



Controller

Install and maintain

NetApp

February 02, 2026

This PDF was generated from <https://docs.netapp.com/us-en/ontap-systems/asa-c800/controller-replace-workflow.html> on February 02, 2026. Always check docs.netapp.com for the latest.

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Controller

Controller replacement workflow - ASA C800

Replace the controller in your ASA C800 storage system by shutting down the impaired controller, removing and replacing the controller, restoring the system configuration, and returning control of storage resources to the replacement controller.

1

Review the requirements to replace the controller

Review the controller replacement requirements, including system compatibility, required tools, ONTAP credentials, and component functionality verification.

2

Shut down the impaired controller

Shut down or take over the impaired controller so that the healthy controller continues to serve data from the impaired controller storage.

3

Replace the controller

Remove the impaired controller, move the FRU components to the replacement controller module, and install the replacement controller module in the enclosure.

4

Restore and verify the system configuration

Verify the low-level system configuration of the replacement controller and reconfigure system settings as necessary.

5

Reable and give back the controller

Reable the controller and transfer the ownership of storage resources back to the replacement controller.

6

Complete controller replacement

Verify the LIFs, check cluster health, and return the failed part to NetApp.

Requirements to replace the controller - ASA C800

Before replacing the controller of your ASA C800 system, ensure you meet the necessary requirements for a successful replacement. This includes verifying all other components in the system are functioning properly, verifying that you have the correct replacement controller, and saving the controller's console output to a text log file.

Review the requirements for replacing the controller module.

- All drive shelves must be working properly.
- The healthy controller must be able to take over the controller being replaced (referred to in this procedure as the impaired controller).
- Do not use this procedure for controller upgrades. Refer to [Choose your controller hardware upgrade procedure](#) for guidance.
- If your system is in a MetroCluster configuration, review [Choosing the correct recovery procedure](#) to determine whether to use this procedure.
- Replace the failed component with the field-replaceable unit (FRU) you received from NetApp.
- Replace the controller module with a controller module of the same model type. You cannot upgrade your system by replacing the controller module.
- You cannot change drives or drive shelves as part of this procedure.
- The boot device is located on the System Management module installed in the back of the system. You do not need to move the boot device when replacing a controller module.
- Understand the controller terminology used in this procedure:
 - The *impaired* controller is the controller being replaced.
 - The *replacement* controller is the new controller replacing the impaired controller.
 - The *healthy* controller is the surviving controller.
- Capture the controller's console output to a text log file.

This provides a record of the procedure to troubleshoot any issues during the replacement process.

What's next?

After you've reviewed the requirements to replace your ASA C800 controller, you need to [shut down the impaired controller](#).

Shut down the impaired controller - ASA C800

Shut down the controller in your ASA C800 storage system to prevent data loss and ensure system stability when replacing the controller.

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.

About this task

- If you have a SAN system, you must have checked event messages (`cluster kernel-service show`) for the impaired controller SCSI blade. The `cluster kernel-service show` command (from priv advanced mode) displays the node name, [quorum status](#) of that node, availability status of that node, and operational status of that node.

Each SCSI-blade process should be in quorum with the other nodes in the cluster. Any issues must be resolved before you proceed with the replacement.

- 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](#).

Steps

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

```
system node autosupport invoke -node * -type all -message MAINT=<# of hours>h
```

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:

- a. Enter the following command from the console of the healthy controller:

```
storage failover modify -node impaired_node_name -auto-giveback false
```

- b. Enter *y* when you see the prompt *Do you want to disable auto-giveback?*

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	Take over or halt the impaired controller from the healthy controller: <pre>storage failover takeover -ofnode <i>impaired_node_name</i> -halt true</pre> The <i>-halt true</i> parameter brings you to the LOADER prompt.

What's next?

After you've shut down the controller, you need to [replace the controller](#).

Replace the controller module hardware - ASA C800

Replace the controller in your ASA C800 system when a hardware failure requires it. The replacement process involves removing the impaired controller, moving the components to the replacement controller, installing the replacement controller, and rebooting it.

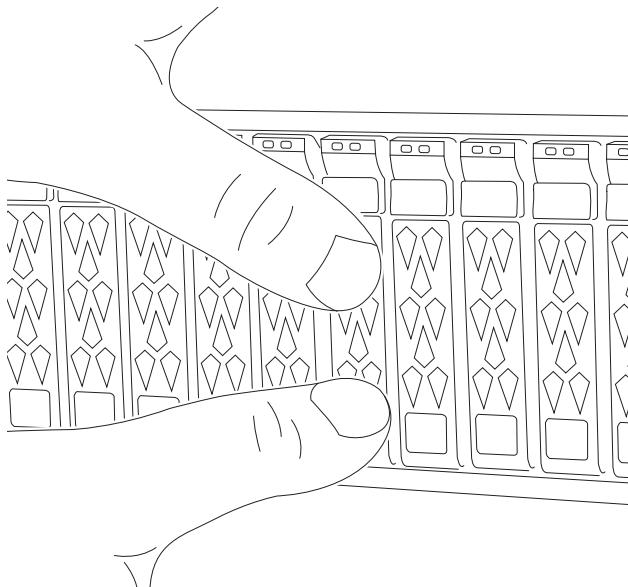
Step 1: Remove the controller module

You must remove the controller module from the chassis when you replace the controller module or replace a component inside the controller module.

Steps

1. If you are not already grounded, properly ground yourself.
2. Ensure that all drives in the chassis are firmly seated against the midplane by using your thumbs to push each drive until you feel a positive stop.

Video - Confirm drive seating



3. Check the controller drives based on the system status:

- On the healthy controller, check if any active RAID group is in a degraded state, failed state, or both:

```
storage aggregate show -raidstatus !*normal*
```

- If the command returns There are no entries matching your query. continue to [go to the next sub-step to check for missing drives](#).
- If the command returns any other results, collect the AutoSupport data from both controllers and contact NetApp Support for further assistance.

```
system node autosupport invoke -node * -type all -message  
'<message_name>'
```

- Check for missing drive issues for both the file system or spare drives:

```
event log show -severity * -node * -message-name *disk.missing*
```

- If the command returns There are no entries matching your query. continue to [go to the next step](#).
- If the command returns any other results, collect the AutoSupport data from both controllers and contact NetApp Support for further assistance.

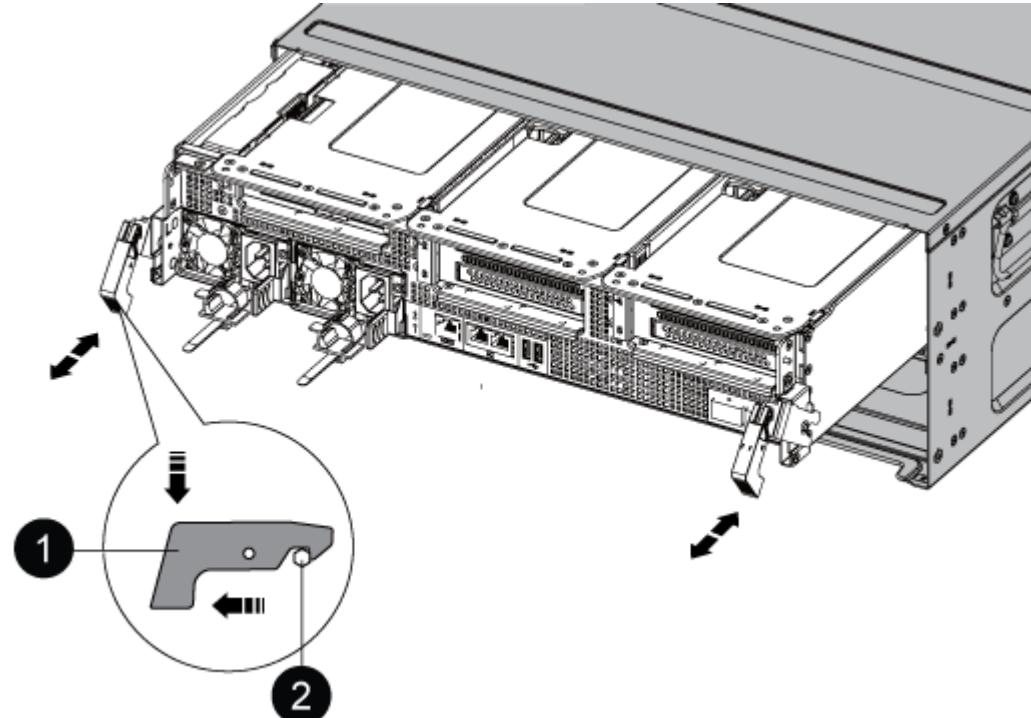
```
system node autosupport invoke -node * -type all -message  
'<message_name>'
```

4. Remove the power cable retainers, then unplug the cables from the power supplies.
5. Loosen the hook and loop strap on the cable management device. Unplug the system cables and SFP/QSFP modules (if needed) from the controller module. Note each cable's location.

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

6. Remove the cable management device from the controller module and set it aside.
7. 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.



1	Locking latch
2	Locking pin

8. Slide the controller module out of the chassis and place it on a stable, flat surface.

Support the bottom of the controller module while sliding it out of the chassis.

Step 2: Move the power supplies

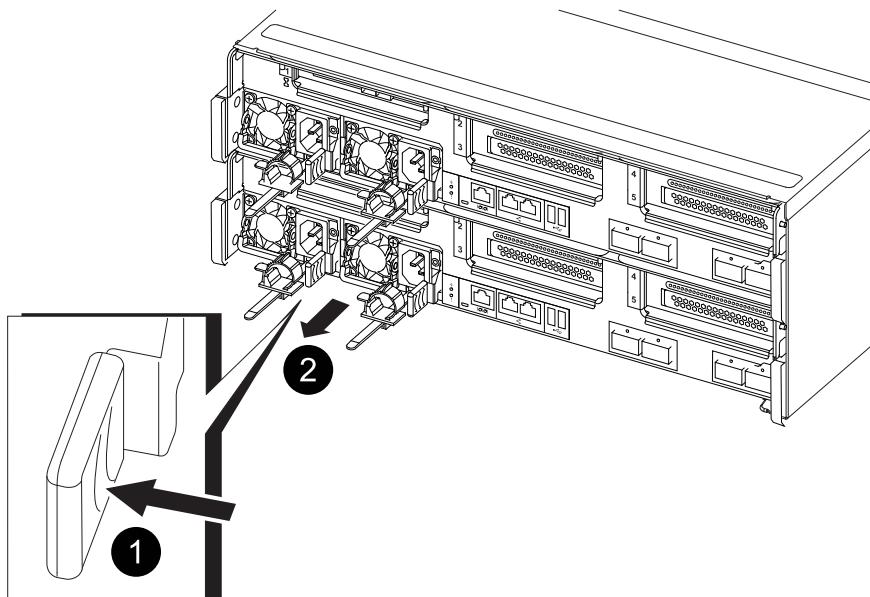
Move the power supplies to the replacement controller module.

Steps

1. Rotate the cam handle such that it can be used to pull power supply out of the controller module while pressing the locking tab.



The power supply is short. Always use two hands to support it when removing it from the controller module so that it does not suddenly swing free from the controller module and injure you.



1	Blue power supply locking tab
2	Power supply

2. Move the power supply to the new controller module, and then install it.
3. Using both hands, support and align the edges of the power supply with the opening in the controller module, and then gently push the power supply into the controller module until the locking tab clicks into place.

The power supplies will only properly engage with the internal connector and lock in place one way.



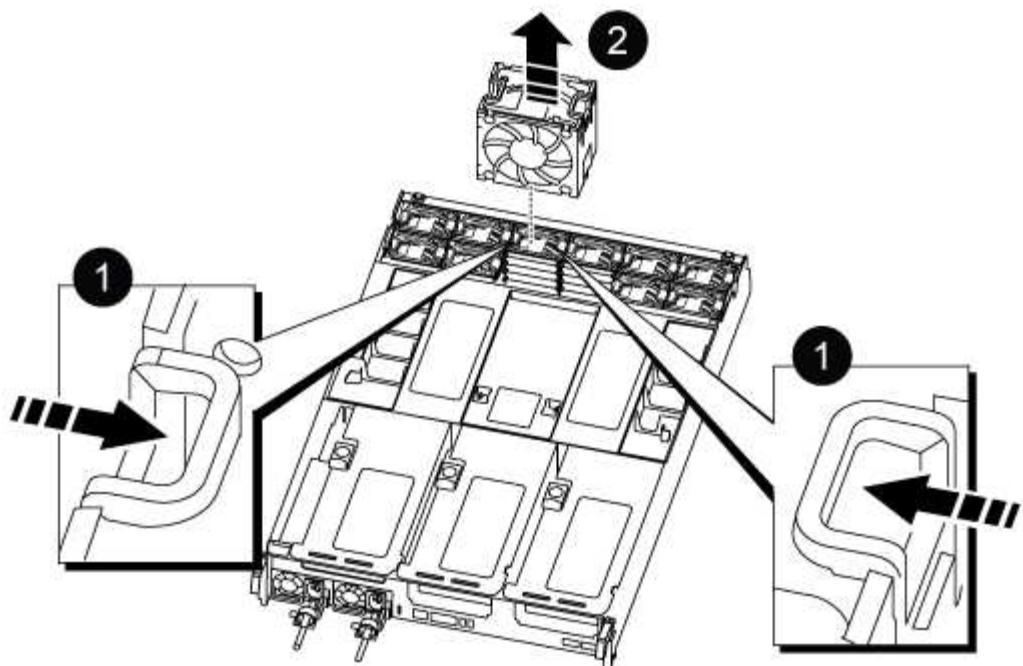
To avoid damaging the internal connector, do not use excessive force when sliding the power supply into the system.

Step 3: Move the fans

Move the fan modules to the replacement controller module.

Steps

1. Remove the fan module by pinching the locking tabs on the side of the fan module, and then lifting the fan module straight out of the controller module.



1	Fan locking tabs
2	Fan module

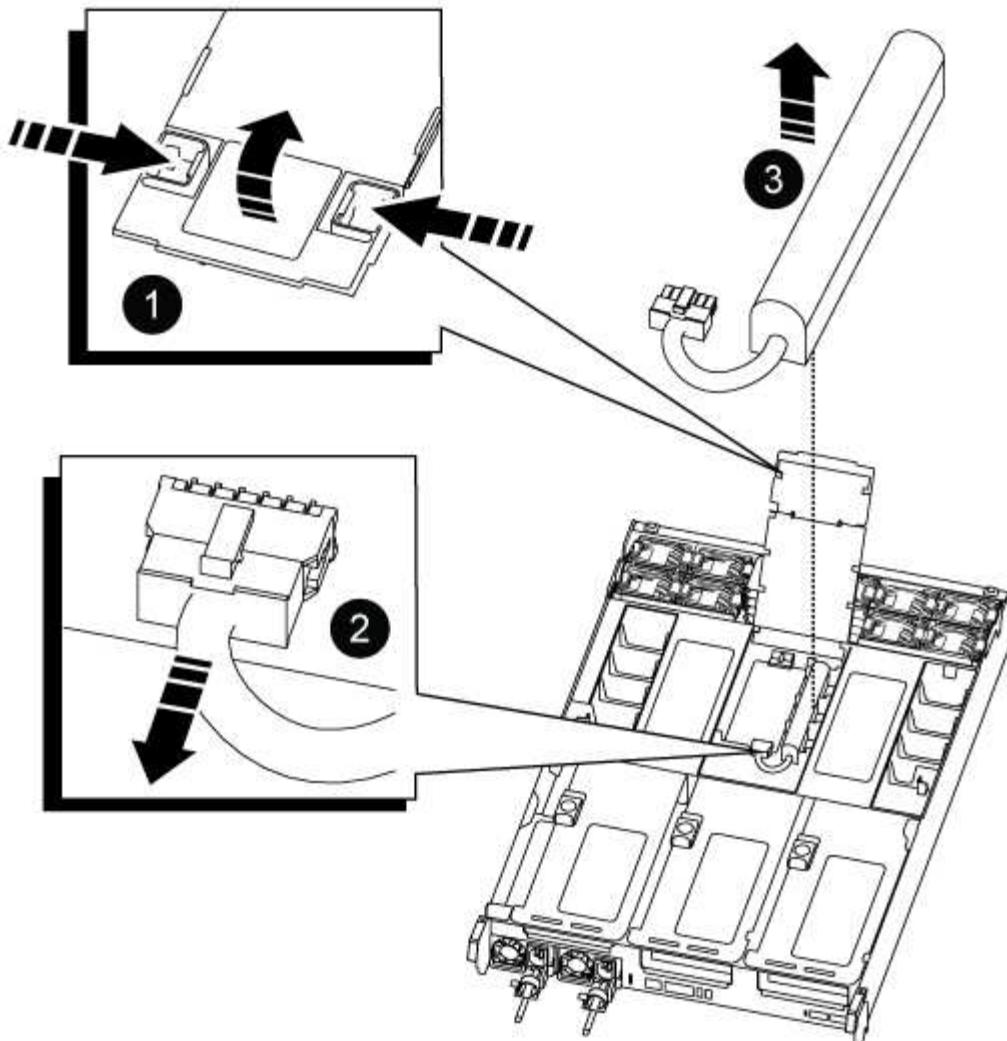
2. Move the fan module to the replacement controller module, and then install the fan module by aligning its edges with the opening in the controller module, and then sliding the fan module into the controller module until the locking latches click into place.
3. Repeat these steps for the remaining fan modules.

Step 4: Move the NVDIMM battery

Move the NVDIMM battery to the replacement controller module.

Steps

1. Open the air duct cover and locate the NVDIMM battery in the riser.



1	Air duct riser
2	NVDIMM battery plug
3	NVDIMM battery pack

Attention: The NVDIMM battery control board LED blinks while destaging contents to the flash memory when you halt the system. After the destage is complete, the LED turns off.

2. Locate the battery plug and squeeze the clip on the face of the battery plug to release the plug from the socket, and then unplug the battery cable from the socket.
3. Grasp the battery and lift the battery out of the air duct and controller module.
4. Move the battery pack to the replacement controller module and then install it in the NVDIMM air duct:
 - a. Insert the battery pack into the slot and press firmly down on the battery pack to make sure that it is locked into place.
 - b. Plug the battery plug into the riser socket and make sure that the plug locks into place.

Step 5: Remove the PCIe risers

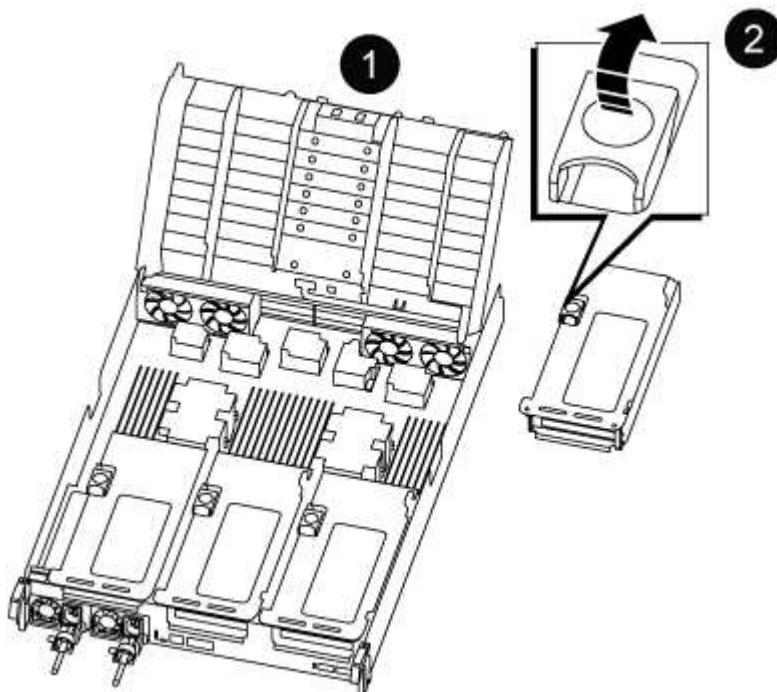
Remove the PCIe risers from the impaired controller module.

Steps

1. Remove the PCIe riser from the controller module:
 - a. Remove any SFP or QSFP modules that might be in the PCIe cards.
 - b. Rotate the riser locking latch on the left side of the riser up and toward the fan modules.

The riser raises up slightly from the controller module.

- c. Lift the riser up, shift it toward the fans so that the sheet metal lip on the riser clears the edge of the controller module, lift the riser out of the controller module, and then place it on a stable, flat surface.



1	Air duct
2	Riser 1 (left riser), Riser 2 (middle riser), and 3 (right riser) locking latches

2. Repeat the preceding step for the remaining risers in the impaired controller module.
3. Repeat the above steps with the empty risers in the replacement controller and put them away.

Step 6: Move system DIMMs

Move the system DIMMs to the replacement controller module.

Steps

1. Note the orientation of the DIMM in the socket so that you can insert the DIMM in the replacement controller module in the proper orientation.

2. Eject the DIMM from its slot by slowly pushing apart the two DIMM ejector tabs on either side of the DIMM, and then slide the DIMM out of the slot.



Carefully hold the DIMM by the edges to avoid pressure on the components on the DIMM circuit board.

3. Locate the slot where you are installing the DIMM.

4. Insert the DIMM squarely into the slot.

The DIMM fits tightly in the slot, but should go in easily. If not, realign the DIMM with the slot and reinsert it.



Visually inspect the DIMM to verify that it is evenly aligned and fully inserted into the slot.

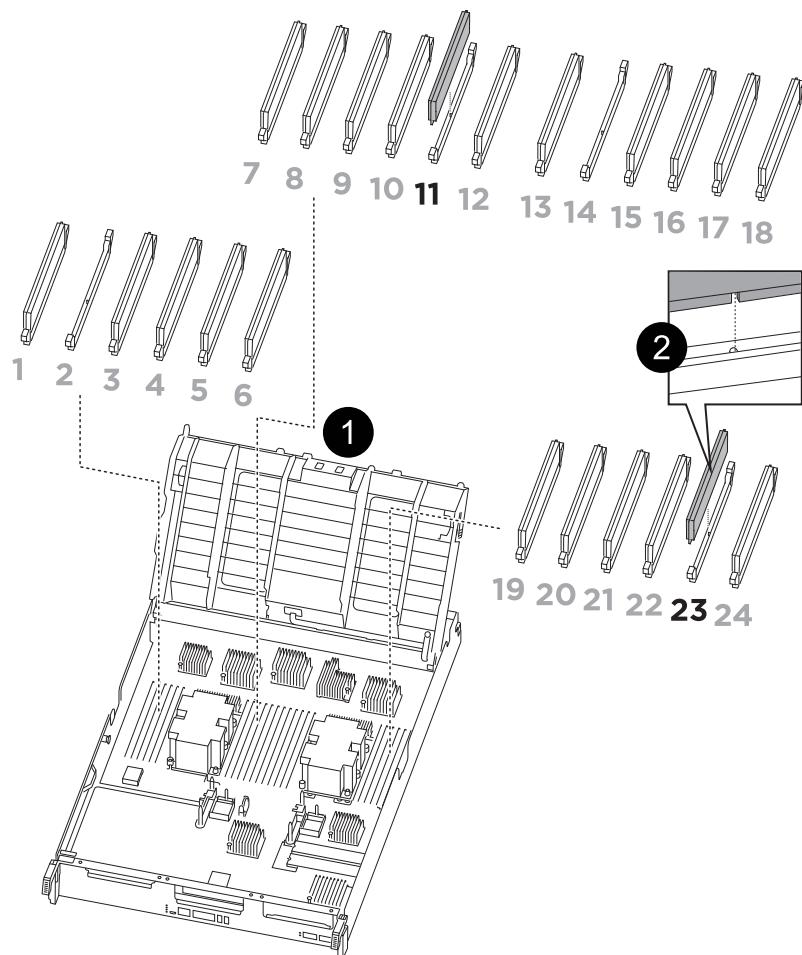
5. Push carefully, but firmly, on the top edge of the DIMM until the ejector tabs snap into place over the notches at the ends of the DIMM.
6. Repeat these steps for the remaining DIMMs.

Step 7: Move the NVDIMMs

Move the NVDIMMs to the replacement controller module.

Steps

1. Locate the NVDIMMs on your controller module.



- NVDIMM: SLOTS 11 & 23

1	Air duct
2	NVDIMMs

2. Note the orientation of the NVDIMM in the socket so that you can insert the NVDIMM in the replacement controller module in the proper orientation.
3. Eject the NVDIMM from its slot by slowly pushing apart the two NVDIMM ejector tabs on either side of the NVDIMM, and then slide the NVDIMM out of the socket and set it aside.



Carefully hold the NVDIMM by the edges to avoid pressure on the components on the NVDIMM circuit board.

4. Locate the slot where you are installing the NVDIMM.
5. Insert the NVDIMM squarely into the slot.

The NVDIMM fits tightly in the slot, but should go in easily. If not, realign the NVDIMM with the slot and reinsert it.



Visually inspect the NVDIMM to verify that it is evenly aligned and fully inserted into the slot.

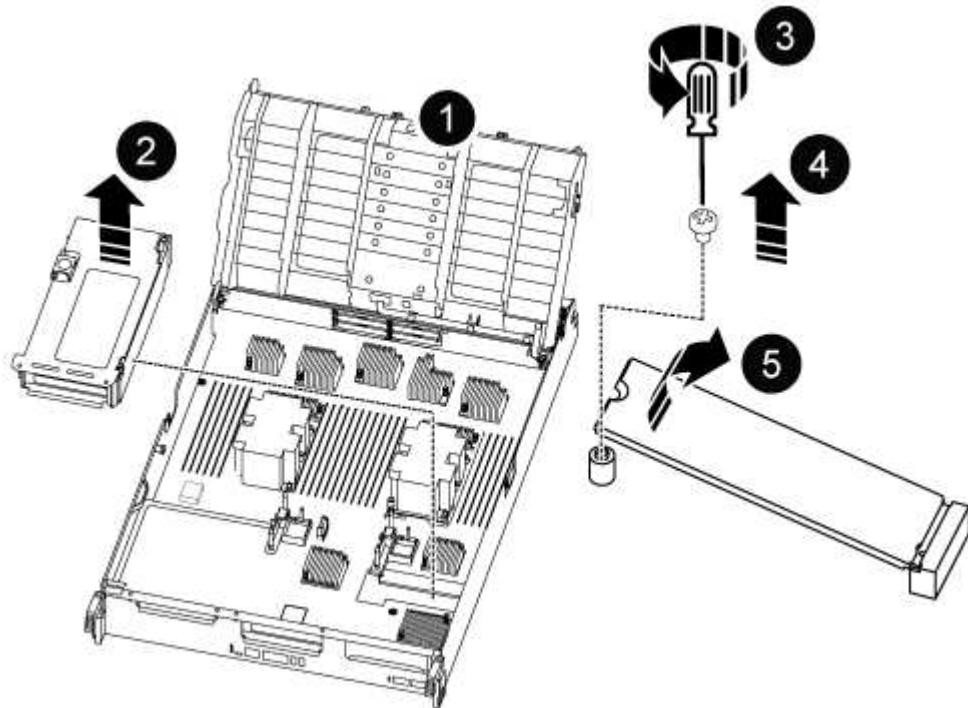
6. Push carefully, but firmly, on the top edge of the NVDIMM until the ejector tabs snap into place over the notches at the ends of the NVDIMM.
7. Repeat the preceding steps to move the other NVDIMM.

Step 8: Move the boot media

Move the boot media to the replacement controller module.

Steps

1. Locate the boot media under Riser 3.



1	Air duct
2	Riser 3
3	Phillips #1 screwdriver
4	Boot media screw
5	Boot media

2. Remove the boot media from the controller module:
 - a. Using a #1 Phillips head screwdriver, remove the screw holding down the boot media and set the screw aside in a safe place.
 - b. Grasping the sides of the boot media, gently rotate the boot media up, and then pull the boot media

straight out of the socket and set it aside.

3. Move the boot media to the new controller module and install it:

- a. Align the edges of the boot media with the socket housing, and then gently push it squarely into the socket.
- b. Rotate the boot media down toward the motherboard.
- c. Secure the boot media to the motherboard using the boot media screw.

Do not over-tighten the screw or you might damage the boot media.

Step 9: Install the PCIe risers

Install the risers in the replacement controller module.

Steps

1. Install the riser into the replacement controller module:

- a. Align the lip of the riser with the underside of the controller module sheet metal.
- b. Guide the riser along the pins in the controller module, and then lower the riser into the controller module.
- c. Swing the locking latch down and click it into the locked position.

When locked, the locking latch is flush with the top of the riser and the riser sits squarely in the controller module.

- d. Reinsert any SFP or QSFP modules that were removed from the PCIe cards.

2. Repeat the preceding step for the remaining PCIe risers.

Step 10: Install the controller module

Reinstall the controller module and reboot it.

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.



Do not completely insert the controller module in the chassis until instructed to do so.

2. Recable the system, as needed.

If you removed the media converters (QSFPs or SFPs), remember to reinstall them if you are using fiber optic cables.

3. Complete the reinstallation of the controller module:

- a. 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.

- b. Rotate the locking latches upward, tilting them so that they clear the locking pins, and then lower them into the locked position.
- c. Plug the power cords into the power supplies, reinstall the power cable locking collar, and then connect the power supplies to the power source.

The controller module begins to boot as soon as power is restored. Be prepared to interrupt the boot process.

- d. If you have not already done so, reinstall the cable management device.

4. Return the impaired controller to normal operation by giving back its storage:

```
storage failover giveback -ofnode impaired_node_name.
```

5. If automatic giveback was disabled, reenable it:

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

6. If AutoSupport is enabled, restore/unsuppress automatic case creation:

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

What's next?

After you've replaced the impaired ASA C800 controller, you need to [restore the system configuration](#)

Restore and verify the system configuration - ASA C800

Return control of storage resources to the replacement controller so your ASA C800 system can resume normal operation. The give back procedure varies based on the encryption type used by your system: no encryption or Onboard Key Manager (OKM) encryption.

After completing the hardware replacement and booting to Maintenance mode, you verify the low-level system configuration of the replacement controller and reconfigure system settings as necessary.

Step 1: Set and verify system time

You should check the time and date on the replacement controller module against the healthy controller module in an HA pair, or against a reliable time server in a stand-alone configuration. If the time and date do not match, you must reset them on the replacement controller module to prevent possible outages on clients due to time differences.

About this task

It is important that you apply the commands in the steps on the correct systems:

- The *replacement* node is the new node that replaced the impaired node as part of this procedure.
- The *healthy* node is the HA partner of the *replacement* node.

Steps

1. If the *replacement* node is not at the LOADER prompt, halt the system to the LOADER prompt.
2. On the *healthy* node, check the system time: `cluster date show`

The date and time are based on the configured timezone.

3. At the LOADER prompt, check the date and time on the *replacement* node: `show date`

The date and time are given in GMT.

4. If necessary, set the date in GMT on the replacement node: `set date mm/dd/yyyy`
5. If necessary, set the time in GMT on the replacement node: `set time hh:mm:ss`
6. At the LOADER prompt, confirm the date and time on the *replacement* node: `show date`

The date and time are given in GMT.

Step 2: Verify and set the HA state of the chassis

You must verify the HA state of the controller module and, if necessary, update the state to match your system configuration.

1. In Maintenance mode from the new controller module, verify that all components display the same HA state: `ha-config show`

The HA state should be the same for all components.

2. If the displayed system state of the controller module does not match your system configuration, set the HA state for the controller module: `ha-config modify controller ha-state`

The value for HA-state can be one of the following:

- ha
- mcc
- mccip
- non-ha

3. If the displayed system state of the controller module does not match your system configuration, set the HA state for the controller module: `ha-config modify controller ha-state`

4. Confirm that the setting has changed: `ha-config show`

What's next?

After you've transferred the ownership of storage resources back to the replacement controller, you need to [complete the controller replacement](#) procedure.

Recable the system and reassign disks - ASA C800

Return control of storage resources to the replacement controller so your ASA C800 system can resume normal operation. The give back procedure varies based on the encryption type used by your system: no encryption or Onboard Key Manager (OKM) encryption.

Step 1: Recable the system

Verify the controller module's storage and network connections by using [Active IQ Config Advisor](#).

Steps

1. Download and install Config Advisor.
2. Enter the information for the target system, and then click Collect Data.
3. Click the Cabling tab, and then examine the output. Make sure that all disk shelves are displayed and all disks appear in the output, correcting any cabling issues you find.
4. Check other cabling by clicking the appropriate tab, and then examining the output from Config Advisor.

Step 2: Reassign disks

If the storage system is in an HA pair, the system ID of the new controller module is automatically assigned to the disks when the giveback occurs at the end of the procedure. You must confirm the system ID change when you boot the *replacement* controller and then verify that the change was implemented.

This step only applies only to systems running ONTAP in an HA pair.

Steps

1. If the *replacement* controller is in Maintenance mode (showing the `*>` prompt, exit Maintenance mode and go to the LOADER prompt: `halt`
2. From the LOADER prompt on the *replacement* controller, boot the controller, entering `y` if you are prompted to override the system ID due to a system ID mismatch: `boot_ontap`
3. Wait until the `Waiting for giveback...` message is displayed on the *replacement* controller console and then, from the healthy controller, verify that the new partner system ID has been automatically assigned: `storage failover show`

In the command output, you should see a message that the system ID has changed on the impaired controller, showing the correct old and new IDs. In the following example, node2 has undergone replacement and has a new system ID of 151759706.

```
node1> `storage failover show`  
                                         Takeover  
Node          Partner      Possible      State Description  
-----  -----  -----  
-----  
node1          node2      false      System ID changed on  
partner (Old:  
151759706), In takeover  
node2          node1      -      Waiting for giveback  
(HA mailboxes)
```

4. From the healthy controller, verify that any coredumps are saved:
 - a. Change to the advanced privilege level: `set -privilege advanced`

You can respond `y` when prompted to continue into advanced mode. The advanced mode prompt appears (`*>`).

- b. Save any coredumps: `system node run -node local-node-name partner savecore`
- c. Wait for the `savecore` command to complete before issuing the giveback.

You can enter the following command to monitor the progress of the `savecore` command: `system node run -node local-node-name partner savecore -s`

- d. Return to the admin privilege level: `set -privilege admin`
5. If your storage system has Storage or Volume Encryption configured, you must restore Storage or Volume Encryption functionality by using one of the following procedures, depending on whether you are using onboard or external key management:
 - [Restore onboard key management encryption keys](#)
 - [Restore external key management encryption keys](#)

6. Give back the controller:

- a. From the healthy controller, give back the replaced controller's storage: `storage failover giveback -ofnode replacement_node_name`

The *replacement* controller takes back its storage and completes booting.

If you are prompted to override the system ID due to a system ID mismatch, you should enter `y`.



If the giveback is vetoed, you can consider overriding the vetoes.

[Find the High-Availability Configuration content for your version of ONTAP 9](#)

- b. After the giveback has been completed, confirm that the HA pair is healthy and that takeover is possible: `storage failover show`

The output from the `storage failover show` command should not include the System ID changed on partner message.

7. Verify that the disks were assigned correctly: `storage disk show -ownership`

The disks belonging to the *replacement* controller should show the new system ID. In the following example, the disks owned by node1 now show the new system ID, 1873775277:

```

node1> `storage disk show -ownership`


Disk  Aggregate Home  Owner  DR Home  Home ID      Owner ID  DR Home ID
Reserver  Pool
-----  -----  -----  -----  -----  -----  -----  -----  -----
-----  -----
1.0.0  aggr0_1  node1 node1  -      1873775277 1873775277  -
1873775277 Pool0
1.0.1  aggr0_1  node1 node1      1873775277 1873775277  -
1873775277 Pool0
.
.
.

```

8. If the system is in a MetroCluster configuration, monitor the status of the controller: `metrocluster node show`

The MetroCluster configuration takes a few minutes after the replacement to return to a normal state, at which time each controller will show a configured state, with DR Mirroring enabled and a mode of normal. The `metrocluster node show -fields node-systemid` command output displays the old system ID until the MetroCluster configuration returns to a normal state.

9. If the controller is in a MetroCluster configuration, depending on the MetroCluster state, verify that the DR home ID field shows the original owner of the disk if the original owner is a controller on the disaster site.

This is required if both of the following are true:

- The MetroCluster configuration is in a switchover state.
- The *replacement* controller is the current owner of the disks on the disaster site.

[Disk ownership changes during HA takeover and MetroCluster switchover in a four-node MetroCluster configuration](#)

10. If your system is in a MetroCluster configuration, verify that each controller is configured: `metrocluster node show - fields configuration-state`

```

node1_siteA::> metrocluster node show -fields configuration-state

dr-group-id          cluster node          configuration-state
-----              -----
-----              -----
1 node1_siteA        node1mcc-001        configured
1 node1_siteA        node1mcc-002        configured
1 node1_siteB        node1mcc-003        configured
1 node1_siteB        node1mcc-004        configured

4 entries were displayed.

```

11. Verify that the expected volumes are present for each controller: `vol show -node node-name`
12. If you disabled automatic takeover on reboot, enable it from the healthy controller: `storage failover modify -node replacement-node-name -onreboot true`

Complete system restoration - ASA C800

To restore your system to full operation, you must restore the NetApp Storage Encryption configuration (if necessary), and install licenses for the new controller, and return the failed part to NetApp, as described in the RMA instructions shipped with the kit.

Step 1: Install licenses for the replacement controller in ONTAP

You must install new licenses for the *replacement* node if the impaired node was using ONTAP features that require a standard (node-locked) license. For features with standard licenses, each node in the cluster should have its own key for the feature.

About this task

Until you install license keys, features requiring standard licenses continue to be available to the *replacement* node. However, if the impaired node was the only node in the cluster with a license for the feature, no configuration changes to the feature are allowed.

Also, using unlicensed features on the node might put you out of compliance with your license agreement, so you should install the replacement license key or keys on the *replacement* node as soon as possible.

Before you begin

The licenses keys must be in the 28-character format.

You have a 90-day grace period in which to install the license keys. After the grace period, all old licenses are invalidated. After a valid license key is installed, you have 24 hours to install all of the keys before the grace period ends.

 If your system was initially running ONTAP 9.10.1 or later, use the procedure documented in [Post Motherboard Replacement Process to update Licensing on a AFF/FAS system](#). If you are unsure of the initial ONTAP release for your system, see [NetApp Hardware Universe](#) for more information.

Steps

1. If you need new license keys, obtain replacement license keys on the [NetApp Support Site](#) in the My Support section under Software licenses.



The new license keys that you require are automatically generated and sent to the email address on file. If you fail to receive the email with the license keys within 30 days, you should contact technical support.

2. Install each license key: `system license add -license-code license-key, license-key...`
3. Remove the old licenses, if desired:
 - a. Check for unused licenses: `license clean-up -unused -simulate`
 - b. If the list looks correct, remove the unused licenses: `license clean-up -unused`

Step 2: Verify LIFs and registering the serial number

Before returning the *replacement* node to service, you should verify that the LIFs are on their home ports, and register the serial number of the *replacement* node if AutoSupport is enabled, and reset automatic giveback.

Steps

1. Verify that the logical interfaces are reporting to their home server and ports: `network interface show -is-home false`
If any LIFs are listed as false, revert them to their home ports: `network interface revert -vserver * -lif *`
2. Register the system serial number with NetApp Support.
 - If AutoSupport is enabled, send an AutoSupport message to register the serial number.
 - If AutoSupport is not enabled, call [NetApp Support](#) to register the serial number.
3. Check the health of your cluster. See the [How to perform a cluster health check with a script in ONTAP KB](#) article for more information.
4. If an AutoSupport maintenance window was triggered, end it by using the `system node autosupport invoke -node * -type all -message MAINT=END` command.
5. If automatic giveback was disabled, reenable it: `storage failover modify -node local -auto -giveback true`

Step 3: Return the failed part to NetApp

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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