



# **Boot media**

Install and maintain

NetApp

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# Boot media

## Overview of boot media replacement - FAS9000

The boot media stores a primary and secondary set of system (boot image) files that the system uses when it boots. The FAS9000 system supports only manual boot media recovery procedures. Automated boot media recovery is not supported.

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`.

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 does not require connection to a network to restore the `var` file system. The HA pair in a single chassis has an internal e0S connection, which is used to transfer `var` config between them.
  - 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

To ensure data security on your storage system, you need to verify the encryption key support and status on your boot media. Check if your ONTAP version supports NetApp Volume Encryption (NVE), and before you shut down the controller check if the key manager is active. The FAS9000 system supports only manual boot media recovery procedures. Automated boot media recovery is not supported.

### Step 1: Check NVE support and download the correct ONTAP image

Determine whether your ONTAP version supports NetApp Volume Encryption (NVE) so you can download the correct ONTAP image for the boot media replacement.

#### Steps

1. Check if your ONTAP version supports encryption:

```
version -v
```

If the output includes 10no-DARE, NVE is not supported on your cluster version.

## 2. Download the appropriate ONTAP image based on NVE support:

- 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



Download the ONTAP image from the NetApp Support Site to your HTTP or FTP server or a local folder. You will need this image file during the boot media replacement procedure.

## Step 2: Verify key manager status and back up configuration

Before shutting down the impaired controller, verify the key manager configuration and back up the necessary information.

### Steps

#### 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, do one of the following:

##### If no key manager is configured:

You can safely shut down the impaired controller and proceed to the shutdown procedure.

##### If a key manager is configured (EKM or OKM):

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

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

- Review the output and check the value in the Restored column. This column indicates whether the

authentication keys for your key manager (either EKM or OKM) have been successfully restored.

3. Complete the appropriate procedure based on your key manager type:

## **External Key Manager (EKM)**

Complete these steps based on the value in the Restored column.

### **If all keys show true in the Restored column:**

You can safely shut down the impaired controller and proceed to the shutdown procedure.

### **If any keys show a value other than true in the Restored column:**

- a. Restore the external key management authentication keys to all nodes in the cluster:

```
security key-manager external restore
```

If the command fails, contact NetApp Support.

- b. Verify that all authentication keys are restored:

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

Confirm that the Restored column displays true for all authentication keys.

- c. If all keys are restored, you can safely shut down the impaired controller and proceed to the shutdown procedure.

## **Onboard Key Manager (OKM)**

Complete these steps based on the value in the Restored column.

### **If all keys show true in the Restored column:**

- a. Back up the OKM information:

- i. Switch to advanced privilege mode:

```
set -priv advanced
```

Enter y when prompted to continue.

- ii. Display the key management backup information:

```
security key-manager onboard show-backup
```

- iii. Copy the backup information to a separate file or your log file.

You will need this backup information if you need to manually recover OKM during the replacement procedure.

- iv. Return to admin mode:

```
set -priv admin
```

- b. You can safely shut down the impaired controller and proceed to the shutdown procedure.

### **If any keys show a value other than true in the Restored column:**

- a. Synchronize the onboard key manager:

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

Enter the 32-character alphanumeric onboard key management passphrase when prompted.



This is the cluster-wide passphrase you created when you initially configured the Onboard Key Manager. If you do not have this passphrase, contact NetApp Support.

- b. Verify all authentication keys are restored:

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

Confirm that the Restored column displays `true` for all authentication keys and the Key Manager type shows `onboard`.

- c. Back up the OKM information:

- i. Switch to advanced privilege mode:

```
set -priv advanced
```

Enter `y` when prompted to continue.

- ii. Display the key management backup information:

```
security key-manager onboard show-backup
```

- iii. Copy the backup information to a separate file or your log file.

You will need this backup information if you need to manually recover OKM during the replacement procedure.

- iv. Return to admin mode:

```
set -priv admin
```

- d. You can safely shut down the impaired controller and proceed to the shutdown procedure.

## Shut down the impaired controller - FAS9000

Shut down or take over the impaired controller using the appropriate procedure for your configuration. The FAS9000 system supports only manual boot media recovery procedures. Automated boot media recovery is not supported.

### Option 1: Most systems

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

- 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

After completing the NVE or NSE tasks, you need to complete the shutdown of the impaired node. NOTE: 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.
Waiting for giveback...	Press Ctrl-C, and then respond <i>y</i> when prompted.
System prompt or password prompt (enter system password)	<p>Take over or halt the impaired controller from the healthy controller:  <code>storage failover takeover -ofnode <i>impaired_node_name</i></code></p> <p>When the impaired controller shows Waiting for giveback..., press Ctrl-C, and then respond <i>y</i>.</p>

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

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



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

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If the impaired controller is displaying...	Then...
The LOADER prompt	Go to the next step.
Waiting for giveback...	Press Ctrl-C, and then respond <i>y</i> when prompted.

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

## Replace the boot media - FAS9000

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. The FAS9000 system supports only manual boot media recovery procedures. Automated boot media recovery is not supported.

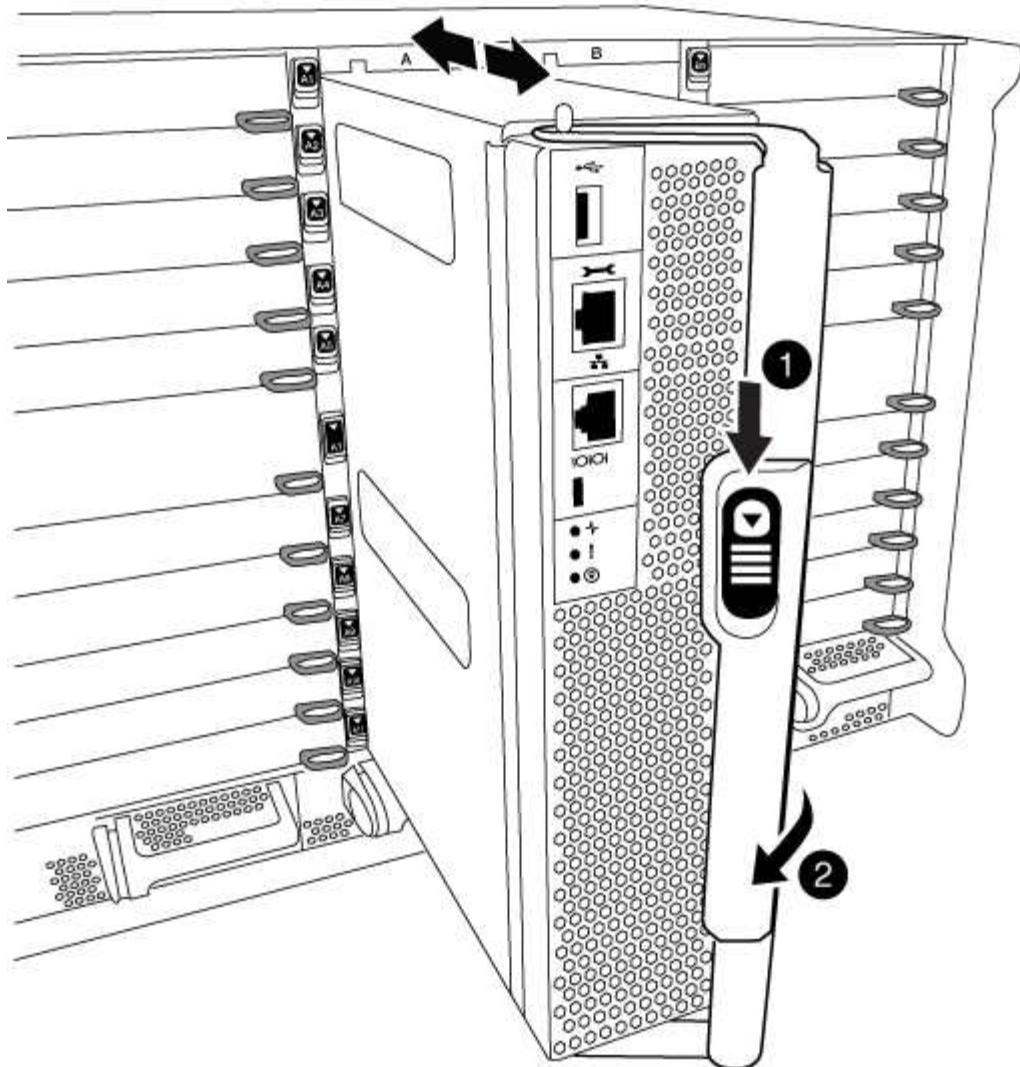
To replace the boot media, you must remove the impaired controller module, install the replacement boot media, and transfer the boot image to a USB flash drive.

### Step 1: Remove the controller

To access components inside the controller, you must first remove the controller module from the system and then remove the cover on the controller module.

#### Steps

1. If you are not already grounded, properly ground yourself.
2. Unplug the cables from the impaired controller module, and keep track of where the cables were connected.
3. Slide the orange button on the cam handle downward until it unlocks.



1

Cam handle release button

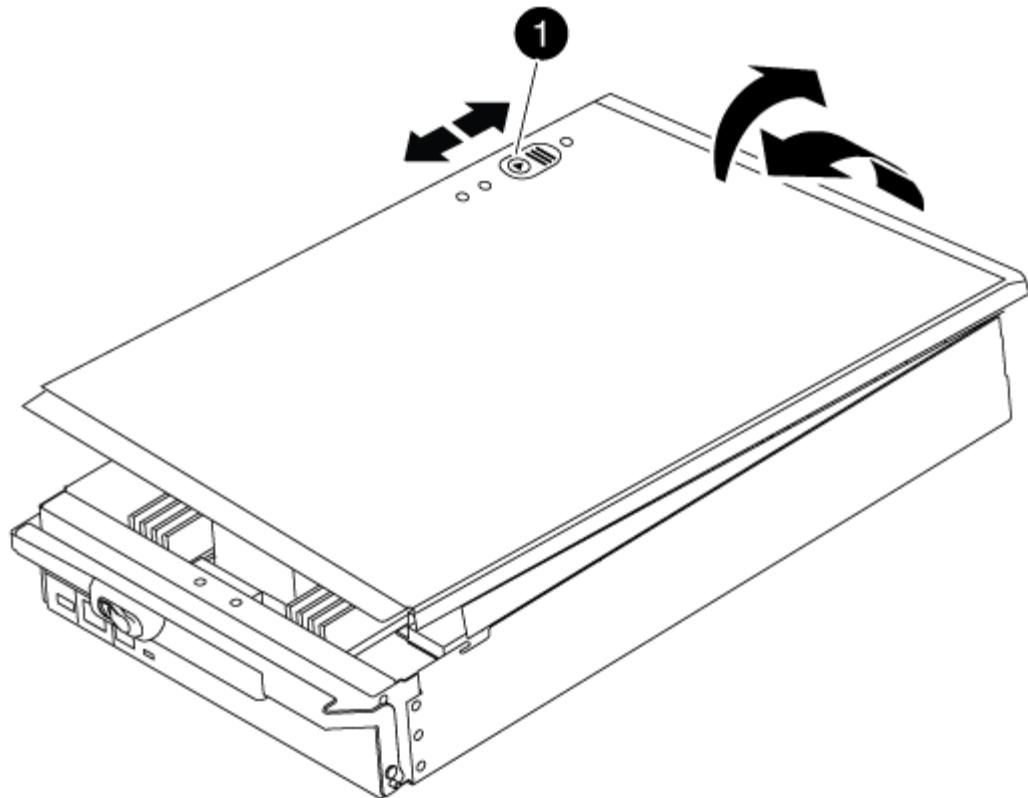
2

Cam handle

4. Rotate the cam handle so that it completely disengages the controller module from the chassis, and then 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.

5. Place the controller module lid-side up on a stable, flat surface, press the blue button on the cover, slide the cover to the back of the controller module, and then swing the cover up and lift it off of the controller module.

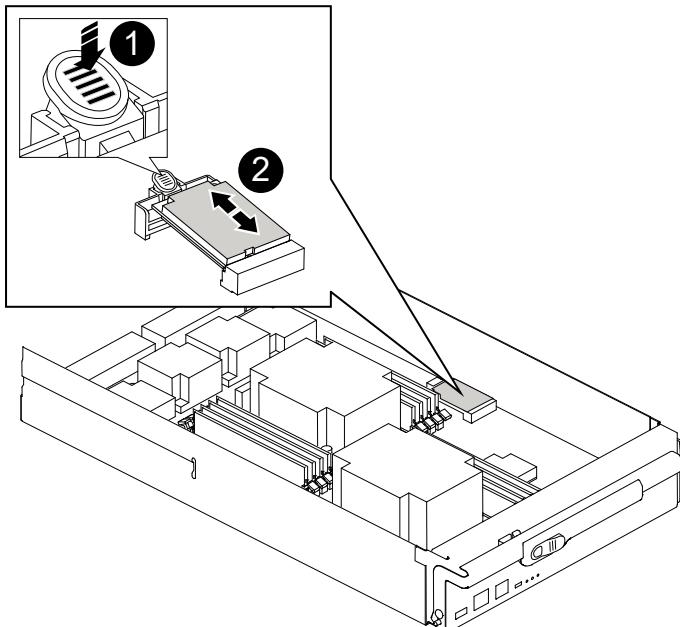


1

Controller module cover locking button

## Step 2: Replace the boot media

Locate the boot media using the following illustration or the FRU map on the controller module:



1

Press release tab

2

Boot media

1. Press the blue button on the boot media housing to release the boot media from its housing, and then gently pull it straight out of the boot media socket.



Do not twist or pull the boot media straight up, because this could damage the socket or the boot media.

2. Align the edges of the replacement boot media with the boot media socket, and then gently push it into the socket.
3. Check the boot media to make sure that it is seated squarely and completely in the socket.

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

4. Push the boot media down to engage the locking button on the boot media housing.
5. Reinstall the controller module lid by aligning the pins on the lid with the slots on the motherboard carrier, and then slide the lid into place.

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

You can install the system image to the replacement boot media using a USB flash drive with the image installed on it. However, you must restore the `var` file system during this procedure.

- You must have a USB flash drive, formatted to 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 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. Align the end of the controller module with the opening in the chassis, and then gently push the controller module halfway into the system.
2. Recable the controller module, as needed.
3. 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.

4. Push the controller module all the way into the system, making sure that the cam handle clears the USB flash drive, firmly push the cam handle to finish seating the controller module, and then push the cam handle to the closed position.

The node begins to boot as soon as it is completely installed into the chassis.

5. Interrupt the boot process to stop at the LOADER prompt by pressing Ctrl-C when you see Starting AUTOBOOT press Ctrl-C to abort....

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

6. Set your network connection type at the LOADER prompt:

- If you are configuring DHCP: `ifconfig e0a -auto`



The target port you configure is the target port you use to communicate with the impaired node from the healthy node during `var` file system restore with a network connection. You can also use the `e0M` port in this command.

- If you are configuring manual connections: `ifconfig e0a -addr=filer_addr -mask=netmask -gw=gateway-dns=dns_addr-domain=dns_domain`
  - `filer_addr` is the IP address of the storage system.
  - `netmask` is the network mask of the management network that is connected to the HA partner.
  - `gateway` is the gateway for the network.
  - `dns_addr` is the IP address of a name server on your network.
  - `dns_domain` is the Domain Name System (DNS) domain name.

If you use this optional parameter, you do not need a fully qualified domain name in the netboot server URL. You need only the server's host name.



Other parameters might be necessary for your interface. You can enter `help ifconfig` at the firmware prompt for details.

7. 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 - FAS9000

The procedure for booting the impaired node from the recovery image depends on whether the system is in a two-node MetroCluster configuration. The FAS9000 system supports only manual boot media recovery procedures. Automated boot media recovery is not supported.

The procedure for booting the impaired node from the recovery image depends on whether the system is in a two-node MetroCluster configuration.

### Option 1: Boot the recovery image in most systems

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

This procedure applies to systems that are not in a two-node MetroCluster configuration.

#### 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:

If your system has...	Then...
A network connection	<ol style="list-style-type: none"> <li data-bbox="638 171 1416 206">a. Press <code>y</code> when prompted to restore the backup configuration.</li> <li data-bbox="638 228 1334 297">b. Set the healthy node to advanced privilege level: <code>set -privilege advanced</code></li> <li data-bbox="638 318 1449 424">c. Run the restore backup command: <code>system node restore-backup -node local -target-address <i>impaired_node_IP_address</i></code></li> <li data-bbox="638 445 1405 481">d. Return the node to admin level: <code>set -privilege admin</code></li> <li data-bbox="638 502 1388 538">e. Press <code>y</code> when prompted to use the restored configuration.</li> <li data-bbox="638 559 1209 595">f. Press <code>y</code> when prompted to reboot the node.</li> </ol>
No network connection	<ol style="list-style-type: none"> <li data-bbox="638 648 1416 684">a. Press <code>n</code> when prompted to restore the backup configuration.</li> <li data-bbox="638 705 1302 741">b. Reboot the system when prompted by the system.</li> <li data-bbox="638 762 1481 832">c. Select the <b>Update flash from backup config</b> (sync flash) option from the displayed menu.</li> </ol> <p data-bbox="670 853 1372 889">If you are prompted to continue with the update, press <code>y</code>.</p>

If your system has...	Then...
No network connection and is in a MetroCluster IP configuration	<p>a. Press <b>n</b> when prompted to restore the backup configuration.</p> <p>b. Reboot the system when prompted by the system.</p> <p>c. Wait for the iSCSI storage connections to connect.</p> <p>You can proceed after you see the following messages:</p> <pre>date-and-time [node- name:iscsi.session.stateChanged:notice]: iSCSI session state is changed to Connected for the target iSCSI-target (type: dr_auxiliary, address: ip-address). date-and-time [node- name:iscsi.session.stateChanged:notice]: iSCSI session state is changed to Connected for the target iSCSI-target (type: dr_partner, address: ip-address). date-and-time [node- name:iscsi.session.stateChanged:notice]: iSCSI session state is changed to Connected for the target iSCSI-target (type: dr_auxiliary, address: ip-address). date-and-time [node- name:iscsi.session.stateChanged:notice]: iSCSI session state is changed to Connected for the target iSCSI-target (type: dr_partner, address: ip-address).</pre> <p>d. Select the <b>Update flash from backup config</b> (sync flash) option from the displayed menu.</p> <p>If you are prompted to continue with the update, press <b>y</b>.</p>

4. Ensure that the environmental variables are set as expected:

- Take the node to the LOADER prompt.
- Check the environment variable settings with the `printenv` command.
- If an environment variable is not set as expected, modify it with the `setenv environment-variable-name changed-value` command.
- Save your changes using the `savenv` command.

5. The next depends on your system configuration:

- If your system has onboard keymanager, NSE or NVE configured, go to [Restore OKM, NSE, and NVE as needed](#)

- If your system does not have onboard keymanager, NSE or NVE configured, complete the steps in this section.

6. From the LOADER prompt, enter the `boot_ontap` command.

<b>*If you see...</b>	<b>Then...*</b>
The login prompt	Go to the next Step.
Waiting for giveback...	<ol style="list-style-type: none"> <li>Log into the partner node.</li> <li>Confirm the target node is ready for giveback with the <code>storage failover show</code> command.</li> </ol>

7. Connect the console cable to the partner node.

8. Give back the node using the `storage failover giveback -fromnode local` command.

9. At the cluster prompt, check the logical interfaces with the `net int -is-home false` command.

If any interfaces are listed as "false", revert those interfaces back to their home port using the `net int revert` command.

10. Move the console cable to the repaired node and run the `version -v` command to check the ONTAP versions.

11. Restore automatic giveback if you disabled it by using the `storage failover modify -node local -auto-giveback true` command.

## Option 2: Boot the recovery image in a two-node MetroCluster configuration

You must boot the ONTAP image from the USB drive and verify the environmental variables.

This procedure applies to systems in a two-node MetroCluster configuration.

### 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. After the image is installed, start the restoration process:
  - a. Press `n` when prompted to restore the backup configuration.
  - b. Press `y` when prompted to reboot to start using the newly installed software.

You should be prepared to interrupt the boot process when prompted.
4. As the system boots, press `Ctrl-C` after you see the `Press Ctrl-C for Boot Menu` message., and when the Boot Menu is displayed select option 6.
5. Verify that the environmental variables are set as expected.
  - a. Take the node to the LOADER prompt.

- b. Check the environment variable settings with the `printenv` command.
- c. If an environment variable is not set as expected, modify it with the `setenv environment-variable-name changed-value` command.
- d. Save your changes using the `savenv` command.
- e. Reboot the node.

## Switch back aggregates in a two-node MetroCluster configuration - FAS9000

After completing the boot media replacement, perform the MetroCluster switchback operation. The FAS9000 system supports only manual boot media recovery procedures. Automated boot media recovery is not supported.

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          Configuration  DR
Group Cluster Node  State      Mirroring Mode
-----  -----  -----
-----  -----
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 - FAS9000

Restore encryption on the replacement boot media. The FAS9000 system supports only manual boot media recovery procedures. Automated boot media recovery is not supported.

Complete the appropriate steps to restore encryption on your system based on your key manager type. If you are unsure which key manager your system uses, check the settings you captured at the beginning of the boot media replacement procedure.

## Onboard Key Manager (OKM)

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

### Before you begin

Ensure you have the following information available:

- Cluster-wide passphrase entered while [enabling onboard key management](#)
- [Backup information for the Onboard Key Manager](#)
- Verification that you have the correct passphrase and backup data using the [How to verify onboard key management backup and cluster-wide passphrase](#) procedure

### Steps

#### On the impaired controller:

1. Connect the console cable to the impaired controller.
2. From the ONTAP boot menu, select the appropriate option:

ONTAP version	Select this option
ONTAP 9.8 or later	<p>Select option 10.</p> <p><b>Show example boot menu</b></p> <div style="border: 1px solid #ccc; padding: 10px; width: fit-content; margin: 10px auto; border-radius: 10px;"><p>Please choose one of the following:</p><p>(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.</p><p>Selection (1-11)? 10</p></div>

ONTAP version	Select this option
ONTAP 9.7 and earlier	<p>Select the hidden option <code>recover_onboard_keymanager</code></p> <p><b>Show example boot menu</b></p> <div style="border: 1px solid #ccc; padding: 10px; border-radius: 10px; background-color: #f9f9f9;"> <p style="margin: 0;">Please choose one of the following:</p> <ul style="list-style-type: none"> <li>(1) Normal Boot.</li> <li>(2) Boot without /etc/rc.</li> <li>(3) Change password.</li> <li>(4) Clean configuration and initialize all disks.</li> <li>(5) Maintenance mode boot.</li> <li>(6) Update flash from backup config.</li> <li>(7) Install new software first.</li> <li>(8) Reboot node.</li> <li>(9) Configure Advanced Drive Partitioning.</li> </ul> <p style="margin: 0;">Selection (1-19)?</p> <p style="margin: 0;"><code>recover_onboard_keymanager</code></p> </div>

3. Confirm that you want to continue the recovery process when prompted:

**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 does 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, including the dashes.

## Show example prompt

Enter the backup data:

```
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
AA  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
AA  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
AA  
0123456789012345678901234567890123456789012345678901  
23  
1234567890123456789012345678901234567890123456789012  
34  
2345678901234567890123456789012345678901234567890123  
45  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
AA  
AAAAAAAAAAAAAAAAAAAAAA  
AA  
AAAAAAAAAAAAAAAAAAAAAA  
AA  
-----END  
BACKUP-----
```

- b. Press Enter twice at the end of the input.

The recovery process completes and displays the following message:

Successfully recovered keymanager secrets.

### 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)

**On the partner controller:**

8. Giveback the impaired controller:

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

**On the impaired controller:**

9. After booting with only the CFO aggregate, synchronize the key manager:

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

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

## 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. Verify that all keys are synced:

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

The command should return no results. If any results appear, repeat the sync command until no results are returned.

### On the partner controller:

### 12. Giveback the impaired controller:

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

### 13. Restore automatic giveback if you disabled it:

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

### 14. If AutoSupport is enabled, restore automatic case creation:

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

## External Key Manager (EKM)

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

### Before you begin

Gather the following files from another cluster node or from your backup:

- /cfcard/kmip/servers.cfg file or the KMIP server address and port
- /cfcard/kmip/certs/client.crt file (client certificate)
- /cfcard/kmip/certs/client.key file (client key)
- /cfcard/kmip/certs/CA.pem file (KMIP server CA certificates)

## Steps

### On the impaired controller:

1. Connect the console cable to the impaired 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. Confirm you have gathered the required information when prompted:

#### 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. Enter the client and server information when prompted:

- a. Enter the client certificate (client.crt) file contents, including the BEGIN and END lines.
- b. Enter the client key (client.key) file contents, including the BEGIN and END lines.
- c. Enter the KMIP server CA(s) (CA.pem) file contents, including the BEGIN and END lines.
- d. Enter the KMIP server IP address.
- e. Enter the KMIP server port (press Enter to use the default port 5696).

**Show example**

```
Enter the client certificate (client.crt) file contents:  
-----BEGIN CERTIFICATE-----  
<certificate_value>  
-----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-----  
<certificate_value>  
-----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
```

The recovery process completes and displays the following message:

```
Successfully recovered keymanager secrets.
```

**Show example**

```
System is ready to utilize external key manager(s).  
Trying to recover keys from key servers....  
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:

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

7. If AutoSupport is enabled, restore automatic case creation:

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

## Return the failed part to NetApp - FAS9000

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. The FAS9000 system supports only manual boot media recovery procedures. Automated boot media recovery is not supported.

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