A

SANtricity commands

NetApp
December 14, 2022

Table of Contents

A

Activate asynchronous mirroring

The `activate storageArray feature` command activates the Asynchronous Mirroring feature.

Supported Arrays

This command applies to any individual storage array, including the E2700, E5600, E2800, and E5700 arrays, as long as all SMcli packages are installed.

Roles

To execute this command on an E2800, or E5700 storage array, you must have the Storage Admin role.

Context

After you activate the asynchronous mirroring feature, you must set up an asynchronous mirror group and an asynchronous mirrored pair.

Syntax

```
activate storageArray feature=asyncRemoteMirror
```

```
activate storageArray feature=asyncMirror
```

Parameters

None.

Minimum firmware level

7.84

Activate storage array firmware

The `activate storageArray firmware` command activates firmware that you have previously downloaded to the pending configuration area on the controllers in the storage array.

Syntax

```
activate storageArray firmware
[healthCheckMelOverride=(TRUE | FALSE)]
```

Parameter

Parameter	Description
healthCheckMelOverride	The setting to override the results of the health check of the major event log (MEL). MEL validation still occurs; it is not bypassed. If the MEL check fails, you can bypass the failure by using this parameter when running the command. Before any activation, the controller checks the event log to determine if an event has occurred that might prevent the new controller firmware from successfully activating. If such an event has occurred, the controller will normally not activate new firmware. This parameter forces the controller to activate new firmware. The default value is FALSE. Set this value to TRUE if you want to force the controller to activate new controller firmware.

Minimum firmware level

8.10 adds the healthCheckMelOverride parameter.

Activate synchronous mirroring

The activate storageArray feature command activates the Synchronous Mirroring feature and creates the mirror repository volume.

Supported Arrays

This command applies to any individual storage array, including the E2700, E5600, E2800, and E5700 arrays, as long as all SMcli packages are installed.

Roles

To execute this command on an E2800 or E5700 storage array, you must have the Storage Admin role.

Context

When you use this command, you can define the mirror repository volume in one of three ways:

- User-defined drives
- User-defined volume group

- User-defined number of drives

If you choose to define a number of drives, the controller firmware chooses which drives to use for the mirror repository volume.

> ⓘ In previous versions of this command, the feature identifier was `remoteMirror`. This feature identifier is no longer valid and is replaced by `syncMirror`.

Syntax (user-defined drives)

```
activate storageArray feature=syncMirror
repositoryRAIDLevel=(0 |1 | 3 | 5 | 6)
repositoryDrives=(trayID1,[drawerID1,slotID1 ... trayIDn
,pass:quotes[[drawerIDn,slotIDn
[driveType=(fibre | SATA | SAS | NVMe4K)
)
[repositoryVolumeGroupUserLabel="volumeGroupName"]
[trayLossProtect=(TRUE | FALSE)]
[drawerLossProtect=(TRUE | FALSE)]
[dataAssurance=(none | enabled)]
```

```
activate storageArray feature=syncMirror
repositoryRAIDLevel=(0 |1 | 5 | 6)
repositoryDrives=(trayID1,[drawerID1,]slotID1 ... trayIDn,[drawerIDn,
]slotIDn)
[repositoryVolumeGroupUserLabel="volumeGroupName"]
[trayLossProtect=(TRUE | FALSE)]
[drawerLossProtect=(TRUE | FALSE)]
[dataAssurance=(none | enabled)]
```

Syntax (user-defined volume group)

```
activate storageArray feature=syncMirror
repositoryVolumeGroup=volumeGroupName
[freeCapacityArea=freeCapacityIndexNumber]
```

Syntax (user-defined number of drives)

```
activate storageArray feature=syncMirror
repositoryRAIDLevel=(1 | 3 | 5 | 6)
repositoryDriveCount=numberOfDrives
[repositoryVolumeGroupUserLabel="volumeGroupName"]
[trayLossProtect=(TRUE | FALSE)]
[drawerLossProtect=(TRUE | FALSE)]
[dataAssurance=(none | enabled)]
```

```
activate storageArray feature=syncMirror
repositoryRAIDLevel=(1 | 5 | 6)
repositoryDriveCount=numberOfDrives
[repositoryVolumeGroupUserLabel="volumeGroupName"]
[trayLossProtect=(TRUE | FALSE)]
[drawerLossProtect=(TRUE | FALSE)]
[dataAssurance=(none | enabled)]
```

Parameters

Parameter	Description
repositoryRAIDLevel	The RAID level for the mirror repository volume. Valid values are 0, 1, 3, 5, or 6.
repositoryDrives	The drives for the mirror repository volume. For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99. Drawer ID values are 1 to 5. All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with E2800 and E5700 controllers have slot ID numbers starting at 0. Drive trays compatible with E2700 and E5600 controllers have slot ID numbers starting at 1. Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).
repositoryVolumeGroupUserLabel	The name that you want to give the new volume group in which the mirror repository volume will be located. Enclose the volume group name in double quotation marks (" ").

Parameter	Description
repositoryVolumeGroup	The name of the mirror repository volume group where the mirror repository volume is located. (To determine the names of the volume groups in your storage array, run the `show storageArray profile` command.)
freeCapacityArea	The index number of the free space in an existing volume group that you want to use to create the mirror repository volume. Free capacity is defined as the free capacity between existing volumes in a volume group. For example, a volume group might have the following areas: volume 1, free capacity, volume 2, free capacity, volume 3, free capacity. To use the free capacity following volume 2, you would specify: `freeCapacityArea=2` Run the `show volumeGroup` command to determine if a free capacity area exists.
repositoryDriveCount	The number of unassigned drives that you want to use for the mirror repository volume.
driveType	The type of drive for which you want to retrieve information. You cannot mix drive types. Valid drive types are: • `fibre` • `SATA` • `SAS` • NVMe4K If you do not specify a drive type, the command defaults to all type.
trayLossProtect	The setting to enforce tray loss protection when you create the mirror repository volume. To enforce tray loss protection, set this parameter to `TRUE`. The default value is `FALSE`.

Parameter	Description
`drawerLossProtect`	The setting to enforce drawer loss protection when you create the mirror repository volume. To enforce drawer loss protection, set this parameter to `TRUE`. The default value is `FALSE`.

Notes

The `repositoryDrives` parameter supports both high-capacity drive trays and low-capacity drive trays. A high-capacity drive tray has drawers that hold the drives. The drawers slide out of the drive tray to provide access to the drives. A low-capacity drive tray does not have drawers. For a high-capacity drive tray, you must specify the identifier (ID) of the drive tray, the ID of the drawer, and the ID of the slot in which a drive resides. For a low-capacity drive tray, you need only specify the ID of the drive tray and the ID of the slot in which a drive resides. For a low-capacity drive tray, an alternative method for identifying a location for a drive is to specify the ID of the drive tray, set the ID of the drawer to `0`, and specify the ID of the slot in which a drive resides.

If the drives that you select for the `repositoryDrives` parameter are not compatible with other parameters (such as the `repositoryRAIDLevel` parameter), the script command returns an error, and Synchronous Mirroring is not activated. The error returns the amount of space that is needed for the mirror repository volume. You can then re-enter the command, and specify the appropriate amount of space.

If you enter a value for the repository storage space that is too small for the mirror repository volumes, the controller firmware returns an error message that provides the amount of space that is needed for the mirror repository volumes. The command does not try to activate Synchronous Mirroring. You can re-enter the command by using the value from the error message for the repository storage space value.

When you assign the drives, if you set the `trayLossProtect` parameter to `TRUE` and have selected more than one drive from any one tray, the storage array returns an error. If you set the `trayLossProtect` parameter to `FALSE`, the storage array performs operations, but the volume group that you create might not have tray loss protection.

When the controller firmware assigns the drives, if you set the `trayLossProtect` parameter to `TRUE`, the storage array returns an error if the controller firmware cannot provide drives that result in the new volume group having tray loss protection. If you set the `trayLossProtect` parameter to `FALSE`, the storage array performs the operation even if it means that the volume group might not have tray loss protection.

The `drawerLossProtect` parameter determines whether data on a volume is accessible if a drawer fails. When you assign the drives, if you set the `drawerLossProtect` parameter to `TRUE` and select more than one drive from any one drawer, the storage array returns an error. If you set the `drawerLossProtect` parameter to `FALSE`, the storage array performs operations, but the volume group that you create might not have drawer loss protection.

Data assurance management

The Data Assurance (DA) feature increases data integrity across the entire storage system. DA enables the storage array to check for errors that might occur when data is moved between the hosts and the drives. When this feature is enabled, the storage array appends error-checking codes (also known as cyclic redundancy checks or CRCs) to each block of data in the volume. After a data block is moved, the storage array uses these CRC codes to determine if any errors occurred during transmission. Potentially corrupted data is neither written to disk nor returned to the host.

If you want to use the DA feature, start with a pool or volume group that includes only drives that support DA. Then, create DA-capable volumes. Finally, map these DA-capable volumes to the host using an I/O interface that is capable of DA. I/O interfaces that are capable of DA include Fibre Channel, SAS, and iSER over InfiniBand (iSCSI Extensions for RDMA/IB). DA is not supported by iSCSI over Ethernet, or by the SRP over InfiniBand.

> (i) When all the drives are DA-capable, you can set the `dataAssurance` parameter to `enabled` and then use DA with certain operations. For example, you can create a volume group that includes DA-capable drives, and then create a volume within that volume group that is DA-enabled. Other operations that use a DA-enabled volume have options to support the DA feature.

If the `dataAssurance` parameter is set to `enabled`, only data assurance capable drives will be considered for volume candidates; otherwise, both data assurance capable and non-data assurance capable drives will be considered. If only data assurance drives are available the new volume group will be created using the enabled data assurance drives.

Minimum firmware level

7.10 adds RAID Level 6 capability.

7.60 adds the `drawerID` user input, the `driveMediaType` parameter, and the `drawerLossProtect` parameter.

7.75 adds the `dataAssurance` parameter.

8.10 removes the `driveMediaType` parameter.

8.60 adds the `driveType` parameter.

Add array label

The `Add array label` command allows you to add a storage array to the configuration with a user-defined label. This allows later commands to address the storage array by the user-defined label rather than by IP address or host name.

Supported Arrays

> (i) The user-defined label provided does not need to match the storage array's name as displayed in System Manager. This is a local label that is only used for referencing the storage array from the CLI.

This command applies to the EF600 and EF300 storage arrays.

Syntax

```
Address1 Address2 add storageArrayLabel label userDefinedString
```

Parameters

Parameter	Description
`Address`	Allows you to specify the IP address (IPv4 or IPv6) or fully qualified host name for the storage array. ⓘ The `Address2` value is optional.
`userDefinedString`	Allows you to specify a label for the storage array.

Minimum firmware level

8.60

Add certificate from array

The `Add certificate from array` command allows you to take a certificate from the array and add it to the CLI package's trust store. The certificate added will only be used by the CLI package.

Supported Arrays

This command applies to the EF600 and EF300 storage arrays.

Syntax

```
ipAddress1 ipAddress2  trust localCertificate
```

Parameters

Parameter	Description
`IPaddress`	Allows you to specify the IP address for the storage array.

Minimum firmware level

8.60

Add certificate from file

The `Add certificate from file` command allows you to take a certificate from the file and add it to the CLI package's trust store. The certificate added will only be used by the CLI package.

Supported Arrays

This command applies to the EF600 and EF300 storage arrays.

Syntax

```
trust localCertificate file filename alias user specified alias
```

Parameters

Parameter	Description
`filename`	Allows you to specify the filename that contains the certificate.
`user specified alias`	Allows you to specify a certificate through the user-defined alias.

Minimum firmware level

8.60

Add drives to SSD cache

The `set ssdCache` command increases the capacity of an existing SSD cache by adding more solid state disks (SSDs).

Supported Arrays

This command applies to any individual storage array, including the E2700, E5600, E2800, and E5700 arrays, as long as all SMcli packages are installed.

> ⓘ To execute this command on an E2800 or E5700 storage array, you must have the Support Admin role.

Syntax

```
set ssdCache [ssdCacheName]
addDrives=(trayID1,[drawerID1,]slotID1 ... trayIDn,[drawerIDn,]slotIDn)
```

Parameters

Parameter	Description
ssdCache	The name of the SSD cache to which you want to add SSDs. Enclose the name in square brackets ([ ]). If the SSD cache name contains special characters or consists only of numbers, you must enclose the name in double quotation marks (" ") inside square brackets.
addDrives	The drives that you want to add to the SSD cache.For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99. Drawer ID values are 1 to 5. All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with E2800 and E5700 controllers have slot ID numbers starting at 0. Drive trays compatible with E2700 and E5600 controllers have slot ID numbers starting at 1. Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).

Notes

The SSD cache can contain any number of SSDs. The maximum size of the SSD cache is 5 TB, but might be less depending on the size of the controller's primary cache.

Minimum firmware level

7.84

Add volume to asynchronous mirror group

The `add volume asyncMirrorGroup` command adds a primary volume to an asynchronous mirror group.

Supported Arrays

This command applies to any individual storage array, with some restrictions. If you are running the command on the E2700 or E5600 array, there are no restrictions.

ⓘ If you are running the command on the E2800 or E5700 array, the client type must be set to `symbol`. This command will not execute if they client type is set to `https`.

Roles

To execute this command on an E2800 or E5700 storage array, you must have the Storage Admin role.

Context

This command is valid only on the local storage array that contains the asynchronous mirror group to which you want to add the primary volume. An asynchronous mirror group has a repository volume that is used to save data for all of the point-in-time images that are part of the asynchronous mirror group. Each primary volume in the asynchronous mirror group has a corresponding mirror volume on a remote storage array.

Syntax

```
add volume="volumeName" asyncMirrorGroup="asyncMirrorGroupName"
remotePassword="password"
(repositoryVolume="repos_xxxx" |
repositoryVolume=(volumeGroupName [capacity=capacityValue)]
repositoryVolume=(diskPoolName [capacity=capacityValue))
```

Parameter

Parameter	Description
volume	The name of the primary volume that you want to add to the asynchronous mirror group. Enclose the volume name in double quotation marks (" ").
asyncMirrorGroup	The name of the asynchronous mirror group that will contain the primary volume that you want to add. Enclose the asynchronous mirror group name in double quotation marks (" ").
remotePassword	This parameter is optional. Use this parameter when the remote storage array is password protected. Enclose the password in double quotation marks (" ").

Parameter	Description
`repositoryVolume`	The name of the repository volume that will contain the changed data from the primary volume. You have two options for defining the name of a repository volume: • Use an existing repository volume: name. • Create a new repository volume when you run this command. The name of an existing repository volume is comprised of two parts: • The term repos. • A four digit numerical identifier that the storage management software assigns to the repository volume name. Enclose the name of the existing repository volume in double quotation marks (" "). If you want to create a new repository volume when you run this command you must enter the name of either a volume group or a disk pool in which you want the repository volume. Optionally, you also can define the capacity of the repository volume. If you want to define the capacity you can use these values: • An integer value that represents a percentage of the base volume capacity. • A decimal fraction value that represents a percentage of the base volume capacity. • A specific size for the repository volume. Size is defined in units of `bytes`, `KB`, `MB`, `GB`, or `TB`. If you do not define the capacity, the storage management software sets the capacity to 20 percent of the primary volume capacity. The storage management software creates the repository volume and links the repository volume to the primary volume.

Notes

- The asynchronous mirroring feature must be enabled and activated on the local and remote storage arrays that will be used for mirror activities.
- The local and remote storage arrays must be connected through a proper Fibre Channel fabric or iSCSI interface.

- The remote storage array must have a volume that has a capacity that is greater than or equal to the capacity of the primary volume on the local storage array. The volume on the remote storage array will be used as the mirror volume.

Minimum firmware level

7.84

Autoconfigure storage array hot spares

The `autoConfigure storageArray hotSpares` command automatically defines and configures the hot spares in a storage array. You can run this command at any time. This command provides the best hot spare coverage for a storage array.

Supported Arrays

This command applies to any individual storage array, including the E2700, E5600, E2800, E5700, EF600 and EF300 arrays, as long as all SMcli packages are installed.

Roles

To execute this command on an E2800, E5700, EF600, or EF300 storage array, you must have the Storage Admin role.

Syntax

```
autoConfigure storageArray hotSpares
```

Parameters

None.

Notes

When you run the `autoconfigure storageArray hotSpares` command, the controller firmware determines the number of hot spares to create based on the total number and type of drives in the storage array. For SAS drives, the controller firmware creates one hot spare for the storage array and one additional hot spare for every 60 drives in the storage array.

Minimum firmware level

6.10

Autoconfigure storage array

The `autoConfigure storageArray` command automatically configures a storage array.

Supported Arrays

This command applies to any individual storage array, including the E2700, E5600, E2800, E5700, EF600 and EF300 arrays, as long as all SMcli packages are installed.

Roles

To execute this command on an E2800, E5700, EF600, or EF300 storage array, you must have the Storage Admin role.

Context

Before you enter the `autoConfigure storageArray` command, run the `show storageArray autoConfiguration` command. The `show storageArray autoConfiguration` command returns configuration information in the form of a list of valid drive types, RAID levels, volume information, and hot spare information. (This list corresponds to the parameters for the `autoConfigure storageArray` command.) The controllers audit the storage array and then determine the highest RAID level that the storage array can support and the most efficient volume definition for the RAID level. If the configuration that is described by the returned list is acceptable, you can enter the `autoConfigure storageArray` command without any parameters. If you want to modify the configuration, you can change the parameters to meet your configuration requirements. You can change a single parameter or all of the parameters. After you enter the `autoConfigure storageArray` command, the controllers set up the storage array by using either the default parameters or those you selected.

Syntax

```
autoConfigure storageArray
[driveType=(SAS | NVMe4K)]
[driveMediaType=(hdd | ssd | allMedia | unknown)]
[raidLevel=(0 | 1 | 3 | 5 | 6)]
[volumeGroupWidth=numberOfDrives]
[volumeGroupCount=numberOfVolumeGroups]
[volumesPerGroupCount=numberOfVolumesPerGroup]
[hotSpareCount=numberOfHotSpares]
[segmentSize=segmentSizeValue]
[cacheReadPrefetch=(TRUE | FALSE)]
[readAheadMultiplier=multiplierValue]
[securityType=(none | capable | enabled)]
[secureDrives=(fips | fde)]
[dataAssurance=(none | enabled)]
```

Parameters

Parameter	Description
driveType	The type of drives that you want to use for the storage array. You must use this parameter when you have more than one type of drive in your storage array. These drive types are valid: • SAS • NVMe4K
driveMediaType	The type of drive media that you want to use for the storage array. You must use this parameter when you have more than one type of drive media in your storage array. These drive media types are valid: • hdd — Use this option when you have hard drives. • ssd — Use this option when you have solid state disks. • unknown — Use if you are not sure what types of drive media are in the drive tray.
raidLevel	The RAID level of the volume group that contains the drives in the storage array. Valid RAID levels are 0, 1, 3, 5, or 6.
volumeGroupWidth	The number of drives in a volume group in the storage array.
volumeGroupCount	The number of volume groups in the storage array. Use integer values.
volumesPerGroupCount	The number of equal-capacity volumes per volume group. Use integer values.
hotSpareCount	The number of hot spares that you want in the storage array. Use integer values.
segmentSize	The amount of data (in KB) that the controller writes on a single drive in a volume before writing data on the next drive. Valid values are 4 (SSD only) ``8, 16, 32, 64, 128, 256, or 512.

Parameter	Description
cacheReadPrefetch	The setting to turn on or turn off cache read prefetch. To turn off cache read prefetch, set this parameter to FALSE. To turn on cache read prefetch, set this parameter to TRUE.
readAheadMultiplier	This parameter defines how many additional data blocks are read into cache. Valid values range from 0 to 65535. ⓘ This parameter is deprecated and will be removed in a future release of storage management software. For best operation use the cacheReadPrefetch parameter.
securityType	The setting to specify the security level when creating the volume groups and all associated volumes. These settings are valid: • none — The volume group and volumes are not secure. • capable — The volume group and volumes are capable of having security set, but security has not been enabled. • enabled — The volume group and volumes have security enabled.
secureDrives	The type of secure drives to use in the volume group. These settings are valid: • fips — To use FIPS compliant drives only. • fde — To use FDE compliant drives. ⓘ Use this parameter along with the securityType parameter. If you specify none for the securityType parameter, the value of the secureDrives parameter is ignored, because non-secure volume groups do not need to have secure drive types specified.

Drives and volume groups

A volume group is a set of drives that are logically grouped together by the controllers in the storage array. The number of drives in a volume group is a limitation of the RAID level and the controller firmware. When you create a volume group, follow these guidelines:

- Beginning with firmware version 7.10, you can create an empty volume group so that you can reserve the capacity for later use.
- You cannot mix drive types within a single volume group.
- You cannot mix HDD and SSD drives within a single volume group.
- The maximum number of drives in a volume group depends on these conditions:
  - The type of controller
  - The RAID level
- RAID levels include: 0, 1, 3, 5, and 6.
  - A volume group with RAID level 3, RAID level 5, or RAID level 6 cannot have more than 30 drives and must have a minimum of three drives.
  - A volume group with RAID level 6 must have a minimum of five drives.
  - If a volume group with RAID level 1 has four or more drives, the storage management software automatically converts the volume group to a RAID level 10, which is RAID level 1 + RAID level 0.
- To enable tray/drawer loss protection, refer to the following tables for additional criteria:

Level	Criteria for Tray Loss Protection	Minimum number of trays required
Disk Pool	The disk pool contains no more than two drives in a single tray.	6
RAID 6	The volume group contains no more than two drives in a single tray.	3
RAID 3 or RAID 5	Each drive in the volume group is located in a separate tray.	3
RAID 1	Each drive in a RAID 1 pair must be located in a separate tray.	2
RAID 0	Cannot achieve Tray Loss Protection.	Not applicable

Level	Criteria for drawer loss protection	Minimum number of drawers required
Disk Pool	The pool includes drives from all five drawers and there are an equal number of drives in each drawer. A 60-drive tray can achieve Drawer Loss Protection when the disk pool contains 15, 20, 25, 30, 35, 40, 45, 50, 55, or 60 drives.	5

Level	Criteria for drawer loss protection	Minimum number of drawers required
RAID 6	The volume group contains no more than two drives in a single drawer.	3
RAID 3 or RAID 5	Each drive in the volume group is located in a separate drawer.	3
RAID 1	Each drive in a mirrored pair must be located in a separate drawer.	2
RAID 0	Cannot achieve Drawer Loss Protection.	Not applicable

Hot spares

With volume groups, a valuable strategy to protect data is to assign available drives in the storage array as hot spare drives. A hot spare is a drive, containing no data, that acts as a standby in the storage array in case a drive fails in a RAID 1, RAID 3, RAID 5, or RAID 6 volume group. The hot spare adds another level of redundancy to the storage array.

Generally, hot spare drives must have capacities that are equal to or greater than the used capacity on the drives that they are protecting. Hot spare drives must be of the same media type, the same interface type, and the same capacity as the drives that they are protecting.

If a drive fails in the storage array, the hot spare is normally substituted automatically for the failed drive without requiring your intervention. If a hot spare is available when a drive fails, the controller uses redundancy data parity to reconstruct the data onto the hot spare. Data evacuation support also allows data to be copied to a hot spare before the software marks the drive "failed."

After the failed drive is physically replaced, you can use either of the following options to restore the data:

When you have replaced the failed drive, the data from the hot spare is copied back to the replacement drive. This action is called copyback.

If you designate the hot spare drive as a permanent member of a volume group, the copyback operation is not needed.

The availability of tray loss protection and drawer loss protection for a volume group depends on the location of the drives that comprise the volume group. Tray loss protection and drawer loss protection might be lost because of a failed drive and the location of the hot spare drive. To make sure that tray loss protection and drawer loss protection are not affected, you must replace a failed drive to initiate the copyback process.

The storage array automatically selects Data Assurance (DA)-capable drives for hot spare coverage of DA-enabled volumes.

Make sure you have DA-capable drives in the storage array for hot spare coverage of DA-enabled volumes. For more information about DA-capable drives, refer to Data Assurance feature.

Secure-capable (FIPS and FDE) drives can be used as a hot spare for both secure-capable and non-secure-capable drives. Non-secure-capable drives can provide coverage for other non-secure-capable drives, and for

secure-capable drives if the volume group does not have the security enabled. A FIPS volume group can only use a FIPS drive as a hot spare; however, you can use a FIPS hot spare for non-secure-capable, secure-capable, and secure-enabled volume groups.

If you do not have a hot spare, you can still replace a failed drive while the storage array is operating. If the drive is part of a RAID 1, RAID 3, RAID 5, or RAID 6 volume group, the controller uses redundancy data parity to automatically reconstruct the data onto the replacement drive. This action is called reconstruction.

Segment size

The size of a segment determines how many data blocks that the controller writes on a single drive in a volume before writing data on the next drive. Each data block stores 512 bytes of data. A data block is the smallest unit of storage. The size of a segment determines how many data blocks that it contains. For example, an 8-KB segment holds 16 data blocks. A 64-KB segment holds 128 data blocks.

When you enter a value for the segment size, the value is checked against the supported values that are provided by the controller at run time. If the value that you entered is not valid, the controller returns a list of valid values. Using a single drive for a single request leaves other drives available to simultaneously service other requests. If the volume is in an environment where a single user is transferring large units of data (such as multimedia), performance is maximized when a single data transfer request is serviced with a single data stripe. (A data stripe is the segment size that is multiplied by the number of drives in the volume group that are used for data transfers.) In this case, multiple drives are used for the same request, but each drive is accessed only once.

For optimal performance in a multiuser database or file system storage environment, set your segment size to minimize the number of drives that are required to satisfy a data transfer request.

Cache read prefetch

Cache read prefetch lets the controller copy additional data blocks into cache while the controller reads and copies data blocks that are requested by the host from the drive into cache. This action increases the chance that a future request for data can be fulfilled from cache. Cache read prefetch is important for multimedia applications that use sequential data transfers. Valid values for the `cacheReadPrefetch` parameter are `TRUE` or `FALSE`. The default is `TRUE`.

Security type

Use the `securityType` parameter to specify the security settings for the storage array.

Before you can set the `securityType` parameter to `enabled`, you must create a storage array security key. Use the `create storageArray securityKey` command to create a storage array security key. These commands are related to the security key:

- `create storageArray securityKey`

- `export storageArray securityKey`

- `import storageArray securityKey`

- `set storageArray securityKey`

- `enable volumeGroup [volumeGroupName] security`

- `enable diskPool [diskPoolName] security`

Secure drives

Secure-capable drives can be either Full Disk Encryption (FDE) drives or Federal Information Processing Standard (FIPS) drives. Use the `secureDrives` parameter to specify the type of secure drives to use. The values you can use are `fips` and `fde`.

Example command

```
autoConfigure storageArray securityType=capable secureDrives=fips;
```

Minimum firmware level

7.10 adds RAID level 6 capability and removes hot spare limits.

7.50 adds the `securityType` parameter.

7.75 adds the `dataAssurance` parameter.

8.25 adds the `secureDrives` parameter.