



E-Series

Maintaining EF300 and EF600 Hardware

June 2021 | 215-13811_2021-06_en-us
doccomments@netapp.com

Contents

Batteries 5

- Overview and requirements..... 5
 - Requirements for replacing a battery..... 5
- Replace battery..... 5
 - Place controller offline..... 6
 - Remove controller canister..... 7
 - Remove failed battery..... 8
 - Install new battery..... 9
 - Reinstall controller canister..... 10
 - Complete battery replacement..... 11

Controllers..... 13

- Overview and requirements..... 13
 - Requirements for replacing a controller..... 13
- Replace controller..... 13
 - Prepare to replace controller..... 14
 - Remove failed controller..... 15
 - Install new controller..... 23
 - Complete controller replacement..... 29

DIMMs 31

- Overview and requirements..... 31
 - Requirements for replacing DIMMs..... 31
- Replace DIMMs..... 31
 - Determining if you need to replace DIMMs in a controller..... 31
 - Place controller offline..... 32
 - Remove controller canister..... 33
 - Remove DIMMs..... 34
 - Install new DIMMs..... 35
 - Reinstall controller canister..... 36
 - Complete DIMMs replacement..... 37

Drives 39

- Overview and requirements..... 39
 - Requirements for replacing drives..... 39
- Replace drive..... 40
 - Prepare to replace drive..... 40
 - Remove drive..... 41
 - Install new drive 42
 - Complete drive replacement..... 42

Fans 44

- Overview and requirements..... 44

Requirements for replacing a fan.....	44
Replace a fan.....	44
Place controller offline.....	44
Remove controller canister.....	45
Remove failed fan.....	46
Install new fan.....	47
Reinstall controller canister.....	48
Complete fan replacement.....	49

Host interface cards 50

Overview and Requirements.....	50
Add host interface cards.....	50
Place controller shelf offline.....	51
Remove controller canister.....	52
Add the new host interface card.....	53
Reinstall the controller canister.....	54
Reinstall the controller canister.....	55
Complete adding host interface card.....	56
Upgrade host interface card.....	57
Place controller shelf offline.....	57
Remove controller canister.....	58
Remove the host interface card.....	60
Upgrade host interface card.....	62
Reinstall controller canister.....	63
Complete the host interface card upgrade.....	64
Replace failed host interface card.....	65
Place the controller offline.....	65
Remove controller canister.....	66
Remove the host interface card.....	67
Replace host interface card.....	69
Reinstall controller canister.....	70
Complete host interface card replacement.....	71

Host port protocol conversion..... 73

Overview and requirements.....	73
Requirements for changing the host protocol.....	73
Change host protocol.....	73
Obtain the feature pack key.....	74
Stop host I/O.....	78
Change the feature pack.....	79
Complete host protocol conversion.....	79
Complete protocol conversion.....	80

Power Supplies 81

Overview and requirements.....	81
Requirements for replacing a power supply.....	81
Replace a power supply.....	81
Remove failed power supply.....	81
Install new power supply and complete power supply replacement.....	82

SAS expansion cards84

 Overview and Requirements.....84

 Add SAS expansion card.....84

 Place controller shelf offline.....84

 Remove controller canister.....85

 Add the new SAS expansion card.....87

 Reinstall the controller canister.....87

 Complete adding SAS expansion card.....88

Copyright and trademark.....90

 Copyright.....90

 Trademark.....90

Batteries

A battery is included with a controller and preserves cached data if the AC power fails.

Overview and requirements

Before you replace a battery, you need to be aware of certain requirements and considerations.

Requirements for replacing a battery

If you plan to replace a failed battery, keep the following requirements in mind.

Recovery Guru alerts

If the Recovery Guru in SANtricity System Manager reports one of following statuses, you must replace the affected battery:

- Battery Failed
- Battery Replacement Required

From SANtricity System Manager, review the details in the Recovery Guru to confirm that there is an issue with a battery and to ensure no other items must be addressed first.

Requirements for replacing a battery

If you plan to replace a battery, keep the following requirements in mind.

- You must have installed SANtricity Storage Manager on a management station, so you can use the storage array's command line interface (CLI).
If this software has not yet been installed, follow the instructions in the [Linux express configuration](#), [Windows express configuration](#), or [VMware express configuration](#) to download and install it.
- You must have a replacement battery.
- You have an ESD wristband, or you have taken other antistatic precautions.
- You must use labels to identify each cable that is connected to the controller canister.

This section describes how to replace a battery in the following controller shelves:

- EF300 controller shelf
- EF600 controller shelf

Replace battery

Each controller canister includes a battery that preserves cached data if the AC power fails. If the Recovery Guru in SANtricity System Manager reports either a Battery Failed status or a Battery Replacement Required status, you must replace the affected battery.

Steps

1. [Place controller offline](#) on page 6

You must place the affected controller offline so you can safely remove the failed battery. You must back up the configuration and collect support data first. Then, you can take the affected controller offline.

2. [Remove controller canister](#) on page 7

You remove the controller canister so you can replace the failed battery with a new one. Disconnect all the cables then you can slide the controller out of the controller shelf.

3. [Remove failed battery](#) on page 8

You must remove the failed battery so you can install the new one. Remove the battery by squeezing the tab and disconnecting the connector housing. Then, you can pull the battery out of the controller.

4. *Install new battery* on page 9

You must install a new battery when the old one has failed. Align the new battery with the side of the controller and then plug the connector into the board.

5. *Re-install controller canister* on page 10

After you install the new battery, you reinstall the controller into the controller shelf. Close the cover and use the handles to slide the controller into the controller shelf.

6. *Place controller online* on page 11

You complete a battery replacement by placing the controller online to confirm the new battery is working correctly. Then, you can collect support data and resume operations.

Place controller offline

You must place the affected controller offline so you can safely remove the failed battery. You must back up the configuration and collect support data first. Then, you can take the affected controller offline.

Before you begin

- Make sure that no volumes are in use or that you have a multipath driver installed on all hosts using these volumes.

Steps

1. From SANtricity System Manager, review the details in the Recovery Guru to confirm that there is an issue with a battery and to ensure no other items must be addressed first.
2. From the Details area of the Recovery Guru, determine which battery to replace.
3. Back up the storage array's configuration database.
If a problem occurs when you remove a controller, you can use the saved file to restore your configuration.
 - a. In System Manager, navigate to the support page.
 - b. Select the **Support Center** tab.
 - c. Select the **Diagnostics** tab.
 - d. Select **Collect Support Data**.
4. If the controller is not already offline, take it offline now using SANtricity System Manager.
 - a. Select **Hardware**.
 - b. If the graphic shows the drives, select **Show back of shelf** to show the controllers.
 - c. Select the controller that you want to place offline.
 - d. From the context menu, select **Place offline**, and confirm that you want to perform the operation.

Note: If you are accessing SANtricity System Manager using the controller you are attempting to take offline, a SANtricity System Manager Unavailable message is displayed. Select **Connect to an alternate network connection** to automatically access SANtricity System Manager using the other controller.

5. Wait for SANtricity System Manager to update the controller's status to offline.



Attention: Do not begin any other operations until after the status has been updated.

6. Select **Recheck** from the Recovery Guru, and confirm that the OK to remove field in the Details area displays Yes, indicating that it is safe to remove this component.

After you finish

Go to [Remove controller canister](#).

Remove controller canister

You remove the controller canister so you can replace the failed battery with a new one. Disconnect all the cables then you can slide the controller out of the controller shelf.

Before you begin

- You must use labels to identify each cable that is connected to the controller canister.
- You have an ESD wristband, or you have taken other antistatic precautions.
- You have prepared a flat, static free work area.

Steps

1. Put on an ESD wristband or take other antistatic precautions.
2. Label each cable that is attached to the controller canister.
3. Disconnect all the cables from the controller canister.



Attention: To prevent degraded performance, do not twist, fold, pinch, or step on the cables.

4. Confirm that the Cache Active LED on the back of the controller is off.
5. Squeeze the handles on either side of the controller, and pull back until it releases from the shelf.



6. Using two hands and the handles, slide the controller canister out of the shelf. When the front of the controller is free of the enclosure, use two hands to pull it out completely.



Attention: Always use two hands to support the weight of a controller canister.



7. Place the controller canister on a flat, static-free surface.

After you finish

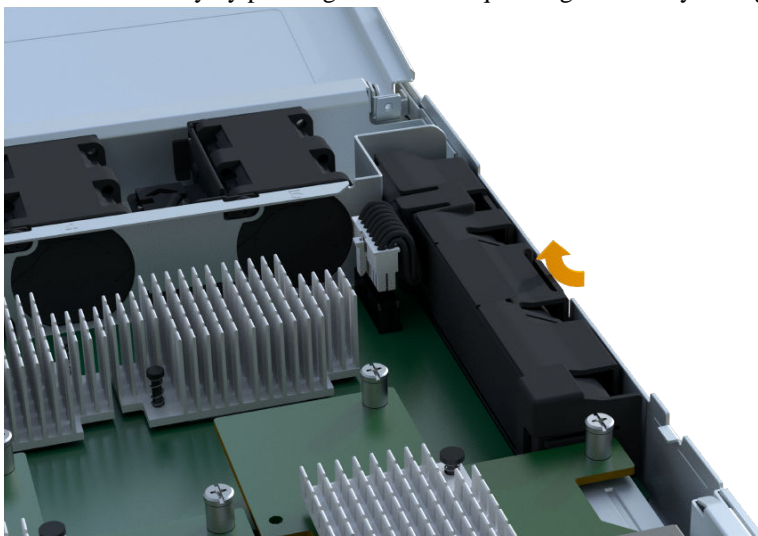
Go to [Remove failed battery](#).

Remove failed battery

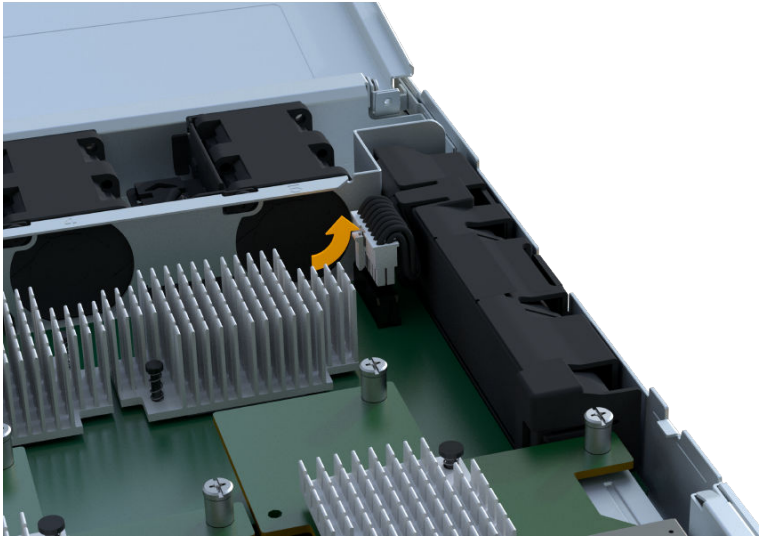
You must remove the failed battery so you can install the new one. Remove the battery by squeezing the tab and disconnecting the connector housing. Then, you can pull the battery out of the controller.

Steps

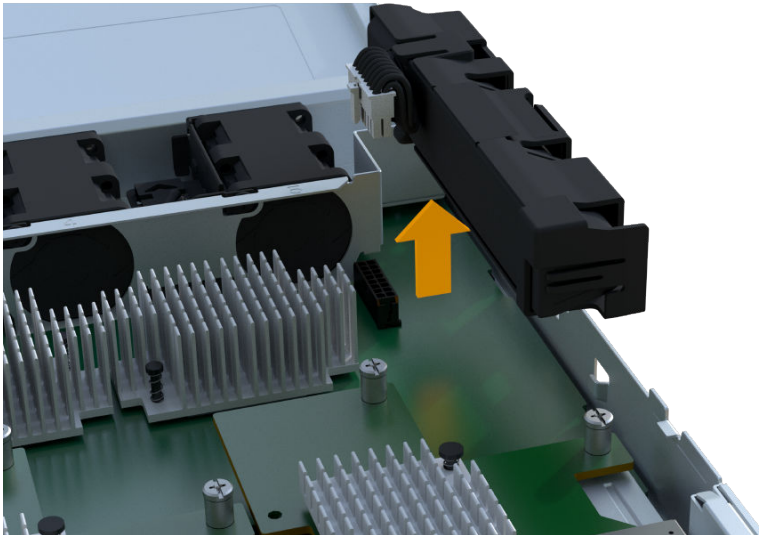
1. Remove the controller canister's cover by unscrewing the single thumbscrew and lifting the lid open.
2. Confirm that the green LED inside the controller is off.
If this green LED is on, the controller is still using battery power. You must wait for this LED to go off before removing any components.
3. Locate the 'press' tab on the side of the controller.
4. Unlatch the battery by pressing the tab and squeezing the battery casing.



5. Gently squeeze the connector housing the battery wiring. Pull up, disconnecting the battery from the board.



6. Lift the battery out of the controller and place on a flat, static-free surface.



7. Follow the appropriate procedures for your location to recycle or dispose of the failed battery.



Warning: To comply with International Air Transport Association (IATA) regulations, never ship a lithium battery by air unless it is installed within the controller shelf.

After you finish

Go to [Install new battery](#).

Install new battery

You must install a new battery when the old one has failed. Align the new battery with the side of the controller and then plug the connector into the board.

Before you begin

- You have removed the failed battery from the controller canister.

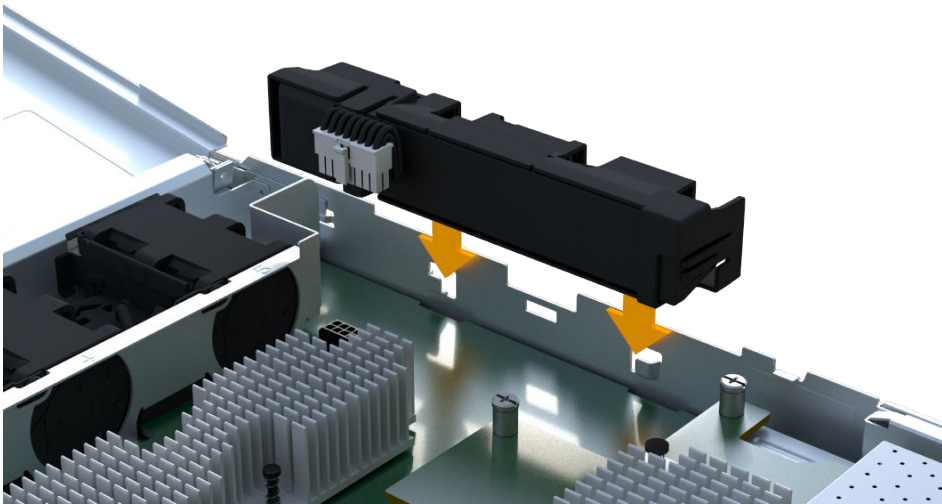
- You have the replacement battery.
- You have an ESD wristband, or you have taken other antistatic precautions.

Steps

1. Unpack the new battery, and set it on a flat, static-free surface.

Important: To comply with IATA safety regulations, replacement batteries are shipped with a state of charge (SoC) of 30 percent or less. When you reapply power, keep in mind that write caching does not resume until the replacement battery is fully charged and it has completed its initial learn cycle.

2. Insert the battery into the controller by lining up the battery casing with the metal latches on the side of the controller.



The battery clicks into place.

3. Plug the battery connector back into the board.

After you finish

Go to [Reinstall controller canister](#).

Reinstall controller canister

After you install the new battery, you reinstall the controller into the controller shelf. Close the cover and use the handles to slide the controller into the controller shelf.

Steps

1. Lower the cover on the controller canister and secure the thumbscrew.
2. While squeezing the controller handles, gently slide the controller canister all the way into the controller shelf.

Note: The controller audibly clicks when correctly installed into the shelf.



After you finish

Go to [Complete battery replacement](#).

Complete battery replacement

You complete a battery replacement by placing the controller online to confirm the new battery is working correctly. Then, you can collect support data and resume operations.

Steps

1. Place controller online.
 - a. In System Manager, navigate to the hardware page.
 - b. Select **Show back of controller**.
 - c. Select the controller with the replaced battery.
 - d. Select **Place online** from the drop-down list.
2. As the controller boots, check the controller LEDs.

When communication with the other controller is reestablished:

 - The amber Attention LED remains on.
 - The Host Link LEDs might be on, blinking, or off, depending on the host interface.
3. When the controller is back online, confirm that its status is Optimal and check the controller shelf's Attention LEDs.

If the status is not Optimal or if any of the Attention LEDs are on, confirm that all cables are correctly seated, and the controller canister is installed correctly. If necessary, remove and reinstall the controller canister.

Note: If you cannot resolve the problem, contact technical support.
4. Click **Support > Upgrade Center** to ensure that the latest version of SANtricity OS is installed.

As needed, install the latest version.
5. Verify that all volumes have been returned to the preferred owner.
 - a. Select **Storage > Volumes**. If current owner and preferred owner are not listed select **All volumes > Columns**. Select current owner and preferred owner, and then recheck to verify that volumes are distributed to their preferred owners.
 - b. If volumes are all owned by preferred owner continue to Step 6.

- c. If none of the volumes are returned, you must manually return the volumes. Go to **Storage > Volumes > More > Redistribute volumes**.
 - d. If only some of the volumes are returned to their preferred owners after auto-distribution or manual distribution you must check the recovery guru for host connectivity issues.
 - e. If there is no recovery guru present or if following the recovery guru steps the volumes are still not returned to their preferred owners contact support.
6. Collect support data for your storage array using SANtricity System Manager.
- a. Select **Support > Support Center > Diagnostics**.
 - b. Select **Collect Support Data**.
 - c. Click **Collect**.

The file is saved in the Downloads folder for your browser with the name `support-data.7z`.

Result

Your battery replacement is complete. You can resume normal operations.

Controllers

A controller consists of a board, firmware, and software. It controls the drives and implements the System Manager functions. This section describes how to replace a single controller or both controllers in your EF300 or EF600 controller shelf.

Overview and requirements

Before you replace a controller, you need to be aware of certain requirements and considerations.

Requirements for replacing a controller

If you plan to replace a controller, keep the following requirements in mind.

Requirements for replacing a failed controller

- You must have a replacement controller canister with the same part number as the controller canister you are replacing.
- You have an ESD wristband, or you have taken other antistatic precautions.
- You must use labels to identify each cable that is connected to the controller canister.
- You must have a #1 Phillips screwdriver.
- You must have installed SANtricity Storage Manager on a management station, so you can use the storage array's command line interface (CLI).

If this software has not yet been installed, follow the instructions in the [Linux express configuration](#), [Windows express configuration](#), or [VMware express configuration](#) to download and install it.

You can replace a controller canister while your storage array is powered on and performing host I/O operations, if the following conditions are true:

- The second controller canister in the shelf has Optimal status.
- The **OK to remove** field in the Details area of the Recovery Guru in SANtricity System Manager displays **Yes**, indicating that it is safe to remove this component.

This section describes how to replace a controller canister in the following controller shelves:

- EF300 controller shelf
- EF600 controller shelf

Replace controller

This section describes the steps to replace a single controller in your EF300 or EF600 controller shelf.

Before you begin

When you replace a failed controller canister, you must remove the battery, power supply, DIMMs, fans, and HIC, if one is installed, from the original controller canister, and install them in the replacement controller canister.

You can determine if you have a failed controller canister in two ways:

- The Recovery Guru in SANtricity System Manager directs you to replace the controller canister.
- The amber Attention LED on the controller canister is on, indicating that the controller has a fault.

Steps

1. *Prepare to replace controller* on page 14

When a controller canister fails, you must replace it. You prepare to replace a controller canister by verifying that the replacement controller canister has the correct FRU part number, backing up the configuration, and collecting support data.

2. *Remove failed controller* on page 15

You remove a controller canister to replace the failed canister with a new one. You remove the failed controller canister by removing the controller from the controller shelf and removing the battery, host interface card, power supply, DIMMs, and fans.

3. *Install new controller* on page 23

You install a new controller canister to replace the failed one. You install the new controller canister after installing the battery, host interface card, power supply, DIMMs, and fans from the original controller.

4. *Complete controller replacement* on page 29

You complete the controller replacement by placing the controller online and confirming that the storage array is working correctly. Then, you can collect support data and resume operations.

Prepare to replace controller

When a controller canister fails, you must replace it. You prepare to replace a controller canister by verifying that the replacement controller canister has the correct FRU part number, backing up the configuration, and collecting support data.

Steps

1. Unpack the new controller canister, and set it on a flat, static-free surface.


Save the packing materials to use when shipping the failed controller canister.

2. Locate the MAC address and FRU part number labels on the back of the controller canister.

3. From SANtricity System Manager, locate the replacement part number for the controller canister you are replacing.

When a controller has a fault and needs to be replaced, the replacement part number is displayed in the Details area of the Recovery Guru. If you need to find this number manually, follow these steps:

a. Select **Hardware**.

b. Locate the controller shelf, which is marked with the controller icon .

c. Click the controller icon.

d. Select the controller, and click **Next**.

e. On the **Base** tab, make a note of the **Replacement Part Number** for the controller.

4. Confirm that the replacement part number for the failed controller is the same as the FRU part number for the replacement controller.



Attention: Possible loss of data access – If the two-part numbers are not the same, do not attempt this procedure. In addition, if the failed controller canister includes a host interface card (HIC), you must install that HIC into the new controller canister. The presence of mismatched controllers or HICs causes the new controller to lock down when you bring it online.

5. Back up the storage array's configuration database.

If a problem occurs when you remove a controller, you can use the saved file to restore your configuration.

- a. In System Manager, navigate to the support page.
 - b. Select the **Support Center** tab.
 - c. Select **Diagnostics** tab.
 - d. Select the **Collect Support Data**.
6. If the controller is not already offline, take it offline now using SANtricity System Manager.
- a. Select **Hardware**.
 - b. If the graphic shows the drives, select **Show back of shelf** to show the controllers.
 - c. Select the controller that you want to place offline.
 - d. From the context menu, select **Place offline**, and confirm that you want to perform the operation.

Note: If you are accessing SANtricity System Manager using the controller you are attempting to take offline, a SANtricity System Manager Unavailable message is displayed. Select **Connect to an alternate network connection** to automatically access SANtricity System Manager using the other controller.

7. Wait for SANtricity System Manager to update the controller's status to offline.



Attention: Do not begin any other operations until after the status has been updated.

8. Select **Recheck** from the Recovery Guru, and confirm that the **OK to remove** field in the Details area displays **Yes**, indicating that it is safe to remove this component.

After you finish

Go to [Remove failed controller](#).

Remove failed controller

You remove a controller canister to replace the failed canister with a new one. You remove the failed controller canister by removing the controller from the controller shelf and removing the battery, host interface card, power supply, DIMMs, and fans.

Steps

1. [Remove controller canister](#) on page 16
You remove the failed controller canister so you can replace it with a new one. Disconnect all the cables then you can slide the controller out of the controller shelf.
2. [Remove battery](#) on page 17
You remove the battery from the failed controller canister so you can install it in the new controller canister. Remove the battery by squeezing the tab and disconnecting the connector housing. Then, you can lift the battery out of the controller.
3. [Remove host interface card](#) on page 18
If the controller canister includes a host interface card (HIC), you must remove the HIC from the original controller canister, so you can reuse it in the new controller canister. To remove the HIC you must first remove the faceplate, then loosen the single thumbscrew on the HIC and lift it from the controller.
4. [Remove power supply](#) on page 20
Remove the power supply so you can install it in the new controller. When you remove a power supply, you disconnect the power cord, and slide the part out of the shelf.
5. [Remove DIMMs](#) on page 21

Remove the DIMMs so you can install them in the new controller. To remove the DIMMs you push apart the ejector tabs and gently lift the DIMM out by its edges.

6. *Remove fans* on page 22

Remove the fans so you can install them in the new controller. You remove the fans by lifting them from the controller.

Remove controller canister

You remove the failed controller canister so you can replace it with a new one. Disconnect all the cables then you can slide the controller out of the controller shelf.

Before you begin

- You must use labels to identify each cable that is connected to the controller canister.
- You have an ESD wristband, or you have taken other antistatic precautions.
- You have prepared a flat, static free work area.

Steps

1. Put on an ESD wristband or take other antistatic precautions.
2. Label each cable that is attached to the controller canister.
3. Disconnect all the cables from the controller canister.



Attention: To prevent degraded performance, do not twist, fold, pinch, or step on the cables.

4. If the controller canister has a HIC that uses SFP+ transceivers, remove the SFPs.
Because you must remove the HIC from the failed controller canister, you must remove any SFPs from the HIC ports. When you reconnect the cables, you can move those SFPs to the new controller canister.
5. Confirm that the Cache Active LED on the back of the controller is off.
6. Squeeze the handles on either side of the controller, and pull back until it releases from the shelf.



7. Using two hands and the handles, slide the controller canister out of the shelf. When the front of the controller is free of the enclosure, use two hands to pull it out completely.



Attention: Always use two hands to support the weight of a controller canister.



8. Place the controller canister on a flat, static-free surface.

After you finish

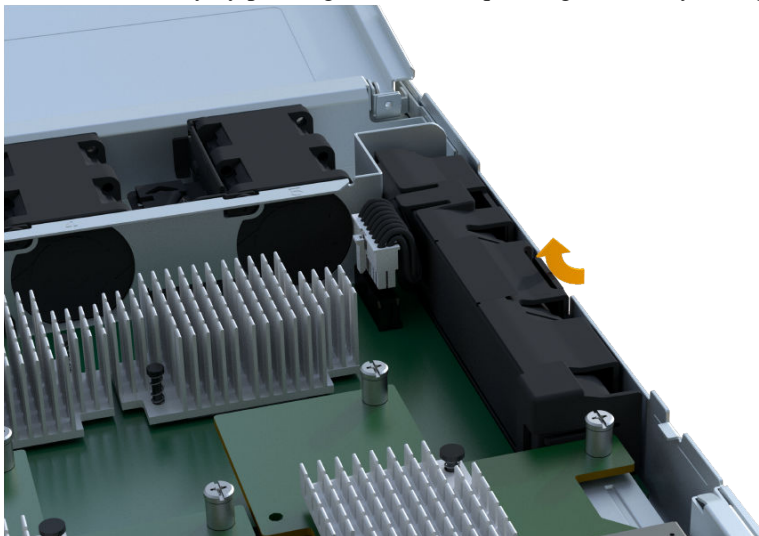
Go to [Remove battery](#) on page 17.

Remove battery

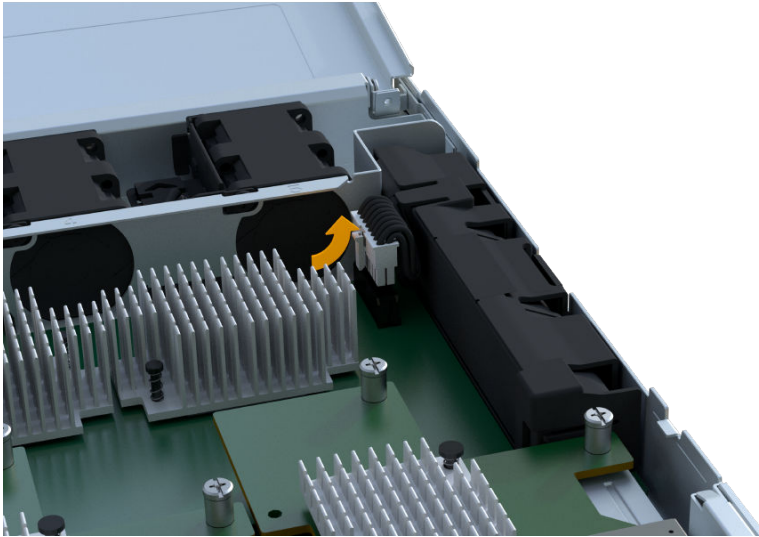
You remove the battery from the failed controller canister so you can install it in the new controller canister. Remove the battery by squeezing the tab and disconnecting the connector housing. Then, you can lift the battery out of the controller.

Steps

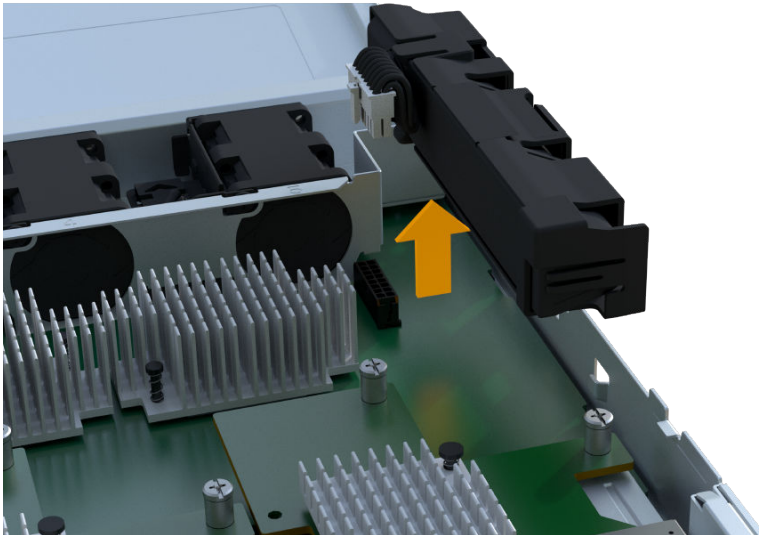
1. Remove the controller canister's cover by unscrewing the single thumbscrew and lifting the lid open.
2. Locate the 'press' tab on the side of the controller.
3. Unlatch the battery by pressing the tab and squeezing the battery casing.



4. Gently squeeze the connector housing the battery wiring. Pull up, disconnecting the battery from the board.



5. Lift the battery out of the controller and place on a flat, static-free surface.



After you finish

Go to [Remove host interface card](#) on page 18.

Remove host interface card

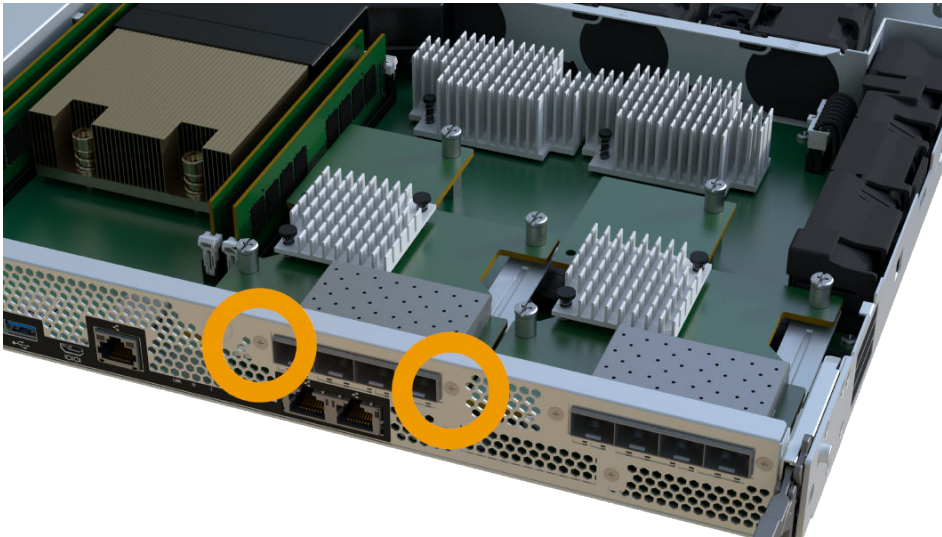
If the controller canister includes a host interface card (HIC), you must remove the HIC from the original controller canister, so you can reuse it in the new controller canister. To remove the HIC you must first remove the faceplate, then loosen the single thumbscrew on the HIC and lift it from the controller.

Before you begin

- You must have a #1 Phillips screwdriver.

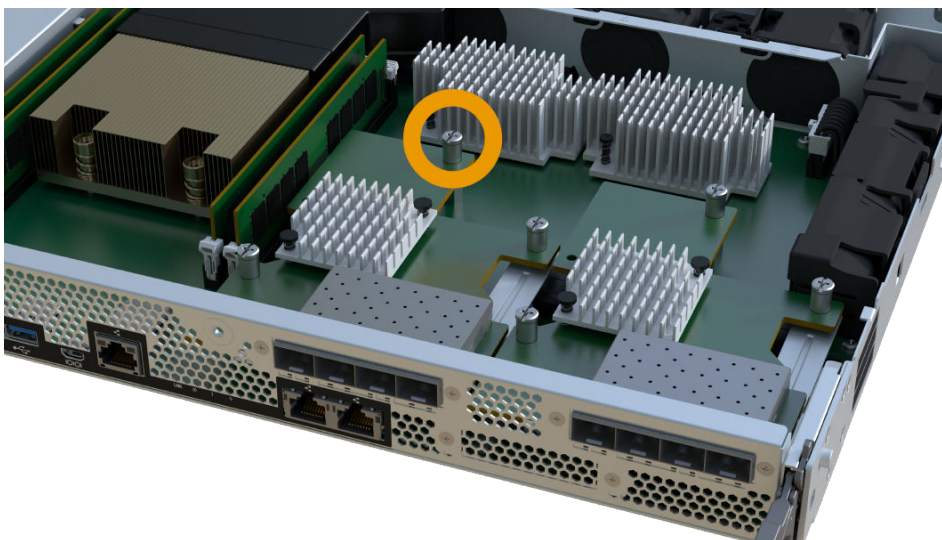
Steps

1. Using a Phillips screwdriver, remove the two screws that attach the HIC faceplate to the controller canister.



Note: The image above is an example, the appearance of your HIC may differ.

2. Remove the HIC faceplate.
3. Using your fingers or a Phillips screwdriver, loosen the single thumbscrew that secure the HIC to the controller card.

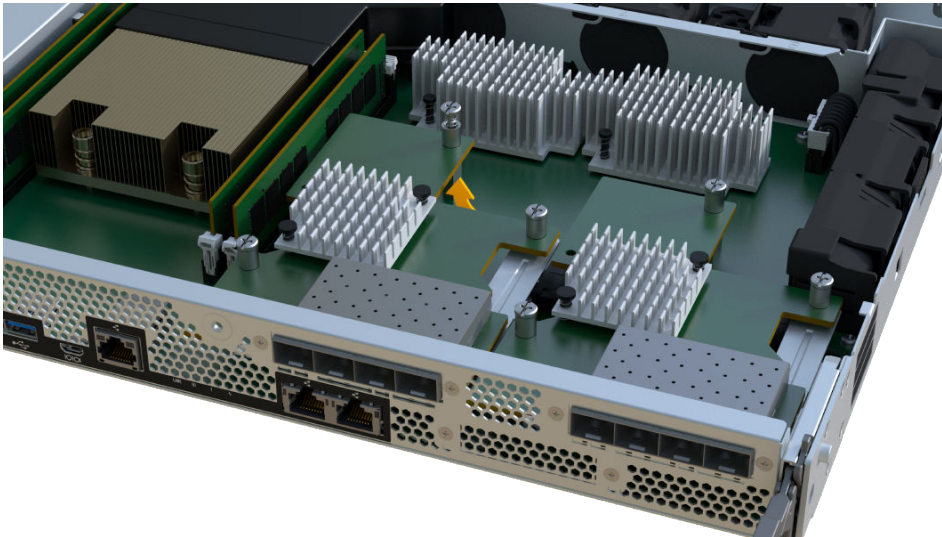


Note: The HIC comes with three screw locations on the top but is secured with only one.

4. Carefully detach the HIC from the controller card by lifting the card up and out of the controller.



Attention: Be careful not to scratch or bump the components on the bottom of the HIC or on the top of the controller card.



5. Place the HIC on a flat, static-free surface.

After you finish

Go to [Remove power supply](#).

Remove power supply

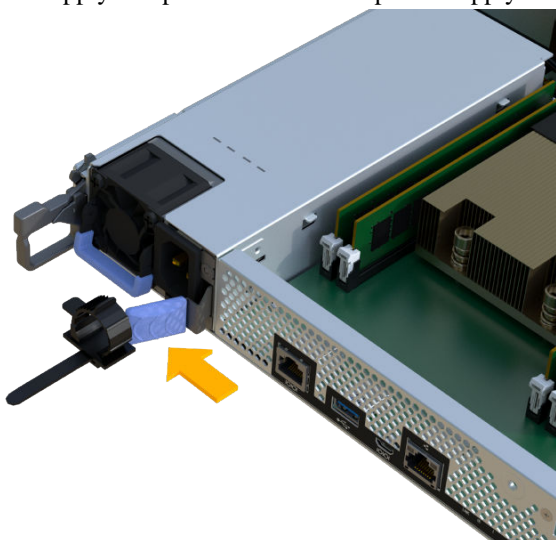
Remove the power supply so you can install it in the new controller. When you remove a power supply, you disconnect the power cord, and slide the part out of the shelf.

Before you begin

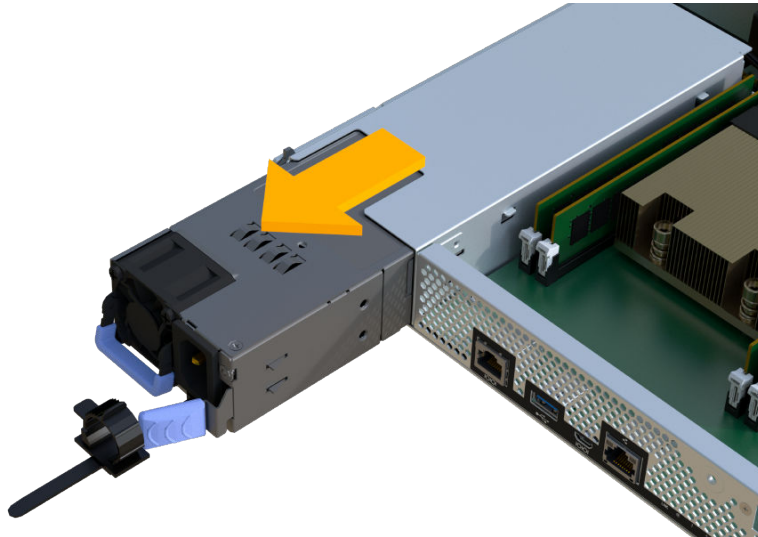
- You have an ESD wristband, or you have taken other antistatic precautions.

Steps

1. Disconnect the power cables:
 - a. Open the power cord retainer, and then unplug the power cord from the power supply.
 - b. Unplug the power cord from the power source.
2. Locate the tab to the right of the power supply and press it towards the power supply unit.



3. Locate the handle on the front of the power supply.
4. Use the handle to slide the power supply straight out of the system.



Attention: When removing a power supply, always use two hands to support its weight.

After you finish

Go to [Remove DIMMs](#).

Remove DIMMs

Remove the DIMMs so you can install them in the new controller. To remove the DIMMs you push apart the ejector tabs and gently lift the DIMM out by its edges.

Before you begin

- You have an ESD wristband, or you have taken other antistatic precautions.

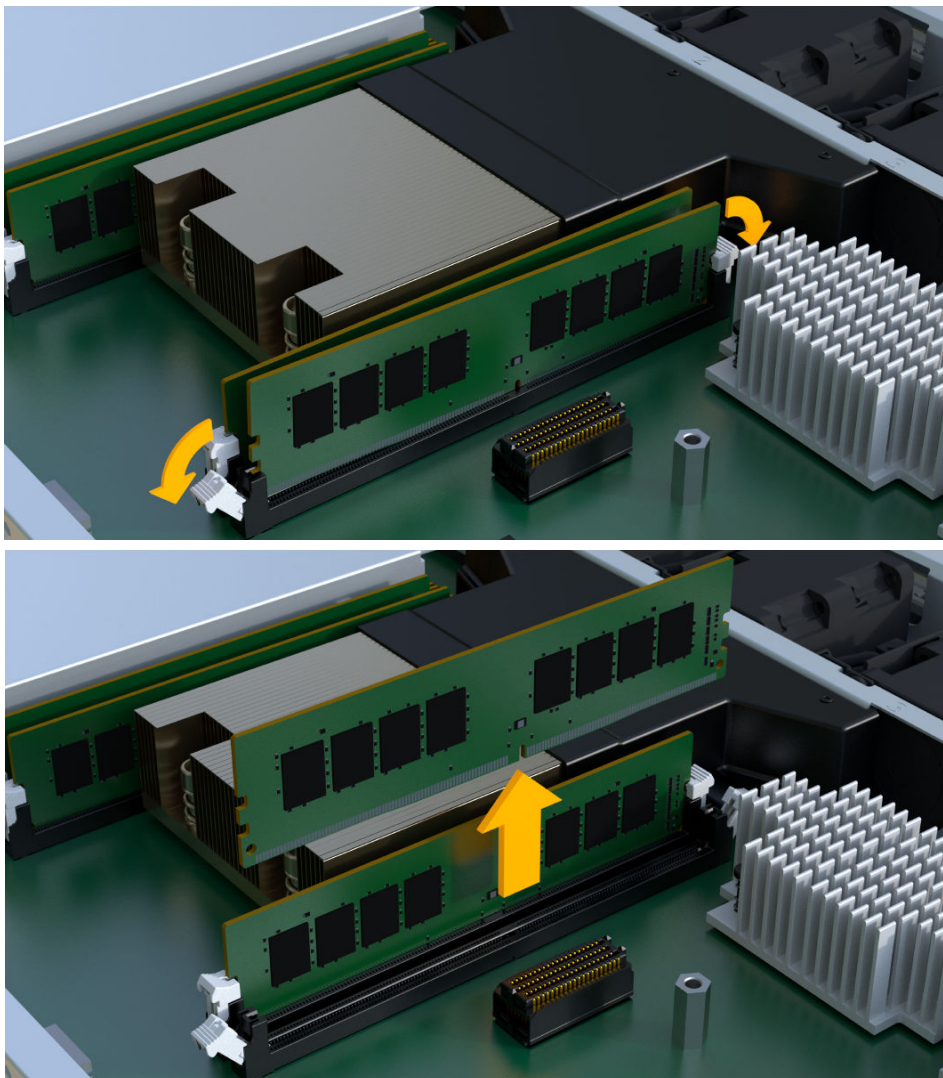
Steps

1. Locate the DIMMs on your controller.
2. Note the orientation of the DIMM in the socket so that you can insert the replacement DIMM in the proper orientation.

Note: A notch at the bottom of the DIMM helps you align the DIMM during installation.

3. Slowly push apart on the two DIMM ejector tabs on either side of the DIMM to eject the DIMM from its slot, and then slide it out of the slot.

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



After you finish

Go to [Remove fans](#)

Remove fans

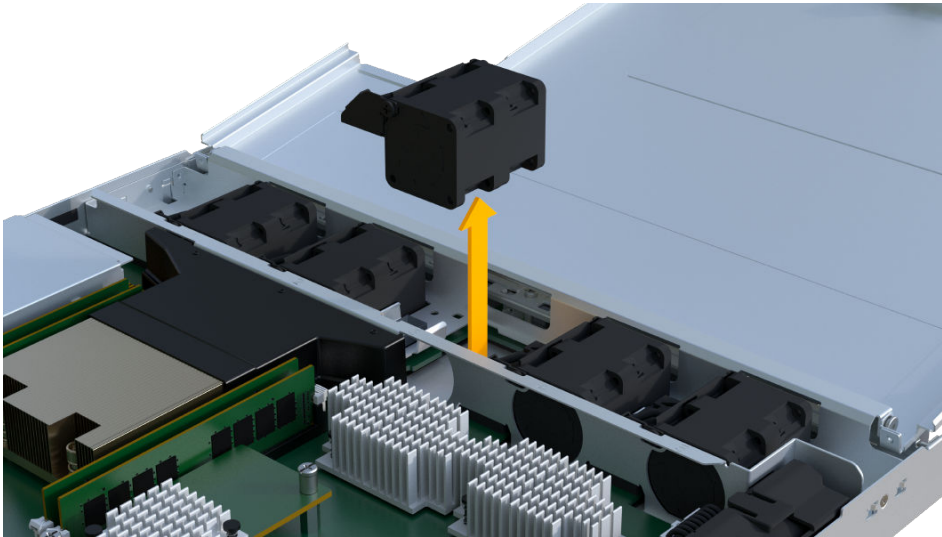
Remove the fans so you can install them in the new controller. You remove the fans by lifting them from the controller.

Before you begin

- You have an ESD wristband, or you have taken other antistatic precautions.

Steps

1. Gently lift the fan from the controller.



2. Repeat until all fans are removed.

After you finish

Go to [Install new controller](#).

Install new controller

You install a new controller canister to replace the failed one. You install the new controller canister after installing the battery, host interface card, power supply, DIMMs, and fans from the original controller.

Steps

1. [Install battery](#) on page 24
You must install the battery into the replacement controller canister. Align the new battery with the side of the controller and then plug the connector into the board.
2. [Install host interface card](#) on page 24
If you removed a HIC from the original controller canister, you must install that HIC in the new controller canister. Install the HIC by gently lowering the card into place and hand tightening the single thumbscrew.
3. [Install power supply](#) on page 26
You must install the power supply into the replacement controller canister. Install the power supply by gently sliding it into the opening of the new controller.
4. [Install DIMMs](#) on page 26
You must install the DIMMs into the new controller canister. Install the DIMMs by sliding the DIMM into the slot and securing the latches on either side.
5. [Install fans](#) on page 27
You must install the fans into the replacement controller canister. Install the fans by sliding them into the shelf.
6. [Install new controller canister](#) on page 28
After installing the battery, power supply, DIMMs, fans, and the host interface card (HIC), if one was initially installed, you can install the new controller canister into the controller shelf. Install

the new controller shelf by closing the cover and using the handles to slide the controller into the controller shelf.

Install battery

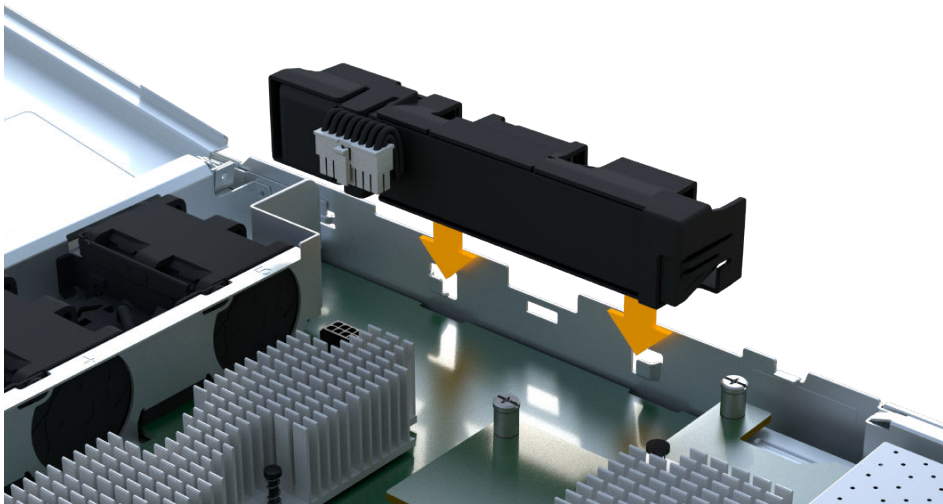
You must install the battery into the replacement controller canister. Align the new battery with the side of the controller and then plug the connector into the board.

Before you begin

- You have the battery from the original controller canister, or a new battery that you ordered.
- You have the replacement controller canister.
- You have an ESD wristband, or you have taken other antistatic precautions.

Steps

1. Insert the battery into the controller by lining up the battery casing with the metal latches on the side of the controller.



The battery clicks into place.

2. Plug the battery connector back into the board.

After you finish

Go to [Install host interface card](#).

Install host interface card

If you removed a HIC from the original controller canister, you must install that HIC in the new controller canister. Install the HIC by gently lowering the card into place and hand tightening the single thumbscrew.

Before you begin

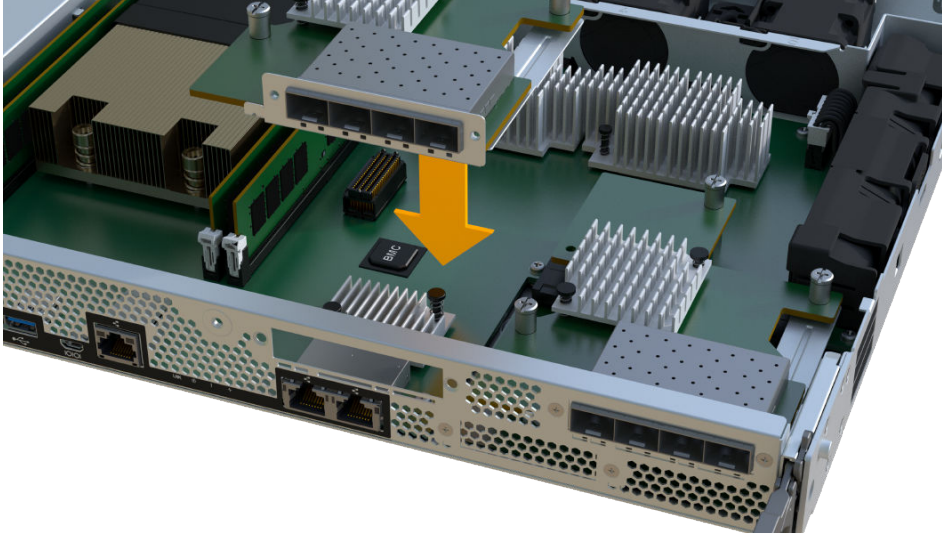
- You must have a replacement controller canister with the same part number as the controller canister you are replacing.
- You must have a #1 Phillips screwdriver.
- You have an ESD wristband, or you have taken other antistatic precautions.

Steps

1. Using a #1 Phillips screwdriver, remove the two screws that attach the blank faceplate to the replacement controller canister, and remove the faceplate.

2. Align the single thumbscrew on the HIC with the corresponding hole on the controller, and align the connector on the bottom of the HIC with the HIC interface connector on the controller card.

Be careful not to scratch or bump the components on the bottom of the HIC or on the top of the controller card.



Note: The image above is an example, the appearance of your HIC may differ.

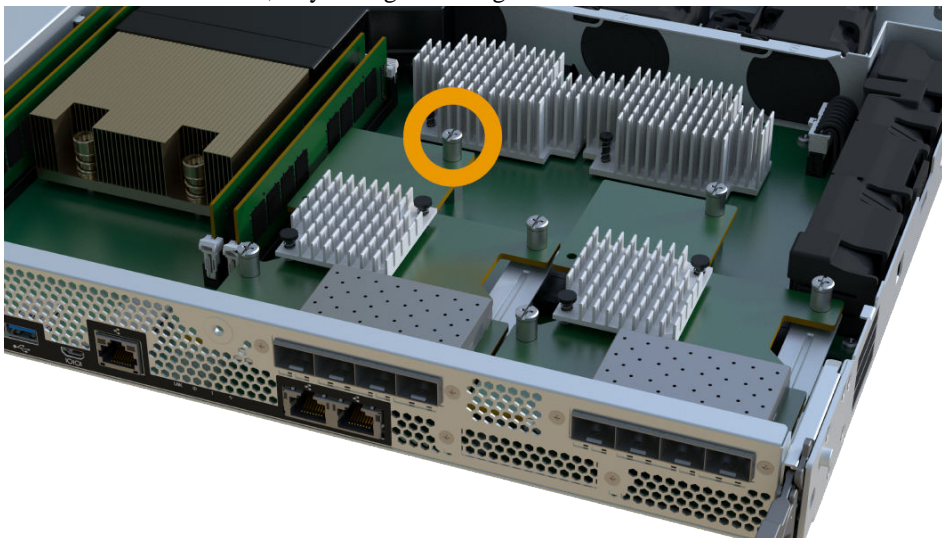
3. Carefully lower the HIC into place, and seat the HIC connector by pressing gently on the HIC.



Attention: Possible equipment damage – Be very careful not to pinch the gold ribbon connector for the controller LEDs between the HIC and the thumbscrew.

4. Hand-tighten the HIC thumbscrew.

Do not use a screwdriver, or you might over tighten the screw.



Note: The image above is an example, the appearance of your HIC may differ.

5. Using a #1 Phillips screwdriver, attach the HIC faceplate you removed from the original controller canister to the new controller canister with the two screws.

After you finish

Go to [Install Power Supply](#)

Install power supply

You must install the power supply into the replacement controller canister. Install the power supply by gently sliding it into the opening of the new controller.

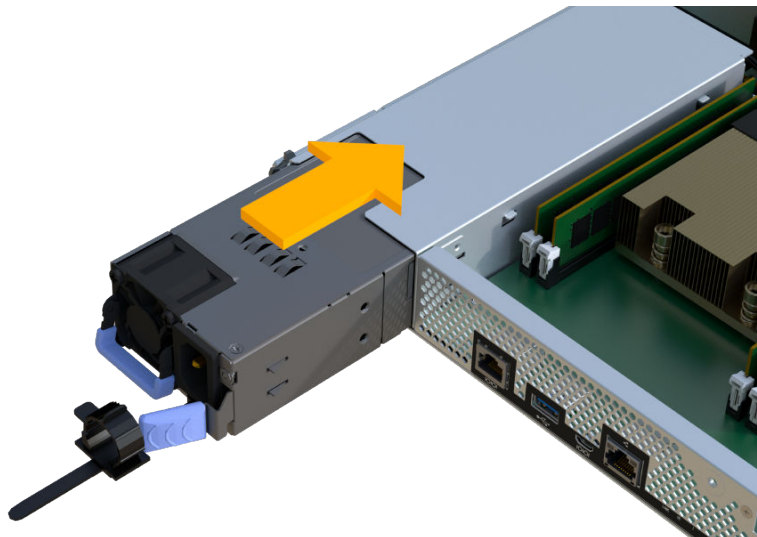
Step

Using both hands, support and align the edges of the power supply with the opening in the system chassis, and then gently push the power supply into the chassis using the cam handle.

The power supplies are keyed and can only be installed one way.



Attention: Do not use excessive force when sliding the power supply into the system; you can damage the connector.



After you finish

Go to [Install DIMMs](#)

Install DIMMs

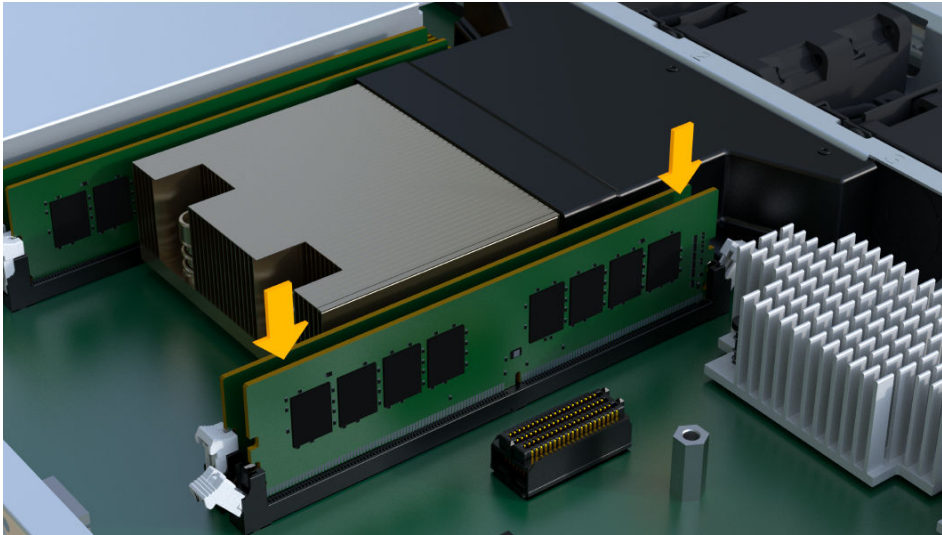
You must install the DIMMs into the new controller canister. Install the DIMMs by sliding the DIMM into the slot and securing the latches on either side.

Before you begin

- You have an ESD wristband, or you have taken other antistatic precautions.

Steps

1. Hold the DIMM by the corners, and align it to the slot.
The notch among the pins on the DIMM should line up with the tab in the socket.
2. Insert the DIMM squarely into the slot.

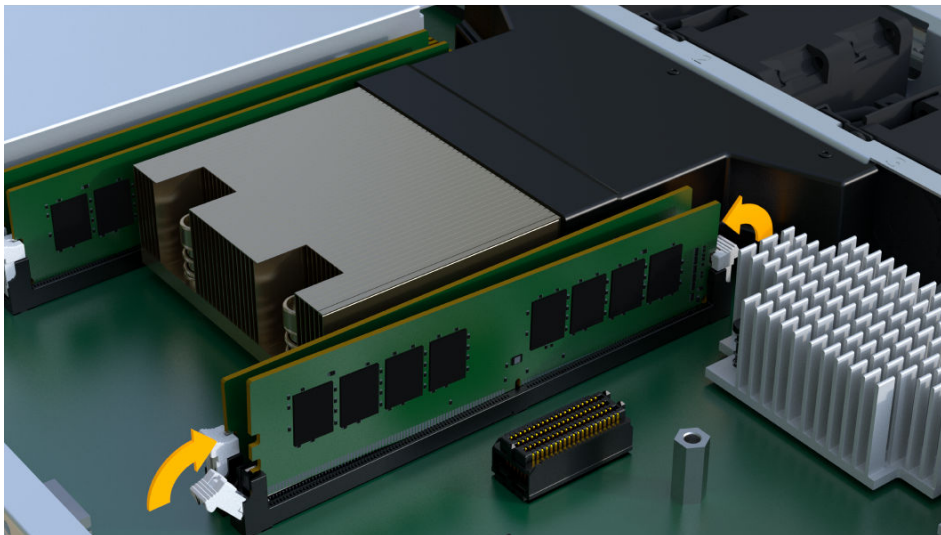


The DIMM fits tightly in the slot, but should go in easily. If not, realign the DIMM with the slot and reinsert it.

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

3. Push carefully, but firmly, on the top edge of the DIMM until the latches snap into place over the notches at the ends of the DIMM.

Note: DIMMs fit tightly. You might need to gently press on one side at a time and secure with each tab individually.



After you finish

Go to [Install Fans](#)

Install fans

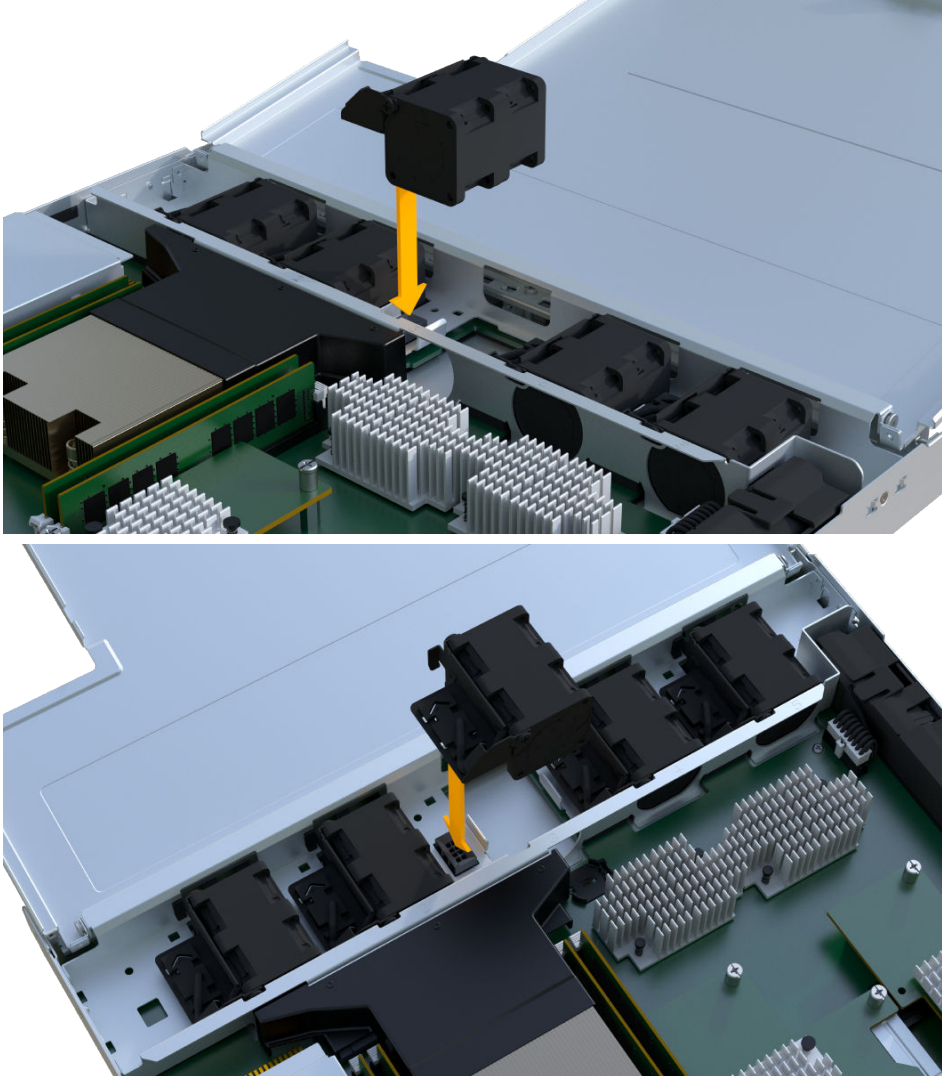
You must install the fans into the replacement controller canister. Install the fans by sliding them into the shelf.

Before you begin

- You have an ESD wristband, or you have taken other antistatic precautions.

Steps

1. Slide the fan all the way into the replacement controller.



2. Repeat until all fans are installed.

After you finish

Go to [Install new controller canister](#)

Install new controller canister

After installing the battery, power supply, DIMMs, fans, and the host interface card (HIC), if one was initially installed, you can install the new controller canister into the controller shelf. Install the new controller shelf by closing the cover and using the handles to slide the controller into the controller shelf.

Steps

1. Lower the cover on the controller canister and secure the thumbscrew.
2. While squeezing the controller handles, gently slide the controller canister all the way into the controller shelf.

Note: The controller audibly clicks when correctly installed into the shelf.



3. Install the SFPs from the original controller in the host ports on the new controller, if they were installed in the original controller, and reconnect all the cables.

If you are using more than one host protocol, be sure to install the SFPs in the correct host ports.

4. If the original controller used DHCP for the IP address, locate the MAC address on the label on the back of the replacement controller. Ask your network administrator to associate the DNS/network and IP address for the controller you removed with the MAC address for the replacement controller.

Note: If the original controller did not use DHCP for the IP address, the new controller adopts the IP address of the controller you removed.

After you finish

Go to [Complete controller replacement](#)

Complete controller replacement

You complete the controller replacement by placing the controller online and confirming that the storage array is working correctly. Then, you can collect support data and resume operations.

Steps

1. Place controller online.
 - a. In System Manager, navigate to the hardware page.
 - b. Select **Show back of controller**.
 - c. Select the replaced controller.
 - d. Select **Place online** from the drop-down list.
2. As the controller boots, check the controller LEDs.

When communication with the other controller is reestablished:

 - The amber Attention LED remains on.
 - The Host Link LEDs might be on, blinking, or off, depending on the host interface.
3. When the controller is back online, confirm that its status is Optimal and check the controller shelf's Attention LEDs.

If the status is not Optimal or if any of the Attention LEDs are on, confirm that all cables are correctly seated and the controller canister is installed correctly. If necessary, remove and reinstall the controller canister.

Note: If you cannot resolve the problem, contact technical support.

4. Click **Hardware > Support > Upgrade Center** to ensure that the latest version of SANtricity OS is installed.

As needed, install the latest version.

5. Verify that all volumes have been returned to the preferred owner.
 - a. Select **Storage > Volumes**. If current owner and preferred owner are not listed select **All volumes > Columns**. Select current owner and preferred owner, and then recheck to verify that volumes are distributed to their preferred owners.
 - b. If volumes are all owned by preferred owner continue to Step 6.
 - c. If none of the volumes are returned, you must manually return the volumes. Go to **Storage > Volumes > More > Redistribute volumes**.
 - d. If only some of the volumes are returned to their preferred owners after auto-distribution or manual distribution you must check the recovery guru for host connectivity issues.
 - e. If there is no recovery guru present or if following the recovery guru steps the volumes are still not returned to their preferred owners contact support.
6. Collect support data for your storage array using SANtricity System Manager.
 - a. Select **Support > Support Center > Diagnostics**.
 - b. Select **Collect Support Data**.
 - c. Click **Collect**.

The file is saved in the Downloads folder for your browser with the name `support-data.7z`.

Result

Your controller replacement is complete. You can resume normal operations.

DIMMs

You must replace a DIMM when a memory mismatch is present, or you have a failed DIMM.

Overview and requirements

Before you replace DIMMs, you need to be aware of certain requirements and considerations.

Requirements for replacing DIMMs

The DIMMs in your storage array are fragile. Improper handling can lead to damage to the DIMMs.

You can replace a DIMM for any EF300 or EF600 controller. You must verify the configuration of your EF300 or EF600 controller to ensure the correct DIMM size is replaced.

Follow these rules to avoid damaging the DIMMs in your storage array:

- Prevent electrostatic discharge (ESD):
 - Keep the DIMM in the ESD bag until you are ready to install it.
 - Open the ESD bag by hand or cut the top off with a pair of scissors. Do not insert a metal tool or knife into the ESD bag.
 - Keep the ESD bag and any packing materials in case you must return a DIMM later.



Warning: Always wear an ESD wrist strap grounded to an unpainted surface on your storage enclosure chassis.

- Handle DIMMs carefully:
 - Always use two hands when removing, installing, or carrying a DIMM.
 - Never force a DIMM into a shelf, and use gentle, firm pressure to completely engage the latch.
 - Always use approved packaging when shipping DIMMs.
- Avoid magnetic fields:
 - Keep DIMMs away from magnetic devices.

This section describes how to replace a DIMM in the following controller shelves:

- EF300 controller shelf
- EF600 controller shelf

Replace DIMMs

To replace your DIMM you must verify the cache size of your controller, place the controller offline, remove the controller, remove the DIMMs, and install the new DIMMs in your controller. Then you can bring your controller back online and verify the storage array is working properly.

Determining if you need to replace DIMMs in a controller

You must verify the cache size of your controller before replacing the DIMMS.

Steps

1. Access the `Storage-Array-Profile` for the controller.
 - a. Select **Support Page > Support Resources > Storage Array Profile**.
2. Select the **Data Cache Module** tab and locate the `Data Cache Module` field.

3. If one of the following is present, note the DIMM's location and continue with remaining procedures in this section to replace the DIMMs on your controller:
 - A failed DIMM, or a DIMM reporting **Data Cache Module** as not optimal.
 - A DIMM with a mismatched **Data Cache Module** capacity.

After you finish

Go to [Place controller offline](#).

Place controller offline

You must place the controller offline so you can safely remove and replace the DIMMs. You must back up the configuration and collect support data first. Then, you can take the controller offline.

Before you begin

- Make sure that no volumes are in use or that you have a multipath driver installed on all hosts using these volumes.
- Ensure you have verified the cache size of your controller and that your DIMMs need replaced.

Steps

1. From SANtricity System Manager, review the details in the Recovery Guru to confirm that there is an issue with a mismatched memory and to ensure no other items must be addressed first.
2. From the Details area of the Recovery Guru, determine which DIMM to replace.
3. Back up the storage array's configuration database.

If a problem occurs when you remove a controller, you can use the saved file to restore your configuration.

- a. In System Manager, navigate to the support page.
 - b. Select the **Support Center** tab.
 - c. Select the **Diagnostics** tab.
 - d. Select **Collect Support Data**.
4. If the controller is not already offline, take it offline now using SANtricity System Manager.
 - a. Select **Hardware**.
 - b. If the graphic shows the drives, select **Show back of shelf** to show the controllers.
 - c. Select the controller that you want to place offline.
 - d. From the context menu, select **Place offline**, and confirm that you want to perform the operation.

Note: If you are accessing SANtricity System Manager using the controller you are attempting to take offline, a SANtricity System Manager Unavailable message is displayed. Select **Connect to an alternate network connection** to automatically access SANtricity System Manager using the other controller.

5. Wait for SANtricity System Manager to update the controller's status to offline.



Attention: Do not begin any other operations until after the status has been updated.

6. Select **Recheck** from the Recovery Guru, and confirm that the OK to remove field in the Details area displays Yes, indicating that it is safe to remove this component.

After you finish

Go to [Remove controller canister](#).

Remove controller canister

You remove the failed controller canister so you can replace your DIMMs with new ones.

Before you begin

- You must use labels to identify each cable that is connected to the controller canister.
- You have an ESD wristband, or you have taken other antistatic precautions.
- You have prepared a flat, static free work area.

Steps

1. Put on an ESD wristband or take other antistatic precautions.
2. Label each cable that is attached to the controller canister.
3. Disconnect all the cables from the controller canister.



Attention: To prevent degraded performance, do not twist, fold, pinch, or step on the cables.

4. Confirm that the Cache Active LED on the back of the controller is off.
5. Squeeze the handles on either side of the controller, and pull back until it releases from the shelf.



6. Using two hands and the handles, slide the controller canister out of the shelf. When the front of the controller is free of the enclosure, use two hands to pull it out completely.



Attention: Always use two hands to support the weight of a controller canister.



7. Place the controller canister on a flat, static-free surface.

After you finish

Go to [Remove DIMMs](#).

Remove DIMMs

If there is a memory mismatch present, you must replace the DIMMs in your controller.

Before you begin

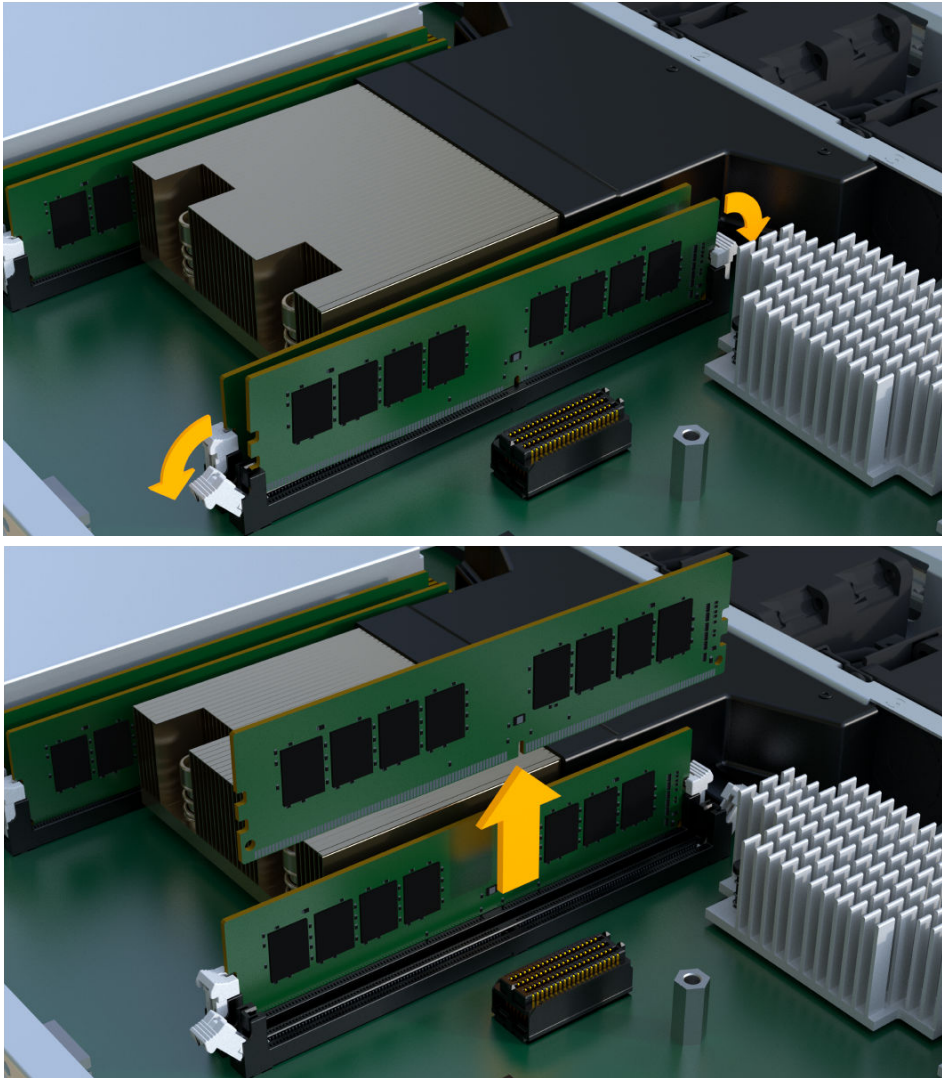
- You have an ESD wristband, or you have taken other antistatic precautions.

Steps

1. Remove the controller canister's cover by unscrewing the single thumbscrew and lifting the lid open.
2. Confirm that the green LED inside the controller is off.
If this green LED is on, the controller is still using battery power. You must wait for this LED to go off before removing any components.
3. Locate the DIMMs on your controller.
4. Note the orientation of the DIMM in the socket so that you can insert the replacement DIMM in the proper orientation.

Note: A notch at the bottom of the DIMM helps you align the DIMM during installation.

5. Slowly push apart on the two DIMM ejector tabs on either side of the DIMM to eject the DIMM from its slot, and then slide it out of the slot.



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

The number and placement of system DIMMs depends on the model of your system.

After you finish

Go to [Install new DIMMs](#).

Install new DIMMs

You install a new DIMM to replace the DIMM previously installed in the controller.

Before you begin

- If you are not already grounded, properly ground yourself.

Steps

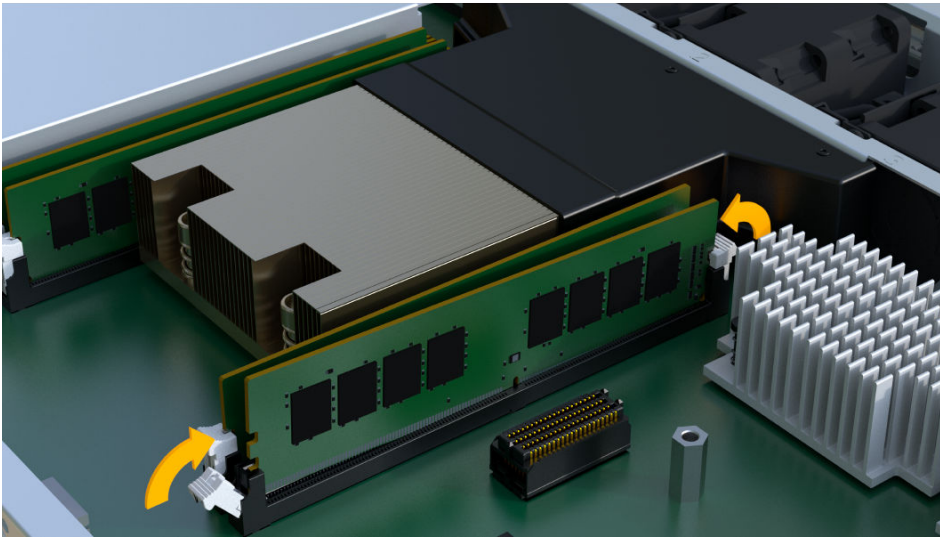
1. Hold the DIMM by the corners, and align it to the slot.
The notch among the pins on the DIMM should line up with the tab in the socket.
2. Insert the DIMM squarely into the slot.

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

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

3. Push carefully, but firmly, on the top edge of the DIMM until the latches snap into place over the notches at the ends of the DIMM.

Note: DIMMs fit tightly. You might need to gently press on one side at a time and secure with each tab individually.



After you finish

Go to [Reinstall controller canister](#).

Reinstall controller canister

After installing the new DIMMs, you reinstall the controller canister into the controller shelf.

Steps

1. Lower the cover on the controller canister and secure the thumbscrew.
2. While squeezing the controller handles, gently slide the controller canister all the way into the controller shelf.

Note: The controller audibly clicks when correctly installed into the shelf.



3. Reconnect all the cables.

After you finish

Go to [Complete DIMMs replacement](#).

Complete DIMMs replacement

You complete a DIMM replacement by placing the controller online to confirm the storage array is working correctly. Then, you can collect support data and resume operations.

Steps

1. Place controller online.
 - a. In System Manager, navigate to the hardware page.
 - b. Select **Show back of controller**.
 - c. Select the controller with the replaced DIMMs.
 - d. Select **Place online** from the drop-down list.
2. As the controller boots, check the controller LEDs.

When communication with the other controller is reestablished:

 - The amber Attention LED remains on.
 - The Host Link LEDs might be on, blinking, or off, depending on the host interface.
3. When the controller is back online, confirm that its status is Optimal and check the controller shelf's Attention LEDs.

If the status is not Optimal or if any of the Attention LEDs are on, confirm that all cables are correctly seated and the controller canister is installed correctly. If necessary, remove and reinstall the controller canister.

Note: If you cannot resolve the problem, contact technical support.
4. Click **Hardware > Support > Upgrade Center** to ensure that the latest version of SANtricity OS is installed.

As needed, install the latest version.
5. Verify that all volumes have been returned to the preferred owner.
 - a. Select **Storage > Volumes**. If current owner and preferred owner are not listed select **All volumes > Columns**. Select current owner and preferred owner, and then recheck to verify that volumes are distributed to their preferred owners.

- b. If volumes are all owned by preferred owner continue to Step 6.
 - c. If none of the volumes are returned, you must manually return the volumes. Go to **Storage > Volumes > More > Redistribute volumes**.
 - d. If only some of the volumes are returned to their preferred owners after auto-distribution or manual distribution you must check the recovery guru for host connectivity issues.
 - e. If there is no recovery guru present or if following the recovery guru steps the volumes are still not returned to their preferred owners contact support.
- 6.** Collect support data for your storage array using SANtricity System Manager.
- a. Select **Support > Support Center > Diagnostics**.
 - b. Select **Collect Support Data**.
 - c. Click **Collect**.

The file is saved in the Downloads folder for your browser with the name `support-data.7z`.

Result

Your DIMM replacement is complete. You can resume normal operations.

Drives

A drive is a device that provides the physical storage media for data.

Overview and requirements

Before you replace a drive, you need to be aware of certain requirements and considerations.

Requirements for replacing drives

The drives in your storage array are fragile. Improper drive handling is a leading cause of drive failure.

Follow these rules to avoid damaging the drives in your storage array:

- Prevent electrostatic discharge (ESD):
 - Keep the drive in the ESD bag until you are ready to install it.
 - Open the ESD bag by hand or cut the top off with a pair of scissors. Do not insert a metal tool or knife into the ESD bag.
 - Keep the ESD bag and any packing materials in case you must return a drive later.
 - Always wear an ESD wrist strap grounded to an unpainted surface on your storage enclosure chassis. If a wrist strap is unavailable, touch an unpainted surface on your storage enclosure chassis before handling the drive.
- Handle drives carefully:
 - Always use two hands when removing, installing, or carrying a drive.
 - Never force a drive into a shelf, and use gentle, firm pressure to completely engage the drive latch.
 - Place drives on cushioned surfaces, and never stack drives on top of each other.
 - Do not bump drives against other surfaces.
 - Before removing a drive from a shelf, unlatch the handle and wait 30 seconds for the drive to spin down.
 - Always use approved packaging when shipping drives.
- Avoid magnetic fields:
 - Keep drives away from magnetic devices.

Magnetic fields can destroy all data on the drive and cause irreparable damage to the drive circuitry.

24-drive shelves

Drive numbering in an EF300 or EF600 controller shelf

The following figure shows how the drives are numbered in each shelf (the shelf's front bezel has been removed).



Drive staggering in an EF300 or EF600 controller shelf

When inserting fewer than 24 drives into an EF300 or EF600 controller, you must alternate between the two halves of the controller. Beginning with the far left and then moving to the far right, place the drives in one at a time.

The following figure shows how to stagger the drives between the two halves.



This section describes how to replace a drive in the following controller shelves:

- EF300 controller shelf
- EF600 controller shelf

Replace drive

The Recovery Guru in SANtricity System Manager monitors the drives in the storage array and can notify you of an impending drive failure or an actual drive failure. When a drive has failed, its amber Attention LED is on. You can hot-swap a failed drive while the storage array is receiving I/O.

Steps

1. [Prepare to replace drive](#) on page 40
You prepare to replace a drive by checking the Recovery Guru in SANtricity System Manager and completing any prerequisite steps. Then, you can locate the failed component.
2. [Remove drive](#) on page 41
You remove a failed drive to replace it with a new one.
3. [Install new drive](#) on page 42
You install a new drive to replace the failed one. Install the replacement drive as soon as possible after removing the failed drive.
4. [Complete drive replacement](#) on page 42
You complete the drive replacement to confirm that the new drive is working correctly.

Prepare to replace drive

You prepare to replace a drive by checking the Recovery Guru in SANtricity System Manager and completing any prerequisite steps. Then, you can locate the failed component.

Steps

1. If the Recovery Guru in SANtricity System Manager has notified you of an *impending drive failure*, but the drive has not yet failed, follow the instructions in the Recovery Guru to fail the drive.
2. If needed, use SANtricity System Manager to confirm you have a suitable replacement drive.
 - a. Select **Hardware**.
 - b. Select the failed drive on the shelf graphic.
 - c. Click the drive to display its context menu, and then select **View settings**.
 - d. Confirm that the replacement drive has a capacity equal to or greater than the drive you are replacing and that it has the features you expect.

For example, do not attempt to replace a hard disk drive (HDD) with a solid-state disk (SSD). Similarly, if you are replacing a secure-capable drive, make sure the replacement drive is also secure-capable.

3. If needed, use SANtricity System Manager to locate the drive within your storage array: From the drive's context menu, select **Turn on locator light**.

The drive's Attention LED (amber) blinks so you can identify which drive to replace.

Note: If you are replacing a drive in a shelf that has a bezel, you must remove the bezel to see the drive LEDs.

After you finish

Go to [Remove drive](#).

Remove drive

You remove a failed drive to replace it with a new one.

Before you begin

- You have an ESD wristband, or you have taken other antistatic precautions.
- You have reviewed [Requirements for replacing drives](#).
- You have prepared a flat, static-free work surface.

About this task

When you remove a drive, you must slide the drive partly out of the shelf and wait for the drive to spin down. Then, you can remove the drive completely.

Steps

1. Unpack the replacement drive, and set it on a flat, static-free surface near the shelf.
Save all packing materials.
2. Press the black release button on the failed drive.
The latch on the drive springs open partially, and the drive releases from the controller.
3. Open the cam handle, and slide out the drive slightly.
4. Wait 30 seconds.
5. Using both hands, remove the drive from the shelf.



6. Place the drive on an antistatic, cushioned surface away from magnetic fields.
7. Wait 30 seconds for the software to recognize that the drive has been removed.

Note: If you accidentally remove an active drive, wait at least 30 seconds, and then reinstall it. For the recovery procedure, refer to the storage management software.

After you finish

Go to [Install new drive](#).

Install new drive

You install a new drive to replace the failed one. Install the replacement drive as soon as possible after removing the failed drive.

Before you begin

- You have a replacement drive that is supported by NetApp for your controller shelf or drive shelf.

Steps

1. Open the cam handle.
2. Using two hands, insert the replacement drive into the open bay, firmly pushing until the drive stops.
3. Slowly close the cam handle until the drive is fully seated in the midplane and the handle clicks into place.

The green LED on the drive comes on when the drive is inserted correctly.

Note: Depending on your configuration, the controller might automatically reconstruct data to the new drive. If the shelf uses hot spare drives, the controller might need to perform a complete reconstruction on the hot spare before it can copy the data to the replaced drive. This reconstruction process increases the time that is required to complete this procedure.

After you finish

Go to [Complete drive replacement](#).

Complete drive replacement

You complete the drive replacement to confirm that the new drive is working correctly.

Steps

1. Check the Power LED and the Attention LED on the drive you replaced. (When you first insert a drive, its Attention LED might be on. However, the LED should go off within a minute.)
 - Power LED is on or blinking, and the Attention LED is off: Indicates that the new drive is working correctly.
 - Power LED is off: Indicates that the drive might not be installed correctly. Remove the drive, wait 30 seconds, and then reinstall it.
 - Attention LED is on: Indicates that the new drive might be defective. Replace it with another new drive.
2. If the Recovery Guru in SANtricity System Manager still shows an issue, select **Recheck** to ensure the problem has been resolved.
3. If the Recovery Guru indicates that drive reconstruction did not start automatically, start reconstruction manually, as follows:

Note: Perform this operation only when instructed to do so by technical support or the Recovery Guru.

- a. Select **Hardware**.
- b. Click the drive that you replaced.
- c. From the drive's context menu, select **Reconstruct**.
- d. Confirm that you want to perform this operation.

When the drive reconstruction completes, the volume group is in an Optimal state.

4. As required, reinstall the bezel.
5. Return the failed part to NetApp, as described in the RMA instructions shipped with the kit.

Result

Your drive replacement is complete. You can resume normal operations.

Fans


Each EF300 or EF600 controller shelf or drive shelf includes five fans for cooling the controller.

Overview and requirements

Before you replace a failed fan, you need to be aware of some requirements.

Requirements for replacing a fan

If you plan to replace a fan, keep the following requirements in mind.

- You have a replacement fan that is supported for your controller shelf or drive shelf model.
- You have an ESD wristband, or you have taken other antistatic precautions.
-  **Attention:** If the Recovery Guru indicates that it is not OK to remove the fan, contact technical support.

This section describes how to replace a fan in the following shelves:

- EF300 controller shelf
- EF600 controller shelf

Replace a fan

Each EF300 and EF600 controller shelf or drive shelf includes five fans. If a fan fails, you must replace it as soon as possible to ensure that the shelf has adequate cooling.

Place controller offline

You must place the controller canister offline so you can safely replace your failed fan. You must back up the configuration and collect support data first. Then, you can take the controller canister offline.

Before you begin

- You have reviewed the details in the Recovery Guru to confirm that there is an issue with a fan. Select **Recheck** from the Recovery Guru to ensure no other items must be addressed first.

Steps

1. From SANtricity System Manager, review the details in the Recovery Guru to confirm that there is an issue with a fan and to ensure no other items must be addressed first.
2. From the Details area of the Recovery Guru, determine which fan to replace.
3. Back up the storage array's configuration database.
If a problem occurs when you remove a controller, you can use the saved file to restore your configuration.
 - a. In System Manager, navigate to the support page.
 - b. Select the **Support Center** tab.
 - c. Select the **Diagnostics** tab.
 - d. Select **Collect Support Data**.
4. If the controller is not already offline, take it offline now using SANtricity System Manager.
 - a. Select **Hardware**.
 - b. If the graphic shows the drives, select **Show back of shelf** to show the controllers.
 - c. Select the controller that you want to place offline.

- d. From the context menu, select **Place offline**, and confirm that you want to perform the operation.

Note: If you are accessing SANtricity System Manager using the controller you are attempting to take offline, a SANtricity System Manager Unavailable message is displayed. Select **Connect to an alternate network connection** to automatically access SANtricity System Manager using the other controller.

5. Wait for SANtricity System Manager to update the controller's status to offline.



Attention: Do not begin any other operations until after the status has been updated.

6. Select **Recheck** from the Recovery Guru, and confirm that the OK to remove field in the Details area displays Yes, indicating that it is safe to remove this component.

After you finish

Go to [Remove controller canister](#).

Remove controller canister

You remove the controller canister so you can replace the failed fan with a new one. Disconnect all the cables then you can slide the controller out of the controller shelf.

Before you begin

- You must use labels to identify each cable that is connected to the controller canister.
- You have an ESD wristband, or you have taken other antistatic precautions.
- You have prepared a flat, static free work area.

Steps

1. Put on an ESD wristband or take other antistatic precautions.
2. Label each cable that is attached to the controller canister.
3. Disconnect all the cables from the controller canister.



Attention: To prevent degraded performance, do not twist, fold, pinch, or step on the cables.

4. Confirm that the Cache Active LED on the back of the controller is off.
5. Squeeze the handles on either side of the controller, and pull back until it releases from the shelf.



6. Using two hands and the handles, slide the controller canister out of the shelf. When the front of the controller is free of the enclosure, use two hands to pull it out completely.



Attention: Always use two hands to support the weight of a controller canister.



7. Place the controller canister on a flat, static-free surface.

After you finish

Go to [Remove failed fan](#).

Remove failed fan

You remove a failed fan so you can replace it with a new one.

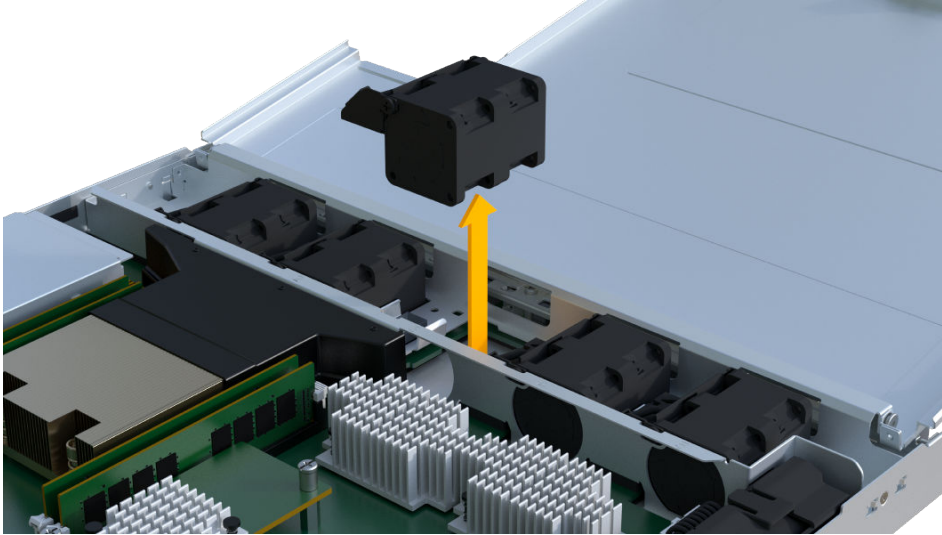
Before you begin

- You have an ESD wristband, or you have taken other antistatic precautions.

Steps

1. Remove the controller canister's cover by unscrewing the single thumbscrew and lifting the lid open.

2. Confirm that the green LED inside the controller is off.
If this green LED is on, the controller is still using battery power. You must wait for this LED to go off before removing any components.
3. Gently lift the failed fan from the controller.



After you finish

Go to [Install new fan](#).

Install new fan

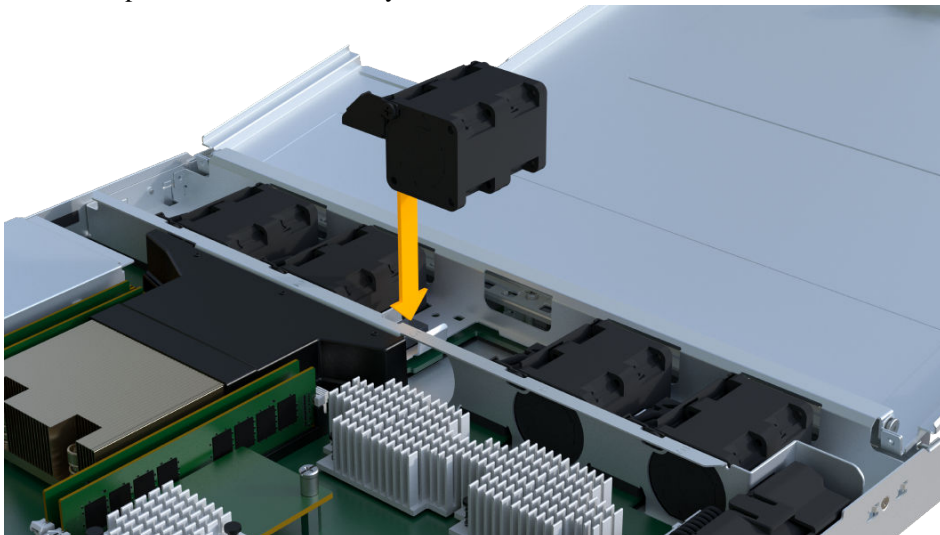
You install a new fan to replace the failed one.

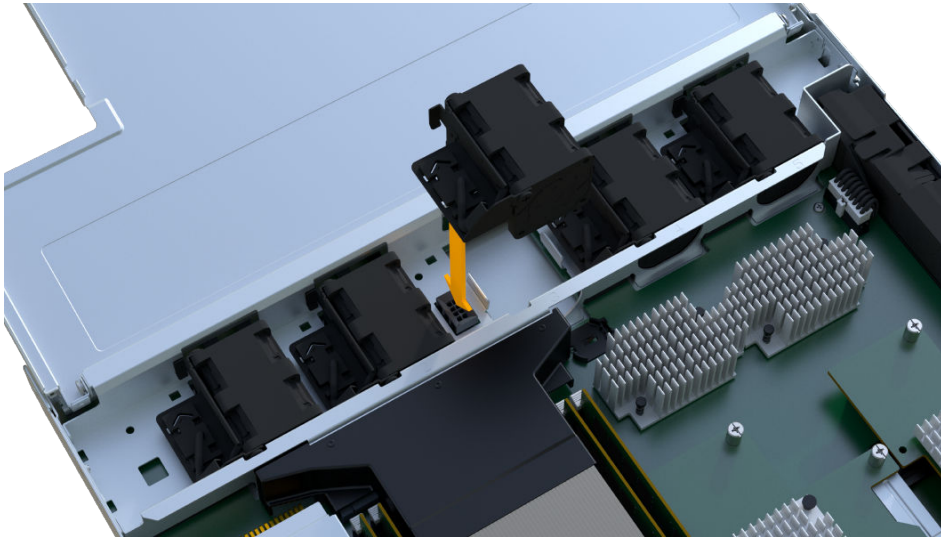
Before you begin

- You have an ESD wristband, or you have taken other antistatic precautions.

Step

Slide the replacement fan all the way into the shelf.





After you finish

Go to [Reinstall controller canister](#)

Reinstall controller canister

After installing the new fan, you can reinstall the controller canister into the controller shelf.

Steps

1. Lower the cover on the controller canister and secure the thumbscrew.
2. While squeezing the controller handles, gently slide the controller canister all the way into the controller shelf.

Note: The controller audibly clicks when correctly installed into the shelf.



After you finish

Go to [Complete fan replacement](#).

Complete fan replacement

You complete the fan replacement by confirming that the new fan is working correctly. Then, you can gather support data and resume normal operations.

Steps

1. Place controller online.
 - a. In System Manager, navigate to the hardware page.
 - b. Select **Show back of controller**.
 - c. Select the controller with the replaced fan.
 - d. Select **Place online** from the drop-down list.
2. As the controller boots, check the controller LEDs.

When communication with the other controller is reestablished:

 - The amber Attention LED remains on.
 - The Host Link LEDs might be on, blinking, or off, depending on the host interface.
3. When the controller is back online, confirm that its status is Optimal and check the controller shelf's Attention LEDs.

If the status is not Optimal or if any of the Attention LEDs are on, confirm that all cables are correctly seated and the controller canister is installed correctly. If necessary, remove and reinstall the controller canister.

Note: If you cannot resolve the problem, contact technical support.
4. Click **Support > Upgrade Center** to ensure that the latest version of SANtricity OS is installed.

As needed, install the latest version.
5. Verify that all volumes have been returned to the preferred owner.
 - a. Select **Storage > Volumes**. If current owner and preferred owner are not listed select **All volumes > Columns**. Select current owner and preferred owner, and then recheck to verify that volumes are distributed to their preferred owners.
 - b. If volumes are all owned by preferred owner continue to Step 6.
 - c. If none of the volumes are returned, you must manually return the volumes. Go to **Storage > Volumes > More > Redistribute volumes**.
 - d. If only some of the volumes are returned to their preferred owners after auto-distribution or manual distribution you must check the recovery guru for host connectivity issues.
 - e. If there is no recovery guru present or if following the recovery guru steps the volumes are still not returned to their preferred owners contact support.
6. Collect support data for your storage array using SANtricity System Manager.
 - a. Select **Support > Support Center > Diagnostics**.
 - b. Select **Collect Support Data**.
 - c. Click **Collect**.

The file is saved in the Downloads folder for your browser with the name `support-data.7z`.

Result

Your fan replacement is complete. You can resume normal operations.

Host interface cards

A host interface card (HIC) must be installed within a controller canister. The EF600 controller includes host ports on the optional HIC. Host ports that are built into the HIC are called HIC ports.

Overview and Requirements

If you plan to upgrade or replace a host interface card (HIC), keep the following requirements in mind.

- You have scheduled a downtime maintenance window for this procedure. You cannot access data on the storage array until you have successfully completed this procedure. Because both controllers must have the same HIC configuration when they are powered on, the power must be off when you change HIC configuration. The presence of mismatched HICs causes the controller with the replacement HIC to lock down when you bring it online.
- You have all cables, transceivers, switches, and host bus adapters (HBAs) needed to connect the new host ports.

For information about compatible hardware, refer to the [NetApp Interoperability Matrix](#) or the [NetApp Hardware Universe](#).

- You have an ESD wristband, or you have taken other antistatic precautions.
- You have a #1 Phillips screwdriver.
- You have labels to identify each cable that is connected to the controller canister.
- You have installed SANtricity Storage Manager on a management station, so you can use the storage array's command line interface (CLI).

If SANtricity Storage Manager has not yet been installed, follow the instructions in the [Linux express configuration](#), [Windows express configuration](#), or [VMware express configuration](#) to download and install the software.

- Some HIC replacements or upgrades may require a host port protocol conversion. Follow the instructions in the [Host port protocol](#) section for this requirement.
- EF300 controllers must have HIC port 2 filled with a HIC for host connectivity.

This section describes how to prepare to add a host interface card in the following controller shelves:

- EF600 controller shelf

This section describes how to prepare to replace or upgrade a host interface card in the following controller shelves:

- EF300 controller shelf
- EF600 controller shelf

Add host interface cards

You add a Host Interface Card (HIC) to EF600 controllers to increase the number of host ports in your storage array.

About this task

- When you add HICs, you must power off the storage array, install the HIC, and reapply power.
- When adding HICs to an EF600 controller repeat all steps to remove the second controller, install the HICs for the second controller, and reinstall the second controller before reapplying power to the controller shelf.



Attention: Possible loss of data access – Never install a HIC in an EF600 controller canister if that HIC was

designed for another E-Series controller. In addition both controllers and both HICs must be identical. The presence of incompatible or mismatched HICs causes the controllers to lock down when you apply power.

This procedure applies to the following controller shelves:

- EF600

Place controller shelf offline

You must place the controller shelf offline so you can safely add the HICs. You must back up the configuration and collect support data first. Then, you can take the controller shelf offline.

Before you begin

- You have scheduled a downtime maintenance window for this procedure. You cannot access data on the storage array until you have successfully completed this procedure. Because both controllers must have the same HIC configuration when they are powered on, the power must be off when you install HICs.

Steps

1. From the Home of SANtricity System Manager, ensure that the storage array has Optimal status.

If the status is not Optimal, use the Recovery Guru or contact technical support to resolve the problem. Do not continue with this procedure.

2. Collect support data for your storage array using SANtricity System Manager.

- a. Select **Support > Support Center > Diagnostics**.
- b. Select **Collect Support Data**.
- c. Click **Collect**.

The file is saved in the Downloads folder for your browser with the name `support-data.7z`.

3. Ensure that no I/O operations are occurring between the storage array and all connected hosts. For example, you can perform these steps:

- Stop all processes that involve the LUNs mapped from the storage to the hosts.
- Ensure that no applications are writing data to any LUNs mapped from the storage to the hosts.
- Unmount all file systems associated with volumes on the array.

Note: The exact steps to stop host I/O operations depend on the host operating system and the configuration, which are beyond the scope of these instructions. If you are not sure how to stop host I/O operations in your environment, consider shutting down the host.



Attention: Possible data loss – If you continue this procedure while I/O operations are occurring, the host application might lose access to the data because the storage is not accessible.

4. Wait for any data in cache memory to be written to the drives.

The green Cache Active LED on the back of each controller is on when cached data needs to be written to the drives. You must wait for this LED to turn off.

5. From the Home page of SANtricity System Manager, select **View Operations in Progress**. Wait for all operations to complete before continuing with the next step.
6. Power down the controller shelf.

- a. Label and then unplug both power cables from controller shelf.
- b. Wait for all LEDs on the controller shelf to turn off.

After you finish

Go to [Remove controller canister](#)

Remove controller canister

You remove the controller canister so you can add the new host interface card. When you remove a controller canister, you must disconnect all cables. Then, you can slide the controller canister out of the controller shelf.

Before you begin

- You must use labels to identify each cable that is connected to the controller canister.
- You must have a #1 Phillips screwdriver.
- You have an ESD wristband, or you have taken other antistatic precautions.
- You have prepared a flat, static free work area.

Steps

1. Put on an ESD wristband or take other antistatic precautions.
2. Label each cable that is attached to the controller canister.
3. Disconnect all the cables from the controller canister.



Attention: To prevent degraded performance, do not twist, fold, pinch, or step on the cables.

4. If the HIC ports use SFP+ transceivers, remove them.

Depending on what type of HIC you are adding to, you might be able to reuse these SFPs.

5. Confirm that the Cache Active LED on the back of the controller is off.
6. Squeeze the handles on either side of the controller, and pull back until it releases from the shelf.



7. Using two hands and the handles, slide the controller canister out of the shelf. When the front of the controller is free of the enclosure, use two hands to pull it out completely.



Attention: Always use two hands to support the weight of a controller canister.



8. Place the controller canister on a flat, static-free surface.

After you finish

Go to [Add the new host interface card](#).

Add the new host interface card

You install the host interface card (HIC) to increase the number of host ports in your storage array.

Before you begin

- You have an ESD wristband, or you have taken other antistatic precautions.
- You have a #1 Phillips screwdriver.
- You have two HICs that are compatible with your controllers.

About this task



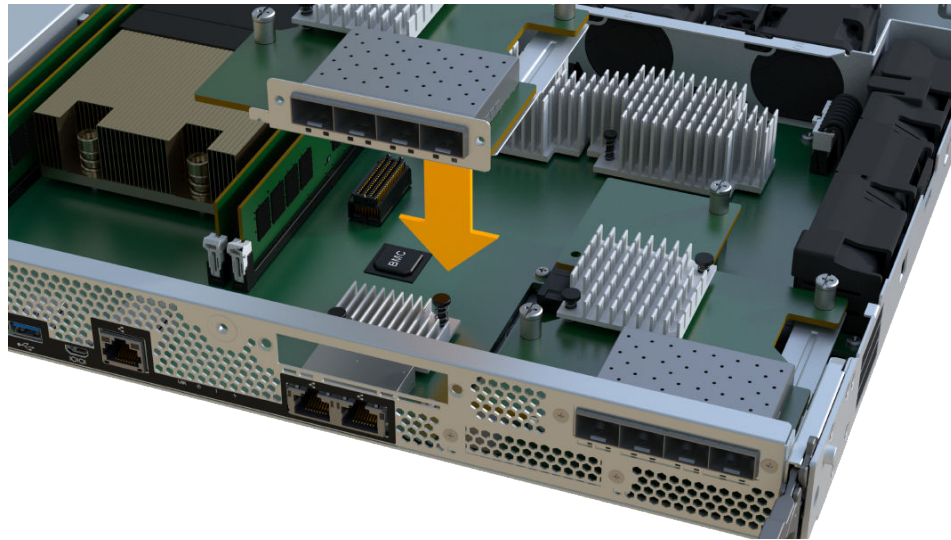
Attention: Possible loss of data access – Never install a HIC in an EF600 controller canister if that HIC was designed for another E-Series controller. In addition, both controllers and both HICs must be identical. The presence of incompatible or mismatched HICs causes the controllers to lock down when you apply power.

Steps

1. Remove the controller canister's cover by unscrewing the single thumbscrew and lifting the lid open.
2. Confirm that the green LED inside the controller is off.
If this green LED is on, the controller is still using battery power. You must wait for this LED to go off before removing any components.
3. Using a #1 Phillips screwdriver, remove the two screws that attach the HIC faceplate to the controller canister, and remove the faceplate.
4. Align the single thumbscrew on the HIC with the corresponding hole on the controller, and align the connector on the bottom of the HIC with the HIC interface connector on the controller card.
Be careful not to scratch or bump the components on the bottom of the HIC or on the top of the controller card.
5. Carefully lower the HIC into place, and seat the HIC connector by pressing gently on the HIC.



Attention: Possible equipment damage – Be very careful not to pinch the gold ribbon connector for the controller LEDs between the HIC and the thumbscrew.



Note: The image above is an example of an EF600, the appearance of your HIC may differ.

6. Hand-tighten the HIC thumbscrew.

Do not use a screwdriver, or you might over tighten the screws.

7. Using a #1 Phillips screwdriver, attach the HIC faceplate you removed from the original controller canister to the new controller canister with the two screws.

After you finish

Go to [Reinstall the controller canister](#).

Reinstall the controller canister

You reinstall the controller canister into the controller shelf after installing the HIC.

Steps

1. Lower the cover on the controller canister and secure the thumbscrew.
2. While squeezing the controller handles, gently slide the controller canister all the way into the controller shelf.

Note: The controller audibly clicks when correctly installed into the shelf.



3. If removed, install the SFPs into the new HIC and reconnect all the cables.
If you are using more than one host protocol, be sure to install the SFPs in the correct host ports.

After you finish

Go to [Complete adding host interface card.](#)

Reinstall the controller canister

You reinstall the controller canister into the controller shelf after installing the HIC.

Steps

1. Lower the cover on the controller canister and secure the thumbscrew.
2. While squeezing the controller handles, gently slide the controller canister all the way into the controller shelf.

Note: The controller audibly clicks when correctly installed into the shelf.



3. If removed, install the SFPs into the new HIC and reconnect all the cables.
If you are using more than one host protocol, be sure to install the SFPs in the correct host ports.

After you finish

Go to [Complete adding host interface card](#).

Complete adding host interface card

You complete the HIC addition by placing the controller online and confirming that the storage array is working correctly. Then, you can collect support data and resume operations.

Steps

1. Place controller online.
 - a. Plug in power cables.
2. As the controller boots, check the controller LEDs.
 - The amber Attention LED remains on.
 - The Host Link LEDs might be on, blinking, or off, depending on the host interface.
3. When the controller is back online, confirm that its status is Optimal and check the controller shelf's Attention LEDs.

If the status is not Optimal or if any of the Attention LEDs are on, confirm that all cables are correctly seated and the controller canister is installed correctly. If necessary, remove and reinstall the controller canister.

Note: If you cannot resolve the problem, contact technical support.

4. Click **Support > Upgrade Center** to ensure that the latest version of SANtricity OS is installed.

As needed, install the latest version.
5. Verify that all volumes have been returned to the preferred owner.
 - a. Select **Storage > Volumes**. If current owner and preferred owner are not listed select **All volumes > Columns**. Select current owner and preferred owner then recheck to verify that volumes are distributed to their preferred owners.
 - b. If volumes are all owned by preferred owner continue to Step 6.
 - c. If none of the volumes are returned, you must manually return the volumes. Go to **Storage > Volumes > More > Redistribute volumes**.
 - d. If only some of the volumes are returned to their preferred owners after auto-distribution or manual distribution you must check the recovery guru for host connectivity issues.
 - e. If there is no recovery guru present or if following the recovery guru steps the volumes are still not returned to their preferred owners contact support.
6. Collect support data for your storage array using SANtricity System Manager.
 - a. Select **Support > Support Center > Diagnostics**.
 - b. Select **Collect Support Data**.
 - c. Click **Collect**.

The file is saved in the Downloads folder for your browser with the name `support-data.7z`.

Result

The process of adding a host interface card in your storage array is complete. You can resume normal operations.

Upgrade host interface card

You upgrade a host interface card (HIC) to increase the number of host ports or to change host protocols.

About this task

- When you upgrade HICs, you must power off the storage array, upgrade the HICs, and reapply power.
- When upgrading HICs in an EF300 or EF600 controller repeat all steps to remove the second controller, upgrade the second controller's HICs, and reinstall the second controller before reapplying power to the controller shelf.



Attention: Possible loss of data access – Never install a HIC in an EF300 or EF600 controller canister if that HIC was designed for another E-Series controller. In addition, both controllers and both HICs must be identical. The presence of incompatible or mismatched HICs causes the controllers to lock down when you apply power.

Steps

1. [Place controller shelf offline](#) on page 57

You must place the controller shelf offline so you can safely upgrade the HICs. You must back up the configuration and collect support data first. Then, you can take the controller shelf offline.

2. [Remove controller canister](#) on page 58

You remove the controller canister so you can upgrade the new host interface card (HIC). When you remove a controller canister, you must disconnect all cables. Then, you can slide the controller canister out of the controller shelf.

3. [Remove the host interface card](#) on page 60

You remove the original host interface card (HIC) so you can replace it with an upgraded one.

4. [Upgrade host interface card](#) on page 62

You install the new host interface card (HIC) to increase the number of host ports or change host protocol in your storage array.

5. [Reinstall controller canister](#) on page 63

You reinstall the controller canister into the controller shelf after upgrading the HIC.

6. [Complete the host interface card upgrade](#) on page 64

You complete the HIC upgrade by placing the controller online and confirming that the storage array is working correctly. Then, you can collect support data and resume operations.

Place controller shelf offline

You must place the controller shelf offline so you can safely upgrade the HICs. You must back up the configuration and collect support data first. Then, you can take the controller shelf offline.

Before you begin

- You have scheduled a downtime maintenance window for this procedure. You cannot access data on the storage array until you have successfully completed this procedure. Because both controllers must have the same HIC configuration when they are powered on, the power must be off when you install HICs.

Steps

1. From the Home of SANtricity System Manager, ensure that the storage array has Optimal status.

If the status is not Optimal, use the Recovery Guru or contact technical support to resolve the problem. Do not continue with this procedure.

2. Collect support data for your storage array using SANtricity System Manager.

- a. Select **Support > Support Center > Diagnostics**.
- b. Select **Collect Support Data**.
- c. Click **Collect**.

The file is saved in the Downloads folder for your browser with the name `support-data.7z`.

3. Ensure that no I/O operations are occurring between the storage array and all connected hosts. For example, you can perform these steps:

- Stop all processes that involve the LUNs mapped from the storage to the hosts.
- Ensure that no applications are writing data to any LUNs mapped from the storage to the hosts.
- Unmount all file systems associated with volumes on the array.

Note: The exact steps to stop host I/O operations depend on the host operating system and the configuration, which are beyond the scope of these instructions. If you are not sure how to stop host I/O operations in your environment, consider shutting down the host.



Attention: Possible data loss – If you continue this procedure while I/O operations are occurring, the host application might lose access to the data because the storage is not accessible.

4. Wait for any data in cache memory to be written to the drives.

The green Cache Active LED on the back of each controller is on when cached data needs to be written to the drives. You must wait for this LED to turn off.

5. From the Home page of SANtricity System Manager, select **View Operations in Progress**. Wait for all operations to complete before continuing with the next step.

6. Power down the controller shelf.

- a. Label and then unplug both power cables from controller shelf.
- b. Wait for all LEDs on the controller shelf to turn off.

After you finish

Go to [Remove controller canister](#)

Remove controller canister

You remove the controller canister so you can upgrade the new host interface card (HIC). When you remove a controller canister, you must disconnect all cables. Then, you can slide the controller canister out of the controller shelf.

Before you begin

- You have labels to identify each cable that is connected to the controller canister.
- You must have a #1 Phillips screwdriver.
- You have an ESD wristband, or you have taken other antistatic precautions.
- You have prepared a flat, static free work area.

Steps

1. Label each cable that is attached to the controller canister.
2. Disconnect all the cables from the controller canister.



Attention: To prevent degraded performance, do not twist, fold, pinch, or step on the cables.

3. If the HIC ports use SFP+ transceivers, remove them.

Depending on what type of HIC you are upgrading to, you might be able to reuse these SFPs.

4. Confirm that the Cache Active LED on the back of the controller is off.
5. Squeeze the handles on either side of the controller, and pull back until it releases from the shelf.



6. Using two hands and the handles, slide the controller canister out of the shelf. When the front of the controller is free of the enclosure, use two hands to pull it out completely.



Attention: Always use two hands to support the weight of a controller canister.



7. Place the controller canister on a flat, static-free surface.

After you finish

Go to [Remove a host interface card](#).

Remove the host interface card

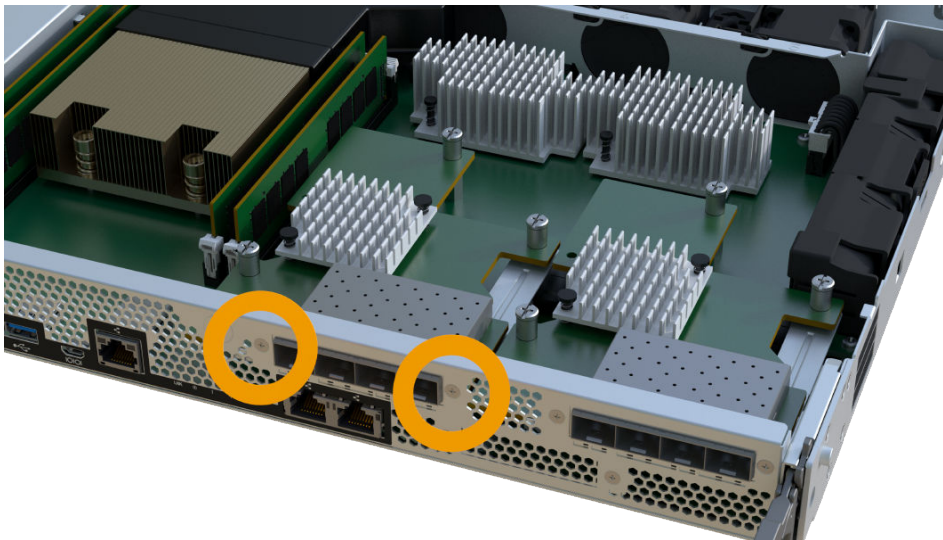
You remove the original host interface card (HIC) so you can replace it with an upgraded one.

Before you begin

- You have a #1 Phillips screwdriver.
- You have an ESD wristband, or you have taken other antistatic precautions.

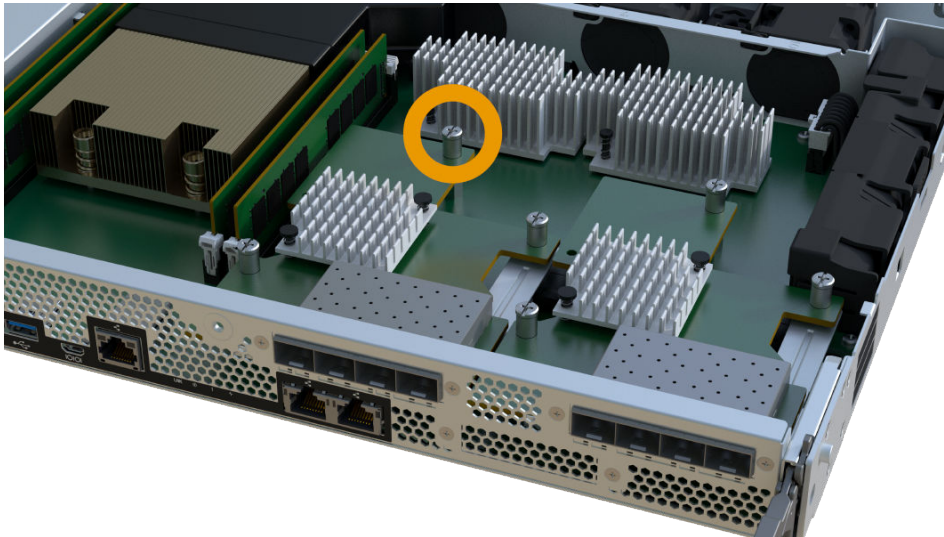
Steps

1. Remove the controller canister's cover by unscrewing the single thumbscrew and lifting the lid open.
2. Confirm that the green LED inside the controller is off.
If this green LED is on, the controller is still using battery power. You must wait for this LED to go off before removing any components.
3. Using a Phillips screwdriver, remove the two screws that attach the HIC faceplate to the controller canister.



Note: The image above is an example, the appearance of your HIC may differ.

4. Remove the HIC faceplate.
5. Using your fingers or a Phillips screwdriver, loosen the single thumbscrew that secure the HIC to the controller card.



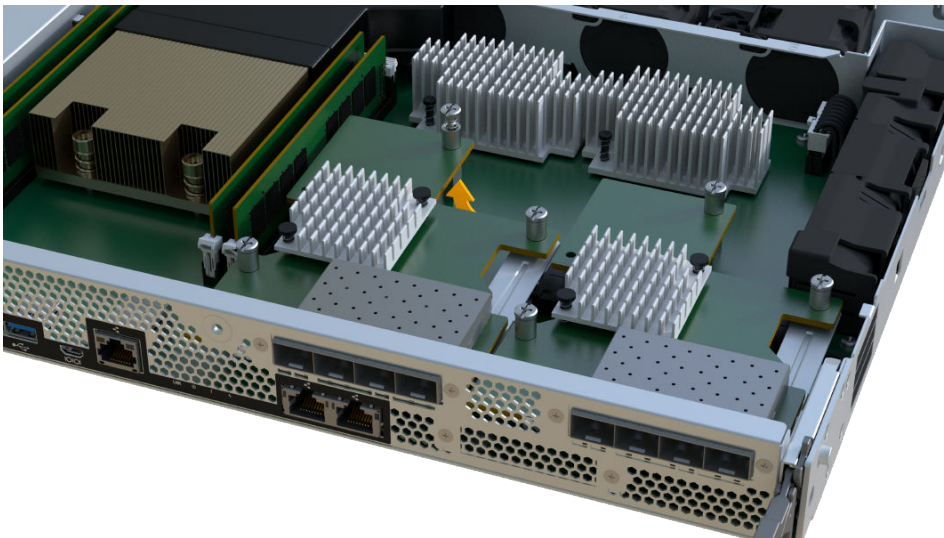
Note: The HIC comes with three screw locations on the top, but is secured with only one.

Note: The image above is an example, the appearance of your HIC may differ.

6. Carefully detach the HIC from the controller card by lifting the card up and out of the controller.



Attention: Be careful not to scratch or bump the components on the bottom of the HIC or on the top of the controller card.



Note: The image above is an example, the appearance of your HIC may differ.

7. Place the HIC on a flat, static-free surface.

After you finish

Go to [Upgrade host interface card.](#)

Upgrade host interface card

You install the new host interface card (HIC) to increase the number of host ports or change host protocol in your storage array.

Before you begin

- You have an ESD wristband, or you have taken other antistatic precautions.
- You have a #1 Phillips screwdriver.
- You have two HICs, that are compatible with your controllers.
- You have removed the HIC that is being upgraded.

About this task

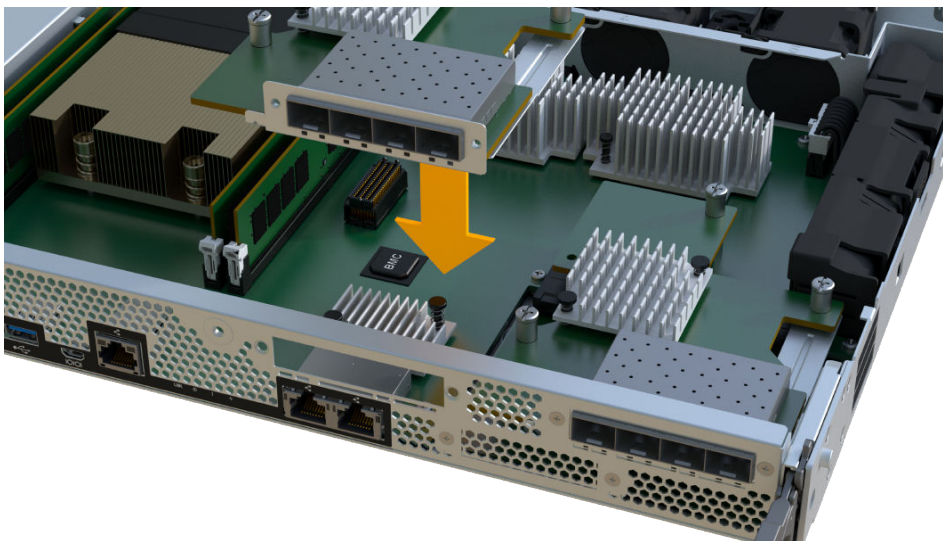


Attention: Possible loss of data access – Never install a HIC in an EF300 or EF600 controller canister if that HIC was designed for another E-Series controller. In addition, both controllers and both HICs must be identical. The presence of incompatible or mismatched HICs causes the controllers to lock down when you apply power.

Steps

1. Unpack the new HIC and the new HIC faceplate.
2. Align the single thumbscrew on the HIC with the corresponding holes on the controller, and align the connector on the bottom of the HIC with the HIC interface connector on the controller card.

Be careful not to scratch or bump the components on the bottom of the HIC or on the top of the controller card.



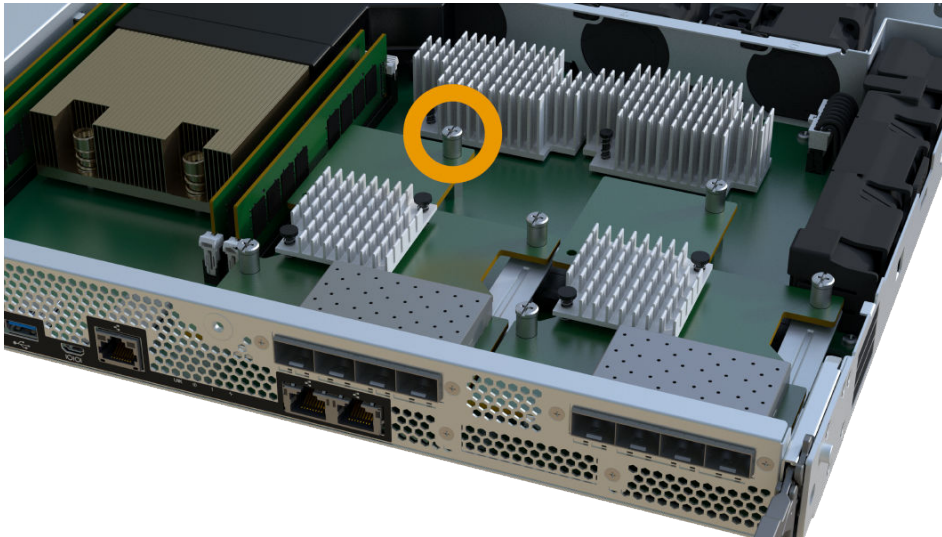
Note: The image above is an example, the appearance of your HIC may differ.

3. Carefully lower the HIC into place, and seat the HIC connector by pressing gently on the HIC.



Attention: Possible equipment damage – Be very careful not to pinch the gold ribbon connector for the controller LEDs between the HIC and the thumbscrew.

4. Hand-tighten the HIC thumbscrew.



Note: The image above is an example, the appearance of your HIC may differ.

Note: Do not use a screwdriver, or you might over tighten the screws.

5. Using a #1 Phillips screwdriver, attach the HIC faceplate you removed from the original HIC with the three screws.

After you finish

Go to [Reinstall controller canister](#).

Reinstall controller canister

You reinstall the controller canister into the controller shelf after upgrading the HIC.

Steps

1. Lower the cover on the controller canister and secure the thumbscrew.
2. While squeezing the controller handles, gently slide the controller canister all the way into the controller shelf.

Note: The controller audibly clicks when correctly installed into the shelf.



3. If removed, install the SFPs into the new HIC and reconnect all the cables. If you are using more than one host protocol, be sure to install the SFPs in the correct host ports.
If you are using more than one host protocol, be sure to install the SFPs in the correct host ports.

After you finish

Go to [Complete the host interface card upgrade](#).

Complete the host interface card upgrade

You complete the HIC upgrade by placing the controller online and confirming that the storage array is working correctly. Then, you can collect support data and resume operations.

Steps

1. Place controller online.
 - a. Plug in power cables.
2. As the controller boots, check the controller LEDs.
 - The amber Attention LED remains on.
 - The Host Link LEDs might be on, blinking, or off, depending on the host interface.
3. When the controller is back online, confirm that its status is Optimal and check the controller shelf's Attention LEDs.
If the status is not Optimal or if any of the Attention LEDs are on, confirm that all cables are correctly seated and the controller canister is installed correctly. If necessary, remove and reinstall the controller canister.

Note: If you cannot resolve the problem, contact technical support.
4. Click **Support > Upgrade Center** to ensure that the latest version of SANtricity OS is installed.
As needed, install the latest version.
5. Verify that all volumes have been returned to the preferred owner.
 - a. Select **Storage > Volumes**. If current owner and preferred owner are not listed select **All volumes > Columns**. Select current owner and preferred owner, and then recheck to verify that volumes are distributed to their preferred owners.
 - b. If volumes are all owned by preferred owner continue to Step 6.
 - c. If none of the volumes are returned, you must manually return the volumes. Go to **Storage > Volumes > More > Redistribute volumes**.
 - d. If only some of the volumes are returned to their preferred owners after auto-distribution or manual distribution you must check the recovery guru for host connectivity issues.
 - e. If there is no recovery guru present or if following the recovery guru steps the volumes are still not returned to their preferred owners contact support.
6. Collect support data for your storage array using SANtricity System Manager.
 - a. Select **Support > Support Center > Diagnostics**.
 - b. Select **Collect Support Data**.
 - c. Click **Collect**.

The file is saved in the Downloads folder for your browser with the name `support-data.7z`.

Result

The process of upgrading a host interface card in your storage array is complete. You can resume normal operations.

Replace failed host interface card

You replace a failed host interface card (HIC) with a new one.

About this task

- When you replace a failed HIC, you must power off the storage array, replace the HIC, and reapply power.



Attention: Possible loss of data access – Never install a HIC in an EF300 or EF600 controller canister if that HIC was designed for another E-Series controller. In addition, both controllers and both HICs must be identical. The presence of incompatible or mismatched HICs causes the controllers to lock down when you apply power.

Place the controller offline

You must place the affected controller offline so you can safely replace the HICs. You must back up the configuration and collect support data first. Then, you can take the controller canister offline.

Before you begin

- You have scheduled a downtime maintenance window for this procedure. You cannot access data on the storage array until you have successfully completed this procedure. Because both controllers must have the same HIC configuration when they are powered on, the power must be off when you install HICs.

Steps

- From SANtricity System Manager, review the details in the Recovery Guru to confirm that there is an issue with a battery and to ensure no other items must be addressed first.
- From the Details area of the Recovery Guru, determine which battery to replace.
- Back up the storage array's configuration database.
If a problem occurs when you remove a controller, you can use the saved file to restore your configuration.
 - In System Manager, navigate to the support page.
 - Select the **Support Center** tab.
 - Select the **Diagnostics** tab.
 - Select **Collect Support Data**.
- If the controller is not already offline, take it offline now using SANtricity System Manager.
 - Select **Hardware**.
 - If the graphic shows the drives, select **Show back of shelf** to show the controllers.
 - Select the controller that you want to place offline.
 - From the context menu, select **Place offline**, and confirm that you want to perform the operation.

Note: If you are accessing SANtricity System Manager using the controller you are attempting to take offline, a SANtricity System Manager Unavailable message is displayed. Select **Connect to an alternate network connection** to automatically access SANtricity System Manager using the other controller.

- Wait for SANtricity System Manager to update the controller's status to offline.



Attention: Do not begin any other operations until after the status has been updated.

6. Select **Recheck** from the Recovery Guru, and confirm that the OK to remove field in the Details area displays Yes, indicating that it is safe to remove this component.

After you finish

Go to [Remove controller canister](#).

Remove controller canister

You remove the controller canister so you can replace the failed host interface card. When you remove a controller canister, you must disconnect all cables. Then, you can slide the controller canister out of the controller shelf.

Before you begin

- You have labels to identify each cable that is connected to the controller canister.
- You must have a #1 Phillips screwdriver.
- You have an ESD wristband, or you have taken other antistatic precautions.
- You have prepared a flat, static free work area.

Steps

1. Label each cable that is attached to the controller canister.
2. Disconnect all the cables from the controller canister.



Attention: To prevent degraded performance, do not twist, fold, pinch, or step on the cables.

3. If the HIC ports use SFP+ transceivers, remove them.

Depending on what type of HIC you are upgrading to, you might be able to reuse these SFPs.

4. Confirm that the Cache Active LED on the back of the controller is off.
5. Squeeze the handles on either side of the controller, and pull back until it releases from the shelf.



6. Using two hands and the handles, slide the controller canister out of the shelf. When the front of the controller is free of the enclosure, use two hands to pull it out completely.



Attention: Always use two hands to support the weight of a controller canister.



7. Place the controller canister on a flat, static-free surface.

After you finish

Go to [Remove the host interface card](#).

Remove the host interface card

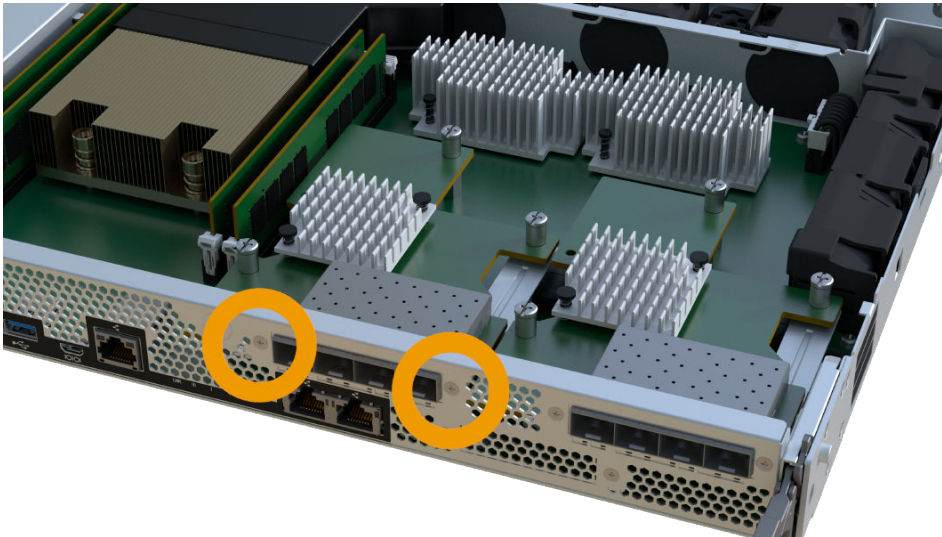
You remove the original host interface card (HIC) so you can replace it with an upgraded one.

Before you begin

- You have a #1 Phillips screwdriver.
- You have an ESD wristband, or you have taken other antistatic precautions.

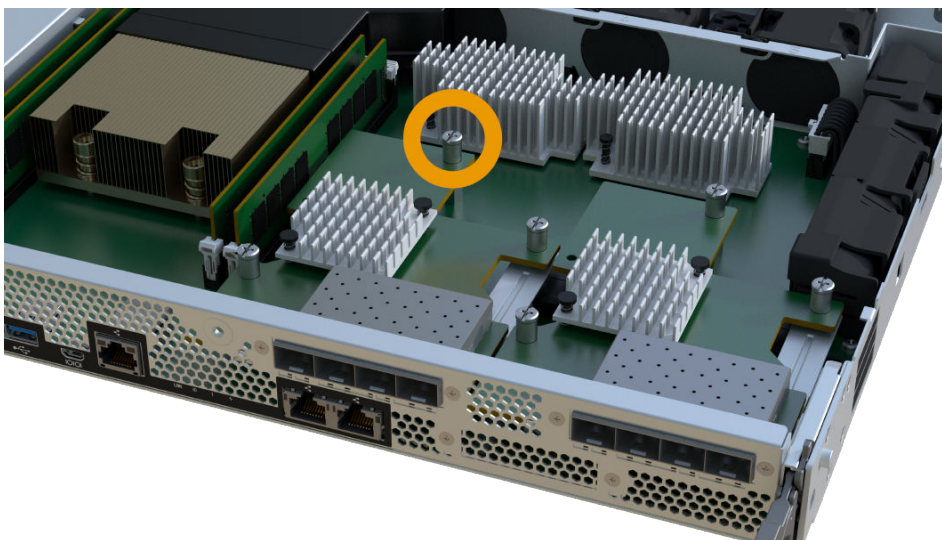
Steps

1. Remove the controller canister's cover by unscrewing the single thumbscrew and lifting the lid open.
2. Confirm that the green LED inside the controller is off.
If this green LED is on, the controller is still using battery power. You must wait for this LED to go off before removing any components.
3. Using a Phillips screwdriver, remove the two screws that attach the HIC faceplate to the controller canister.



Note: The image above is an example, the appearance of your HIC may differ.

4. Remove the HIC faceplate.
5. Using your fingers or a Phillips screwdriver, loosen the single thumbscrew that secure the HIC to the controller card.



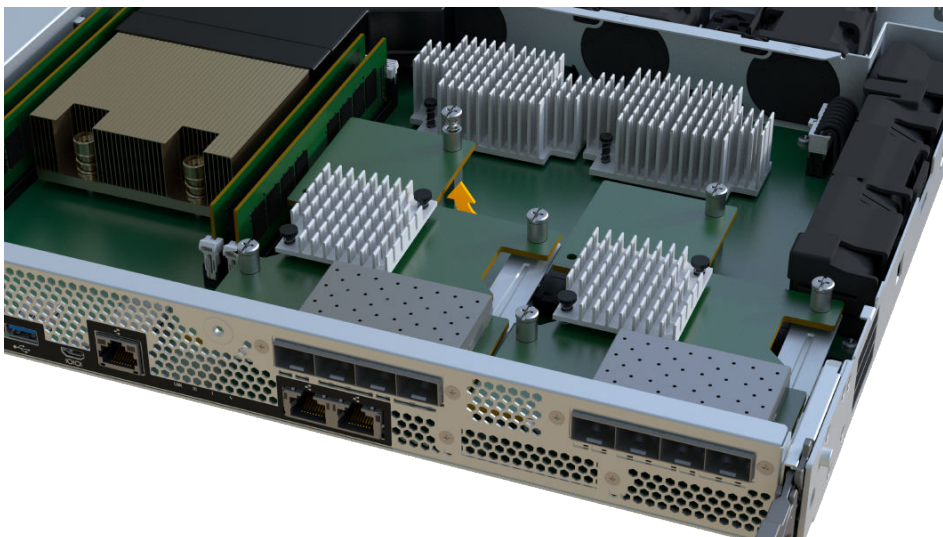
Note: The HIC comes with three screw locations on the top, but is secured with only one.

Note: The image above is an example, the appearance of your HIC may differ.

6. Carefully detach the HIC from the controller card by lifting the card up and out of the controller.



Attention: Be careful not to scratch or bump the components on the bottom of the HIC or on the top of the controller card.



Note: The image above is an example, the appearance of your HIC may differ.

7. Place the HIC on a flat, static-free surface.

After you finish

Go to [Replace host interface card](#).

Replace host interface card

You install a new host interface card (HIC) to replace the failed HIC with a new one.

Before you begin

- You have an ESD wristband, or you have taken other antistatic precautions.
- You have a #1 Phillips screwdriver.
- You have HICs, that are compatible with your controllers.
- You have removed the HIC that is being upgraded.

About this task



Attention: Possible loss of data access – Never install a HIC in an Ef300 or EF600 controller canister if that HIC was designed for another E-Series controller. In addition, if you have a duplex configuration, both controllers and both HICs must be identical. The presence of incompatible or mismatched HICs causes the controllers to lock down when you apply power.

Steps

1. Unpack the new HIC and the new HIC faceplate.
2. Align the single thumbscrew on the HIC with the corresponding holes on the controller, and align the connector on the bottom of the HIC with the HIC interface connector on the controller card.

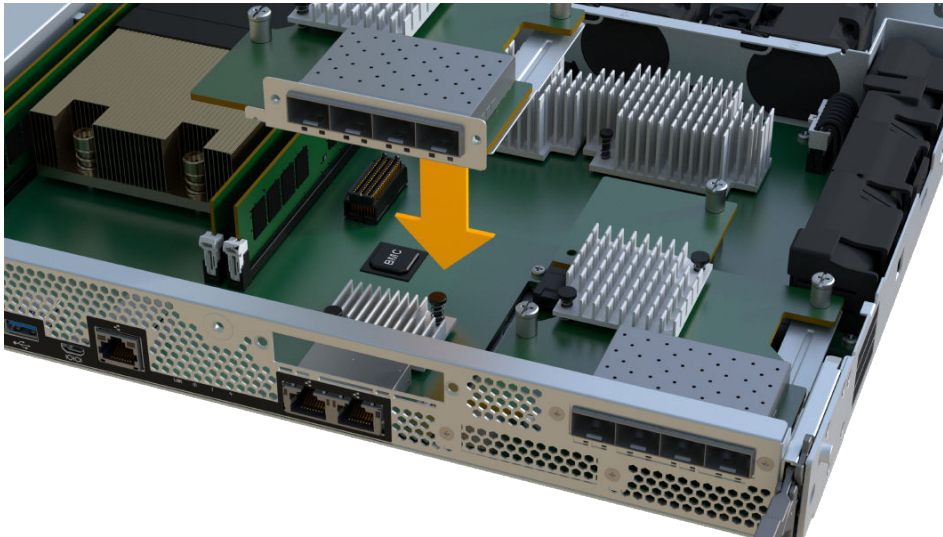
Be careful not to scratch or bump the components on the bottom of the HIC or on the top of the controller card.

3. Carefully lower the HIC into place, and seat the HIC connector by pressing gently on the HIC.



Attention: Possible equipment damage – Be very careful not to pinch the gold ribbon connector for the

controller LEDs between the HIC and the thumbscrew.



Note: The image above is an example, the appearance of your HIC may differ.

4. Hand-tighten the HIC thumbscrew.

Do not use a screwdriver, or you might over tighten the screws.

5. Using a #1 Phillips screwdriver, attach the HIC faceplate you removed from the original HIC with the three screws.

After you finish

Go to [Reinstall controller canister](#)

Reinstall controller canister

After replacing the host interface card (HIC), you reinstall the controller canister into the controller shelf.

Steps

1. Lower the cover on the controller canister and secure the thumbscrew.
2. While squeezing the controller handles, gently slide the controller canister all the way into the controller shelf.

Note: The controller audibly clicks when correctly installed into the shelf.



3. Install the SFPs into the new HIC and reconnect all the cables.

If you are using more than one host protocol, be sure to install the SFPs in the correct host ports.

After you finish

Go to [Complete host interface card replacement](#).

Complete host interface card replacement

You complete the HIC replacement by placing the controller online and confirming that the storage array is working correctly. Then, you can collect support data and resume operations.

Steps

1. Place controller online.
 - a. In System Manager, navigate to the hardware page.
 - b. Select **Show back of controller**.
 - c. Select the controller with the replaced host interface card.
 - d. Select **Place online** from the drop-down list.
2. As the controller boots, check the controller LEDs.

When communication with the other controller is reestablished:

 - The amber Attention LED remains on.
 - The Host Link LEDs might be on, blinking, or off, depending on the host interface.
3. When the controller is back online, confirm that its status is Optimal and check the controller shelf's Attention LEDs.

If the status is not Optimal or if any of the Attention LEDs are on, confirm that all cables are correctly seated and the controller canister is installed correctly. If necessary, remove and reinstall the controller canister.

Note: If you cannot resolve the problem, contact technical support.
4. Click **Support > Upgrade Center** to ensure that the latest version of SANtricity OS is installed.

As needed, install the latest version.
5. Verify that all volumes have been returned to the preferred owner.

- a. Select **Storage > Volumes**. If current owner and preferred owner are not listed select **All volumes > Columns**. Select current owner and preferred owner, and then recheck to verify that volumes are distributed to their preferred owners.
 - b. If volumes are all owned by preferred owner continue to Step 6.
 - c. If none of the volumes are returned, you must manually return the volumes. Go to **Storage > Volumes > More > Redistribute volumes**.
 - d. If only some of the volumes are returned to their preferred owners after auto-distribution or manual distribution you must check the recovery guru for host connectivity issues.
 - e. If there is no recovery guru present or if following the recovery guru steps the volumes are still not returned to their preferred owners contact support.
- 6.** Collect support data for your storage array using SANtricity System Manager.
- a. Select **Support > Support Center > Diagnostics**.
 - b. Select **Collect Support Data**.
 - c. Click **Collect**.

The file is saved in the Downloads folder for your browser with the name `support-data.7z`.

Result

Your host interface card replacement is complete. You can resume normal operations.

Host port protocol conversion

You can convert the protocol of a host to a different protocol so that compatibility and you can convert the protocol of your host connections to a different protocol to match your infrastructure needs.

Overview and requirements

Learn about the requirements you need to know about before converting the host protocol.

Requirements for changing the host protocol

Learn about the requirements you need to keep in mind when changing the host port protocol.

- You have scheduled a downtime maintenance window for this procedure.
- You must stop host I/O operations when you perform the conversion. You cannot access data on the storage array until you have successfully completed the conversion.
- You are using out-of-band management. (You cannot use in-band management to complete this procedure.)
- You have obtained the necessary hardware for the conversion, which may include a new set of HICs and/or SFPs. Your NetApp Sales Representative can help you determine what hardware you need and help you order the correct parts.
- The dual-protocol SFP transceivers support 16Gb and 8Gb FC, as well as 10Gb iSCSI. Therefore, you may not need to change SFPs if you have the dual-protocol and are simply switching between FC and iSCSI or vice versa.
- Some host port protocol conversions may require a host interface card addition, or upgrade. Follow the instructions in the [Host interface card](#) section for this requirement.

This section describes how to change the host port protocol for the following controller shelves:

- EF300 controller shelf
- EF600 controller shelf

Change host protocol

If you have an Infiniband (IB) HIC, or a Fibre Channel (FC) HIC you can change the host port protocol using the process in the following section.

Steps

1. [Obtain the feature pack key](#) on page 74

To obtain the feature pack, you need the serial number from the controller shelf, a Feature Activation Code, and the Feature Enable Identifier for the storage array.

2. [Stop host I/O](#) on page 78

You must stop all I/O operations from the host before converting the protocol of the host ports. You cannot access data on the storage array until you successfully complete the conversion.

3. [Change the feature pack](#) on page 79

You change the feature pack to convert the host protocol of your host ports.

Obtain the feature pack key

To obtain the feature pack, you need the serial number from the controller shelf, a Feature Activation Code, and the Feature Enable Identifier for the storage array.

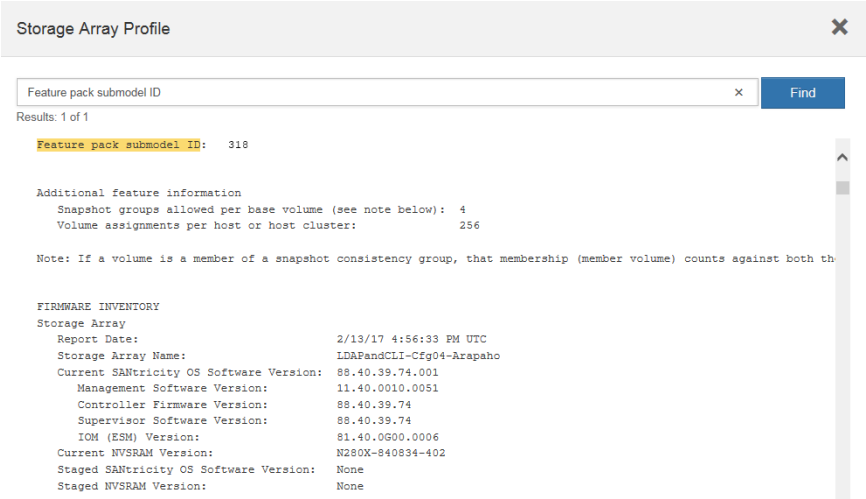
Steps

- 1. Locate the serial number.
 - a. From SANtricity System Manager, select **Support > Support Center**.
 - b. With the **Support Resources** tab selected, scroll to the **View top storage array properties** section.
 - c. Locate the **Chassis Serial Number**, and copy this value to a text file.

View top storage array properties

Storage array world-wide identifier (ID):	600A0980006CEF9B00000000574DB18C
Chassis serial number:	1142FG00061
Number of shelves:	2
Number of drives:	41
Drive media types:	HDD
Number of controllers:	2
Controller board ID:	2806

- 2. Locate the **feature pack submodel ID**.
 - a. From the SANtricity System Manager, select **Support**.
 - b. Select the **Support Center** tile.
 - c. On the Support Resources tab, locate and select the **Storage Array Profile** link.
 - d. Type **feature pack submodel ID** in the text box, and click **Find**.
 - e. Locate the feature pack submodel ID for the starting configuration.



3. Using the feature pack submodel ID, locate the corresponding Controller submodel ID for the starting configuration and find the Feature Activation Code for the desired ending configuration within the following table. Then, copy that Feature Activation Code to a text file.

Table 1: Encryption Capable Feature Activation Codes

Starting configuration		Ending configuration		Feature Activation Code
Controller submodel ID	HIC ports	Controller submodel ID	HIC ports	
443	NVMe/FC or NVMe/RoCE	444	NVMe/IB	DH5-HB4-ZK9QH
		448	FC	7HZ-EB4-ZHAYW
		491	iSER/IB	0H1-675-Z5SII
		492	SRP/IB	NHD-V75-ZB6ZX
444	NVMe/FC or NVMe/IB	443	NVMe/RoCE	YH3-XB4-ZJRIZ
		448	FC	2HU-BB4-ZFCG5
		491	iSER/IB	2H3-P75-Z6AQG
		492	SRP/IB	5HG-G75-ZDNEZ
448	FC	443	NVMe/FC or NVMe/RoCE	JHX-UB4-ZGTP1
		444	NVMe/FC or NVMe/IB	LHS-RB4-ZDV29
		491	iSER/IB	FH6-975-Z7Q7H
		492	SRP/IB	0HI-Z75-ZE4L5

Starting configuration		Ending configuration		Feature Activation Code
Controller submodel ID	HIC ports	Controller submodel ID	HIC ports	
491	iSER/IB	443	NVMe/FC or NVMe/RoCE	MHQ-M85-ZIJNT
		444	NVMe/FC or NVMe/IB	4HS-685-ZJZ1U
		448	FC	YHU-P85-ZLHCX
		465	FC/PTL	AHX-985-ZMXMI
		492	SRP/IB	ZHZ-S85-ZNF4J
492	SRP/IB	443	NVMe/FC or NVMe/RoCE	EH3-C85-Z0V93
		444	NVMe/FC or NVMe/IB	BH5-V85-ZQDQJ
		448	FC	1H8-F85-ZRT1V
		465	FC/PTL	1HA-Y85-ZSB7S
		491	iSER/IB	KHD-I85-ZUSMI
465	FC/PTL	491	iSER	6H8-S75-Z98FH
		492	SRP	NHL-J75-ZFL3W

Starting configuration		Ending configuration		Feature Activation Code
Controller submodel ID	HIC ports	Controller submodel ID	HIC ports	
516	NVMe/RoCE	517	NVMe/IB	LHF-285-ZV9YZ
		518	FC	IHI-L85-ZXQEP
		519	iSER/IB	RHK-585-ZY7P5
		520	FC-PTL	NHN-095-ZZ0XF
		521	SRP/IB	GHP-895-Z25BD
517	NVMe/IB	516	NVMe/RoCE	7HS-R95-Z3M06
		518	FC	UHU-B95-Z43X2
		519	FC-PTL	8HX-U95-Z5K6F
		520	iSER/IB	UHZ-E95-Z71LH
		521	SRP/IB	SH2-X95-Z8IVS

Starting configuration		Ending configuration		Feature Activation Code
Controller submodel ID	HIC ports	Controller submodel ID	HIC ports	
518	FC	516	NVMe/FC or NVMe/RoCE	UH5-H95-Z9Z58
		517	NVMe/FC or NVMe/IB	XH7-195-ZBGJC
		519	FC-PTL	FHA-K95-ZCXX0
		520	iSER/IB	JHC-595-ZDE3X
		521	SRP/IB	0HF-095-ZFVFN
519	FC-PTL	516	NVMe/FC or NVMe/RoCE	YHH-895-ZGCXS
		517	NVMe/FC or NVMe/IB	2HK-R95-ZHT83
		518	FC	1HM-BA5-ZJALA
		520	iSER/IB	YHP-UA5-ZKRXA
		521	SRP/IB	MHR-EA5-ZL83V
520	iSER/IB	516	NVMe/FC or NVMe/RoCE	HHU-XA5-ZNPLT
		517	NVMe/FC or NVMe/IB	YHW-HA5-Z07QK
		518	FC	WHZ-1A5-ZPN4U
		519	FC/PTL	7H2-KA5-ZR5C3
		521	SRP	3H5-4A5-ZSLVX
521	SRP/IB	516	NVMe/FC or NVMe/RoCE	1H7-NA5-ZT31W
		517	NVMe/FC or NVMe/IB	XHA-7A5-ZVJGC
		518	FC	KHC-QA5-ZW1P3
		519	FC/PTL	CHE-AA5-ZXH2F
		520	iSER/IB	SHH-TA5-ZZYHS

Note: If your controller submodel ID is not listed, contact [NetApp Support](#).

4. In System Manager, locate the Feature Enable Identifier.
 - a. Go to **Settings > System**.
 - b. Scroll down to **Add-ons**.
 - c. Under **Change Feature Pack**, locate the **Feature Enable Identifier**.
 - d. Copy and paste this 32-digit number to a text file.

Change Feature Pack ✕

Ensure you have obtained a feature pack file from your Technical Support Engineer. After you have obtained the file, transfer it to the storage array to change your feature pack.

Feature Enable Identifier: 333030343238333030343439574DB18C

Select the feature pack file: Browse...

Current feature pack: SMID 261

Important: Changing a feature pack is an offline operation. Verify that there are no hosts or applications accessing the storage array and back up all data before proceeding.

Type CHANGE to confirm that you want to perform this operation.

Change Cancel

5. Go to [NetApp License Activation: Storage Array Premium Feature Activation](#), and enter the information required to obtain the feature pack.

- Chassis Serial Number
- Feature Activation Code
- Feature Enable Identifier

Important: The Premium Feature Activation web site includes a link to “Premium Feature Activation Instructions.” Do not attempt to use those instructions for this procedure.

6. Choose whether to receive the key file for the feature pack in an email or download it directly from the site.

After you finish

Go to [Stop host I/O](#).

Stop host I/O

You must stop all I/O operations from the host before converting the protocol of the host ports. You cannot access data on the storage array until you successfully complete the conversion.

Steps

1. Ensure that no I/O operations are occurring between the storage array and all connected hosts. For example, you can perform these steps:

- Stop all processes that involve the LUNs mapped from the storage to the hosts.
- Ensure that no applications are writing data to any LUNs mapped from the storage to the hosts.
- Unmount all file systems associated with volumes on the array.

Note: The exact steps to stop host I/O operations depend on the host operating system and the configuration, which are beyond the scope of these instructions. If you are not sure how to stop host I/O operations in your environment, consider shutting down the host.



Attention: Possible data loss – If you continue this procedure while I/O operations are occurring, you might lose data.

2. Wait for any data in cache memory to be written to the drives.

The green Cache Active LED on the back of each controller is on when cached data needs to be written to the drives. You must wait for this LED to turn off.

3. From the Home page of SANtricity System Manager, select **View Operations in Progress**.
4. Wait for all operations to complete before continuing with the next step.

After you finish

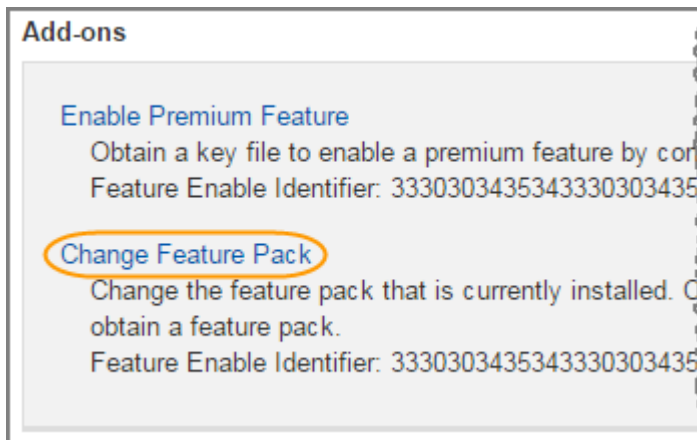
Go to [Change the feature pack](#)

Change the feature pack

You change the feature pack to convert the host protocol of your host ports.

Steps

1. From SANtricity System Manager, select **Settings > System**.
2. Under **Add-ons**, select **Change Feature Pack**.



3. Click **Browse**, and then select the feature pack you want to apply.
4. Type **CHANGE** in the field.
5. Click **Change**.

The feature pack migration begins. Both controllers automatically reboot twice to allow the new feature pack to take effect. The storage array returns to a responsive state after the reboot is complete.
6. Confirm the host ports have the protocol you expect.
 - a. From SANtricity System Manager, select **Hardware**.
 - b. Click **Show back of shelf**.
 - c. Select the graphic for either Controller A or Controller B.
 - d. Select **View settings** from the context menu.
 - e. Select the **Host Interfaces** tab.
 - f. Click **Show more settings**.

After you finish

Go to [Complete host protocol conversion](#).

Complete host protocol conversion

After converting the protocol of the host ports, you need to perform additional steps before you can use the new protocol.

Complete protocol conversion

After you apply the feature pack key to convert the protocol you must configure the host to use the appropriate protocol.

Step

Configure the host to use the appropriate protocol.

For step-by-step instructions on how to configure the host, see the guide appropriate for your system:

[*Linux express configuration*](#)

[*VMware express configuration*](#)

[*Windows express configuration*](#)

Specific settings might vary. Check the [*NetApp Interoperability Matrix*](#) for specific instructions and additional recommended settings for your solution.

After you finish

Your host protocol conversion is complete. You can resume normal operations.

Power Supplies

A power supply provides a redundant power source in a controller shelf.

Overview and requirements

Before you replace a power supply, you need to be aware of some requirements.

Requirements for replacing a power supply

If you plan to replace a power supply, keep the following requirements in mind.

- You must have a replacement power supply that is supported for your controller shelf or drive shelf model.
- You have an ESD wristband, or you have taken other antistatic precautions.

This section describes how to replace a power supply in the following shelves:

- EF300 controller shelf
- EF600 controller shelf

Replace a power supply

You can replace the power supplies when they fail in your EF300 or EF600 controller. If a power supply fails, you must replace it as soon as possible so the controller shelf has a redundant power source.

Remove failed power supply

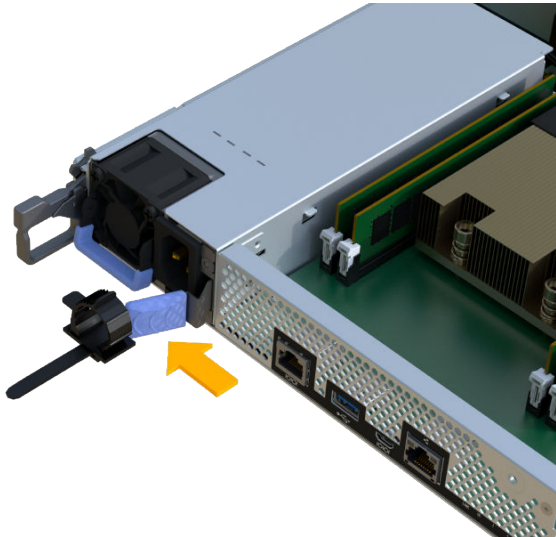
You remove a failed power supply so you can replace it with a new one. When you remove a power supply, you slide the part out of the shelf.

Before you begin

- You have reviewed the details in the Recovery Guru to confirm that there is an issue with the power supply. Select **Recheck** from the Recovery Guru to ensure no other items must be addressed first.
- You have checked that the amber Attention LED on the power supply is on, indicating that the power supply or its integrated fan has a fault.
- You have an ESD wristband, or you have taken other antistatic precautions.

Steps

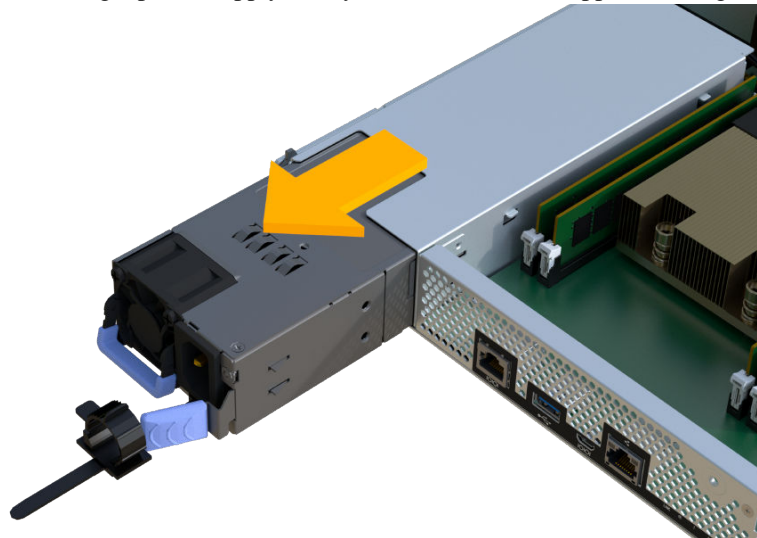
1. Unpack the new power supply, and set it on a level surface near the drive shelf.
Save all packing materials for use when returning the failed power supply.
2. Disconnect the power cables:
 - a. Open the power cord retainer, and then unplug the power cord from the power supply.
 - b. Unplug the power cord from the power source.
3. Locate the tab to the right of the power supply and press it towards the power supply unit.



4. Locate the handle on the front of the power supply.
5. Use the handle to slide the power supply straight out of the system.



Attention: When removing a power supply, always use two hands to support its weight.



After you finish

Go to [Install new power supply](#).

Install new power supply and complete power supply replacement

You install a new power supply to replace the failed one. Install the power supply by gently sliding it into the opening of the new controller. Then complete the power supply replacement by confirming that the new power supply is working correctly.

Before you begin

- You have a replacement power supply that is supported for your controller shelf .
- You have unpacked the replacement power supply.
- You have removed the failed power supply.

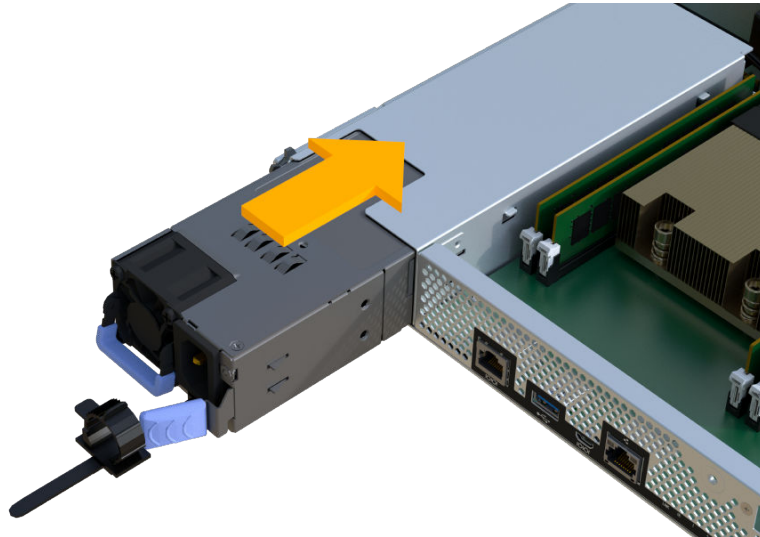
Steps

1. Using both hands, support and align the edges of the power supply with the opening in the system chassis, and then gently push the power supply into the chassis using the cam handle.

The power supplies are keyed and can only be installed one way.



Attention: Do not use excessive force when sliding the power supply into the system; you can damage the connector.



2. Confirm that its status is Optimal and check the controller shelf's Attention LEDs.

If the status is not Optimal or if any of the Attention LEDs are on, confirm that all cables are correctly seated and the controller canister is installed correctly. If necessary, remove and reinstall the controller canister.

Note: If you cannot resolve the problem, contact technical support.

3. Click **Support > Upgrade Center** to ensure that the latest version of SANtricity OS is installed.

As needed, install the latest version.

Result

Your power supply replacement is complete. You can resume normal operations.

SAS expansion cards

A SAS expansion card may be installed within a controller canister. The EF300 controller supports SAS expansion.

Overview and Requirements

If you plan to add a SAS expansion card, keep the following requirements in mind.

- You have followed the [Installation and Setup Instructions for the EF600](#) to set up your EF300 controller.
- You have updated your firmware to the latest version. To update your firmware follow the instructions in the [Upgrading SANtricity OS](#).
- You have scheduled a downtime maintenance window for this procedure. You cannot access data on the storage array until you have successfully completed this procedure.
- You have an ESD wristband, or you have taken other antistatic precautions.
- You have a #1 Phillips screwdriver.
- You have labels to identify each cable that is connected to the controller canister.
- You have installed SANtricity System Manager on a management station, so you can use the storage array's command line interface (CLI).

If SANtricity System Manager has not yet been installed, follow the instructions in the [Linux express configuration](#), [Windows express configuration](#), or [VMware express configuration](#) to download and install the software.

- EF300 controllers may have a SAS expansion card installed in port 1 to allow for drive tray expansion.
- To cable your SAS expansion see [Cabling E-Series hardware](#) for instructions.

This section describes how to prepare to replace or upgrade a host interface card in the following controller shelves:

- EF300 controller shelf

Add SAS expansion cards

You add a SAS expansion card to EF300 controllers to allow for drive tray expansion.

About this task

- When you add a SAS expansion card, you must power off the storage array, install the new SAS expansion card, and reapply power.

Place controller shelf offline

You must place the controller shelf offline so you can safely add the SAS expansion card. You must back up the configuration and collect support data first. Then, you can take the controller shelf offline.

Before you begin

- You have scheduled a downtime maintenance window for this procedure. You cannot access data on the storage array until you have successfully completed this procedure.

Steps

1. From the Home page of SANtricity System Manager, ensure that the storage array has Optimal status.

If the status is not Optimal, use the Recovery Guru or contact technical support to resolve the problem. Do not continue with this procedure.

2. Collect support data for your storage array using SANtricity System Manager.

- a. Select **Support > Support Center > Diagnostics**.
- b. Select **Collect Support Data**.
- c. Click **Collect**.

The file is saved in the Downloads folder for your browser with the name `support-data.7z`.

3. Ensure that no I/O operations are occurring between the storage array and all connected hosts. For example, you can perform these steps:

- Stop all processes that involve the LUNs mapped from the storage to the hosts.
- Ensure that no applications are writing data to any LUNs mapped from the storage to the hosts.
- Unmount all file systems associated with volumes on the array.

Note: The exact steps to stop host I/O operations depend on the host operating system and the configuration, which are beyond the scope of these instructions. If you are not sure how to stop host I/O operations in your environment, consider shutting down the host.



Attention: Possible data loss – If you continue this procedure while I/O operations are occurring, the host application might lose access to the data because the storage is not accessible.

4. Wait for any data in cache memory to be written to the drives.

The green Cache Active LED on the back of each controller is on when cached data needs to be written to the drives. You must wait for this LED to turn off.

5. From the Home page of SANtricity System Manager, select **View Operations in Progress**. Wait for all operations to complete before continuing with the next step.

6. Power down the controller shelf.

- a. Label and then unplug both power cables from controller shelf.
- b. Wait for all LEDs on the controller shelf to turn off.

After you finish

Go to [Remove controller canister](#)

Remove controller canister

You remove the controller canister so you can add the new SAS expansion card. When you remove a controller canister, you must disconnect all cables. Then, you can slide the controller canister out of the controller shelf.

Before you begin

- You must use labels to identify each cable that is connected to the controller canister.
- You must have a #1 Phillips screwdriver.
- You have an ESD wristband, or you have taken other antistatic precautions.
- You have prepared a flat, static free work area.

Steps

1. Put on an ESD wristband or take other antistatic precautions.
2. Label each cable that is attached to the controller canister.
3. Disconnect all the cables from the controller canister.



Attention: To prevent degraded performance, do not twist, fold, pinch, or step on the cables.

4. Confirm that the Cache Active LED on the back of the controller is off.
5. Squeeze the handles on either side of the controller, and pull back until it releases from the shelf.



6. Using two hands and the handles, slide the controller canister out of the shelf. When the front of the controller is free of the enclosure, use two hands to pull it out completely.



Attention: Always use two hands to support the weight of a controller canister.



7. Place the controller canister on a flat, static-free surface.

After you finish

Go to [Add the new SAS expansion card](#).

Add the new SAS expansion card

You install the SAS expansion card to allow for drive tray expansion.

Before you begin

- You have an ESD wristband, or you have taken other antistatic precautions.
- You have a #1 Phillips screwdriver.
- You have a SAS expansion card that is compatible with your controller.
- On an EF300 controller shelf a SAS expansion card may only be installed in port 1.

Steps

1. Remove the controller canister's cover by unscrewing the single thumbscrew and lifting the lid open.
2. Confirm that the green LED inside the controller is off.
If this green LED is on, the controller is still using battery power. You must wait for this LED to go off before removing any components.
3. Using a #1 Phillips screwdriver, remove the two screws that attach the faceplate to the controller canister, and remove the faceplate.
4. Align the single thumbscrew on the SAS expansion card with the corresponding hole on the controller, and align the connector on the bottom of the expansion card with the expansion card interface connector on the controller card.
Be careful not to scratch or bump the components on the bottom of the SAS expansion card or on the top of the controller card.
5. Carefully lower the SAS expansion card into place, and seat the expansion card connector by pressing gently on the expansion card.
6. Hand-tighten the SAS expansion card thumbscrew.
Do not use a screwdriver, or you might over tighten the screws.
7. Using a #1 Phillips screwdriver, attach the faceplate you removed from the original controller canister to the new controller canister with the two screws.

After you finish

Go to [Reinstall the controller canister](#).

Reinstall the controller canister

You reinstall the controller canister into the controller shelf after installing the new SAS expansion card.

Steps

1. Lower the cover on the controller canister and secure the thumbscrew.
2. While squeezing the controller handles, gently slide the controller canister all the way into the controller shelf.

Note: The controller audibly clicks when correctly installed into the shelf.



After you finish

Go to [Complete adding SAS expansion card](#).

Complete adding SAS expansion card

You complete the SAS expansion card addition by placing the controller online and confirming that the storage array is working correctly. Then, you can collect support data and resume operations.

Steps

1. Plug in power cables to place the controller online.
2. As the controller boots, check the controller LEDs.
 - The amber Attention LED remains on.
 - The Host Link LEDs might be on, blinking, or off, depending on the host interface.
3. When the controller is back online, confirm that its status is Optimal and check the controller shelf's Attention LEDs.

If the status is not Optimal or if any of the Attention LEDs are on, confirm that all cables are correctly seated and the controller canister is installed correctly. If necessary, remove and reinstall the controller canister.

Note: If you cannot resolve the problem, contact technical support.

4. Click **Support > Upgrade Center** to ensure that the latest version of SANtricity OS is installed.
As needed, install the latest version.
5. Verify that all volumes have been returned to the preferred owner.
 - a. Select **Storage > Volumes**. If current owner and preferred owner are not listed select **All volumes > Columns**. Select current owner and preferred owner then recheck to verify that volumes are distributed to their preferred owners.
 - b. If volumes are all owned by preferred owner continue to Step 6.
 - c. If none of the volumes are returned, you must manually return the volumes. Go to **Storage > Volumes > More > Redistribute volumes**.
 - d. If only some of the volumes are returned to their preferred owners after auto-distribution or manual distribution you must check the recovery guru for host connectivity issues.

- e. If there is no recovery guru present or if following the recovery guru steps the volumes are still not returned to their preferred owners, contact support.
6. Collect support data for your storage array using SANtricity System Manager.
 - a. Select **Support > Support Center > Diagnostics**.
 - b. Select **Collect Support Data**.
 - c. Click **Collect**.

The file is saved in the Downloads folder for your browser with the name `support-data.7z`.

Result

The process of adding a SAS expansion card in your storage array is complete. You can resume normal operations.

To cable your SAS expansion see [Cabling E-Series hardware](#) for instructions.

Copyright and trademark

Copyright

Copyright © 2020 NetApp, Inc. All rights reserved. Printed in the U.S.

No part of this document covered by copyright may be reproduced in any form or by any means—graphic, electronic, or mechanical, including photocopying, recording, taping, or storage in an electronic retrieval system—without prior written permission of the copyright owner.

Software derived from copyrighted NetApp material is subject to the following license and disclaimer:

THIS SOFTWARE IS PROVIDED BY NETAPP "AS IS" AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE HEREBY DISCLAIMED. IN NO EVENT SHALL NETAPP BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

NetApp reserves the right to change any products described herein at any time, and without notice. NetApp assumes no responsibility or liability arising from the use of products described herein, except as expressly agreed to in writing by NetApp. The use or purchase of this product does not convey a license under any patent rights, trademark rights, or any other intellectual property rights of NetApp.

The product described in this manual may be protected by one or more U.S. patents, foreign patents, or pending applications.

Data contained herein pertains to a commercial item (as defined in FAR 2.101) and is proprietary to NetApp, Inc. The U.S. Government has a non-exclusive, non-transferrable, non-sublicensable, worldwide, limited irrevocable license to use the Data only in connection with and in support of the U.S. Government contract under which the Data was delivered. Except as provided herein, the Data may not be used, disclosed, reproduced, modified, performed, or displayed without the prior written approval of NetApp, Inc. United States Government license rights for the Department of Defense are limited to those rights identified in DFARS clause 252.227-7015(b).

Trademark

NETAPP, the NETAPP logo, and the marks listed on the NetApp Trademarks page are trademarks of NetApp, Inc. Other company and product names may be trademarks of their respective owners.

<http://www.netapp.com/us/legal/netapptmlist.aspx>