CHAPTER 5

Configuring SME Tapes

This chapter contains information about managing tapes that are encrypted using SME.

This chapter includes the following topics:

Information About SME Tape Management

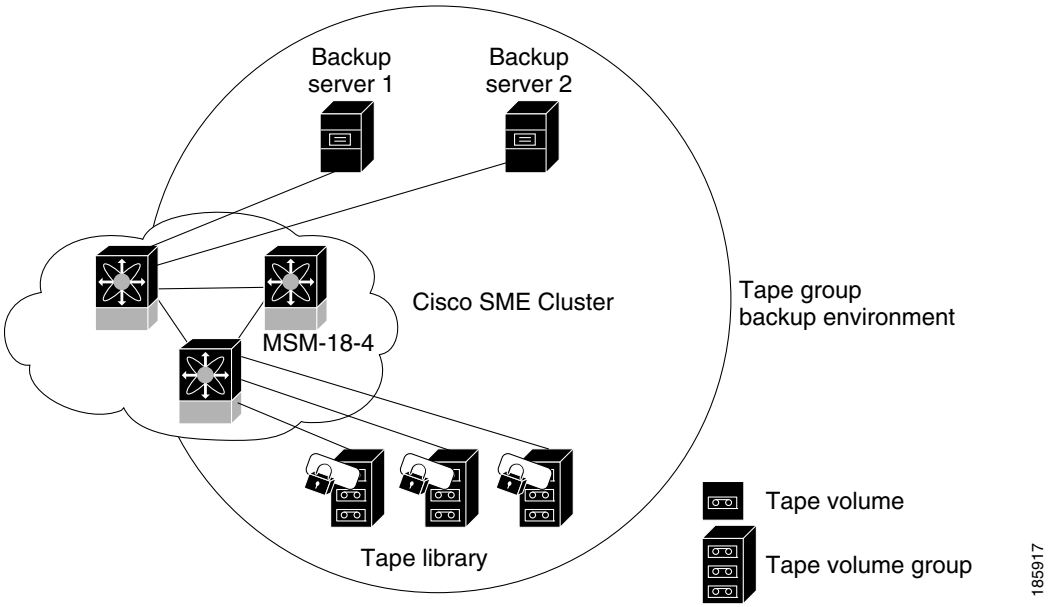
Once provisioned, SME provides transparency to hosts and targets. To manage the paths from a hosts to tape devices, SME uses the following:

- Tape group—A backup environment in the SAN. This consists of all the tape backup servers and the tape libraries that they access.
- Tape device—A tape drive that is configured for encryption.
- Tape volume—A physical tape cartridge identified by a barcode for a given use.
- Tape volume group—A logical set of tape volumes configured for a specific purpose. Using SME, a tape volume group can be configured using a barcode range or a specified regular expression. In an auto-volume group, a tape volume group can be the volume pool name configured at the backup application.

SME provides the capability to export a volume group with an encryption password. This file could later be imported to a volume group. Also, volume group filtering options provide mechanisms to specify what type of information will be included in a specific volume group. For example, you could filter information in a volume group by specifying a barcode range.

Figure 5-1 shows the SME tape backup environment.

Figure 5-1 SME Tape Backup Environment and Configuration



The following concepts are used in tape management procedures:

- Key management settings
- Auto-volume group
- Key-on-Tape
- Compression
- Configuring volume groups

Note If data is written to a partially non-SME encrypted tape, it is left in clear text. When a tape is recycled or relabeled, the tape will be encrypted by SME.

Configuring SME Tape Management Using the CLI

This section includes the following topics:

Enabling and Disabling Tape Compression

Detailed Steps

To enable tape compression, follow these steps:

	Command	Purpose
Step 1	`switch# config t`	Enters configuration mode.
Step 2	`switch(config)# sme cluster clustername1` `switch(config-sme-cl)#`	Specifies the cluster and enters SME cluster configuration submode.
Step 3	`switch(config-sme-cl)# tape-compression` `switch(config-sme-cl)#`	Enables tape compression.
Step 4	`switch(config-sme-cl)# no tape-compression` `switch(config-sme-cl)#`	Disables tape compression.

Enabling and Disabling Key-on-Tape

SME provides the option to store the encrypted security keys on the backup tapes.

Detailed Steps

To enable the key-on-tape feature, follow these steps:

	Command	Purpose
Step 1	`switch# config t`	Enters configuration mode.
Step 2	`switch(config)# sme cluster clustername1` `switch(config-sme-cl)#`	Specifies the cluster and enters SME cluster configuration submode.
Step 3	`switch(config-sme-cl)# key-ontape` `switch(config-sme-cl)#`	Enables the key-on-tape feature.
Step 4	`switch(config-sme-cl)# no key-ontape` `switch(config-sme-cl)#`	Disables key-on-tape feature.

Configuring a Tape Volume Group

A tape volume group is a group of tapes that are categorized usually by function. For example, HR1 could be the designated tape volume group for all Human Resource backup tapes; EM1 could be the designated tape volume group for all e-mail backup tapes.

Adding tape groups allows you to select the VSANs, hosts, storage devices, and paths that SME will use for encrypted data. For example, adding a tape group for HR data sets the mapping for SME to transfer data from the HR hosts to the dedicated HR backup tapes.

Detailed Steps

To configure a tape volume group, follow these steps:

	Command	Purpose
Step 1	`switch# config t`	Enters configuration mode.
Step 2	`switch(config)# sme cluster clustername1` `switch(config-sme-cl)#`	Specifies the cluster and enters SME cluster configuration submode.
Step 3	`switch(config-sme-cl)# tape-bkgrp groupname1` `switch(config-sme-cl-tape-bkgrp)#`	Specifies the tape volume group and enters the SME tape volume group submode.
Step 4	`switch(config-sme-cl-tape-bkgrp)# tape-device devicename1` `switch(config-sme-cl-tape-bkgrp-tapedevice)#`	Specifies the tape device name and enters the SME tape device submode.
Step 5	`switch(config-sme-cl-tape-bkgrp-tapedevice)# tape-device devicename1 D` `switch(config-sme-cl-tape-bkgrp-tapedevice)#`	Specifies the tape cartridge identifier.
Step 6	`switch(config-sme-cl-tape-bkgrp-tapedevice)# host 10:00:00:00:c9:4e:19:ed target 2f:ff:00:06:2b:10:c2:e2 vsan 4093 lun 0 fabric f1` `switch(config-sme-cl-tape-bkgrp-tapedevice)#`	Specifies the host and target, the VSAN, LUN and the fabric (f1) for the tape volume group.
Step 7	`switch(config-sme-cl-tape-bkgrp-tapedevice)# enable`	Enables the tape device.

Enabling and Disabling Automatic Volume Groups

When SME recognizes that a tape barcode does not belong to an exiting volume group, then SME creates a new volume group when automatic volume grouping is enabled.

Automatic volume grouping is disabled by default.

Detailed Steps

To enable or disable automatic volume grouping, follow these steps:

	Command	Purpose
Step 1	`switch# config t`	Enters configuration mode.
Step 2	`switch(config)# sme cluster clustername1` `switch(config-sme-cl)#`	Specifies the cluster and enters SME cluster configuration submode.

	Command	Purpose
Step 3	`switch(config-sme-cl)# auto-volgrp` `switch(config-sme-cl)#`	Specifies automatic volume grouping.
Step 4	`switch(config-sme-cl)# no auto-volgrp` `switch(config-sme-cl)#`	Specifies no automatic volume grouping.

Adding a Tape Device to the Tape Group

A tape device is specified as part of a tape group and is identified using a name as an alias.

Detailed Steps

To add a tape device to the tape group, follow these steps:

	Command	Purpose
Step 1	`switch# config t`	Enters configuration mode.
Step 2	`switch(config)# sme cluster clustername1` `switch(config-sme-cl)#`	Specifies the cluster and enters SME cluster configuration submode.
Step 3	`switch(config-sme-cl)# tape-bkgrp groupname1` `switch(config-sme-cl-tape-bkgrp)#`	Specifies the tape volume group and enters the SME tape volume group submode.
Step 4	`switch(config-sme-cl-tape-bkgrp)# tape-device devicename1` `switch(config-sme-cl-tape-bkgrp-tape device)#`	Specifies the tape device name and enters the SME tape device submode.
Step 5	`switch(config-sme-cl-tape-bkgrp-tape device)# tape-device devicename1 D` `switch(config-sme-cl-tape-bkgrp-tape device)#`	Specifies the tape cartridge identifier.

Adding Paths to the Tape Device

Caution All IT-nexuses that host paths between the server and storage must be added to the configuration or else the data integrity is at risk.

A tape device is specified as part of a tape group and is identified using a name as an alias. All the paths to the tape device in the cluster must be specified using the host, target, LUN, VSAN, and fabric.

Detailed Steps

To add a path to a tape device in the cluster, follow these steps:

	Command	Purpose
Step 1	`switch# config t`	Enters configuration mode.
Step 2	`switch(config)# sme cluster clustername1` `switch(config-sme-cl)#`	Specifies the cluster and enters SME cluster configuration submode.
Step 3	`switch(config-sme-cl)# tape-bkgrp groupname1` `switch(config-sme-cl-tape-bkgrp)#`	Specifies the tape volume group and enters the SME tape volume group submode.
Step 4	`switch(config-sme-cl-tape-bkgrp)# tape-device devicename1` `switch(config-sme-cl-tape-bkgrp-tape device)#`	Specifies the tape device name and enters the SME tape device submode.
Step 5	`switch(config-sme-cl-tape-bkgrp-tape device)# tape-device devicename1 D` `switch(config-sme-cl-tape-bkgrp-tape device)#`	Specifies the tape cartridge identifier.
Step 6	`switch(config-sme-cl-tape-bkgrp-tape device)# host 10:00:00:00:c9:4e:19:ed target 2f:ff:00:06:2b:10:c2:e2 vsan 4093 lun 0 fabric f1` `switch(config-sme-cl-tape-bkgrp-tape device)#`	Specifies the host and target, the VSAN, LUN and the fabric (f1) for the tape volume group.
Step 7	`switch(config-sme-cl-tape-bkgrp-tape device)# no host 10:00:00:00:c9:4e:19:ed target 2f:ff:00:06:2b:10:c2:e2 vsan 4093 lun 0` `switch(config-sme-cl-tape-bkgrp-tape device)#`	Removes the specified path from the tape device.

Note If the IT-nexus specified in the path above is not configured in SME, SME will also trigger a discovery of the IT-nexus along with adding the configured path to the specified tape device. In a scripted environment, when adding paths, it is always advisable to give a delay of one minute to allow the IT-nexus discovery to complete.

Bypassing Tape Encryption

You can enable or disable the bypass feature once you create the tape device.

Note By default, bypass encryption is disabled. Writes fails when a clear text tape is loaded.

Detailed Steps

To enable or disable bypass tape encryption, follow these steps:

	Command	Purpose
Step 1	`switch# config t`	Enters configuration mode.
Step 2	`switch(config)# sme cluster clustername1` `switch(config-sme-cl)#`	Specifies the cluster and enters SME cluster configuration submode.
Step 3	`switch(config-sme-cl)# tape-bkgrp groupname1` `switch(config-sme-cl-tape-bkgrp)#`	Specifies the tape volume group and enters the SME tape volume group submode.
Step 4	`switch(config-sme-cl-tape-bkgrp)# tape-device tapename1` `switch(config-sme-cl-tape-bkgrp tape-device tapename1)#`	Specifies the tape that has clear text data.
Step 5	`switch(config-sme-cl-tape-bkgrp-tape device)# no by pass`	Specifies the bypass policy for the tape device, which rejects writes when a clear text tape is used.
	`switch(config-sme-cl-tape-bkgrp-tape device)# by pass`	Specifies the bypass policy for the tape device, which allows data to pass in clear text.

Configuring SME Tape Management Using the GUI

This section includes the following topics:

Configuring Groups

This section includes the following topics:

Adding Tape Groups

Note Messages are logged to the switch when the tapes bypass encryption.

Restrictions

If a tape is written before SME is activated, it will remain a clear text tape and will only become an encrypted tape when it is reformatted or relabeled on a tape drive that is defined in an active SME environment.

Detailed Steps

To add a tape group, follow these steps:

Step 1 Select **Tape Groups**. Click **Add**.

Note A default volume group is created when the tape group is created; none of the configurations can be changed for the default volume group; however, you can create a new volume group.

Step 2 Enter a name for the tape group. Click **Next**.

Note You can click Finish to create an empty tape group that can be used for preprovisioning. You can specify the devices later.

Step 3 Select specific VSANs for the tape group. Click **Next**.

Step 4 Select the hosts (backup servers) for the tape group. Click **Next**.

Step 5 Select the tape drives for the tape group. Click **Next**.

Step 6 Select the paths to use to create the tape group. Click **Next**.

Step 7 Verify the information. Click **Confirm** to save and activate the changes. Your screen will refresh to the DCNM-SAN SME screen.

Step 8 View the hosts, tape devices, and volume groups that belong to the tape group.

Note Messages are logged to the switch when tapes are bypassing encryption.

Deleting Tape Groups

Prerequisites

- Before deleting a tape group, delete tape devices and tape volume groups.

Detailed Steps

To delete a tape group, follow these steps:

Step 1 Select **Tape Groups** to display the tape groups that are part of the cluster.

Step 2 Select a tape group and click **Remove**.

Step 3 Click **OK** to delete the tape group.

Configuring Tape Devices

This section includes the following topics:

Adding Tape Devices

Detailed Steps

To add tape devices to an existing tape group, follow these steps:

Step 1 Click **Tape Devices**. Click **Add**.

Step 2 Select the VSANs that you would like to discover paths from. Click **Next**.

Step 3 Select the hosts that you would like to discover paths from. Click **Next**.

Step 4 Select the tape drives. Click **Next**.

Step 5 Select the paths that SME would use for encrypted data between the host and tape devices. Click **Next**.

Step 6 Confirm the addition of the new tape device. Click **Confirm** to close the SME wizard and to return to the DCNM-SAN SME screen.

Step 7 View the new tape device that was added to the cluster.

Deleting Tape Devices

Detailed Steps

To delete a tape device from an existing tape group, follow these steps:

Step 1 Click **Tape Devices,** and then select the device you want to remove.

Step 2 Click **Remove**.

Step 3 Click **OK** to delete the tape device.

Step 4 View the notification that the tape drive has been removed.

Configuring Tape Paths

This section includes the following topics:

Adding Tape Paths

Use the Tape Path Wizard to quickly add or modify tape paths between hosts and target backup devices.

Caution All IT-nexuses that host paths between the server and storage must be added to the configuration or else the data integrity is at risk.

Detailed Steps

To add a tape path to a tape device, follow these steps:

Step 1 Select a tape device.

Step 2 Click **Add**.

Step 3 Select the appropriate fabric and enter the VSAN, initiator and target WWNs, and the LUN. Click **Next**.

Step 4 Confirm the addition of the new tape path. Click **Confirm** to close the SME wizard and to return to the DCNM-SAN SME screen.

Deleting Paths from a Device

Detailed Steps

To delete a tape path from a device, follow these steps:

Step 1 Click a tape device name to display the tape device details and the paths.

Step 2 Select a tape path and click **Remove**.

Step 3 Click **OK** to delete the tape path and to view the tape path removed notification.

Configuring Tape Volume Groups

This section includes the following topics:

Adding Tape Volume Groups

Restrictions

- Overlapping ranges are not recommended. If there are overlapping ranges, then SME places the volume based on the lexicographic ordering of the volume group.

Detailed Steps

To add tape volume groups to an existing tape group, follow these steps:

Step 1 Click **Volume Groups**. Click **Create**.

Step 2 Enter the new volume group name and configure a filter that SME will use to match volumes for that volume group. Select from the following:

- None—Used only if you want to import volume groups into another volume group.
- Regex—SME will place the volume if the barcode matches the expression.
- Ranges—SME will place the volume within a specific barcode range.

Note If there is not a direct match, then the volumes will be placed in the default volume group.

Alternately, you can enter the barcode ranges that will be included in this volume group.

Click **Next**.

Step 3 Confirm the addition of the new volume group. Click **Confirm** to close the SME wizard and to return to the DCNM-SAN SME screen.

Step 4 View the new volume group added to the tape group.

Note For information on importing and exporting volume groups, see Chapter 7, "Configuring SME Key Management."

Deleting Tape Volume Groups

Detailed Steps

To delete a tape volume group from a SME cluster, follow these steps:

Step 1 Select **Volume Groups** in the navigation pane to display the tape volume groups in the cluster.

Step 2 Select a tape volume group and click **Remove**.

Step 3 Click **OK** to delete the tape volume group and to view the volume group notification.

Configuring Key Management Operations

Key management operations include archiving and purging keys. It also includes exporting and importing volume groups.

This section includes the following topics:

Purging Volumes

Purging keys deletes deactivated or active keys from the Cisco KMC. You can delete the deactivated volume group, which purges all keys. If you delete an active volume group, all the keys are deactivated.

Purging keys at the volume level in unique key mode allows you to purge specific volumes.

Restrictions

- Purging keys from the Cisco KMC cannot be undone.

Detailed Steps

To purge keys that are currently active or deactivated, follow these steps:

Step 1 Select a volume group and click **Active** or **Deactivated** to view the keys that are deactivated in the Cisco KMC.

Step 2 Select the deactivated keys that you want to purge.

Step 3 Click **Remove**.

Purging Volume Groups

Detailed Steps

To purge a volume group, follow these steps:

Step 1 Select a deactivated volume group and click **Remove**.

Step 2 Click **Confirm**.

Exporting Volume Groups

Exporting tape volume groups can be advantageous when tapes are moved to a different cluster. In that scenario, you will need the keys if you have to restore those tapes. If the source cluster is online, follow the steps in this section.

Detailed Steps

To export volume groups from an online cluster, follow these steps:

Step 1 Select a volume group to display the volume groups in the cluster.

Step 2 Select a volume group.

Step 3 Click **Export**.

Step 4 Enter the volume group file password. Click **Next**.

Step 5 Click **Download** to download the volume group file.

Step 6 A dialog box appears asking you if you want to save this file. Save the .dat file.

Note The exported volume group file can be used by the Offline Data Restore Tool (ODRT) software to convert the SME encrypted tape back to clear-text when the SME line card or the Cisco MDS switch is unavailable.

Importing Volume Groups

You can import a previously exported volume group file into a selected volume group.

Detailed Steps

To import a volume group file, follow these steps:

Step 1 Select Volume Groups in the navigation pane to display the volume groups in the cluster.

Step 2 Select a volume group and click **Import**.

Note You must select an existing volume group. To import into a new volume group, create the volume group first, and then import a volume group.

Step 3 Browse and locate the file to import. Enter the password that was assigned to encrypt the file. Click **Next**.

Step 4 Select the volume group .dat file. Click **Open**.

Step 5 Click **Confirm** to begin the import process or click **Back** to choose another volume group file.

Note The imported keys in tape volume groups are read-only by default. However, if the entry "sme.retain.imported.key.state=true" is set in the conf/smeserver.properties file and the DCNM-SAN is restarted, the state of the imported keys are retained and both read and write operations can be performed.

Rekeying Tape Volume Groups

Tape volume groups can be rekeyed periodically to ensure better security and also when the key security has been compromised.

In the unique key mode, the rekey operation generates a new tape volume group wrap key. The current tape volume group wrap key is archived. The current media keys remain unchanged, and the new media keys are wrapped with the new tape volume group wrap key.

In the shared key mode, the rekey operation generates a new tape volume group wrap key and a new tape volume group shared key. The current tape volume group wrap key is archived while the current tape volume group shared key remain unchanged (in active state).

The volume groups can be rekeyed monthly even if you do not use the unique key mode.

Detailed Steps

To rekey tape volume groups, follow these steps:

Step 1 In the DCNM-SAN Web Client navigation pane, select **Volume Groups** to display the volume groups in the cluster.

Step 2 Select one or more volume groups.

Step 3 Click **Rekey**. A confirmation dialog box is displayed asking if the rekey operation is to be performed. Click **OK** to rekey the selected volume groups.

Auto Replicating Tape Media Keys

This section describes how to auto replicate the media keys in the DCNM-SAN Web Client. The following topics are covered:

Creating Tape Key Replication Relationships

Detailed Steps

To auto replicate the tape media keys, follow these steps:

Step 1 In the DCNM-SAN Web Client, click the **SME** tab.

Step 2 Select **Clusters** in the navigation pane to display the clusters.

Step 3 Select a cluster and select **Tape Key Replication**. The Tape Key Replication Relationships pane appears.

Step 4 Click **Create** to create a tape key replication relationship. A Create Replication Relationship area appears where the source cluster and the destination clusters are displayed.

Step 5 Select the clusters to expand or collapse the list of the Source Volume Group and the Destination Volume Group. Choose tape groups from the Source Volume Group and the Destination Volume Group to create a tape key replication relationship context.

Step 6 Click **Submit** to save the settings. A notification window appears to indicate the creation of the tape key replication relationship and the replication status shows as Created.

Removing Tape Key Replication Relationships

Detailed Steps

To remove a tape key replication relationship, follow these steps:

Step 1 Click **Clusters** in the navigation pane to display the clusters and select **Tape Key Replication**. The Tape Key Replication Relationships area appears on the right-hand pane.

Step 2 Select the tape group whose replication relationship needs to be removed. Click **Remove.**

Step 3 A confirmation dialog box is displayed asking if the relationship needs to be removed. Click **OK** to remove the replication relationship of the selected volume groups.

Step 4 A notification window appears that indicates the removal of the tape key replication relationship.

Using Basic Security Mode for Master Key Download

In Basic security mode, the master key file can be downloaded multiple times from the DCNM-SAN Web Client. The cluster detail view includes a button to download the master key file.

Detailed Steps

To download the master key file (Basic security mode), follow these steps:

Step 1 Select a cluster name in the navigation pane to view the cluster details.

Step 2 Click the **Download Keyfile** button to download the master key file.

Step 3 Enter the password to protect the master key file. Confirm the password. Click **Download** to begin downloading the encrypted file.

Step 4 Click **Close** to close the wizard.

Step 5 You will be asked if you want to open or save the file. Click **Save** to save the downloaded master key file.

Replacing Smart Cards

This section describes how to replace smart cards for clusters in the following modes:

- Replacing Smart Cards Using Standard Mode, page 5-16
- Replacing Smart Cards Using Advanced Mode, page 5-16

Replacing Smart Cards Using Standard Mode

In Standard security mode, the master key can be downloaded to a replacement smart card from the DCNM-SAN Web Client.

Detailed Steps

To replace a smart card (Standard security mode), follow these steps:

Step 1 Select **Smartcards** to display the smart card information for the cluster.

Step 2 Click **Replace** to launch the smart card replacement wizard. Click **Next**.

Step 3 Insert the smart card and enter the Password, PIN, and Label for the smart card. Click **Next**.

Step 4 Click **Finish** to close the wizard.

Replacing Smart Cards Using Advanced Mode

Note In SME Disk cluster, replacing smart cards does not rewrap disk keys. This feature will be supported in a future release.

Detailed Steps

To replace a smart card (Advanced security mode), follow these steps:

Step 1 Select **Smartcards** to display the smart card information for the cluster.

Step 2 Select the smart card that you want to replace. Click **Replace** to launch the smart card replacement wizard.

Step 3 Insert the new smart card. Click **Next**.

The SME Recovery Officer who owns the replacement smart card is prompted to log in and to insert the smart card to download the master key.

Step 4 Enter the switch login information and the smart card PIN and label. Click **Next**.

Each member of the Cisco Recovery Officer quorum is requested to log in and present their smart card to authorize and authenticate the operation.

Step 5 Insert one of the smart cards that stores the master key. Click **Next**.

Step 6 Enter the switch login information and the smart card PIN and Label. Click **Next**. Do this for each of the smart cards.

Step 7 Insert the smart cards belonging to each recovery officer in any order.

To store the new master keyshares, follow these steps:

a. Enter the switch login information, the PIN number for the smart card, and a label that will identify the smart card. Click **Next**.

A notification is shown that the first keyshare is successfully stored.

b. Enter the switch credentials and PIN information for the second recovery officer. Click **Next**.

A notification is shown that the second keyshare is successfully stored.

c. Enter the switch credentials and PIN information for the third recovery officer. Click **Next.**

A notification is shown that the third keyshare is successfully stored.

d. Enter the switch credentials and PIN information for the fourth recovery officer. Click **Next**.

A notification is shown that the fourth keyshare is successfully stored.

e. Enter the switch credentials and PIN information for the fifth recovery officer. Click **Next**.

A notification is shown that the fifth keyshare is successfully stored. Click **Next** to begin the automatic synchronization of volume groups.

You will see an indication that the operation is in progress and to wait until the synchronization of volume groups is completed.

Step 8 The smart card replacement is completed. Click **Close** to return to the DCNM-SAN Web Client and to view the smart card information.

Step 9 Select **Smartcards** to view the new smart card information. The smart card details display the old recovery shares and the new recovery shares.

Exporting Volume Groups From Deactivated Clusters

Note Exporting volume groups from deactivated clusters applies to both Tape and Disk. However for Disk, if the cluster is offline you must provide the master key for the cluster.

When an SME cluster is deactivated, all key management operations such as exporting volume groups, are performed at the Cisco KMC. Exporting volume keys is a critical operation and must be authorized by SME Recovery Officers.

The following sections describe the exporting of volume groups in different modes:

- Exporting Volume Groups Using Basic Mode, page 5-18

Exporting Volume Groups Using Basic Mode

Detailed Steps

To export a volume group from a deactivated cluster (Basic security mode), follow these steps:

Step 1 Select a volume group to display the volume groups in the cluster. Click **Export**.

Step 2 Click **Browse** to locate the volume group master key file.

Step 3 Select the master key file. Click **Open**.

Step 4 Enter the password that protects the master key for the archived volume group. Click **Next**.

Step 5 Enter the password that will be used to encrypt the exported file. Confirm the password and click **Next**.

Step 6 Click **Download** to begin downloading the volume group file.

Step 7 You will be asked if you want to open or save the file. To save the exported volume group, click **Save**.

Exporting Volume Groups Using Standard Mode

Detailed Steps

To export a volume group from a deactivated cluster (Standard security mode), follow these steps:

Step 1 Select **Volume Groups** (in a deactivated cluster) to display the volume groups in the cluster. Select a volume group and click **Export**.

Step 2 Insert one of the five smart cards into the smart card reader. Click **Next**.

Step 3 Enter the smart card Label and PIN. Click **Next**.

Step 4 Enter the password to encrypt the volume group file. Confirm the password and click **Next**.

Step 5 Click **Download** to begin downloading the file.

Step 6 You will be asked if you want to open or save the file. To save the file, click **Save**.

Exporting Volume Groups Using Advanced Mode

Detailed Steps

To export a volume group from a deactivated cluster (Advanced security mode), follow these steps:

Step 1 Select **Volume Groups** (in a deactivated cluster) to display the volume groups in the cluster. Select a volume group and click **Export**.

Step 2 Insert one of the five smart cards into the smart card reader. Click **Next**.

Step 3 Enter the smart card Label and PIN. Click **Next**.

The keyshare is retrieved.

Step 4 Insert the next smart card into the smart card reader. Click **Next**.

Note Repeat this step for each smart card that is required to unlock the master key. The number of required smart cards depends on the quorum number selected during the cluster creation, for example, two of five smart cards.

Step 5 Enter the smart card Label and PIN. Click **Next**.

Step 6 Enter the volume group file password. Confirm the password and click **Next**.

Step 7 Click **Download** to begin downloading the volume group.

Step 8 You will be asked if you want to open or save the file. Click **Save** to save the .dat file.

Migrating KMC Server

Prerequisites

If the KMC server is integrated with RSA Key Manager, both the KMC and RSA Key Manager must be synchronized. If a KMC server is removed to purge all the keys, follow the required procedures to purge all the keys first before you uninstall the KMC server. This ensures that the keys in the RSA Key Manager are also purged.

Restrictions

The migrating of the KMC server is only applicable for SME Tape. For SME Disk, there is no RSA key manager support.

Detailed Steps

To migrate a KMC server, follow these steps:

Step 1 Migrate all keys to the new KMC server. Refer to the backup and restore procedures outlined in Appendix O, “Database Backup and Restore Operations.”

Step 2 After restoring the database, install DCNM-SAN in the new KMC server and point the DCNM-SAN to the database. This ensures that all the keys are maintained across the KMC migration.

Step 3 Update the cluster with the new KMC server details when the new KMC server is active.

a. Go to the DCNM-SAN Web Client and click the **SME** tab.

b. Select the cluster. The cluster details page displays.

c. Click **Modify** and choose the new KMC server.

If the KMC server is integrated with RSA Key Manager, modify the settings and select the RKM server.

Step 4 Uninstall the DCNM-SAN server instance of the previous KMC server. This removes the previous KMC server.

Verifying SME Tape Management Configuration

To display SME Tape management configuration information, perform one of the following tasks:

Command	Purpose
show sme cluster tape	Displays summary or detailed information about tapes.
show sme cluster tape detail	Displays information about tape cartridges.
show sme cluster tape-bkgrp	Displays information about all tape volume groups or about a specific group.

For detailed information about the fields in the output from these commands, refer to the *Cisco MDS 9000 Family NX-OS Command Reference*.

Monitoring SME Tape Management

This section includes the following topics:

Viewing Host Details

You can view detailed information about hosts in a SME cluster. Information for a specific host includes the tape group membership, paths from the host to the target, VSAN, fabric, status, and the tape device.

To view the host details, select a host in the navigation pane.

Viewing Tape Device Details

You can view detailed information about tape devices in a SME cluster. Information for a specific tape device includes the tape group membership, device description, serial number, and the host and target PWWN.

To view the tape device details, select a tape device in the navigation pane.

Viewing SME Tape Information Using the CLI

Use the **show sme cluster tape** command to view summary or detailed information about tapes.

```
switch# show sme cluster clustername1 tape summary
------------------------------------------------------------------------------
Host WWN                 Description         Crypto-Tape        Status
                                             Backup Group
------------------------------------------------------------------------------
10:00:00:00:c9:4e:19:ed  HP Ultrium 2-SCSI   HR1                online
```

Viewing Tape Cartridge Information

Use the **show sme cluster tape detail** to view information about tape cartridges.

```
switch# show sme cluster clustername1 tape detail
Tape 1 is online
    Is a Tape Drive
    HP Ultrium 2-SCSI
    Serial Number is 2b10c2e22f
    Is a member of HR1
    Paths
      Host 10:00:00:00:c9:4e:19:ed Target 2f:ff:00:06:2b:10:c2:e2 LUN 0x0000
```

Viewing Tape Volume Group Information

Use the **show sme cluster tape-bkgrp** command to view information about all tape volume groups or about a specific group.

```
switch# show sme cluster clustername1 tape-bkgrp
------------------------------------------------------------------------------
Name          Tape Devices      Volume Groups
------------------------------------------------------------------------------
HR1          1                 1

switch# show sme cluster clustername1 tape-bkgrp HR1
Tape Backupgroup HR1
  Compression is Disabled
  Number of tape devices is 1
  Number of volume groups is 1

  Tape device td1 is online
    Is a tape drive
    Description is HP Ultrium 2-SCSI
    Serial number is 2b10c2e22f
    Paths
      Host 10:00:00:00:c9:4e:19:ed Target 2f:ff:00:06:2b:10:c2:e2 Lun 0x0000 vsan 4093[f1]
```

Viewing the Status of the Tape Device

Use the **show sme internal info cluster** <*cname*> **tape-all command** to view tape information.

```
SWitch# show sme internal info cluster tie1 tape-all

  Tape Backup Groups : 1
  Last Seq Id        : 1
```

```
Tape Backup Group      : tb2
Memory Address         : 0x10788854
Seq Id                 : 1
Compression            : Enabled
Key on Tape            : Disabled
Tape Key Recycle       : Enabled
Shared Key Mode        : Disabled
Auto Volume Group      : Disabled
Tape Devices           : 1
Last Device Seq Id     : 4
Tape Volgrps           : 1
Last Volgrp Seq Id     : 1

  Tape Devices      : 1
  Last Seq Id       : 4

    Tape Device         : td0
    Memory Address      : 0x107ba054
    Seq ID              : 4
    SME (Encryption)    : Enabled
    Compression         : Enabled
    Bypass-Policy       : BYPASS DISABLED
    Cached Lun Path     : (nil)
    FSM State           : SME_CTAPE_DEVICE_G_ST_STABLE
    ITL Count           : 1
    Tape Drive          : 0x107d123c
    LUN FSM State       : SME_LUN_ST_STABLE

    Lun Path :0x107d185c
    IT       :V 3 I 40:00:00:00:00:00:00:01 T 40:00:00:00:00:00:00:02
    LUN      :0x0000
    Is Configured
    Status   :2
    Error    :0x0
    Flags    :0x1
```

Use the **sh sme internal info cluster tie1 tape-bkgrp tb2 tape-device td0** to view the information about a particular Tape Device in a particular Tape Backup Group.

```
Switch# sh sme internal info cluster tie1 tape-bkgrp tb2 tape-device td0

  Tape Device         : td0
  Memory Address      : 0x107ba054
  Seq ID              : 4
  SME (Encryption)    : Enabled
  Compression         : Enabled
  Bypass-Policy       : BYPASS DISABLED
  Cached Lun Path     : (nil)
  FSM State           : SME_CTAPE_DEVICE_G_ST_STABLE
  ITL Count           : 1
  Tape Drive          : 0x107d123c
  LUN FSM State       : SME_LUN_ST_STABLE

  Lun Path :0x107d185c
  IT       :V 3 I 40:00:00:00:00:00:00:01 T 40:00:00:00:00:00:00:02
  LUN      :0x0000
  Is Configured
  Status   :2
  Error    :0x0
  Flags    :0x1
```

Use the **Show Interface smex/y** to view statistical information about the SME interface configured for Encryption.

```
Switch# sh int sme1/1
sme1/1 is up
    In fabric Fabric_sw119
    Member of cluster tie1

    SME                     IOs        IO/s               Bytes          Rate
    --------------------------------------------------------------------------
    Host Reads               0           0                   0     0.00  B/s
    Host Writes              0           0                   0     0.00  B/s
    Host Total               0           0                   0     0.00  B/s

    Tgt Reads                0           0                   0     0.00  B/s
    Tgt Writes               0           0                   0     0.00  B/s
    Tgt Total                0           0                   0     0.00  B/s

    Clear                   IOs        IO/s               Bytes          Rate
    --------------------------------------------------------------------------
    Host Reads               0           0                   0     0.00  B/s
    Host Writes              0           0                   0     0.00  B/s
    Host Total               0           0                   0     0.00  B/s

    Tgt Reads                0           0                   0     0.00  B/s
    Tgt Writes               0           0                   0     0.00  B/s
    Tgt Total                0           0                   0     0.00  B/s

    Compression Ratio             0 : 0
    SME to Clear                0.00 %
    Read to Write               0.00 %

    Clear Luns 1, Encrypted Luns 0

    Error Statistics
      0 CTH, 0 Authentication 0 Compression
      0 Key Generation, 0 Incorrect Read Size
      0 Overlap Commands, 0 Stale Key Accesses
      0 Overload Condition, 0 Incompressible
      0 XIPC Task Lookup, 0 Invalid CDB
      0 Ili, 0 Eom, 0 Filemark, 0 Other
     2 FAILED WRITE Count - BYPASS DISABLED by USER ======> If write fails for clear text
tape
        last error at Tue Jun 26 13:39:49 2012
```

Use the module Commands to view LUN specific information.

show sme internal info crypto-node 1 lun all

```
module-1# sh sme internal info crypto-node 1 lun all
TAPE LUN TREE
LUN
---
  cpp_lun_ndx               0x5
  serial no.                0003-0000-00000000:0000000000000000
  type                      sequential
  sme_enabled               1
  crypto_status             0
  vendor_id                 SONY
  product_id                SDZ-130
  asl_id
  prod_rev_level            0201
  vendor_specific
  cluster_name              tie1
  enable_pad                False
  pad to                    0x0
  bkgrp_name                tb2
  device_name               td0
```

```
flags                   0
granularity             2
max_block_len_lim       1000
min_block_len_lim       4
block_length            512
compression             1
key_ontape              0
Bypass_Policy           BYPASS DISABLED
has tape                yes
position                200
has cth                 no
bypass enc              no
wrap guid               0000000000000000-0000000000000000
media guid              0000000000000000-0000000000000000
total itl count         1
active itl count        1
cmd_send_err            0
Not locked
```

Feature History for SME Tape Management

Table 5-1 lists the release history for this feature.

Table 5-1 Feature History for SME Tape Configuration

Feature Name	Releases	Feature Information
Added a new SME tape command	5.2(6)	Added a new SME tape command.
Software change	5.2(1)	In Release 5.2(1), Fabric Manager is changed to DCNM for SAN (DCNM-SAN).
	4.1(1c)	In Release 4.1(1b) and later, the MDS SAN-OS software is changed to MDS NX-OS software. The earlier releases are unchanged and all refrerences are retained.