recovery.

Mirror before promotion	Mirror after promotion
mirror ID = aaa	mirror ID = bbb
primary image = LUN xxxx	primary image = LUN yyyy
secondary image = LUN yyyy	secondary image = LUN xxxx

If the images are not synchronized, you can choose to forcibly promote (oos), locally promote, or to not promote. OOS promote and local promote require a full resynchronization of the data before mirrored protection is again in effect.

Summary of MirrorView/S failures

Table 4 on page 106 shows how MirrorView/S might help you recover from system failure at the primary and secondary sites. It assumes that the secondary image of the mirror is in either the Synchronized or Consistent state.

Table 4. Recovery from system failure

Event	Result and recovery
Loss of access to primary image LUN	Check the event log for degraded operation.Check connections between the server and storage system, including zoning and correct operation of any switches. Check for an SP reboot.
Secondary SP is rebooted	If you reboot the secondary SP, or if you pull out the back of the secondary SP to disengage it from all connections, you will see a system fracture. Allow the SP to return online after the reboot. If you had selected Auto Recovery, the system will automatically resynchronize. If you selected manual, you must administratively fracture and then once the mirror is in the admin fractured condition, you can manually resynchronize the mirror.
Server accessing primary image fails	Catastrophic failure. I/O stops. After the time period that the quiesce threshold passes defined, all nonfractured secondaries in the consistent state transition to the synchronized state. Nothing more happens until the server is repaired or replaced, or a secondary image is promoted.

Table 4. Recovery from system failure *(continued)*

Event	Result and recovery
Storage system running primary image fails	Option 1 - Catastrophic failure. The mirror is left in the state it was already in. If the secondary image is in either the Consistent or Synchronized state, it may be promoted to provide access to your data. Note: Any writes in progress when the primary image fails may not propagate to the secondary image. Also, if the remote image was fractured at the time of the failure, any writes since the fracture will not have propagated.
	Option 2 - Noncatastrophic failure, repair is feasible. The administrator has the problem fixed, and then synchronizes the secondary image. The write intent log, if used, shortens the synchronization time needed. If a write intent log is not used, then a full synchronization may be necessary.
	Option 3 - Only one SP fails. If the SP that controls the mirror fails, software on the server (for example, PowerPath) can detect the failure. This software can then cause control of the mirror to be transferred to the surviving SP, and normal operations can continue. If such software is not running on the server, then you must either manually transfer control using Navisphere, or access to the mirror stops until the SP is back in service. If the SP that does not control the LUN fails, then mirroring continues as normal.

Table 4. Recovery from system failure *(continued)*

Event	Result and recovery
Storage system running secondary image fails	◆ If the SP that does not control the secondary image fails, nothing happens with respect to this mirror. ◆ If the SP that controls the mirror fails (or both SPs fail or a catastrophic failure of the entire system occurs), the primary system will fracture the image hosted on this storage system. The mirror may consequently go to attention state (if it is so configured), but I/O continues as normal to the primary image. The administrator has a choice: If the secondary can easily be fixed (for example, if someone pulled out a cable), then the administrator can have it fixed and let things resume. Otherwise, to regain protection of your data and ensure that you have another storage system available, you can force destroy the existing mirror, recreate it, and add a secondary image on another working storage system. Protection is not established until the full synchronization of the secondary image completes.
Loss of connection between storage systems (indicated by system fractures)	◆ Verify zoning of ports and switches for the MirrorView connection between storage systems. ◆ Verify all cables are properly seated and in the correct location. ◆ Check the switch logs to ensure no connection or firmware issues. ◆ Verify port speeds and switch port speeds for the MirrorView ports. ◆ Determine if the connectivity loss is on one or both SPs. ◆ Verify that the storage system or SP is operating properly with no other faults or symptoms. ◆ Try to disable and re-enable the MirrorView connection from both storage systems.

Table 4. Recovery from system failure *(continued)*

Event	Result and recovery
Failures when adding secondary images	Make sure that: ◆ The connection between storage systems works. ◆ You are managing both storage systems (which may require managing two domains). ◆ The secondary LUN is available and the same size as the primary image. ◆ The secondary image LUN is not in the storage group. ◆ The secondary image LUN is not already a secondary image, of either a synchronous or asynchronous mirror. ◆ The mirror is not a member of a consistency group.
When the secondary image cannot be synchronized	Make sure that: ◆ The connection between the storage systems is still good. ◆ The recovery policy is set to auto, not manual. ◆ The secondary SP is working. ◆ The mirror is not a member of a consistency group. ◆ If the image is fractured, view the Last Image Error. Try manually fracturing and then manually synchronizing the image.
You cannot access the LUN	Make sure that: ◆ The mirror is active. ◆ The LUN is in the storage group. ◆ You are not attempting to access the secondary image LUN. ◆ The SP is operating.

Recovering from serious errors

In the unlikely event that the mechanism for tracking changes made to the primary image fails (for example, insufficient memory is available on the SP), the secondary image is marked as permanently fractured. To recover from this situation, you must remove the secondary image from the mirror, and then add it again (which does a full resynchronization). This failure may indicate that you are using close to the storage system's capacity for layered features.

Some other serious failures will transition MirrorView/S into a degraded mode of operation, where administrative requests will be rejected and no further updates run. Degraded mode affects only a single SP; the other SP in the storage system may continue to run normally (depending on the nature of the failure).

When an SP enters degraded mode, the system logs an event that indicates why MirrorView/S is in the degraded mode. Usually you can recover from the degraded mode by simply rebooting the affected SP, but some specific cases require you to check other components that MirrorView/S uses before rebooting the SP. Table 5 on page 110 lists various scenarios in which MirrorView/S goes to the degraded mode and the recovery options you can take.

Table 5. Recovery from degraded mode

Event	Result and recovery
Internal memory corruption	Mirror data does not match the expected value. Reboot the SP.
Serious, unexpected errors	MirrorView/S receives unexpected errors from its underlying components during operation. Look at the event log for a record of errors, and take steps to correct them. For example, if the reserved LUN pool LUNs are faulted, recover the reserved LUN pool LUNs. Then reboot the SP.
Internal fracture failure	A fracture operation fails due to reasons other than an error you made. Look at the event log for the appropriate failure reason. Reboot the SP to fix the problem.

How consistency groups handle failures

When a failure occurs during normal operations for consistency groups, MirrorView/S lets you perform several actions in order to recover.

When recovering from failures, MirrorView/S achieves three goals:

◆ Preserves data integrity

◆ Minimizes the amount of time that data is unavailable to the user

◆ Ensures that the consistency of the consistency group is maintained

Access to the SP fails

Consider a consistency group that has four mirrors, two of which are owned by SP A and two of which are owned by SP B. If the connection to the remote system fails for SP A, then all four mirrors will be fractured including the two mirrors on SP B, which still have good connectivity to the remote system. For data consistency, if one or more of the mirrors is fractured, then all must be fractured. When the connectivity to the remote system is restored for SP A, then the consistency group will be automatically synchronized if the recovery policy is auto. If the recovery policy is manual, you must manually start a synchronization after the connectivity is restored.

Primary storage system fails

If the storage system running the primary consistency group fails, access to the data in the group's member LUNs is lost. You can either repair the failed storage system and then continue operations, or you can promote the secondary consistency group, and access the data from the secondary storage system.

Recovering by promoting a secondary consistency group

As part of the consistency group promotion each mirror member is promoted. This section describes three types of group promotions, which are based on the connectivity status between the primary and the secondary and the condition of the individual members. For more information about promoting a consistency group, see Chapter 3.

Note: You can promote a consistency group only if it is in the Consistent or Synchronized state.

If a failure occurs during promotion (for example, an SP reboots), the consistency group may be left in an inconsistent state. It is possible that some members have only primary

images or some have been promoted or not promoted at all. Determine the state of the promoted consistency group to detect any problems during promotion.

A consistency group is in the incomplete state if at least one of its member's primary images is missing its corresponding secondary images.

Normal promotion

When you request promotion for a secondary group, the software determines if connectivity exists between the storage systems hosting the primary and secondary consistency groups. If connectivity is working, it tests the members of the group to determine if the result of promotion will be an out-of-sync group or a synchronized one. The promote operation will fail if, for example, the primary is unreachable or the secondary group will be out-of-sync after promotion. You then can do a local only promote or a force promote, described below.

Force promote

Force promote promotes each member of the group and places the newly promoted mirrors in the group (removing the original members). If the original primary storage system is available, the original primary images will become secondary images of the promoted mirrors. The promoted group is marked as out-of-sync and its recovery policy is set to manual. You must initiate a synchronization for the group in order to start the full synchronization, which is required for the group to be once again protecting your data. If the original primary storage system is unavailable, force promote has the same effect as local only promote, described below.

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Note: You must perform a full synchronization on the new secondary image, which will overwrite all existing data on that image.

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Local only promote

A local only promote promotes the secondary image of each consistency group member to a primary image, but does not attempt to add the original primary image or any other existing secondary images to the promoting mirror. If a connection exists between the primary and the secondary, for each member of the primary, the software attempts to remove the image being promoted on the secondary. Thus, the original primary consistency group will have all primary images and no secondary images. If no connection exists, the promote will still continue on the secondary, and the operation will not fail. The original primary consistency group cannot communicate with the promoted secondary consistency group even if the MirrorView/S connection between the storage systems is restored (since the secondary consistency group was promoted to a primary consistency group).

Note: Either the local only promote or the force promote operation can result in a consistency group that contains mirrors that have no secondary images at all. In this case, the consistency group is no longer performing its function. The best way to correct this is to remove the mirrors from the consistency group, add secondary images as required, and add the mirrors back to the group.

Table 6. Configurations in which local only and incomplete states can occur

Configuration	Possible failure cause	Recovery options	Is the consistency group promotable in this state?
`Local only`: Consistency group members consist of only primary images. Individual members do not have any secondary images associated with them.	You performed a local only promotion or force promotion and the connection was down.	Force destroy the consistency group on both systems. Choose which system you want to be the secondary system and destroy the mirrors that were in the group on that system. Then, on the other system, add secondary images to the mirrors. Create the consistency group and add the mirrors to the group.	No, because there are no secondary images associated with the consistency group.
`Incomplete`: If a normal promotion or a force promotion fails in mid-operation, some members may consist of only primary images. The remaining members are successfully promoted and have secondaries associated with them.	A failure occurred during a normal or force promote.	Force the removal of the members with no secondary image, and then add secondaries to those mirrors. Add them back into the consistency group as necessary.	If the original primary consistency group has a secondary image in it, it is force promotable. If there is a secondary image in the consistency group and it is synchronized or consistent, then promotion is an option.

Failure of the secondary consistency group

When a primary consistency group cannot communicate with a secondary consistency group, the group's condition changes to system fractured. When a consistency group is system fractured, no writes are propagated to the secondary consistency group.

The primary storage system attempts to minimize the amount of work required to synchronize the secondary after it recovers. It keeps track of the write requests to the consistency group, so that only modified areas will be copied to the secondary during recovery. Also, consider the case where the consistency group has some members whose primary image LUNs reside on SP A and some on SP B. If the MirrorView connection is

broken between SP Bs of the primary and the secondary storage system, the consistency group is system fractured to maintain the consistent state of the consistency group.

Recovery policy after promoting

When you promote a mirror that is not part of a consistency group, its recovery policy automatically changes to manual. When you promote a consistency group, the recovery policy does not change. If a group with automatic recovery policy is in the synchronized state after being promoted, the group remains in full automatic recovery mode. If the group with an automatic recovery policy is out-of-sync after being promoted, automatic recovery temporarily stops. Thus, the new primary group may have older data than the secondary system (the original primary system). You must decide whether or not to synchronize the group. When you perform a successful group synchronization, the group returns to full automatic recovery mode.

CAUTION After force promoting a consistency group that is out-of-sync after the promotion, use caution before synchronizing the consistency group. If the consistency group was fractured before the promotion, the new primary system may have data that is much older than the original primary (now secondary) system. Synchronizing the consistency group may overwrite newer data on the original primary system.

Note: Failure scenarios may occur whereby a mirror may no longer exist, but is still considered a member of the consistency group. In this situation the consistency group is in the incomplete state. A mirror can be missing from the consistency group if the promotion fails between the process destroying the original mirror and creating the new one.

If a consistency group is in the scrambled state, then a promotion is allowed.

iSCSI-related failure conditions

Table 7 on page 115 shows the iSCSI-related failure conditions and the reasons they occur.

Table 7. iSCSI-related failures

Failure condition	Reason
You selected iSCSI and Fibre Channel connections for the same storage system and clicked Enable in the **Manage Mirror Connections** dialog box.	You selected iSCSI and fibre connections for the storage system; you must choose one or the other.
You selected iSCSI for a storage system already configured to be reached with a Fibre Channel for MirrorView connection.	You tried to connect storage system A to storage system B with an iSCSI connection, but a Fibre Channel connection between these two storage systems already exists. If you want to change from Fibre Channel to iSCSI, you must first disable the Fibre Channel connection to storage system B.
You selected Fibre Channel for a storage system already configured to be reached with an iSCSI for MirrorView connection.	You tried to connect storage system A to storage system B with a Fibre Channel connection, but an iSCSI connection between these two storage systems already exists. If you want to change from iSCSI to Fibre Channel, you must first disable the iSCSI connection to storage system B.

This appendix lists the MirrorView/S error codes returned by the CLI. The numbers proceed sequentially.

◆

MirrorView/S command error codes

Error value	Description
1	Invalid command line parameters
2	Too few parameters.
3	Too many parameters.
5	Invalid LUN number.
30	LUN does not exist.
39	Cannot access device.
41	Command not supported.
66	Error returned from agent.
89	ToInvalid switch combination.
125	Invalid SP name.
127	Package number invalid.
128	This version of FLARE Software does not support nondisruptive software installation (NDU).
129	Cannot open this file.
130	File does not exist.
131	RAID type must be r1 (RAID1), r3 (RAID 3), r5 (RAID 5), or r1_0 (RAID1/0).
132	Multiple subcommands specified. Check syntax.
133	Disk for PSM must be on DPE bus 0.
134	Configuration does not exist.
135	Configuration already exists.
136	Size specified is too small.
137	Configuration does not exist. Run the navicli initializearray command to configure the system.
138	First option must be a subcommand.
139	Cannot create RAID group for PSM (Persistent Storage Manager).
140	Name or UID (unique ID) is required.
141	Invalid name specified.
142	Image UID is required.
143	Name and LUN are required.
144	Storage system UID (unique ID) and LUN UID are required.
145	Mirror not found.
146	Image not found.

147	Synchronized rate cannot be changed since input image is primary.
148	Cannot specify both **-uid** and **-filename**.
149	Invalid cache.
150	Invalid session.
151	Session does not exist.
152	Session is stopping.
155	The -o option requires -filename.
156	Path to store files is required.
157	Cannot specify both -all and -filename.
158	Enter file index or `quit.`
159	Invalid input.
160	Index is out of range.
161	File not found.
162	Space not available to retrieve file.
163	Specified feature not supported.
164	Feature must be specified.
165	Cannot specify both '-lun' and '-lunuid'.
166	Invalid storage processor name.
167	PSM (Persistent Storage Manager) is not broken.
168	PSM (Persistent Storage Manager) is broken. Cannot list or create PSM.
169	LUN cannot be unbound.
170	Operation not supported on this type of storage system.
171	Incompatible arguments. Invalid storage system serial number.
172	Directory not specified.
173	Invalid number of blocks.
174	Number of blocks not specified.
175	Reading of data not supported on this storage system.
176	Invalid snapshot World Wide Name (WWN).
177	Invalid storage system serial number.
178	Navicli '-f' option required to store data in file.
179	Invalid IP address format.
180	Storage group cannot be shared.
181	Invalid HLU number.

182	Invalid ALU number.
183	Invalid port ID.
184	Remote server cannot be managed.
185	Email response test failed.
186	Email page response test failed.
187	Modem page response test failed.
188	Snmp response test failed.
189	Phone home response test failed.
190	Mandatory switch for email/emailpage.
191	Mandatory switch for modem page.
192	Mandatory switch for snmp.
193	Only one message or file can be specified.
194	Valid dial string contains only digits, parentheses, hyphen.
195	File does not exist or cannot be opened.
196	Specified user already exists.
197	The offset switch is not supported for this storage system.
198	Valid COM port number is 1, 2, 3, or 4.
199	Valid dial command is atd, atDp or atD.
200	Valid message delay contains only ",,," (one or more commas).
202	Target LUN number is missing.
203	Session name is missing.
206	Cannot specify both -mode and -simulation.
207	This command is not supported on remote server.
208	Switch -pathname must be specified.
209	Get local server attributes failed.
210	This version of FLARE Software does not support Hi5 RAID type.
215	The HLU (server LUN) number you specified cannot be found.
216	This command must be issued from the SP to which the LUN will trespass.
217	Invalid bus or enclosure number.
218	Invalid WWN Seed.
219	Invalid EMC Part Number.
220	This RAID group has maximum number of LUNs already.
221	Not enough cache LUNs in the specified SP's cache.

222	This LUN cannot be added to the storage group since it is participating in a remote mirror.
223	Allocate log needs to specify a LUN with a valid owner.
224	This request has been issued through the SP that is not the current owner of the targeted LUN.
234	The LUN is in a storage group.
276	Multiple mirrors with the same name have been found. Please use UID for a specific mirror.
337	Remote mirror write intent log size is too small.
414	Mirror cannot resolve path.
433	LUN is in use.

Error codes - Hexadecimal

Error value (Decimal)	Error value (Hexadecimal)	Description
19872	0x4DA0	Invalid sync mirror command.
19874	0x4DA2	Sync feature object is not available.
19876	0x4DA4	Sync enabling software is not installed.
19878	0x4DA6	Unexpected sync mirror error occured.
19880	0x4DA8	No available LUs for mirroring on the system.
19881	0x4DA9	Specified LU is not available for cloning.
19882	0x4DAA	Specified mirror source is not available.
19883	0x4DAB	MirrorView requires same LUN size on mirrored images.
19884	0x4DAC	LUN is in a storage group.
19885	0x4DAD	Multiple errors occurred.
19886	0x4DAE	Intentlog allocate error.
19887	0x4DAF	Intentlog deallocate error.
19888	0x4DB0	Disablepath error.
19889	0x4DB1	Layered driver can't be added to LU stack.
19890	0x4DB2	Adding a layered driver to LU stack failed.
19891	0x4DB3	Removing a layered driver to LU stack failed.
19892	0x4DB4	Mirror can't be activated.
19893	0x4DB5	The mirror can't be deactivated (not active).
19894	0x4DB6	Error on fracture image.

19895	0x4DB7	Error on sync image.
19896	0x4DoB8	Error on promote image.
19897	0x4DB9	Requested image wasn't found/didn't exist.
19898	0x4DBA	Error on remove image.
19899	0x4DBB	Error on specified LU is used by other feature and cannot be chosen as mirror LU.
19900	0x4DBC	Cannot perform create, add secondary image or allocate WIL on a LU while it is migrating.
19901	0x4DBD	Cannot perform setfeature on a LU while it is private.
19902	0x4DBE	Moved from CLIError.h.
19903	0x4DBF	setfeature command is not supported on a thin LUN.
20547	0x5043	Mirror name already used.
Consistency group error codes		
21312	0x5340	The maximum number of groups is already defined.
21313	0x5341	Unable to locate the specified group.
21314	0x5342	The following group cannot be destroyed because it still has mirror members.
21315	0x5343	Unable to locate the specified mirror.
21316	0x5344	This mirror cannot be added to the group because it does not have exactly 1 secondary image.
21317	0x5345	Either the -remoteuid or -remoteaddress switch must be used because this mirror has more than 1 secondary image.
21318	0x5346	The remoteuid cannot be the same the array on which the group resides.
21319	0x5347	The mirror has no images on the specified remote array.
21320	0x5348	The mirror is already a member of a group, so it cannot be added to this one.
21321	0x5349	The remote image specified does not reside on the same array as the rest of the group's members.
21338	0x535A	Specified mirror is not a member of the group.
21339	0x535B	The specified missing mirror is not a member of the group.
21340	0x535C	Group name is already used.

This appendix provides a list of commands that are supported by Secure CLI on various storage systems. Unless otherwise noted once supported all commands will be supported on all subsequent releases. The commands that are not supported on specific systems are also listed.

Secure CLI command coverage

Commands	CX series	CX3 series	CX4 series
`mirror -sync -addimage`	6.19	6.22	6.28
`mirror -sync -allocatelog`	6.19	6.22	6.28
`mirror -sync -change`	6.19	6.22	6.28
`mirror -sync -changeimage`	6.19	6.22	6.28
`mirror -sync -create`	6.19	6.22	6.28
`mirror -sync -deallocatelog`	6.19	6.22	6.28
`mirror -sync -destroy`	6.19	6.22	6.28
`mirror -sync -fractureimage`	6.19	6.22	6.28
`mirror -sync -info`	6.19	6.22	6.28
`mirror -sync -list`	6.19	6.22	6.28
`mirror -sync -listsyncprogress`	6.19	6.22	6.28
`mirror -sync -listlog`	6.19	6.22	6.28
`mirror -sync -promoteimage`	6.19	6.22	6.28
`mirror -sync -removeimage`	6.19	6.22	6.28
`mirror -sync -setfeature`	6.19	6.22	6.28
`mirror -sync -syncimage`	6.19	6.22	6.28
`mirror -disablepath`	6.19	6.22	6.28
`mirror -enablepath`	6.19	6.22	6.28
`mirror -sync -creategroup`	6.19	6.22	6.28
`mirror -sync -destroygroup`	6.19	6.22	6.28
`mirror -sync -addtogroup`	6.19	6.22	6.28
`mirror -sync -removefromgroup`	6.19	6.22	6.28
`mirror -sync -changegroup`	6.19	6.22	6.28
`mirror -sync -syncgroup`	6.19	6.22	6.28
`mirror -sync -fracturegroup`	6.19	6.22	6.28
`mirror -sync -promotegroup`	6.19	6.22	6.28
`mirror -sync -listgroups`	6.19	6.22	6.28

Note: The version number indicates the earliest Navisphere version that supported the command for each system type.

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