Boot media

Install and maintain

NetApp
February 13, 2026

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Boot media

Overview of boot media replacement - AFF A320

The AFF A320 system supports only manual boot media recovery procedures.

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 - AFF A320

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 AFF A320 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 `1Ono-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	`security key-manager keystore show` • If EKM is enabled, `EKM` is listed in the command output. • If OKM is enabled, `OKM` is listed in the command output. • If no key manager is enabled, `No key manager keystores configured` is listed in the command output.
ONTAP 9.13.1 or earlier	`security key-manager show-key-store` • If EKM is enabled, `external` is listed in the command output. • If OKM is enabled, `onboard` is listed in the command output. • If no key manager is enabled, `No key managers configured` is listed in the command output.

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):

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

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

   b. 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 node - AFF A320

After completing the NVE or NSE tasks, you need to complete the shutdown of the impaired node. Shut down or take over the impaired controller using the appropriate procedure for your configuration. The AFF A320 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 `y` when prompted.
System prompt or password prompt (enter system password)	Take over or halt the impaired controller from the healthy controller: `storage failover takeover -ofnode impaired_node_name` When the impaired controller shows Waiting for giveback…, press Ctrl-C, and then respond `y`.

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: System is in a MetroCluster

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

Replace the boot media - AFF A320

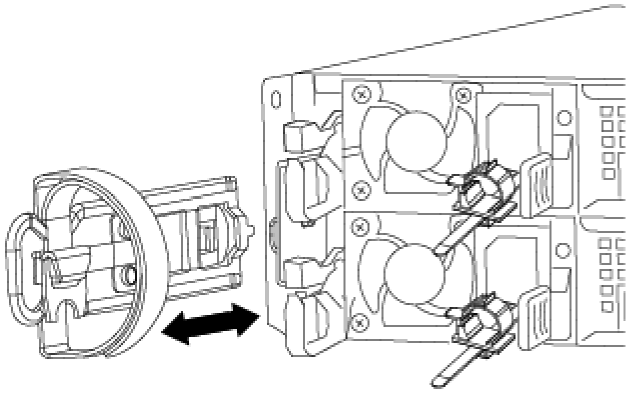
To replace the boot media, you must remove the impaired controller module, install the replacement boot media, and transfer the boot image to a USB flash drive. The AFF A320 system supports only manual boot media recovery procedures. Automated boot media recovery is not supported.

Step 1: Remove the controller module

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

Steps

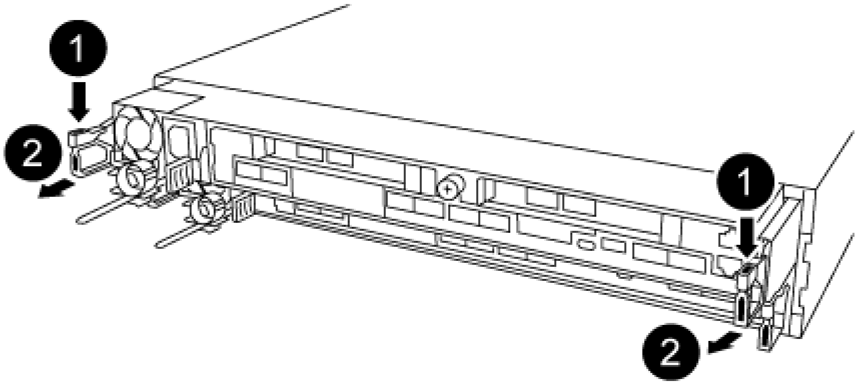
1. If you are not already grounded, properly ground yourself.
2. Unplug the controller module power supply from the power source.
3. Loosen the hook and loop strap binding the cables to the cable management device, and then unplug the system cables and SFPs (if needed) from the controller module, keeping 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 and set aside the cable management devices from the left and right sides of the controller module.

5. Remove the controller module from the chassis:



   a. Insert your forefinger into the latching mechanism on either side of the controller module.
   b. Press down on the orange tab on top of the latching mechanism until it clears the latching pin on the chassis.

      The latching mechanism hook should be nearly vertical and should be clear of the chassis pin.

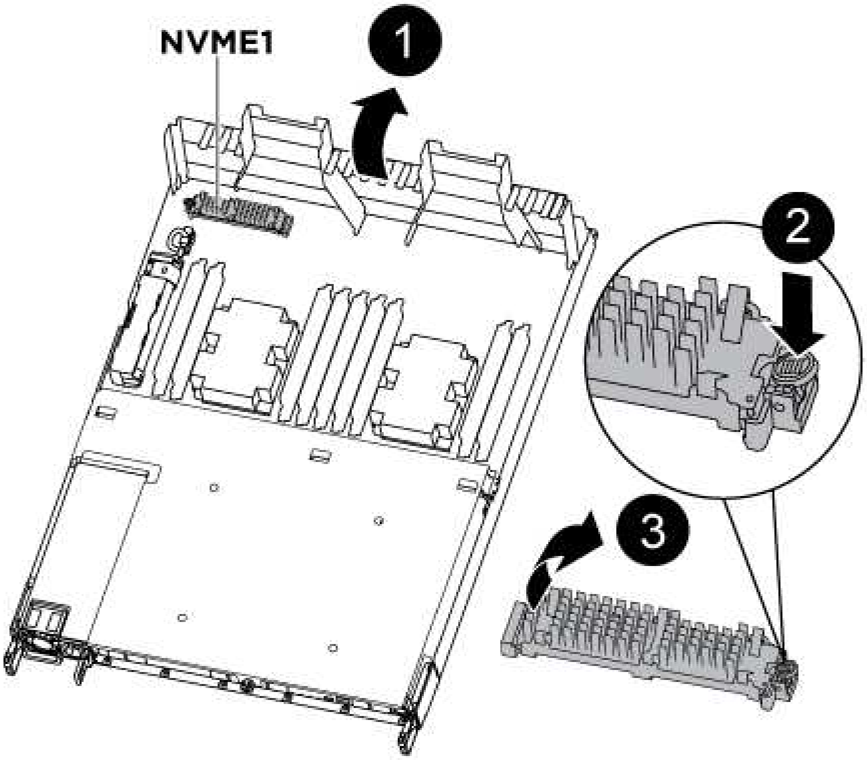
   c. Gently pull the controller module a few inches toward you so that you can grasp the controller module sides.
   d. Using both hands, gently pull the controller module out of the chassis and set it on a flat, stable surface.

Step 2: Replace the boot media

You must locate the boot media in the controller module, and then follow the directions to replace it.

Steps

1. Open the air duct and locate the boot media using the following illustration or the FRU map on the controller module:
2. Locate and remove the boot media from the controller module:



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.

1. 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.

3. 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.

4. Close the air duct.

Step 3: Transfer the boot image using a USB flash drive

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.

- 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 reinstallation of the controller module:
   a. Make sure the latch arms are locked in the extended position.
   b. Using the latch arms, push the controller module into the chassis bay until it stops.

      ⓘ Do not push down on the latching mechanism at the top of the latch arms. Doing so with raise the locking mechanism and prohibit sliding the controller module into the chassis.

   c. Press down and hold the orange tabs on top of the latching mechanism.
   d. Gently push the controller module into the chassis bay until it is flush with the edges of the chassis.

> The latching mechanism arms slide into the chassis.

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

e. Release the latches to lock the controller module into place.

f. 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 node to boot to LOADER.

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

   The image is downloaded from the USB flash drive.

10. When prompted, either enter the name of the image or accept the default image displayed inside the brackets on your screen.
11. After the image is installed, start the restoration process:
    a. Record the IP address of the impaired node that is displayed on the screen.

    b. Press `y` when prompted to restore the backup configuration.

    c. Press `y` when prompted to overwrite /etc/ssh/ssh_host_dsa_key.
12. From the partner node in advanced privilege level, start the configuration synchronization using the IP address recorded in the previous step: `system node restore-backup -node local -target -address` *`impaired_node_IP_address`*
13. If the restore is successful, press `y` on the impaired node when prompted to use the restored copy?.
14. Press `y` when you see confirm backup procedure was successful, and then press `y` when prompted to reboot the node.
15. Verify that the environmental variables are set as expected.
    a. Take the node to the LOADER prompt.

    From the ONTAP prompt, you can issue the command system node halt -skip-lif-migration-before -shutdown true -ignore-quorum-warnings true -inhibit-takeover true.

    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.
16. With the rebooted impaired node displaying the `Waiting for giveback…` message, perform a giveback from the healthy node:

If your system is in…	Then…
An HA pair	After the impaired node is displaying the `Waiting for giveback…` message, perform a giveback from the healthy node: a. From the healthy node: `storage failover giveback -ofnode partner_node_name` The impaired node takes back its storage, finishes booting, and then reboots and is again taken over by the healthy node. ⓘ If the giveback is vetoed, you can consider overriding the vetoes. HA pair management b. Monitor the progress of the giveback operation by using the `storage failover show-giveback` command. c. After the giveback operation is complete, confirm that the HA pair is healthy and that takeover is possible by using the `storage failover show` command. d. Restore automatic giveback if you disabled it using the storage failover modify command.

17. Exit advanced privilege level on the healthy node.

Boot the recovery image - AFF A320

You must boot the ONTAP image from the USB drive, restore the file system, and verify the environmental variables. The AFF A320 system supports only manual boot media recovery procedures. Automated boot media recovery is not supported.

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	a. Press `y` when prompted to restore the backup configuration. b. Set the healthy node to advanced privilege level: `set -privilege advanced` c. Run the restore backup command: `system node restore-backup -node local -target-address impaired_node_IP_address` d. Return the node to admin level: `set -privilege admin` e. Press `y` when prompted to use the restored configuration. f. Press `y` when prompted to reboot the node.
No network connection	a. Press `n` when prompted to restore the backup configuration. b. Reboot the system when prompted by the system. c. Select the **Update flash from backup config** (sync flash) option from the displayed menu. If you are prompted to continue with the update, press **`y`**.

If your system has…	Then…

No network connection and is in a MetroCluster IP configuration	a. Press `n` when prompted to restore the backup configuration.
	b. Reboot the system when prompted by the system.
	c. Wait for the iSCSI storage connections to connect.
	You can proceed after you see the following messages:
	`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).`
	d. Select the **Update flash from backup config** (sync flash) option from the displayed menu.
	If you are prompted to continue with the update, press **`y`**.

4. Ensure 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.
5. The next depends on your system configuration:
    - If your system has onboard keymanager, NSE or NVE configured, go to Post boot media replacement steps for OKM, NSE, and NVE

- 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.

If you see…	Then…
The login prompt	Go to the next Step.
Waiting for giveback…	a. Log into the partner node. b. Confirm the target node is ready for giveback with the `storage failover show` command.

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.

Restore encryption - AFF A320

Restore encryption on the replacement boot media. The AFF A320 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:

<table>
<tr><th>ONTAP version</th><th>Select this option</th></tr>
<tr><td>ONTAP 9.8 or later</td><td>

Select option 10.

Show example boot menu

```
Please choose one of the following:

(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)? 10
```

</td></tr>
</table>

ONTAP version	Select this option

ONTAP 9.7 and earlier	Select the hidden option `recover_onboard_keymanager`
	Show example boot menu
	`Please choose one of the following:`
	
	`(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.`
	`Selection (1-19)? recover_onboard_keymanager`

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:

--------------------------BEGIN
BACKUP--------------------------
01234567890123456789012345678901234567890123456789012345678901
23
12345678901234567890123456789012345678901234567890123456789012
34
23456789012345678901234567890123456789012345678901234567890123
45
34567890123456789012345678901234567890123456789012345678901234
56
45678901234567890123456789012345678901234567890123456789012345
67
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
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AA
01234567890123456789012345678901234567890123456789012345678901
23
12345678901234567890123456789012345678901234567890123456789012
34
23456789012345678901234567890123456789012345678901234567890123
45
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
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 - AFF A320

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 AFF A320 system supports only manual boot media recovery procedures.

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