# Boot media - automated recovery

## Install and maintain

NetApp
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# Boot media - automated recovery

## Boot media automated recovery workflow - ASA A800

The automated recovery of the boot image involves the system automatically identifying and selecting the appropriate boot menu option. It uses the boot image on partner node to reinstall ONTAP on the replacement boot media in your ASA A800 system.

The automated boot media recovery process is supported only in ONTAP 9.17.1 and later. If your storage system is running an earlier version of ONTAP, use the manual boot recovery procedure.

To get started, review the replacement requirements, shut down the controller, replace the boot media, allow the system to restore the image, and verify system functionality.

1. **Review the boot media requirements**

Review the requirements for boot media replacement.

2. **Shut down the controller**

Shut down the controller in your storage system when when you need to replace the boot media.

3. **Replace the boot media**

Remove the failed boot media from the controller module and install the replacement boot media.

4. **Restore the image on the boot media**

Restore the ONTAP image from the partner controller.

5. **Return the failed part to NetApp**

Return the failed part to NetApp, as described in the RMA instructions shipped with the kit.

## Requirements for automated boot media recovery - ASA A800

Before replacing the boot media in your ASA A800, ensure you meet the necessary requirements for a successful replacement. This includes verifying that you have the correct replacement boot media, confirming that the e0S (e0M wrench) port on the impaired controller is not faulty, and determining whether Onboard Key Manager (OKM) or External Key Manager (EKM) is enabled.

The automated boot media recovery process is supported only in ONTAP 9.17.1 and later. If your storage system is running an earlier version of ONTAP, use the manual boot recovery procedure.

- You must replace the failed component with a replacement FRU component of the same capacity that you received from NetApp.
- Verify that the e0M (wrench) port on the impaired controller is connected and not faulty.

  The e0M port is used to communicate between the two controllers during the automated boot recovery process.

- For OKM, you need the cluster-wide passphrase and also the backup data.
- For EKM, you need copies of the following files from the partner node:
  - /cfcard/kmip/servers.cfg file.
  - /cfcard/kmip/certs/client.crt file.
  - /cfcard/kmip/certs/client.key file.
  - /cfcard/kmip/certs/CA.pem file.
- It is critical to apply the commands to the correct controller when you are replacing the impaired boot media:
  - The *impaired controller* is the controller on which you are performing maintenance.
  - The *healthy controller* is the HA partner of the impaired controller.

**What's next**

After you've reviewed the boot media requirements, you shut down the controller.

# Shut down the controller for automated boot media recovery - ASA A800

Shut down the impaired controller in your ASA A800 storage system to prevent data loss and maintain system stability during the automated boot media recovery process.

The automated boot media recovery process is supported only in ONTAP 9.17.1 and later. If your storage system is running an earlier version of ONTAP, use the manual boot recovery procedure.

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 `y` when prompted. |
| System prompt or password prompt | Take over or halt the impaired controller from the healthy controller:<br><br>`storage failover takeover -ofnode impaired_node_name -halt true`<br><br>The *-halt true* parameter brings you to the LOADER prompt. |

**What's next**

After you shut down the impaired controller, you replace the boot media.

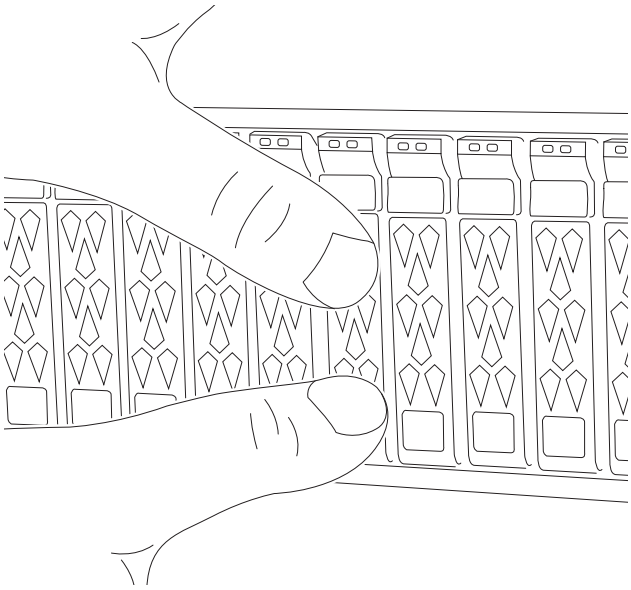
# Replace the boot media for automated boot recovery - ASA A800

The boot media in your ASA A800 system stores essential firmware and configuration data. The replacement process involves removing and opening the controller module, removing the impaired boot media, installing the replacement boot media in the controller module, and then reinstalling the controller module.

The automated boot media recovery process is supported only in ONTAP 9.17.1 and later. If your storage system is running an earlier version of ONTAP, use the manual boot recovery procedure.

The boot media is located inside the controller module under the air duct, and is accessed by removing the controller module from the system.

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.

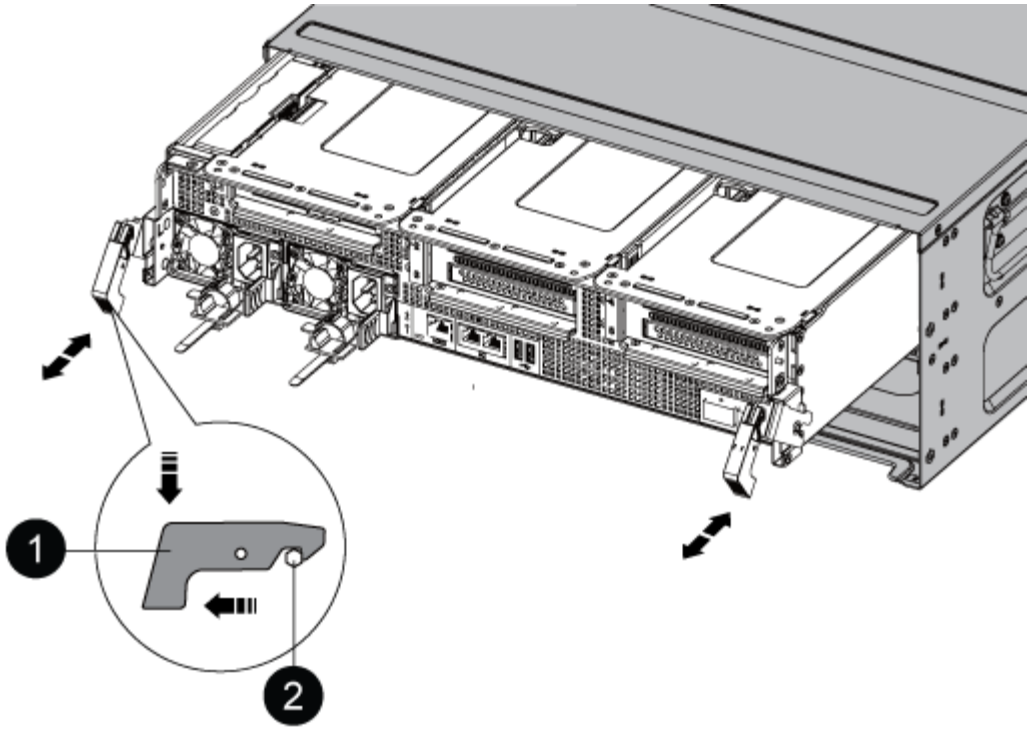


3. Unplug the controller module power supplies from the source.
4. Release the power cable retainers, and then unplug the cables from the power supplies.
5. Loosen the hook and loop strap binding the cables to the cable management device, and then unplug the system cables and SFP and QSFP modules (if 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.

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.

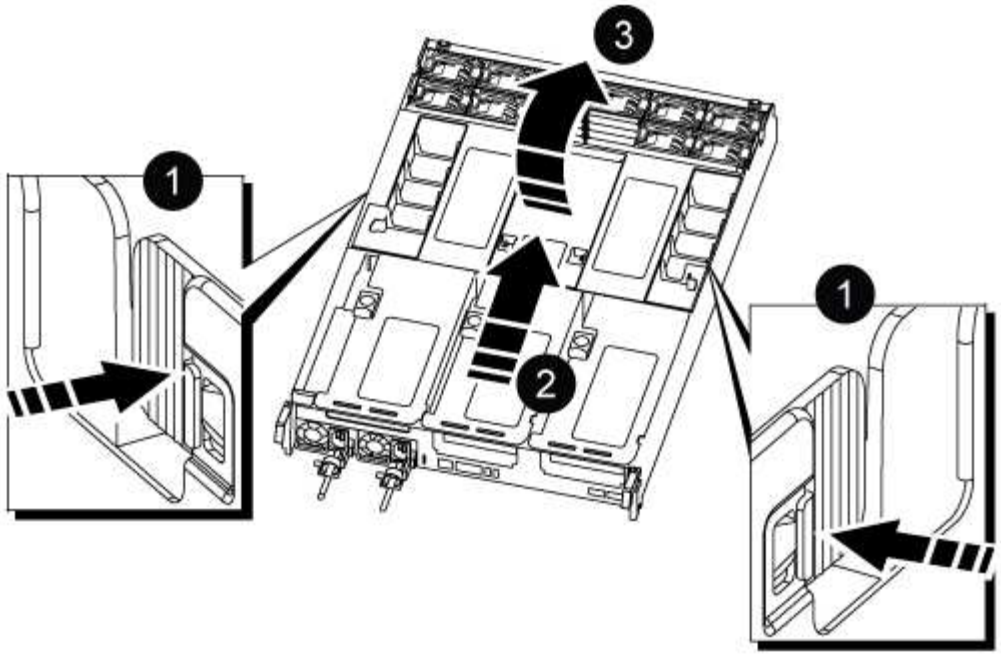



| | |
|---|---|
| 1 | Locking latch |
| 2 | Locking pin |

8. Slide the controller module out of the chassis.

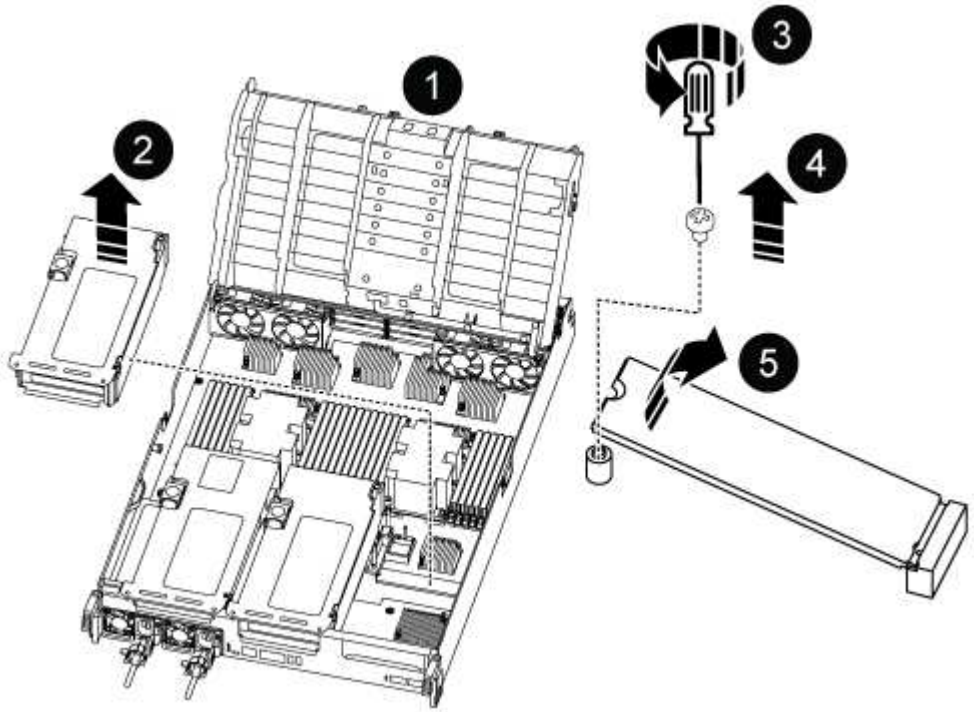
   Make sure that you support the bottom of the controller module as you slide it out of the chassis.

9. Place the controller module on a stable, flat surface, and then open the air duct:
   a. Press in the locking tabs on the sides of the air duct toward the middle of the controller module.
   b. Slide the air duct toward the fan modules, and then rotate it upward to its completely open position.



| | |
|---|---|
| 1 | Air duct locking tabs |
| 2 | Slide air duct towards fan modules |
| 3 | Rotate air duct towards fan modules |

10. Locate the boot media in the controller module and replace it:



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

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.

11. Install the replacement boot media into the controller module:

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.

12. Reinstall the riser into the controller module.

13. Close the air duct:

a. Rotate the air duct downward.

b. Slide the air duct toward the risers until it clicks into place.

14. Install the controller module:

a. Align the end of the controller module with the opening in the chassis, and then gently push the controller module half-way into the way into the system.

b. Recable the controller module, firmly push the cam handle to finish seating the controller module, push the cam handle to the closed position, and then tighten the thumbscrew.

The controller module begins to boot and stops at the LOADER prompt.

**What's next**

After physically replacing the impaired boot media, restore the ONTAP image from the partner node.

# Automated boot media recovery from the partner node - ASA A800

After installing the new boot media device in your ASA A800 system, you can start the

automated boot media recovery process to restore the configuration from the partner node. During the recovery process, the system checks whether encryption is enabled and determines the type of key encryption in use. If key encryption is enabled, the system guides you through the appropriate steps to restore it.

The automated boot media recovery process is supported only in ONTAP 9.17.1 and later. If your storage system is running an earlier version of ONTAP, use the manual boot recovery procedure.

**Before you begin**

- Determine your key manager type:
  - Onboard Key Manager (OKM): Requires cluster-wide passphrase and backup data
  - External Key Manager (EKM): Requires the following files from the partner node:
    - `/cfcard/kmip/servers.cfg`
    - `/cfcard/kmip/certs/client.crt`
    - `/cfcard/kmip/certs/client.key`
    - `/cfcard/kmip/certs/CA.pem`

**Steps**

1. From the LOADER prompt, start the boot media recovery process:

   ```
   boot_recovery -partner
   ```

   The screen displays the following message:

   ```
   Starting boot media recovery (BMR) process. Press Ctrl-C to abort…
   ```

2. Monitor the boot media install recovery process.

   The process completes and displays the `Installation complete` message.

3. The system checks for encryption and displays one of the following messages:

| If you see this message… | Do this… |
|---|---|
| `key manager is not configured. Exiting.` | Encryption is not installed on the system.<br>a. Wait for the login prompt to display.<br>b. Log into the node and give back the storage:<br>`storage failover giveback -ofnode` *`impaired_node_name`*<br>c. Go to re-enabling automatic giveback if it was disabled. |
| `key manager is configured.` | Encryption is installed. Go to restoring the key manager. |

If the system cannot identify the key manager configuration, it displays an error message and prompts you to confirm whether key manager is configured and which type (onboard or external). Answer the prompts to proceed.

4. Restore the key manager using the appropriate procedure for your configuration:

**Onboard Key Manager (OKM)**

The system displays the following message and begins running BootMenu Option 10:

```
key manager is configured.
Entering Bootmenu Option 10...

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

a. Enter `y` at the prompt to confirm you want to start the OKM recovery process.

b. Enter the passphrase for onboard key management when prompted.

c. Enter the passphrase again when prompted to confirm.

d. Enter the backup data for onboard key manager when prompted.

**Show example of passphrase and backup data prompts**

```
Enter the passphrase for onboard key management:
-----BEGIN PASSPHRASE-----
<passphrase_value>
-----END PASSPHRASE-----
Enter the passphrase again to confirm:
-----BEGIN PASSPHRASE-----
<passphrase_value>
-----END PASSPHRASE-----
Enter the backup data:
-----BEGIN BACKUP-----
<passphrase_value>
-----END BACKUP-----
```

e. Monitor the recovery process as it restores the appropriate files from the partner node.

When the recovery process is complete, the node reboots. The following messages indicate a successful recovery:

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

Successfully recovered keymanager secrets.
```

f. After the node reboots, verify that the system is back online and operational.

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

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

h. After the partner node is fully up and serving data, synchronize the OKM keys across the cluster:

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

Go to re-enabling automatic giveback if it was disabled.

**External Key Manager (EKM)**

The system displays the following message and begins running BootMenu Option 11:

```
key manager is configured.
Entering Bootmenu Option 11...
```

a. Enter the EKM configuration settings when prompted:

i. Enter the client certificate contents from the `/cfcard/kmip/certs/client.crt` file:

**Show example of client certificate contents**

```
-----BEGIN CERTIFICATE-----
<certificate_value>
-----END CERTIFICATE-----
```

ii. Enter the client key file contents from the `/cfcard/kmip/certs/client.key` file:

**Show example of client key file contents**

```
-----BEGIN RSA PRIVATE KEY-----
<key_value>
-----END RSA PRIVATE KEY-----
```

iii. Enter the KMIP server CA(s) file contents from the `/cfcard/kmip/certs/CA.pem` file:

**Show example of KMIP server file contents**

```
-----BEGIN CERTIFICATE-----
<KMIP_certificate_CA_value>
-----END CERTIFICATE-----
```

iv. Enter the server configuration file contents from the `/cfcard/kmip/servers.cfg` file:

**Show example of server configuration file contents**

```
xxx.xxx.xxx.xxx:5696.host=xxx.xxx.xxx.xxx
xxx.xxx.xxx.xxx:5696.port=5696
xxx.xxx.xxx.xxx:5696.trusted_file=/cfcard/kmip/certs/CA.pem
xxx.xxx.xxx.xxx:5696.protocol=KMIP1_4
1xxx.xxx.xxx.xxx:5696.timeout=25
xxx.xxx.xxx.xxx:5696.nbio=1
xxx.xxx.xxx.xxx:5696.cert_file=/cfcard/kmip/certs/client.cr
t
xxx.xxx.xxx.xxx:5696.key_file=/cfcard/kmip/certs/client.key
xxx.xxx.xxx.xxx:5696.ciphers="TLSv1.2:kRSA:!CAMELLIA:!IDEA:
!RC2:!RC4:!SEED:!eNULL:!aNULL"
xxx.xxx.xxx.xxx:5696.verify=true
xxx.xxx.xxx.xxx:5696.netapp_keystore_uuid=<id_value>
```

v. If prompted, enter the ONTAP Cluster UUID from the partner node. You can check the cluster UUID from the partner node using the `cluster identify show` command.

**Show example of ONTAP Cluster UUID prompt**

```
Notice: bootarg.mgwd.cluster_uuid is not set or is empty.
Do you know the ONTAP Cluster UUID? {y/n} y
Enter the ONTAP Cluster UUID: <cluster_uuid_value>


System is ready to utilize external key manager(s).
```

vi. If prompted, enter the temporary network interface and settings for the node:

- The IP address for the port
- The netmask for the port
- The IP address of the default gateway

**Show example of temporary network setting prompts**

```
In order to recover key information, a temporary network
interface needs to be
configured.

Select the network port you want to use (for example,
'e0a')
e0M

Enter the IP address for port : xxx.xxx.xxx.xxx
Enter the netmask for port : xxx.xxx.xxx.xxx
Enter IP address of default gateway: xxx.xxx.xxx.xxx
Trying to recover keys from key servers....
[discover_versions]
[status=SUCCESS reason= message=]
```

b. Verify the key restoration status:

- If you see `kmip2_client: Successfully imported the keys from external key server: xxx.xxx.xxx.xxx:5696` in the output, the EKM configuration has been successfully restored. The process restores the appropriate files from the partner node and reboots the node. Proceed to the next step.
- If the key is not successfully restored, the system halts and displays error and warning messages. Rerun the recovery process from the LOADER prompt: `boot_recovery -partner`

**Show example of key recovery error and warning messages**

```
ERROR: kmip_init: halting this system with encrypted
mroot...
WARNING: kmip_init: authentication keys might not be
available.
*****************************************************
*                 A T T E N T I O N                 *
*                                                   *
*       System cannot connect to key managers.      *
*                                                   *
*****************************************************
ERROR: kmip_init: halting this system with encrypted
mroot...
.
Terminated

Uptime: 11m32s
System halting...

LOADER-B>
```

c. After the node reboots, verify that the system is back online and operational.

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

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

Go to re-enabling automatic giveback if it was disabled.

5. If automatic giveback was disabled, reenable it:

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

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

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

**What's next**

After you've restored the ONTAP image and the node is up and serving data, you return the failed part to NetApp.

# Return the failed boot media to NetApp - ASA A800

If a component in your ASAF A800 system fails, return the failed part to NetApp. See the

Part Return and Replacements page for further information.

## Copyright information



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