# Controller

Install and maintain

NetApp
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# Controller

## Overview of controller replacement - ASA A400

You must review the prerequisites for the replacement procedure and select the correct one for your version of the ONTAP operating system.

- All drive shelves must be working properly.

- If your system is in a MetroCluster configuration, you must review the section Choosing the correct recovery procedure to determine whether you should use this procedure.

  If this is the procedure you should use, note that the controller replacement procedure for a controller in a four or eight node MetroCluster configuration is the same as that in an HA pair. No MetroCluster-specific steps are required because the failure is restricted to an HA pair and storage failover commands can be used to provide nondisruptive operation during the replacement.

- You must replace the failed component with a replacement FRU component you received from your provider.

- You must be replacing a controller module with a controller module of the same model type. You cannot upgrade your system by just replacing the controller module.

- You cannot change any drives or drive shelves as part of this procedure.

- In this procedure, the boot device is moved from the impaired controller to the *replacement* controller so that the *replacement* controller will boot up in the same version of ONTAP as the old controller module.

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

  - The *impaired* controller is the controller that is being replaced.

  - The *replacement node* is the new controller that is replacing the impaired controller.

  - The *healthy* controller is the surviving controller.

- You must always capture the controller's console output to a text file.

  This provides you a record of the procedure so that you can troubleshoot any issues that you might encounter during the replacement process.

## Shut down the impaired controller - ASA A400

Shut down or take over the impaired controller using the appropriate procedure for your configuration.

**Option 1: Most systems**

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 are using NetApp Storage Encryption, you must have reset the MSID using the instructions in the Returning SEDs to unprotected mode.

- If you have a SAN system, you must have checked event messages (`cluster kernel-service show`) for impaired controller SCSI blade. The `cluster kernel-service show` command 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=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`

   (i) When you see *Do you want to disable auto-giveback?*, enter `y`.

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 | Take over or halt the impaired controller from the healthy controller: `storage failover takeover -ofnode impaired_node_name` <br><br> When the impaired controller shows Waiting for giveback…, press Ctrl-C, and then respond `y`. |

**Option 2: Controller is in a two-node MetroCluster**

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

**About this task**

- If you are using NetApp Storage Encryption, you must have reset the MSID using the instructions in the "Return a FIPS drive or SED to unprotected mode" section of NetApp Encryption overview with the CLI.

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

**Steps**

1. Check the MetroCluster status to determine whether the impaired controller has automatically switched over to the healthy controller: `metrocluster show`

2. Depending on whether an automatic switchover has occurred, proceed according to the following table:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

# Replace the controller - ASA A400

To replace the controller module hardware, you must remove the impaired controller, move FRU components to the replacement controller module, install the replacement controller module in the chassis, and then boot the system to Maintenance mode.
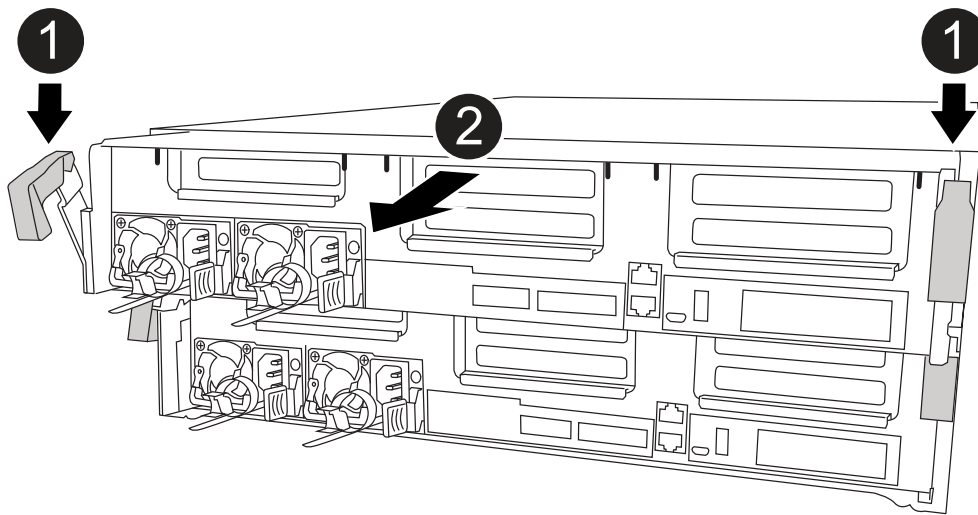
## Step 1: Remove the controller module

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

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

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

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

   The controller module moves slightly out of the chassis.



| | |
|---|---|
| ❶ | Locking latches |
| ❷ | Controller moves slightly out of chassis |

6. Slide the controller module out of the chassis.

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

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

8. On the replacement controller module, open the air duct and remove the empty risers from the controller module using the animation, illustration, or the written steps:

Animation - Remove the empty risers from the replacement controller module
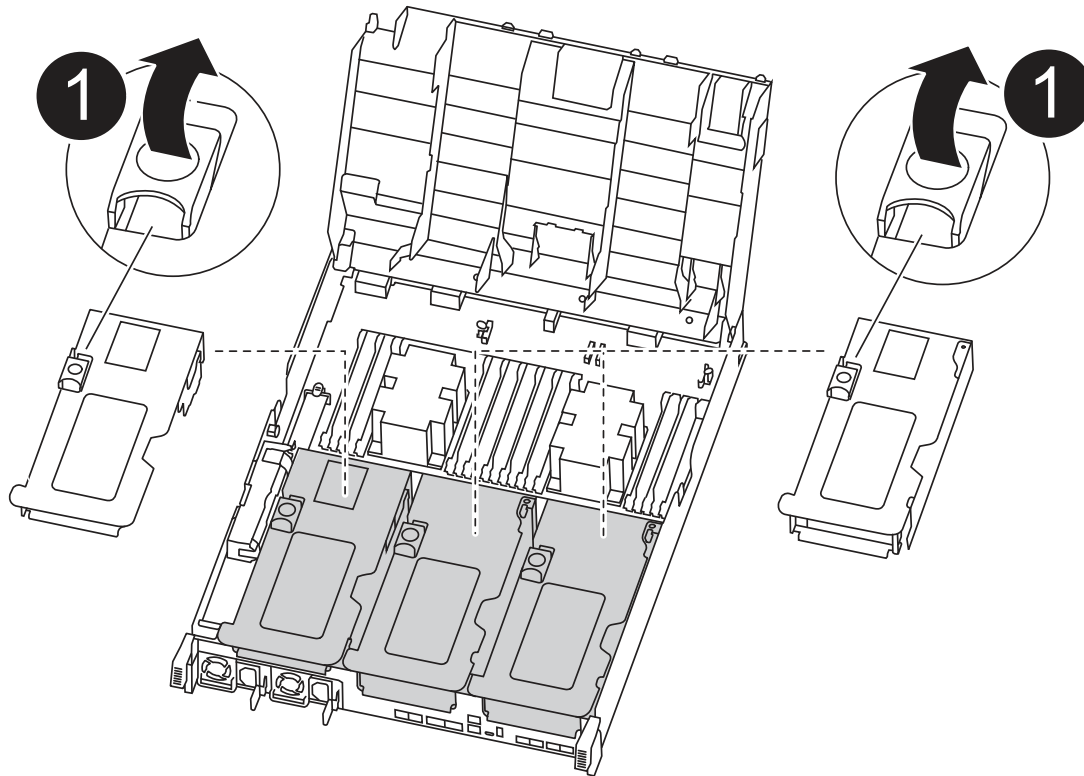


| | Riser latches |
|---|---|

a. Press the locking tabs on the sides of the air duct in toward the middle of the controller module.

b. Slide the air duct toward the back of the controller module, and then rotate it upward to its completely open position.

c. Rotate the riser locking latch on the left side of riser 1 up and toward air duct, lift the riser up, and then set it aside.

d. Repeat the previous step for the remaining risers.

## Step 2: Move the power supplies

You must move the power supply from the impaired controller module to the replacement controller module when you replace a controller module.

You can use the following animation, illustration, or the written steps to move the power supplies to the replacement controller module.

Animation - Move the power supplies

1. Remove the power supply:
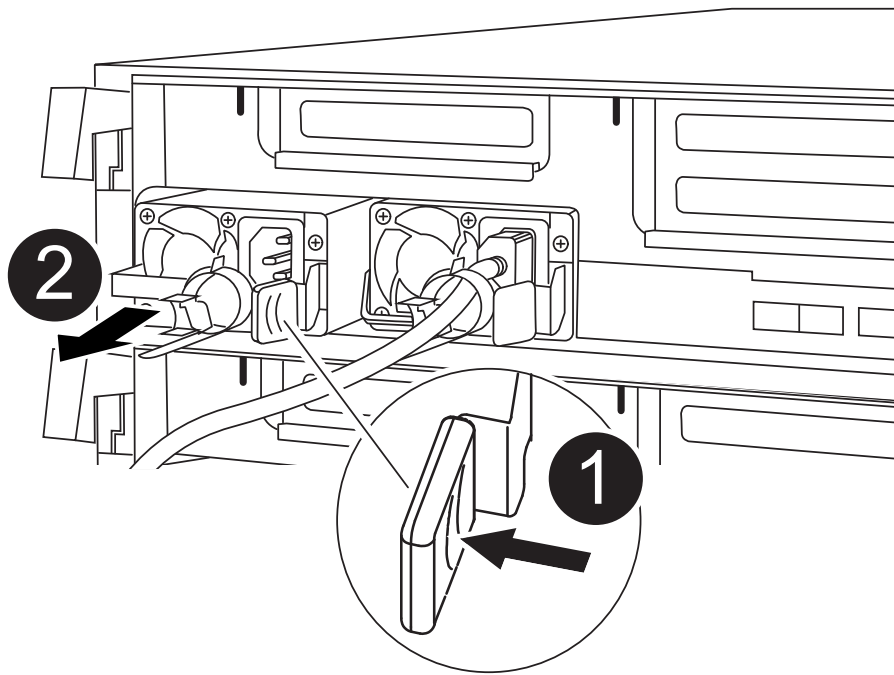
| ① | PSU locking tab |
| --- | --- |
| ② | Power cable retainer |

a. Rotate the cam handle so that it can be used to pull the power supply out of the chassis.

b. Press the blue locking tab to release the power supply from the chassis.

c. Using both hands, pull the power supply out of the chassis, and then set it aside.

1. Move the power supply to the new controller module, and then install it.

2. 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.

3. Repeat the preceding steps for any remaining power supplies.

## Step 3: Move the NVDIMM battery

To move the NVDIMM battery from the impaired controller module to the replacement controller module, you must perform a specific sequence of steps.

You can use the following animation, illustration, or the written steps to move the NVDIMM battery from the impaired controller module to the replacement controller module.
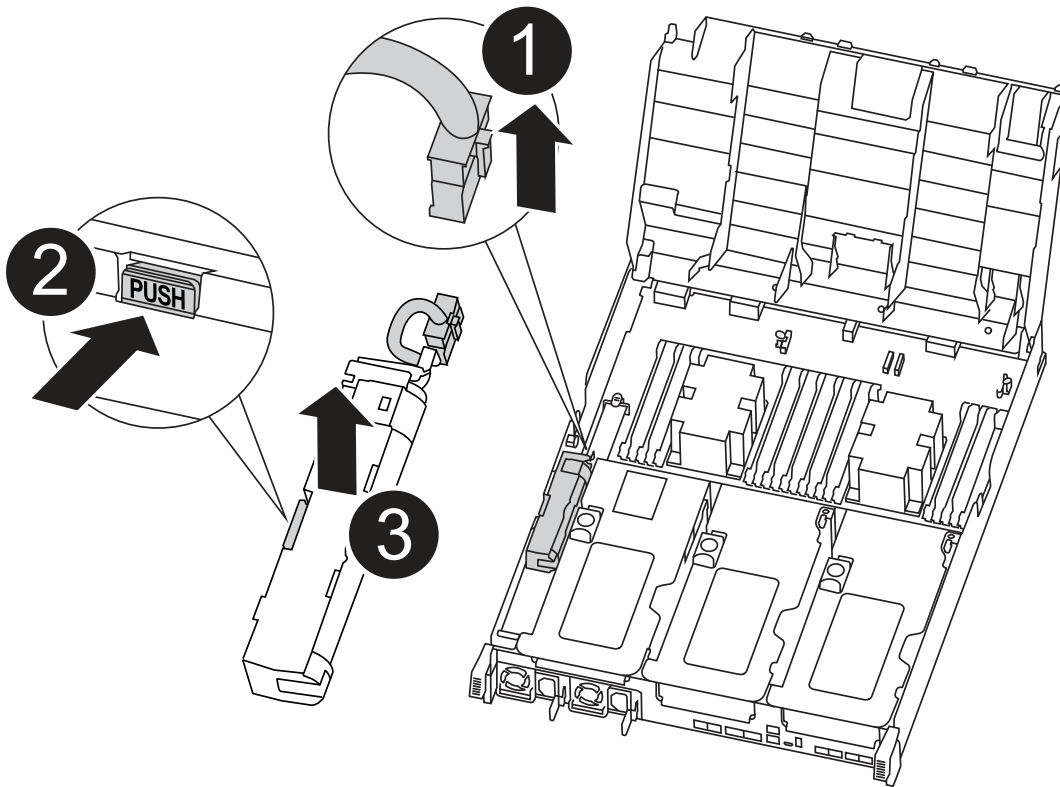
| | NVDIMM battery plug |
|---|---|
| ❶ | |
| | NVDIMM battery locking tab |
| ❷ | |
| | NVDIMM battery |
| ❸ | |

1. Open the air duct:

   a. Press the locking tabs on the sides of the air duct in toward the middle of the controller module.

   b. Slide the air duct toward the back of the controller module, and then rotate it upward to its completely open position.

2. Locate the NVDIMM battery in the controller module.

3. 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.

4. Grasp the battery and press the blue locking tab marked PUSH, and then lift the battery out of the holder and controller module.

5. Move the battery to the replacement controller module.

6. Align the battery module with the opening for the battery, and then gently push the battery into slot until it locks into place.

   ⓘ   Do not plug the battery cable back into the motherboard until instructed to do so.

## Step 4: Move the boot media

You must locate the boot media, and then follow the directions to remove it from the impaired controller module and insert it into the replacement controller module.

You can use the following animation, illustration, or the written steps to move the boot media from the impaired controller module to the replacement controller module.

Animation - Move the boot media
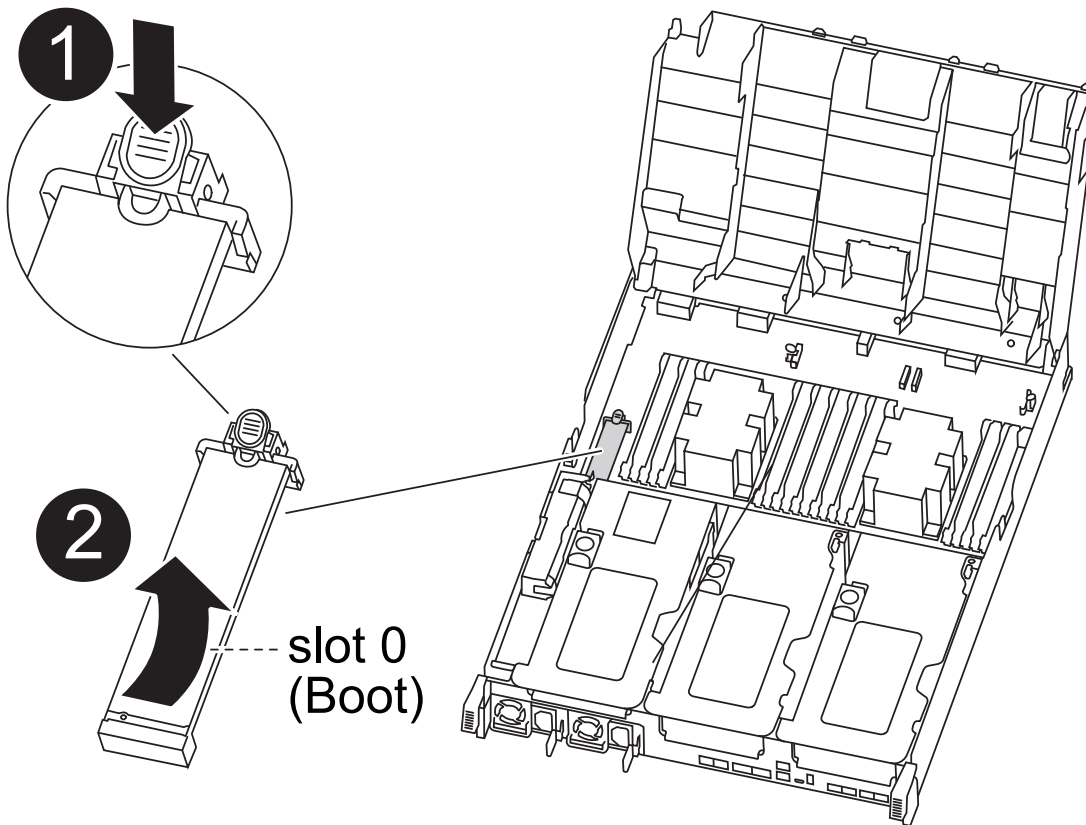


| | |
|---|---|
| ❶ | Boot media locking tab |
| ❷ | Boot media |

1. 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.

2. Move the boot media to the new controller module, align the edges of the boot media with the socket housing, 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. Lock the boot media in place:

a. Rotate the boot media down toward the motherboard.

b. Press the blue locking button so that it is in the open position.

c. Placing your fingers at the end of the boot media by the blue button, firmly push down on the boot media end to engage the blue locking button.

## Step 5: Move the PCIe risers and mezzanine card

As part of the controller replacement process, you must move the PCIe risers and mezzanine card from the impaired controller module to the replacement controller module.

You can use the following animations, illustrations, or the written steps to move the PCIe risers and mezzanine card from the impaired controller module to the replacement controller module.

Moving PCIe riser 1 and 2 (left and middle risers):

Animation - Move PCI risers 1 and 2

Moving the mezzanine card and riser 3 (right riser):

Animation - Move the mezzanine card and riser 3



PCIe 2-3    PCIe 4-5
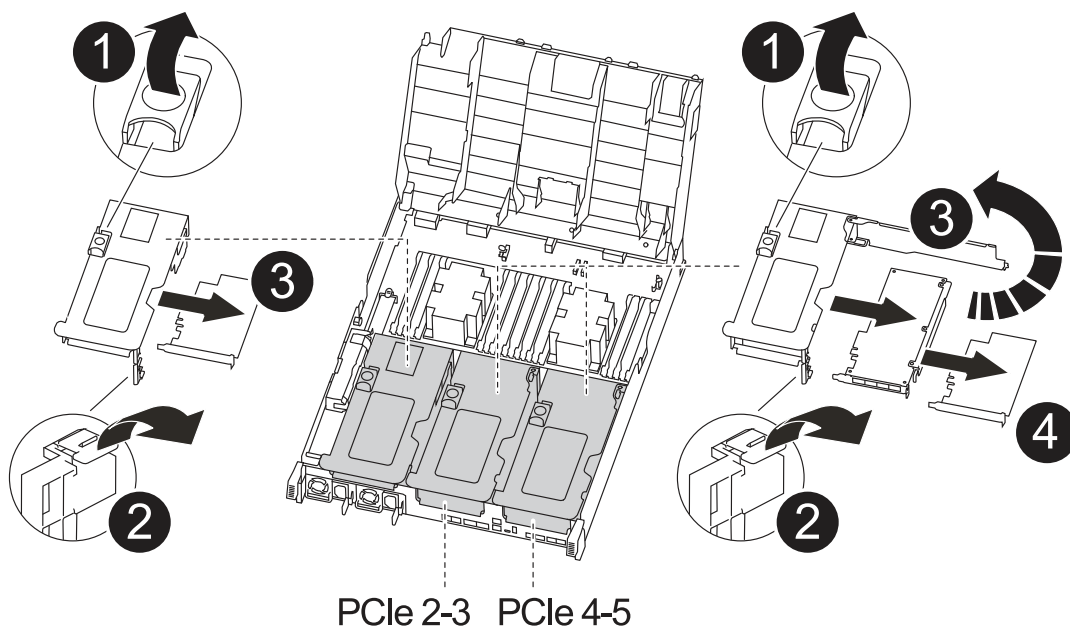
| | | |
|---|---|---|
| ❶ | Riser locking latch | |
| ❷ | PCI card locking latch | |
| ❸ | PCI locking plate | |
| ❹ | PCI card | |

1. Move PCIe risers one and two from the impaired controller module to the replacement 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 air duct.

      The riser raises up slightly from the controller module.

   c. Lift the riser up, and then move it to the replacement controller module.

   d. Align the riser with the pins to the side of the riser socket, lower the riser down on the pins, push the riser squarely into the socket on the motherboard, and then rotate the latch down flush with the sheet metal on the riser.

   e. Repeat this step for riser number 2.

2. Remove riser number 3, remove the mezzanine card, and install both into the replacement 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 air duct.

      The riser raises up slightly from the controller module.

   c. Lift the riser up, and then set it aside on a stable, flat surface.

   d. Loosen the thumbscrews on the mezzanine card, and gently lift the card directly out of the socket, and then move it to the replacement controller module.

   e. Install the mezzanine in the replacement controller and secure it with the thumbscrews.

   f. Install the third riser in the replacement controller module.
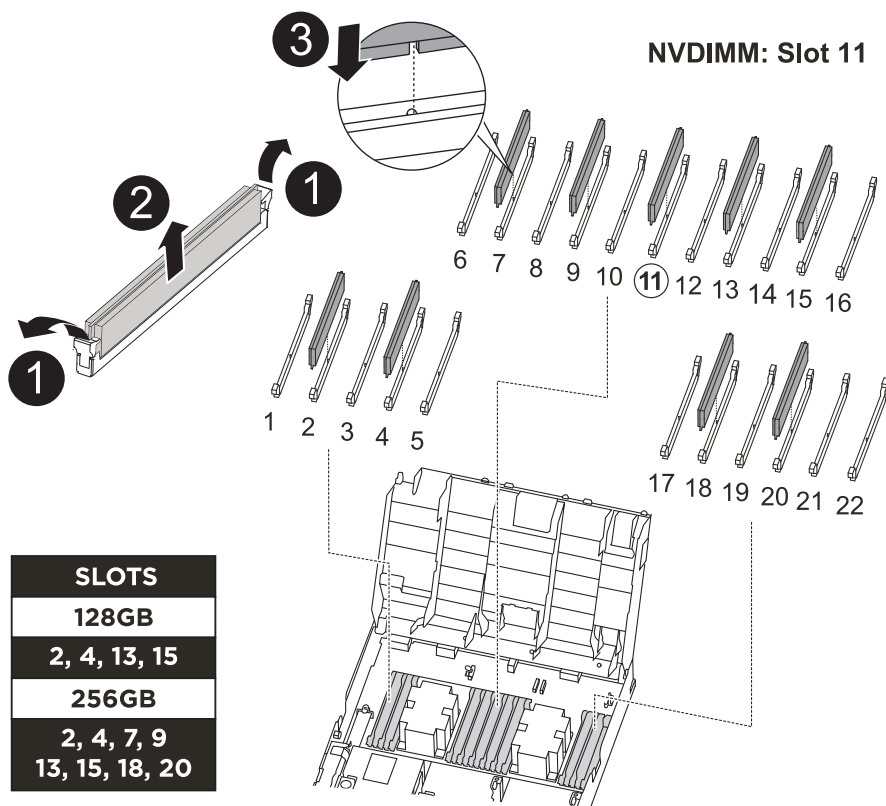
## Step 6: Move the DIMMs

You need to locate the DIMMs, and then move them from the impaired controller module to the replacement controller module.

You must have the new controller module ready so that you can move the DIMMs directly from the impaired controller module to the corresponding slots in the replacement controller module.

You can use the following animation, illustration, or the written steps to move the DIMMs from the impaired controller module to the replacement controller module.

Animation - Move the DIMMs

**NVDIMM: Slot 11**

| | SLOTS |
|---|---|
| | **128GB** |
| | 2, 4, 13, 15 |
| | **256GB** |
| | 2, 4, 7, 9 13, 15, 18, 20 |

| | |
|---|---|
| ❶ | DIMM locking tabs |
| ❷ | DIMM |
| ❸ | DIMM socket |

1. Locate the DIMMs on your controller module.

2. 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.

3. Verify that the NVDIMM battery is not plugged into the new controller module.

4. Move the DIMMs from the impaired controller module to the replacement controller module:

   > ⓘ Make sure that you install the each DIMM into the same slot it occupied in the impaired controller module.

   a. Eject the DIMM from its slot by slowly pushing apart the 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.

   b. Locate the corresponding DIMM slot on the replacement controller module.

   c. Make sure that the DIMM ejector tabs on the DIMM socket are in the open position, and then insert the

DIMM squarely into the socket.

The DIMMs fit tightly in the socket, but should go in easily. If not, realign the DIMM with the socket and reinsert it.

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

    e. Repeat these substeps for the remaining DIMMs.

5. Plug the NVDIMM battery into the motherboard.

Make sure that the plug locks down onto the controller module.

## Step 7: Install the controller module

After all of the components have been moved from the impaired controller module to the replacement controller module, you must install the replacement controller module into the chassis, and then boot it to Maintenance mode.

1. If you have not already done so, close the air duct.

2. Align the end of the controller module with the opening in the chassis, and then gently push the controller module halfway into the system.

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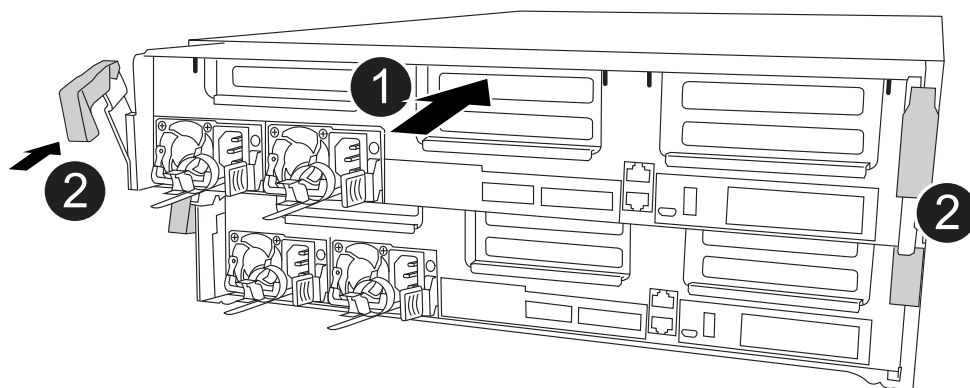


| | |
|---|---|
| ① | Slide controller into the chassis |
| ② | Locking latches |

3. Cable the management and console ports only, so that you can access the system to perform the tasks in the following sections.

> ℹ️ You will connect the rest of the cables to the controller module later in this procedure.

4. Complete the installation of the controller module:

a. Plug the power cord into the power supply, reinstall the power cable locking collar, and then connect the power supply to the power source.

b. Using the locking latches, firmly push the controller module into the chassis until the locking latches begin to rise.

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

c. Fully seat the controller module in the chassis by rotating the locking latches upward, tilting them so that they clear the locking pins, gently push the controller all the way in, and then lower the locking latches into the locked position.

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

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

e. Interrupt the normal boot process and boot to LOADER by pressing `Ctrl-C`.

> ⓘ If your system stops at the boot menu, select the option to boot to LOADER.

f. At the LOADER prompt, enter `bye` to reinitialize the PCIe cards and other components.

g. Interrupt the boot process and boot to the LOADER prompt by pressing `Ctrl-C`.

If your system stops at the boot menu, select the option to boot to LOADER.

# Restore and verify the system configuration - ASA A400

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 after replacing the controller

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: `date`

   The date and time are given in GMT.

## Step 2: Verify and set the HA state of the controller module

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`

   ° `mcc-2n`

   ° `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`

# Recable the system and reassign disks - ASA A400

Continue the replacement procedure by recabling the storage and confirming disk reassignment.

## Step 1: Recable the system

Recable the controller module's storage and network connections.

**Steps**

1. Recable the system.

2.  Verify that the cabling is correct by using Active IQ Config Advisor.

    a.  Download and install Config Advisor.

    b.  Enter the information for the target system, and then click Collect Data.

    c.  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.

    d.  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 procedure applies only to systems running ONTAP in an HA pair.

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:
                                                  151759755, New:
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`.

   > (i)   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 A400

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.

**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.

   > ℹ️ 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. If an AutoSupport maintenance window was triggered, end it by using the `system node autosupport invoke -node * -type all -message MAINT=END` command.

4. If automatic giveback was disabled, reenable it: `storage failover modify -node local -auto -giveback true`

## Step 3: Switch back aggregates in a two-node MetroCluster configuration

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

This task only applies to two-node MetroCluster configurations.

**Steps**

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

   ```
   cluster_B::>  metrocluster node show

   DR                                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.

## Step 4: 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 & Replacements page for further information.