



# **Boot media**

## **Install and maintain**

NetApp  
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# Boot media

## Overview of boot media replacement - ASA C400

The boot media stores a primary and secondary set of system (boot image) files that the system uses when it boots. Depending on your network configuration, you can perform either a nondisruptive or disruptive replacement.

You must have a USB flash drive, formatted to FAT32, with the appropriate amount of storage to hold the `image_XXX.tgz` file.

You also must copy the `image_XXX.tgz` file to the USB flash drive for later use in this procedure.

- The nondisruptive and disruptive methods for replacing a boot media both require you to restore the `var` file system:
  - For nondisruptive replacement, the HA pair must be connected to a network to restore the `var` file system.
  - For disruptive replacement, you do not need a network connection to restore the `var` file system, but the process requires two reboots.
- You must replace the failed component with a replacement FRU component you received from your provider.
- It is important that you apply the commands in these steps on the correct node:
  - The *impaired* node is the node on which you are performing maintenance.
  - The *healthy node* is the HA partner of the impaired node.

## Check encryption key support and status - ASA C400

Before shutting down the impaired controller, check if your version of ONTAP supports NetApp Volume Encryption (NVE) and if your key management system is properly configured.

### Step 1: Check if your version of ONTAP supports NetApp Volume Encryption

Check whether your ONTAP version supports NetApp Volume Encryption (NVE). This information is crucial for downloading the correct ONTAP image.

1. Determine if your ONTAP version supports encryption by running the following command:

```
version -v
```

If the output includes `1Ono-DARE`, NVE is not supported on your cluster version.

2. Depending on whether NVE is supported on your system, take one of the following actions:
  - If NVE is supported, download the ONTAP image with NetApp Volume Encryption.
  - If NVE is not supported, download the ONTAP image **without** NetApp Volume Encryption.

## Step 2: Determine if it is safe to shut down the controller

To safely shut down a controller, first identify whether the External Key Manager (EKM) or the Onboard Key Manager (OKM) is active. Then, verify the key manager in use, display the appropriate key information, and take action based on the status of the authentication keys.

1. Determine which key manager is enabled on your system:

ONTAP version	Run this command
ONTAP 9.14.1 or later	<pre>security key-manager keystore show</pre> <ul style="list-style-type: none"><li>• If EKM is enabled, EKM is listed in the command output.</li><li>• If OKM is enabled, OKM is listed in the command output.</li><li>• If no key manager is enabled, No key manager keystores configured is listed in the command output.</li></ul>
ONTAP 9.13.1 or earlier	<pre>security key-manager show-key-store</pre> <ul style="list-style-type: none"><li>• If EKM is enabled, external is listed in the command output.</li><li>• If OKM is enabled, onboard is listed in the command output.</li><li>• If no key manager is enabled, No key managers configured is listed in the command output.</li></ul>

2. Depending on whether a key manager is configured on your system, select one of the following options.

### No key manager configured

You can safely shut down the impaired controller. Go to [shutdown the impaired controller](#).

### External or Onboard key manager configured

- a. Enter the following query command to display the status of the authentication keys in your key manager.

```
security key-manager key query
```

- b. Check the output for the value in the Restored column for your key manager.

This column indicates whether the authentication keys for your key manager (either EKM or OKM) have been successfully restored.

3. Depending on whether your system is using the External Key Manager or Onboard Key Manager, select one of the following options.

## External Key Manager

Depending on the output value displayed in the `Restored` column, follow the appropriate steps.

Output value in <code>Restored</code> column	Follow these steps...
<code>true</code>	You can safely shut down the impaired controller. Go to <a href="#">shutdown the impaired controller</a> .
Anything other than <code>true</code>	<ol style="list-style-type: none"><li>Restore the external key management authentication keys to all nodes in the cluster using the following command: <pre>security key-manager external restore</pre>If the command fails, contact <a href="#">NetApp Support</a>.</li><li>Verify that the <code>Restored</code> column displays <code>true</code> for all authentication keys by entering the <code>security key-manager key query</code> command.  If all the authentication keys are <code>true</code>, you can safely shut down the impaired controller. Go to <a href="#">shutdown the impaired controller</a>.</li></ol>

## Onboard Key Manager

Depending on the output value displayed in the `Restored` column, follow the appropriate steps.

Output value in <code>Restored</code> column	Follow these steps...
<code>true</code>	<p>Manually back up the OKM information.</p> <ol style="list-style-type: none"><li>Go to the advanced mode by entering <code>set -priv advanced</code> and then enter <code>Y</code> when prompted.</li><li>Enter the following command to display the key management information: <pre>security key-manager onboard show-backup</pre></li><li>Copy the contents of the backup information to a separate file or your log file.  You'll need it in disaster scenarios where you might need to manually recover OKM.</li><li>You can safely shut down the impaired controller. Go to <a href="#">shutdown the impaired controller</a>.</li></ol>

Output value in Restored column	Follow these steps...
Anything other than <code>true</code>	<p>a. Enter the onboard security key-manager sync command:</p> <pre>security key-manager onboard sync</pre> <p>b. Enter the 32 character, alphanumeric onboard key management passphrase when prompted.</p> <p>If the passphrase cannot be provided, contact <a href="#">NetApp Support</a>.</p> <p>c. Verify the Restored column displays <code>true</code> for all authentication keys:</p> <pre>security key-manager key query</pre> <p>d. Verify that the Key Manager type displays <code>onboard</code>, and then manually back up the OKM information.</p> <p>e. Enter the command to display the key management backup information:</p> <pre>security key-manager onboard show-backup</pre> <p>f. Copy the contents of the backup information to a separate file or your log file.</p> <p>You'll need it in disaster scenarios where you might need to manually recover OKM.</p> <p>g. You can safely shut down the impaired controller. Go to <a href="#">shutdown the impaired controller</a>.</p>

## Shut down the impaired controller - ASA C400

After completing the NVE or NSE tasks, you need to complete the shutdown of the impaired controller. Shut down or take over the impaired controller using the appropriate procedure for your configuration.

### Option 1: Most configurations

After completing the NVE or NSE tasks, you need to complete the shutdown of the impaired controller.

#### Steps

- a. Take the impaired controller to the LOADER prompt:

If the impaired controller displays...	Then...
The LOADER prompt	Go to Remove controller module.
Waiting for giveback...	Press Ctrl-C, and then respond <code>y</code> when prompted.
System prompt or password prompt (enter system password)	Take over or halt the impaired controller from the healthy controller: <code>storage failover takeover -ofnode impaired_node_name</code>  When the impaired controller shows Waiting for giveback..., press Ctrl-C, and then respond <code>y</code> .

- b. From the LOADER prompt, enter: `printenv` to capture all boot environmental variables. Save the output to your log file.



This command may not work if the boot device is corrupted or non-functional.

## Option 2: Controller is in a MetroCluster configuration



Do not use this procedure if your system is in a two-node MetroCluster configuration.

To shut down the impaired controller, you must determine the status of the controller and, if necessary, take over the controller so that the healthy controller continues to serve data from the impaired controller storage.

- If you have a cluster with more than two nodes, it must be in quorum. If the cluster is not in quorum or a healthy controller shows false for eligibility and health, you must correct the issue before shutting down the impaired controller; see [Synchronize a node with the cluster](#).
- If you have a MetroCluster configuration, you must have confirmed that the MetroCluster Configuration State is configured and that the nodes are in an enabled and normal state (`metrocluster node show`).

### Steps

1. If AutoSupport is enabled, suppress automatic case creation by invoking an AutoSupport message:

```
system node autosupport invoke -node * -type all -message  
MAINT=number_of_hours_downh
```

The following AutoSupport message suppresses automatic case creation for two hours: `cluster1:*>`

```
system node autosupport invoke -node * -type all -message MAINT=2h
```

2. Disable automatic giveback from the console of the healthy controller: `storage failover modify -node local -auto-giveback false`
3. Take the impaired controller to the LOADER prompt:

If the impaired controller is displaying...	Then...
The LOADER prompt	Go to the next step.

If the impaired controller is displaying...	Then...
Waiting for giveback...	Press Ctrl-C, and then respond <code>y</code> when prompted.
System prompt or password prompt (enter system password)	Take over or halt the impaired controller from the healthy controller: <pre>storage failover takeover -ofnode impaired_node_name</pre> <p>When the impaired controller shows Waiting for giveback..., press Ctrl-C, and then respond <code>y</code>.</p>

### Option 3: Controller is in a two-node Metrocluster

To shut down the impaired controller, you must determine the status of the controller and, if necessary, switch over the controller so that the healthy controller continues to serve data from the impaired controller storage.

#### About this task

- You must leave the power supplies turned on at the end of this procedure to provide power to the healthy controller.

#### Steps

- Check the MetroCluster status to determine whether the impaired controller has automatically switched over to the healthy controller: `metrocluster show`
- Depending on whether an automatic switchover has occurred, proceed according to the following table:

If the impaired controller...	Then...
Has automatically switched over	Proceed to the next step.
Has not automatically switched over	Perform a planned switchover operation from the healthy controller: <code>metrocluster switchover</code>
Has not automatically switched over, you attempted switchover with the <code>metrocluster switchover</code> command, and the switchover was vetoed	Review the veto messages and, if possible, resolve the issue and try again. If you are unable to resolve the issue, contact technical support.

- Resynchronize the data aggregates by running the `metrocluster heal -phase aggregates` command from the surviving cluster.

```
controller_A_1::> metrocluster heal -phase aggregates
[Job 130] Job succeeded: Heal Aggregates is successful.
```

If the healing is vetoed, you have the option of reissuing the `metrocluster heal` command with the `-override-vetoes` parameter. If you use this optional parameter, the system overrides any soft vetoes



that prevent the healing operation.

4. Verify that the operation has been completed by using the `metrocluster operation show` command.

```
controller_A_1::> metrocluster operation show
  Operation: heal-aggregates
  State: successful
Start Time: 7/25/2016 18:45:55
  End Time: 7/25/2016 18:45:56
  Errors: -
```

5. Check the state of the aggregates by using the `storage aggregate show` command.

```
controller_A_1::> storage aggregate show
Aggregate      Size Available Used% State   #Vols  Nodes           RAID
Status
-----
...
aggr_b2      227.1GB   227.1GB   0% online    0  mcc1-a2
raid_dp, mirrored, normal...
```

6. Heal the root aggregates by using the `metrocluster heal -phase root-aggregates` command.

```
mcc1A::> metrocluster heal -phase root-aggregates
[Job 137] Job succeeded: Heal Root Aggregates is successful
```

If the healing is vetoed, you have the option of reissuing the `metrocluster heal` command with the `-override-vetoes` parameter. If you use this optional parameter, the system overrides any soft vetoes that prevent the healing operation.

7. Verify that the heal operation is complete by using the `metrocluster operation show` command on the destination cluster:

```
mcc1A::> metrocluster operation show
  Operation: heal-root-aggregates
  State: successful
Start Time: 7/29/2016 20:54:41
  End Time: 7/29/2016 20:54:42
  Errors: -
```

8. On the impaired controller module, disconnect the power supplies.

# Replace the boot media - ASA C400

To replace the boot media, you must remove the impaired controller module, install the replacement boot media, and transfer the boot image to a USB flash drive.

## Step 1: Remove the controller module

To access components inside the controller module, you must remove the controller module from the chassis.

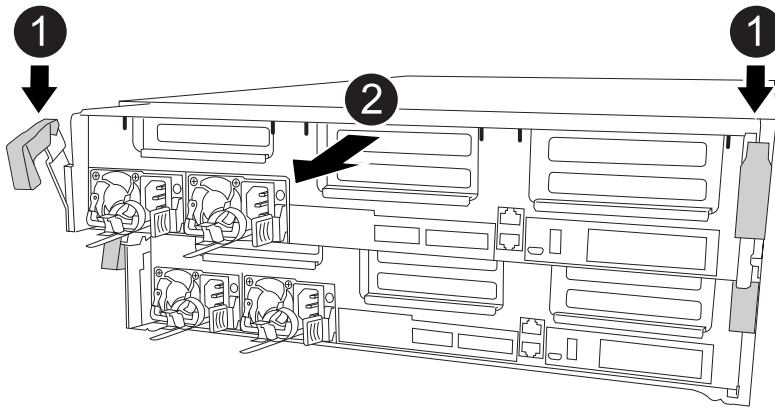
### Steps

1. If you are not already grounded, properly ground yourself.
2. Release the power cable retainers, and then unplug the cables from the power supplies.
3. Loosen the hook and loop strap binding the cables to the cable management device, and then unplug the system cables and SFPs (if needed) from the controller module, keeping track of where the cables were connected.

Leave the cables in the cable management device so that when you reinstall the cable management device, the cables are organized.

4. Remove the cable management device from the controller module and set it aside.
5. Press down on both of the locking latches, and then rotate both latches downward at the same time.

The controller module moves slightly out of the chassis.



<b>1</b>	Locking latches
<b>2</b>	Controller moves slightly out of chassis

6. Slide the controller module out of the chassis.

Make sure that you support the bottom of the controller module as you slide it out of the chassis.

7. Place the controller module on a stable, flat surface.

## Step 2: Replace the boot media

You must locate the boot media in the controller module (see the FRU map on the controller module), and then follow the directions to replace it.

### Before you begin

Although the contents of the boot media is encrypted, it is a best practice to erase the contents of the boot media before replacing it. For more information, see the [Statement of Volatility](#) for your system on the NetApp Support Site.



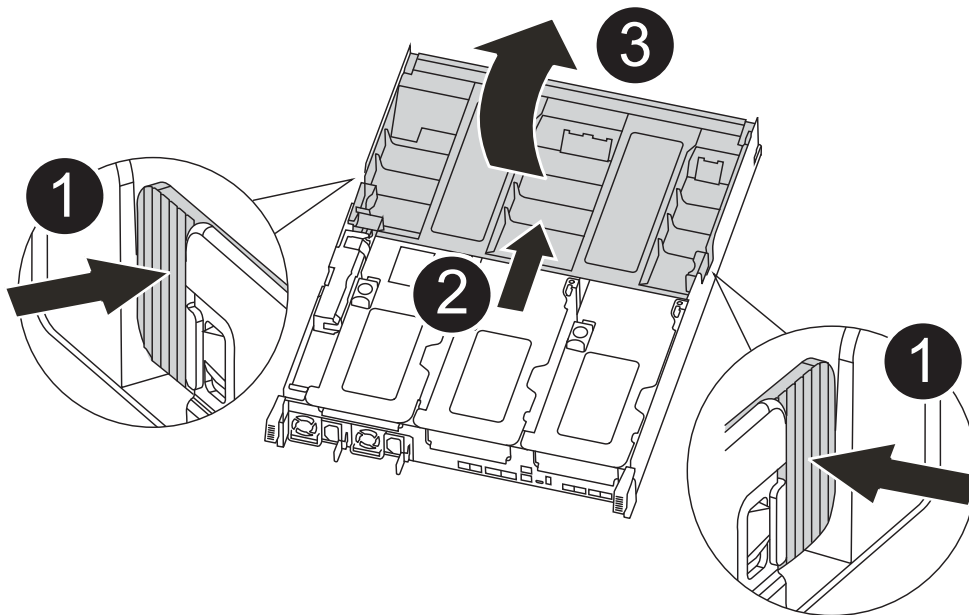
You must log into the NetApp Support Site to display the *Statement of Volatility* for your system.

You can use the following animation, illustration, or the written steps to replace the boot media.

### Animation - Replace the boot media

#### Steps

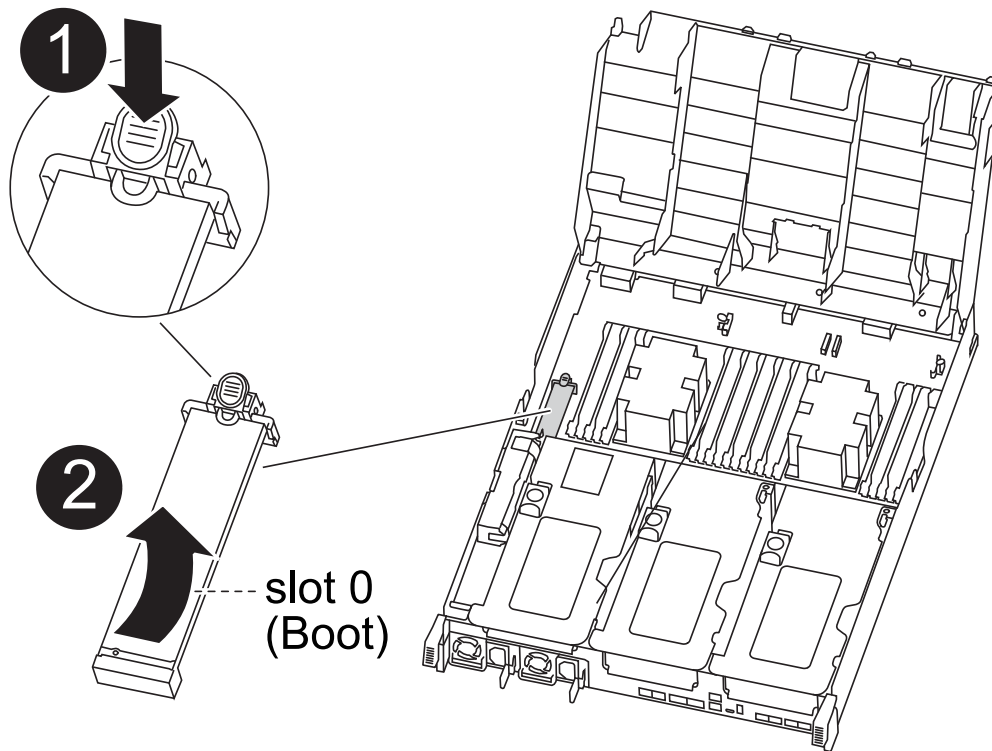
1. Open the air duct:



1	Locking tabs
2	Slide air duct toward back of controller
3	Rotate air duct up

- a. Press the locking tabs on the sides of the air duct in toward the middle of the controller module.
- b. Slide the air duct toward the back of the controller module, and then rotate it upward to its completely open position.

2. Locate and remove the boot media from the controller module:



<b>1</b>	Press blue button
<b>2</b>	Rotate boot media up and remove from socket

- a. Press the blue button at the end of the boot media until the lip on the boot media clears the blue button.
- b. Rotate the boot media up and gently pull the boot media out of the socket.
3. Align the edges of the replacement boot media with the boot media socket, and then gently push it into the socket.
4. Check the boot media to make sure that it is seated squarely and completely in the socket.

If necessary, remove the boot media and reseal it into the socket.

5. Lock the boot media in place:
  - a. Rotate the boot media down toward the motherboard.
  - b. Placing a finger at the end of the boot media by the blue button, push down on the boot media end to engage the blue locking button.
  - c. While pushing down on the boot media, lift the blue locking button to lock the boot media in place.
6. Close the air duct.

### Step 3: Transfer the boot image to the boot media

The replacement boot media that you installed does not have a boot image, so you need to transfer a boot image using a USB flash drive.

#### Before you begin

- You must have a USB flash drive, formatted to MBR/FAT32, with at least 4GB capacity
- A copy of the same image version of ONTAP as what the impaired controller was running. You can download the appropriate image from the Downloads section on the NetApp Support Site
  - If NVE is enabled, download the image with NetApp Volume Encryption, as indicated in the download button.
  - If NVE is not enabled, download the image without NetApp Volume Encryption, as indicated in the download button.
- If your system is an HA pair, you must have a network connection.
- If your system is a stand-alone system you do not need a network connection, but you must perform an additional reboot when restoring the `var` file system.

## Steps

1. Download and copy the appropriate service image from the NetApp Support Site to the USB flash drive.
  - a. Download the service image to your work space on your laptop.
  - b. Unzip the service image.



If you are extracting the contents using Windows, do not use WinZip to extract the netboot image. Use another extraction tool, such as 7-Zip or WinRAR.

There are two folders in the unzipped service image file:

- `boot`
- `efi`

- c. Copy the `efi` folder to the top directory on the USB flash drive.



If the service image has no `efi` folder, see [EFI folder missing from Service Image download file used for boot device recovery for FAS and AFF models^](#) .

The USB flash drive should have the `efi` folder and the same Service Image (BIOS) version of what the impaired controller is running.

- d. Remove the USB flash drive from your laptop.
2. If you have not already done so, close the air duct.
  3. Align the end of the controller module with the opening in the chassis, and then gently push the controller module halfway into the system.
  4. Reinstall the cable management device and recable the system, as needed.

When recabling, remember to reinstall the media converters (SFPs or QSFPs) if they were removed.

5. Plug the power cable into the power supply and reinstall the power cable retainer.
6. Insert the USB flash drive into the USB slot on the controller module.

Make sure that you install the USB flash drive in the slot labeled for USB devices, and not in the USB console port.

7. Complete the installation of the controller module:

- a. Plug the power cord into the power supply, reinstall the power cable locking collar, and then connect the power supply to the power source.
- b. Firmly push the controller module into the chassis until it meets the midplane and is fully seated.

The locking latches rise when the controller module is fully seated.



Do not use excessive force when sliding the controller module into the chassis to avoid damaging the connectors.

The controller module begins to boot as soon as it is fully seated in the chassis. Be prepared to interrupt the boot process.

- c. Rotate the locking latches upward, tilting them so that they clear the locking pins, and then lower them into the locked position.
  - d. If you have not already done so, reinstall the cable management device.
8. Interrupt the boot process by pressing Ctrl-C to stop at the LOADER prompt.

If you miss this message, press Ctrl-C, select the option to boot to Maintenance mode, and then `halt` the controller to boot to LOADER.

9. If the controller is in a stretch or fabric-attached MetroCluster, you must restore the FC adapter configuration:
- a. Boot to Maintenance mode: `boot_ontap maint`
  - b. Set the MetroCluster ports as initiators: `ucadmin modify -m fc -t initiator adapter_name`
  - c. Halt to return to Maintenance mode: `halt`

The changes will be implemented when the system is booted.

## Boot the recovery image - ASA C400

You must boot the ONTAP image from the USB drive, restore the file system, and verify the environmental variables.

### Steps

1. From the LOADER prompt, boot the recovery image from the USB flash drive: `boot_recovery`

The image is downloaded from the USB flash drive.

2. When prompted, either enter the name of the image or accept the default image displayed inside the brackets on your screen.
3. Restore the var file system:

### Option 1: ONTAP 9.16.0 or earlier

- a. On the impaired controller, press `Y` when you see `Do you want to restore the backup configuration now?`
- b. On the impaired controller, press `Y` when prompted to overwrite `/etc/ssh/ssh_host_ecdsa_key`.
- c. On the healthy partner controller, set the impaired controller to advanced privilege level: `set -privilege advanced`.
- d. On the healthy partner controller, run the restore backup command: `system node restore-backup -node local -target-address impaired_node_IP_address`.

**NOTE:** If you see any message other than a successful restore, contact [NetApp Support](#).

- e. On the healthy partner controller, return the impaired controller to admin level: `set -privilege admin`.
- f. On the impaired controller, press `Y` when you see `Was the restore backup procedure successful?`.
- g. On the impaired controller, press `Y` when you see `...would you like to use this restored copy now?`.
- h. On the impaired controller, press `Y` when prompted to reboot the impaired controller and press `ctrl-c` for the Boot Menu.
- i. If the system does not use encryption, select *Option 1 Normal Boot.*, otherwise go to [Restore encryption](#).

### Option 2: ONTAP 9.16.1 or later

- a. On the impaired controller, press `Y` when prompted to restore the backup configuration.

After restore procedure is successful, this message will be seen on the console -  
`syncflash_partner: Restore from partner complete.`

- b. On the impaired controller, press `Y` when prompted to confirm if the restore backup was successful.
- c. On the impaired controller, press `Y` when prompted to use the restored configuration.
- d. On the impaired controller, press `Y` when prompted to reboot the node.
- e. On the impaired controller, press `Y` when prompted to reboot the impaired controller and press `ctrl-c` for the Boot Menu.
- f. If the system does not use encryption, select *Option 1 Normal Boot.*, otherwise go to [Restore encryption](#).

4. Connect the console cable to the partner controller.
5. Give back the controller using the `storage failover giveback -fromnode local` command.
6. Restore automatic giveback if you disabled it by using the `storage failover modify -node local -auto-giveback true` command.
7. If AutoSupport is enabled, restore/unsuppress automatic case creation by using the `system node autosupport invoke -node * -type all -message MAINT=END` command.

**NOTE:** If the process fails, contact [NetApp Support](#).

## Switch back aggregates in a two-node MetroCluster configuration - ASA C400

After you have completed the FRU replacement in a two-node MetroCluster configuration, you can perform the MetroCluster switchback operation. This returns the configuration to its normal operating state, with the sync-source storage virtual machines (SVMs) on the formerly impaired site now active and serving data from the local disk pools.

This task only applies to two-node MetroCluster configurations.

### Steps

1. Verify that all nodes are in the enabled state: `metrocluster node show`

```
cluster_B::> metrocluster node show

DR
Group Cluster Node          Configuration  DR
-----
-----
1      cluster_A
      controller_A_1 configured    enabled    heal roots
completed
      cluster_B
      controller_B_1 configured    enabled    waiting for
switchback recovery
2 entries were displayed.
```

2. Verify that resynchronization is complete on all SVMs: `metrocluster vserver show`
3. Verify that any automatic LIF migrations being performed by the healing operations were completed successfully: `metrocluster check lif show`
4. Perform the switchback by using the `metrocluster switchback` command from any node in the surviving cluster.
5. Verify that the switchback operation has completed: `metrocluster show`

The switchback operation is still running when a cluster is in the `waiting-for-switchback` state:



```

cluster_B::> metrocluster show
Cluster           Configuration State      Mode
-----
Local: cluster_B configured      switchover
Remote: cluster_A configured     waiting-for-switchback

```

The switchback operation is complete when the clusters are in the normal state.:

```

cluster_B::> metrocluster show
Cluster           Configuration State      Mode
-----
Local: cluster_B configured      normal
Remote: cluster_A configured     normal

```

If a switchback is taking a long time to finish, you can check on the status of in-progress baselines by using the `metrocluster config-replication resync-status show` command.

6. Reestablish any SnapMirror or SnapVault configurations.

## Restore encryption - ASA C400

Restore encryption on the replacement boot media.

You must complete steps specific to systems that have Onboard Key Manager (OKM), NetApp Storage Encryption (NSE) or NetApp Volume Encryption (NVE) enabled using the settings that you captured at the beginning of the boot media replace procedure.

Depending on which a key manger is configured on your system, select one of the following options to restore it from the boot menu.

- [Option 1: Restore the Onboard Key Manager configuration](#)
- [Option 2: Restore the External Key Manager configuration](#)

### Option 1: Restore the Onboard Key Manager configuration

Restore the Onboard Key Manager (OKM) configuration from the ONTAP boot menu.

#### Before you begin

- Make sure you have following information while restoring the OKM configuration:
  - Cluster-wide passphrase entered [while enabling onboard key management](#).
  - [Backup information for the Onboard Key Manager](#).
- Perform the [How to verify onboard key management backup and cluster-wide passphrase](#) procedure before proceeding.

#### Steps

1. Connect the console cable to the target controller.

2. From the ONTAP boot menu select the appropriate option from the boot menu.

ONTAP version	Select this option
ONTAP 9.8 or later	<p data-bbox="620 220 831 256">Select option 10.</p> <p data-bbox="620 289 950 325"><b>Show example boot menu</b></p> <div data-bbox="656 363 1455 1146" style="border: 1px solid #ccc; padding: 10px;"><p data-bbox="683 401 1292 436">Please choose one of the following:</p><ul style="list-style-type: none"><li data-bbox="683 478 976 514">(1) Normal Boot.</li><li data-bbox="683 520 1133 556">(2) Boot without /etc/rc.</li><li data-bbox="683 562 1047 598">(3) Change password.</li><li data-bbox="683 604 1365 674">(4) Clean configuration and initialize all disks.</li><li data-bbox="683 680 1154 716">(5) Maintenance mode boot.</li><li data-bbox="683 722 1328 758">(6) Update flash from backup config.</li><li data-bbox="683 764 1240 800">(7) Install new software first.</li><li data-bbox="683 806 976 842">(8) Reboot node.</li><li data-bbox="683 848 1192 917">(9) Configure Advanced Drive Partitioning.</li><li data-bbox="683 924 1333 993">(10) Set Onboard Key Manager recovery secrets.</li><li data-bbox="683 999 1317 1068">(11) Configure node for external key management.</li></ul><p data-bbox="683 1083 1032 1119">Selection (1-11)? 10</p></div>

ONTAP version	Select this option
ONTAP 9.7 and earlier	<p data-bbox="621 163 1365 195">Select the hidden option <code>recover_onboard_keymanager</code></p> <p data-bbox="621 233 951 264"><b>Show example boot menu</b></p> <div data-bbox="654 306 1455 968" style="border: 1px solid #ccc; padding: 10px; background-color: #f9f9f9;"> <p data-bbox="683 342 1292 373">Please choose one of the following:</p> <ul style="list-style-type: none"> <li data-bbox="683 422 976 453">(1) Normal Boot.</li> <li data-bbox="683 464 1133 495">(2) Boot without <code>/etc/rc</code>.</li> <li data-bbox="683 506 1049 537">(3) Change password.</li> <li data-bbox="683 548 1365 611">(4) Clean configuration and initialize all disks.</li> <li data-bbox="683 621 1154 653">(5) Maintenance mode boot.</li> <li data-bbox="683 663 1328 695">(6) Update flash from backup config.</li> <li data-bbox="683 705 1240 737">(7) Install new software first.</li> <li data-bbox="683 747 976 779">(8) Reboot node.</li> <li data-bbox="683 789 1192 852">(9) Configure Advanced Drive Partitioning.</li> </ul> <p data-bbox="683 863 980 894">Selection (1-19)?</p> <p data-bbox="683 905 1138 936"><code>recover_onboard_keymanager</code></p> </div>

3. Confirm that you want to continue the recovery process.

**Show example prompt**

```
This option must be used only in disaster recovery procedures. Are you
sure? (y or n):
```

4. Enter the cluster-wide passphrase twice.

While entering the passphrase the console will not show any input.

**Show example prompt**

```
Enter the passphrase for onboard key management:

Enter the passphrase again to confirm:
```

5. Enter the backup information.

- a. Paste the entire content from the BEGIN BACKUP line through the END BACKUP line.



## Show example prompt

```
Trying to recover keymanager secrets....
Setting recovery material for the onboard key manager
Recovery secrets set successfully
Trying to delete any existing km_onboard.wkeydb file.

Successfully recovered keymanager secrets.

*****
*****
* Select option "(1) Normal Boot." to complete recovery process.
*
* Run the "security key-manager onboard sync" command to
synchronize the key database after the node reboots.
*****
*****
```



Do not proceed if the displayed output is anything other than `Successfully recovered keymanager secrets`. Perform troubleshooting to correct the error.

6. Select option 1 from the boot menu to continue booting into ONTAP.

## Show example prompt

```
*****
*****
* Select option "(1) Normal Boot." to complete the recovery process.
*
*****
*****

(1) Normal Boot.
(2) Boot without /etc/rc.
(3) Change password.
(4) Clean configuration and initialize all disks.
(5) Maintenance mode boot.
(6) Update flash from backup config.
(7) Install new software first.
(8) Reboot node.
(9) Configure Advanced Drive Partitioning.
(10) Set Onboard Key Manager recovery secrets.
(11) Configure node for external key management.
Selection (1-11)? 1
```

7. Confirm that the controller's console displays the following message.

```
Waiting for giveback...(Press Ctrl-C to abort wait)
```

8. From the partner node, giveback the partner controller by entering the following command.

```
storage failover giveback -fromnode local -only-cfo-aggregates true.
```

9. After booting with only the CFO aggregate, run the following command.

```
security key-manager onboard sync
```

10. Enter the cluster-wide passphrase for the Onboard Key Manager.

## Show example prompt

```
Enter the cluster-wide passphrase for the Onboard Key Manager:
```

```
All offline encrypted volumes will be brought online and the
corresponding volume encryption keys (VEKs) will be restored
automatically within 10 minutes. If any offline encrypted volumes
are not brought online automatically, they can be brought online
manually using the "volume online -vserver <vserver> -volume
<volume_name>" command.
```



If the sync is successful the cluster prompt is returned with no additional messages. If the sync fails an error message appears before returning to the cluster prompt. Do not continue until the error is corrected and the sync runs successfully.

11. Ensure that all keys are synced by entering the following command.

```
security key-manager key query -restored false.
```

```
There are no entries matching your query.
```



No results should appear when filtering for false in the restored parameter.

12. Giveback the node from the partner by entering the following command.

```
storage failover giveback -fromnode local
```

13. Restore automatic giveback, if you disabled it, by entering the following command.

```
storage failover modify -node local -auto-giveback true
```

14. If AutoSupport is enabled, restore automatic case creation by entering the following command.

```
system node autosupport invoke -node * -type all -message MAINT=END
```

## Option 2: Restore the External Key Manager configuration

Restore the External Key Manager configuration from the ONTAP boot menu.

### Before you begin

You need the following information for restoring the External Key Manager (EKM) configuration.

- A copy of the `/cfcard/kmip/servers.cfg` file from another cluster node or the following information:
  - The KMIP server address.
  - The KMIP port.
- A copy of the `/cfcard/kmip/certs/client.crt` file from another cluster node or the client certificate.

- A copy of the `/cfcard/kmip/certs/client.key` file from another cluster node or the client key.
- A copy of the `/cfcard/kmip/certs/CA.pem` file from another cluster node or the KMIP server CA(s).

## Steps

1. Connect the console cable to the target controller.
2. Select option 11 from the ONTAP boot menu.

### Show example boot menu

```
(1) Normal Boot.
(2) Boot without /etc/rc.
(3) Change password.
(4) Clean configuration and initialize all disks.
(5) Maintenance mode boot.
(6) Update flash from backup config.
(7) Install new software first.
(8) Reboot node.
(9) Configure Advanced Drive Partitioning.
(10) Set Onboard Key Manager recovery secrets.
(11) Configure node for external key management.
Selection (1-11)? 11
```

3. When prompted, confirm you have gathered the required information.

### Show example prompt

```
Do you have a copy of the /cfcard/kmip/certs/client.crt file? {y/n}
Do you have a copy of the /cfcard/kmip/certs/client.key file? {y/n}
Do you have a copy of the /cfcard/kmip/certs/CA.pem file? {y/n}
Do you have a copy of the /cfcard/kmip/servers.cfg file? {y/n}
```

4. When prompted, enter the client and server information.

### Show prompt

```
Enter the client certificate (client.crt) file contents:
Enter the client key (client.key) file contents:
Enter the KMIP server CA(s) (CA.pem) file contents:
Enter the server configuration (servers.cfg) file contents:
```



## Show example

```
Enter the client certificate (client.crt) file contents:
-----BEGIN CERTIFICATE-----
MIIDvjCCAqagAwIBAgICN3gwDQYJKoZIhvcNAQELBQAwY8xCzAJBgNVBAYTA1VT
MRMwEQYDVQQIEwpDYWxpZm9ybmlhMQwwCgYDVQQHEwNTVkwxDzANBgNVBAoTBk5l
MSUubQusvzAFs8G3P54GG32iIRvaCFnj2gQpCxcilJ0qB2foiBGx5XVQ/Mtk+rlap
Pk4ECW/wqSOUXDYtJs1+RB+w0+SHx8mzxpzbz3mXF/X/1PC3YOzVNCq5eieek62si
Fp8=
-----END CERTIFICATE-----

Enter the client key (client.key) file contents:
-----BEGIN RSA PRIVATE KEY-----
<key_value>
-----END RSA PRIVATE KEY-----

Enter the KMIP server CA(s) (CA.pem) file contents:
-----BEGIN CERTIFICATE-----
MIIEizCCA3OgAwIBAgIBADANBgkqhkiG9w0BAQsFADCBjzELMAkGA1UEBhMCVVMx
7yaumMQETNrpMfP+nQMd34y4AmseWYGM6qG0z37BRnYU0Wf2qDL61cQ3/jkm7Y94
EQBKG1NY8dVyjphmYZv+
-----END CERTIFICATE-----

Enter the IP address for the KMIP server: 10.10.10.10
Enter the port for the KMIP server [5696]:

System is ready to utilize external key manager(s).
Trying to recover keys from key servers....
kmip_init: configuring ports
Running command '/sbin/ifconfig e0M'
..
..
kmip_init: cmd: ReleaseExtraBSDPort e0M
```

After you enter the client and server information, the recovery process completes.

## Show example

```
System is ready to utilize external key manager(s).
Trying to recover keys from key servers....
[Aug 29 21:06:28]: 0x808806100: 0: DEBUG: kmip2::main:
[initOpenssl]:460: Performing initialization of OpenSSL
Successfully recovered keymanager secrets.
```

5. Select option 1 from the boot menu to continue booting into ONTAP.

#### Show example prompt

```
*****
*****
* Select option "(1) Normal Boot." to complete the recovery process.
*
*****
*****

(1) Normal Boot.
(2) Boot without /etc/rc.
(3) Change password.
(4) Clean configuration and initialize all disks.
(5) Maintenance mode boot.
(6) Update flash from backup config.
(7) Install new software first.
(8) Reboot node.
(9) Configure Advanced Drive Partitioning.
(10) Set Onboard Key Manager recovery secrets.
(11) Configure node for external key management.
Selection (1-11)? 1
```

6. Restore automatic giveback, if you disabled it, by entering the following command.

```
storage failover modify -node local -auto-giveback true
```

7. If AutoSupport is enabled, restore automatic case creation by entering the following command.

```
system node autosupport invoke -node * -type all -message MAINT=END
```

## Return the failed part to NetApp - ASA C400

Return the failed part to NetApp, as described in the RMA instructions shipped with the kit. See the [Part Return and Replacements](#) page for further information.

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