

E-Series

Maintaining E5700 Hardware

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Batteries

A battery is included with a controller canister 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.

Battery overview

Each controller canister includes a battery that preserves cached data if the AC power fails. To protect your data, you must replace a failed battery as soon as possible.

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.

Steps needed to replace battery

The following is an overview of the steps to replace a battery in E5700 controllers (E5724, EF570, or E5760):

1. Take controller offline.
2. Remove the controller canister.
3. Replace the battery.
4. Replace the controller canister.
5. Bring the controller online.

Requirements for replacing a failed battery

If you plan to replace a failed 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 should use labels to identify each cable that is connected to the controller canister.

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 (duplex) on page 7
   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 failed battery on page 9
   You must remove the failed battery so you can install a new one.
3. Install new battery on page 12
   You install a new battery into the controller canister to replace the failed one.
4. Place controller online (duplex) on page 16
   Place the controller online to confirm the storage array is working correctly. Then, you can collect support data and resume operations.

Place controller offline (duplex)

If you have a duplex configuration, 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

- Your storage array must have two controllers. The controller that you are not placing offline must be online (in the optimal state).
- You have verified that no volumes are in use or that you have a multipath driver installed on all hosts using these volumes.

About this task

Perform this task only if your storage array has two controllers (duplex configuration).

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. Open the Enterprise Management Window (EMW) for SANtricity Storage Manager on your management station.

   b. Select the storage array.

   c. Select **Tools > Execute Script**.

d. Type the following command in the text box.

```
save storageArray dbmDatabase sourceLocation=onboard
contentType=all file="filename";
```

In this command, *filename* is the file path and file name to which you want to save the database. Enclose the file name in double quotation marks (" "). For example:

```
file="C:\Program Files\CLI\logs\dbmdata.zip"
```

This command does not automatically append a file extension to the saved file. You must specify a file extension when entering the file name.

e. Select **Tools > Verify and Execute**.

4. 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`.

5. If the controller is not already offline, take it offline now using either SANtricity System Manager or the Enterprise Management Window's (EMW) script editor:

- To use 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 System Manager Unavailable message is displayed. Select **Connect to an alternate network connection** to automatically access SANtricity System Manager using the other controller.

- To use script editor in the EMW:

a. Open the Enterprise Management Window (EMW) in SANtricity Storage Manager on your local host.

b. Select the storage array.

c. Select **Tools > Execute Script**.

d. Type one of the following commands in the text box.

```
For controller A: set controller [a] availability=offline
```

```
For controller B: set controller [b] availability=offline
```

e. Select **Tools > Verify and Execute**.

The system attempts to take the controller offline.

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

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

After you finish

Go to *Remove failed battery* on page 9.

Remove failed battery

You must remove the failed battery so you can install a new one.

Steps

1. Step 1: Remove controller canister on page 9
   Remove the controller canister so you can disconnect all cables. Then, you can slide the controller canister out of the controller shelf.
2. Step 2: Remove failed battery on page 11
   Remove the failed battery by pushing the release latch down and away from the controller canister.

Related concepts

Battery overview on page 6
Requirements for replacing a failed battery on page 6

Step 1: Remove controller canister

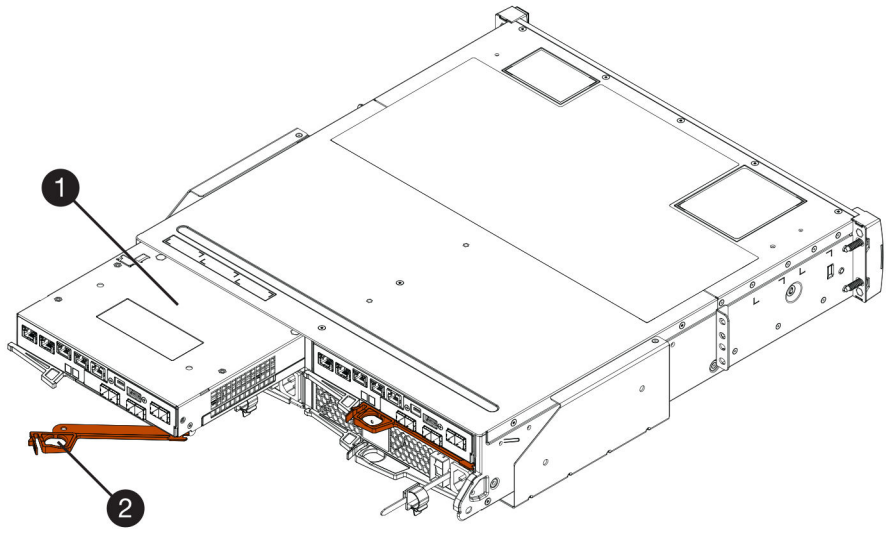
When you remove a controller canister, you must disconnect all cables. Then, you can slide the controller canister out of the controller shelf.

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 of the cables from the controller canister.

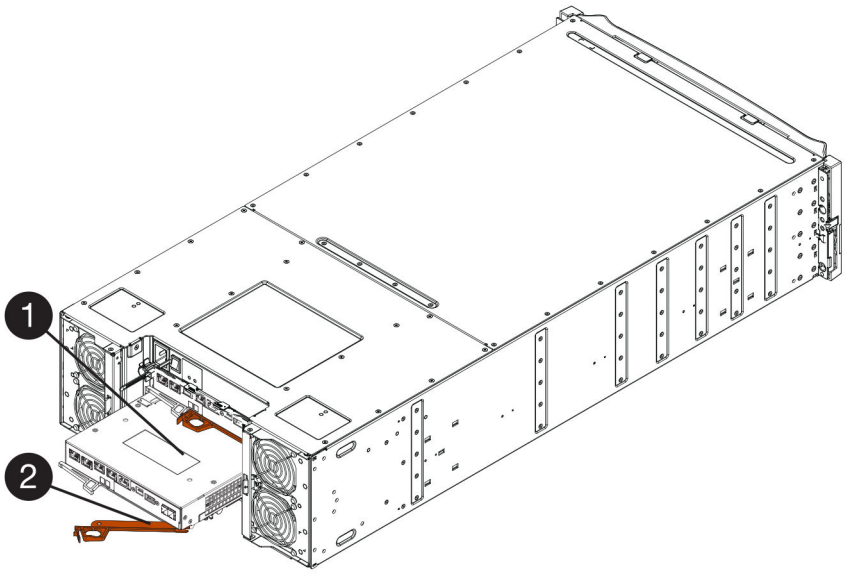
   Attention: To prevent degraded performance, do not twist, fold, pinch, or step on the cables.
4. If the host ports on the controller canister use SFP+ transceivers, leave them installed.
5. Confirm that the Cache Active LED on the back of the controller is off.
6. Squeeze the latch on the cam handle until it releases, and then open the cam handle to the right to release the controller canister from the shelf.

   The following figure is an example of an E5724 controller shelf:



1 Controller canister 2 Cam handle

The following figure is an example of an E5760 controller shelf:



1 Controller canister 2 Cam handle

7. Using two hands and the cam handle, slide the controller canister out of the shelf.

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

   If you are removing the controller canister from an E5724 controller shelf, a flap swings into place to block the empty bay, helping to maintain air flow and cooling.

8. Turn the controller canister over, so that the removable cover faces up.
9. Place the controller canister on a flat, static-free surface.

After you finish

Go to *Step 2: Remove failed battery* on page 11.

Step 2: Remove failed battery

After removing the controller canister from the controller shelf, you can remove the battery.

Steps

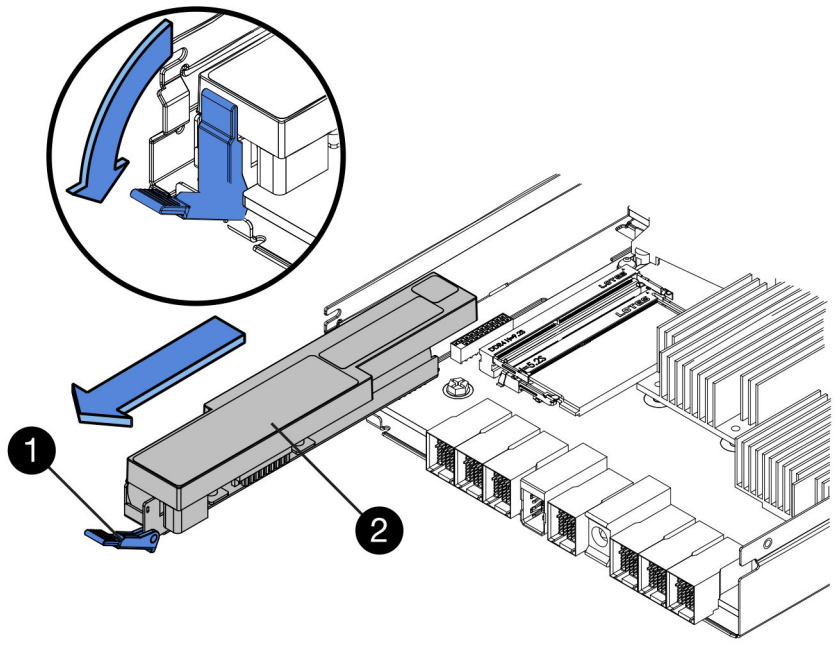
1. Remove the controller canister's cover by pressing down on the button and sliding the cover off.
2. Confirm that the green LED inside the controller (between the battery and the DIMMs) is off.

   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.



1 Internal Cache Active LED 2 Battery

3. Locate the blue release latch for the battery.
4. Unlatch the battery by pushing the release latch down and away from the controller canister.



1 Battery release latch 2 Battery

5. Lift up on the battery, and slide it out of the controller canister.
6. 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* on page 12.

Install new battery

You install a new battery into the controller canister to replace the failed one.

Steps

1. Step 1: Install new battery on page 13
   Install a new battery when the old one has failed.
2. Step 2: Re-install controller canister on page 14
   Reinstall the controller canister into the controller shelf after installing the new battery.

Related concepts

Battery overview on page 6
Requirements for replacing a failed battery on page 6

Step 1: Install new battery

Install a new battery when the old one has failed.

Before you begin

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

Steps

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

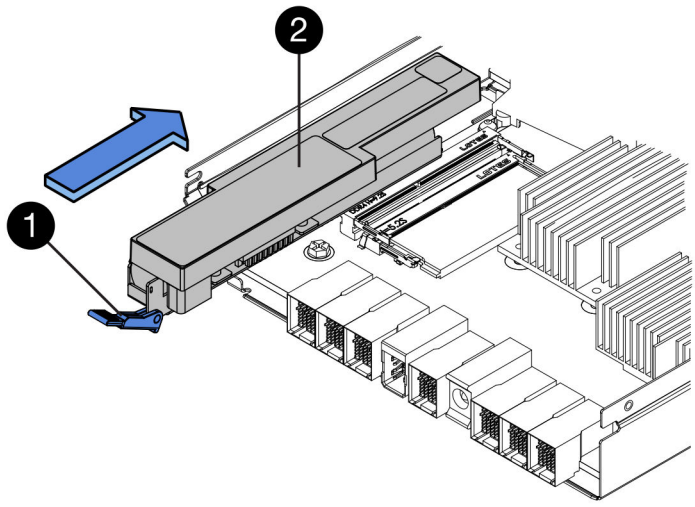
   Important: To comply with IATA safely regulations, replacement batteries are shipped with a state of charge (SoC) of 30 percent or less. When you reapply power, keep in mind that write caching will not resume until the replacement battery is fully charged and it has completed its initial learn cycle.

2. Orient the controller canister so that the slot for the battery faces toward you.
3. Insert the battery into the controller canister at a slight downward angle.

   You must insert the metal flange at the front of the battery into the slot on the bottom of the controller canister, and slide the top of the battery beneath the small alignment pin on the left side of the canister.

4. Move the battery latch up to secure the battery.

   When the latch clicks into place, the bottom of the latch hooks into a metal slot on the chassis.



1 Battery release latch 2 Battery

5. Turn the controller canister over to confirm that the battery is installed correctly.

   Attention: Possible hardware damage – The metal flange at the front of the battery must be completely inserted into the slot on the controller canister (as shown in the first figure). If the battery is not installed correctly (as shown in the second figure), the metal flange might contact the controller board, causing damage to the controller when you apply power.

- **Correct – The battery's metal flange is completely inserted in the slot on the controller:**



- **Incorrect – The battery's metal flange is not inserted into the slot on the controller:**



After you finish

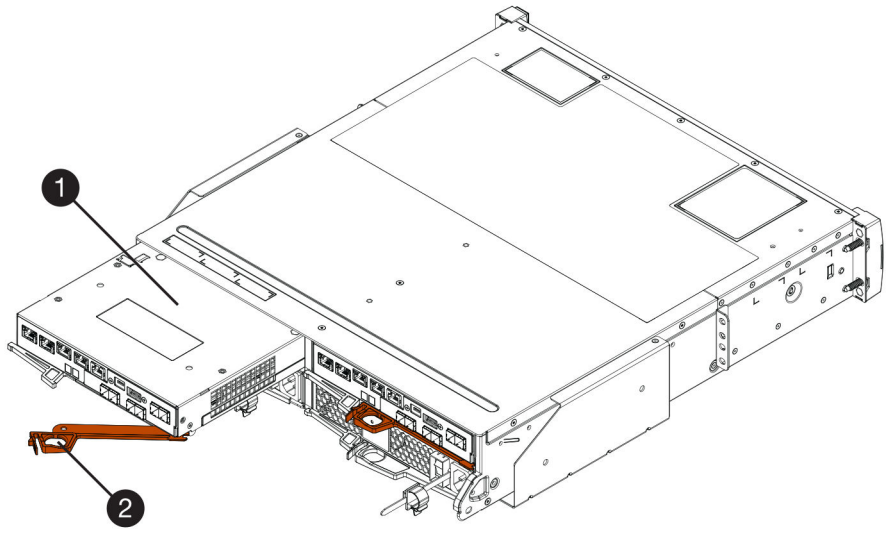
Go to *Step 2: Re-install controller canister* on page 14.

Step 2: Re-install controller canister

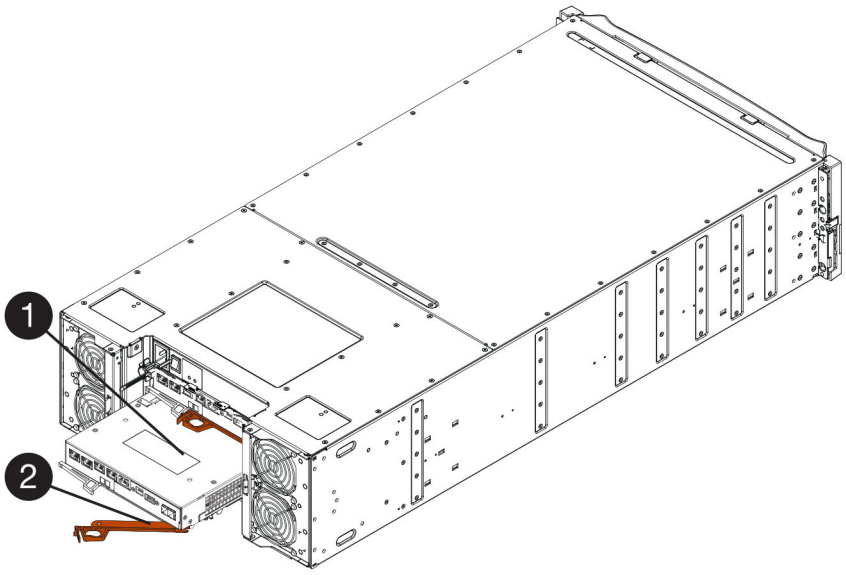
Reinstall the controller canister into the controller shelf after installing the new battery.

Steps

1. You reinstall the cover on the controller canister by sliding the cover from back to front until the button clicks.
2. Turn the controller canister over, so that the removable cover faces down.
3. With the cam handle in the open position, slide the controller canister all the way into the controller shelf.



1 Controller canister 2 Cam handle



1 Controller canister 2 Cam handle

4. Move the cam handle to the left to lock the controller canister in place.
5. Reconnect all the cables.

After you finish

Go to *Place controller offline (duplex)* on page 16.

Place controller online (duplex)

Place the controller online to confirm the storage array is working correctly. Then, you can collect support data and resume operations.

About this task

Perform this task only if your storage array has two controllers.

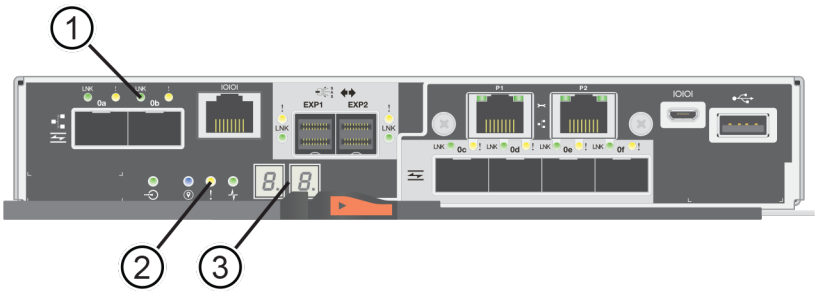
Steps

1. As the controller boots, check the controller LEDs and the seven-segment display.

   Note: The figure shows an example controller canister. Your controller might have a different number and a different type of host ports.

   When communication with the other controller is reestablished:

   - The seven-segment display shows the repeating sequence **OS**, **OL**, ***blank*** to indicate that the controller is offline.
   - The amber Attention LED remains lit.
   - The Host Link LEDs might be on, blinking, or off, depending on the host interface.



1 Host Link LEDs 2 Attention LED (Amber) 3 Seven-segment display

2. Bring the controller online using either SANtricity System Manager or the Enterprise Management Window's (EMW) script editor:

   - To use SANtricity System Manager:

     a. Select **Hardware**.

     b. If the graphic shows the drives, select **Show back of shelf**.

     c. Select the controller you want to place online.

     d. Select **Place Online** from the context menu, and confirm that you want to perform the operation.

     The system places the controller online.

   - To use script editor in the EMW:

     a. Open the Enterprise Management Window (EMW) in SANtricity Storage Manager on your local host.

     b. Select the storage array.

c. Select **Tools > Execute Script**.

d. Type one of the following commands in the text box.

```
For controller A: set controller [a] availability=online;
```

```
For controller B: set controller [b] availability=online;
```

e. Select **Tools > Verify and Execute**.

The system places the controller online.

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 check that the battery and the controller canister are installed correctly. If necessary, remove and reinstall the controller canister and the battery.

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

4. 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 controller in a duplex configuration.

Overview and requirements

This topic provides an overview of the controller and describes the requirements you need to know about before replacing a controller or adding a second controller.

Controller overview

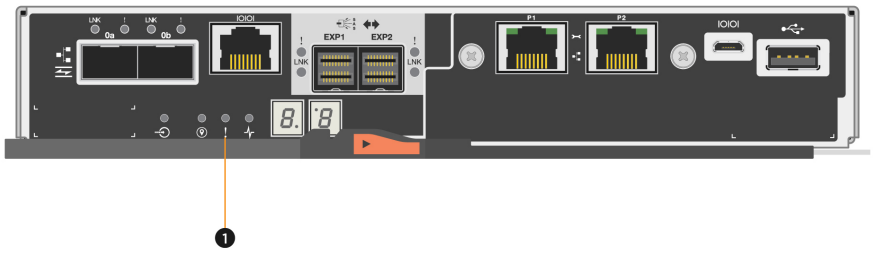
Each controller canister contains a controller card, a battery, and an optional host interface card (HIC).

Replace controller

When you replace a failed controller canister, you must remove the battery 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.



1 Attention LED

Note: The figure shows an example controller canister; the host ports on your controller canister might be different.

Requirements for replacing a controller

If you plan to replace a controller or add a second 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.

Duplex configuration

For a controller shelf with two controllers (duplex configuration), you can replace a controller canister while your storage array is powered on and performing host I/O operations, as long as 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.

Replace controller in duplex configuration

You can replace a controller canister in a duplex configuration, which is a two-controller module configuration within the storage array. Each controller canister contains a controller card, a battery, and an optional host interface card (HIC). When you replace a controller canister, you must remove the battery and HIC, if one is installed, from the original controller canister, and install them in the replacement controller canister.

Steps

1. Prepare to replace controller (duplex) on page 20
   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. If the controller is still online, you must take it offline.
2. Remove failed controller (duplex) on page 22
   You remove a controller canister to replace the failed canister with a new one. Perform this task only if your storage array has two controllers (duplex configuration).
3. Install new controller (duplex) on page 27
   You install a new controller canister to replace the failed one. Perform this task only if your storage array has two controllers (duplex configuration).
4. Complete controller replacement (duplex) on page 32
   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.

Related concepts

Controller overview on page 18
Requirements for replacing a controller on page 19

Prepare to replace controller (duplex)

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. If the controller is still online, you must take it offline.

About this task

This task describes how to prepare to replace a controller canister in the duplex version (two controllers) for the following controller shelves:

- E5724 controller shelf
- E5760 controller shelf

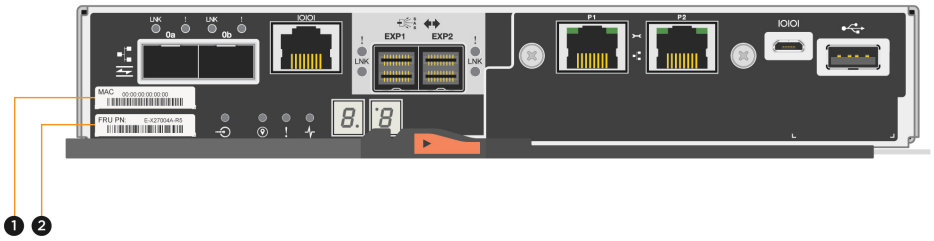
Perform this task only if your storage array has two controllers (duplex configuration).

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.



1. MAC address: The MAC address for management port 1 (“P1”). If you used DHCP to obtain the original controller's IP address, you need this address to connect to the new controller.

2. FRU part number: This number must match the replacement part number for the currently installed controller.

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. Open the Enterprise Management Window (EMW) for SANtricity Storage Manager on your management station.

   b. Select the storage array.

   c. Select **Tools > Execute Script**.

   d. Type the following command in the text box.

   ```
   save storageArray dbmDatabase sourceLocation=onboard
   contentType=all file="filename";
   ```

   In this command, *`filename`* is the file path and file name to which you want to save the database. Enclose the file name in double quotation marks (" "). For example:

   ```
   file="C:\Program Files\CLI\logs\dbmdata.zip"
   ```

   This command does not automatically append a file extension to the saved file. You must specify a file extension when entering the file name.

   e. Select **Tools > Verify and Execute**.

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`.

7. If the controller is not already offline, take it offline now using either SANtricity System Manager or the Enterprise Management Window's (EMW) script editor:

   • To use 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 System Manager Unavailable message is displayed. Select **Connect to an alternate network connection** to automatically access SANtricity System Manager using the other controller.

- To use script editor in the EMW:

a. Open the Enterprise Management Window (EMW) in SANtricity Storage Manager on your local host.

b. Select the storage array.

c. Select **Tools > Execute Script**.

d. Type one of the following commands in the text box.

```
For controller A: set controller [a] availability=offline
```

```
For controller B: set controller [b] availability=offline
```

e. Select **Tools > Verify and Execute**.

The system attempts to take the controller offline.

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

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

9. 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 (duplex)* on page 22.

Remove failed controller (duplex)

You remove a controller canister to replace the failed canister with a new one. Perform this task only if your storage array has two controllers (duplex configuration).

Steps

1. Step 1: Remove controller canister (duplex) on page 23
   Remove the failed controller canister so you can replace it with a new one.
2. Step 2: Remove battery (duplex) on page 24
   Remove the battery so you can install the new controller.
3. Step 3: Remove host interface card (duplex) on page 26
   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.

Step 1: Remove controller canister (duplex)

You remove the failed controller canister so you can replace it with a new one.

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.

Steps

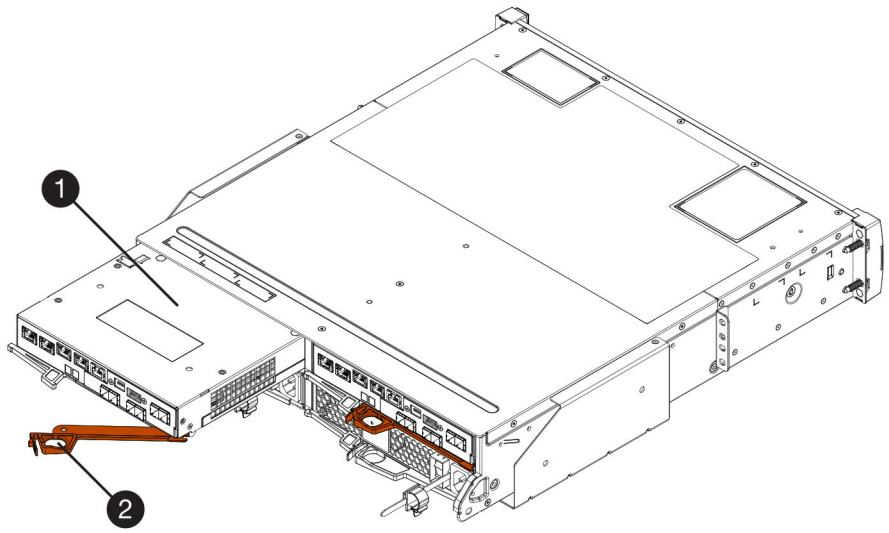
1. Put on an ESD wristband or take other antistatic precautions.
2. Label each cable that is attached to the controller canister.
3. Disconnect all the cables from the controller canister.

   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.

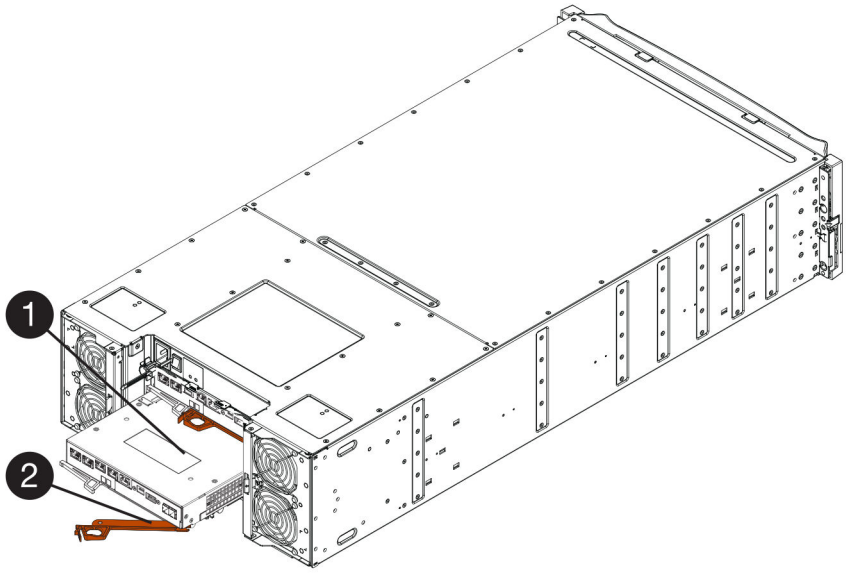
   Because you must remove the HIC from the failed controller canister, you must remove any SFPs from the HIC ports. However, you can leave any SFPs installed in the baseboard host ports. When you reconnect the cables, you can move those SFPs to the new controller canister.
5. Confirm that the Cache Active LED on the back of the controller is off.
6. Squeeze the latch on the cam handle until it releases, and then open the cam handle to the right to release the controller canister from the shelf.

   The following figure is an example of an E5724 controller shelf:



1 Controller canister 2 Cam handle

The following figure is an example of an E5760 controller shelf:



1 Controller canister 2 Cam handle

7. Using two hands and the cam handle, slide the controller canister out of the shelf.

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

   If you are removing the controller canister from an E5724 controller shelf, a flap swings into place to block the empty bay, helping to maintain air flow and cooling.

8. Turn the controller canister over, so that the removable cover faces up.
9. Place the controller canister on a flat, static-free surface.

After you finish

Go to *Step 2: Remove battery (duplex)* on page 24.

Step 2: Remove battery (duplex)

Remove the battery so you can install the new controller.

Steps

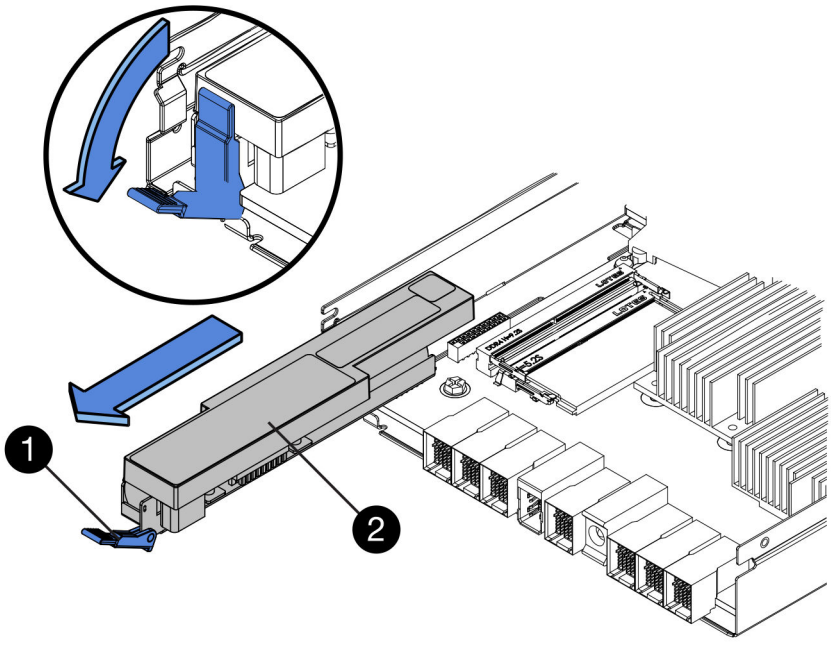
1. You remove the controller canister's cover by pressing down on the button and sliding the cover off.
2. Confirm that the green LED inside the controller (between the battery and the DIMMs) is off.

   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.



1 Internal Cache Active LED 2 Battery

3. Locate the blue release latch for the battery.
4. Unlatch the battery by pushing the release latch down and away from the controller canister.



1 Battery release latch 2 Battery

5. Lift up on the battery, and slide it out of the controller canister.

After you finish

Go to *Step 3: Remove host interface card (duplex)* on page 26.

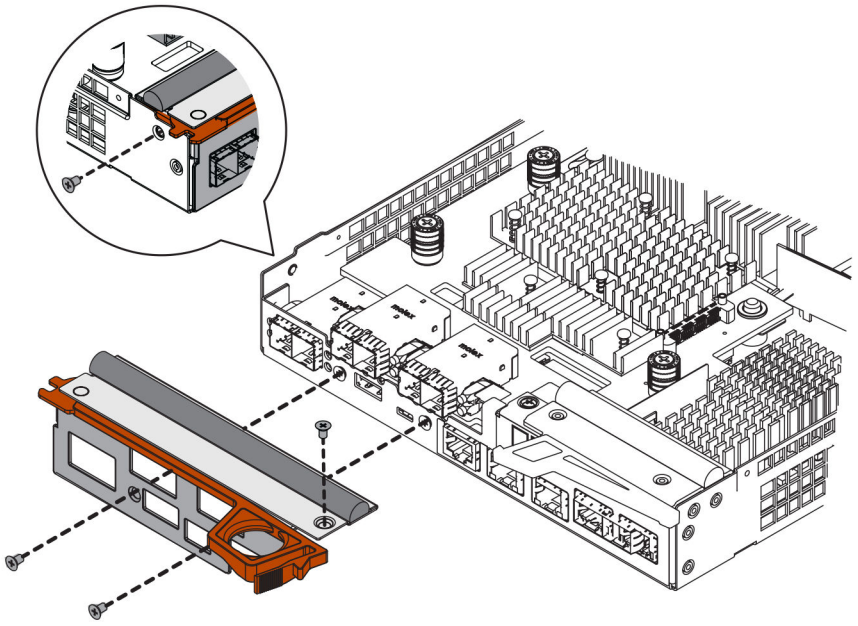
Step 3: Remove host interface card (duplex)

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.

Steps

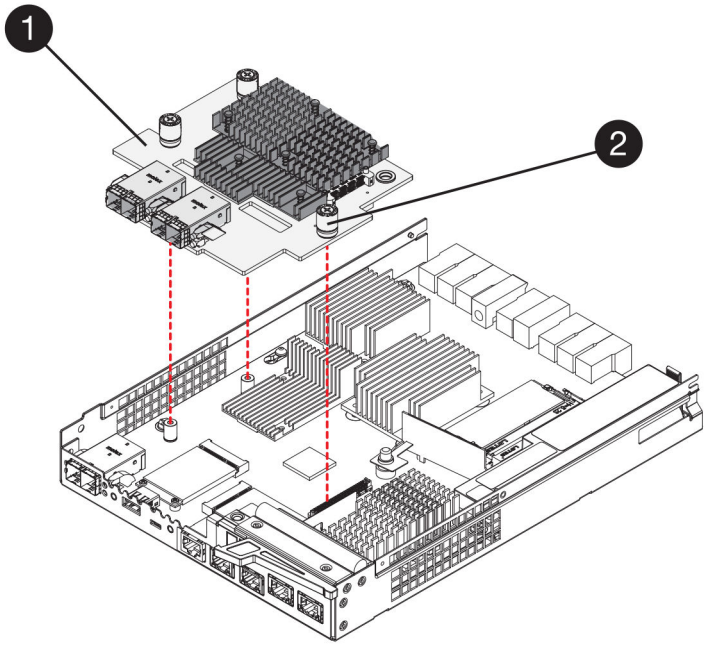
1. Using a #1 Phillips screwdriver, remove the screws that attach the HIC faceplate to the controller canister.

   There are four screws: one on the top, one on the side, and two on the front.



2. Remove the HIC faceplate.
3. Using your fingers or a Phillips screwdriver, loosen the three thumbscrews that secure the HIC to the controller card.
4. Carefully detach the HIC from the controller card by lifting the card up and sliding it back.

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



1 Host interface card (HIC) 2 Thumbscrews

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

After you finish

Go to *Install new controller (duplex)* on page 27.

Install new controller (duplex)

You install a new controller canister to replace the failed one. Perform this task only if your storage array has two controllers (duplex configuration).

Steps

1. Step 1: Install battery (duplex) on page 27
   You must install the battery into the replacement controller canister. You can install the battery that you removed from the original controller canister or install a new battery that you ordered.
2. Step 2: Install host interface card (duplex) on page 29
   If you removed a HIC from the original controller canister, you must install that HIC in the new controller canister.
3. Step 3: Install new controller canister (duplex) on page 31
   After installing the battery and the host interface card (HIC), if one was initially installed, you can install the new controller canister into the controller shelf.

Step 1: Install battery (duplex)

You must install the battery into the replacement controller canister. You can install the battery that you removed from the original controller canister or install a new battery that you ordered.

Before you begin

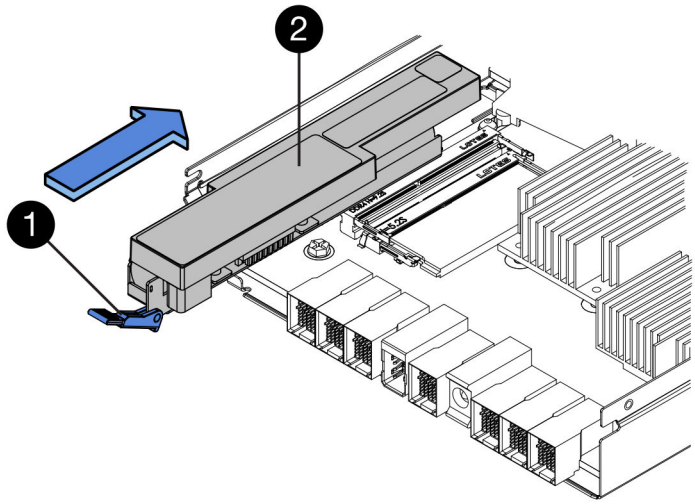
- You have the battery from the original controller canister.
- You have the replacement controller canister.

Steps

1. Turn the replacement controller canister over, so that the removable cover faces up.
2. Press down on the cover button, and slide the cover off.
3. Orient the controller canister so that the slot for the battery faces toward you.
4. Insert the battery into the controller canister at a slight downward angle.

   You must insert the metal flange at the front of the battery into the slot on the bottom of the controller canister, and slide the top of the battery beneath the small alignment pin on the left side of the canister.
5. Move the battery latch up to secure the battery.

   When the latch clicks into place, the bottom of the latch hooks into a metal slot on the chassis.



1 Battery release latch 2 Battery

6. Turn the controller canister over to confirm that the battery is installed correctly.

   Attention: Possible hardware damage – The metal flange at the front of the battery must be completely inserted into the slot on the controller canister (as shown in the first figure). If the battery is not installed correctly (as shown in the second figure), the metal flange might contact the controller board, causing damage to the controller when you apply power.

   - **Correct – The battery's metal flange is completely inserted in the slot on the controller:**



- **Incorrect – The battery's metal flange is not inserted into the slot on the controller:**



After you finish

Go to *Step 3: Remove host interface card (duplex)* on page 26.

Step 2: Install host interface card (duplex)

If you removed a HIC from the original controller canister, you must install that HIC in the new controller canister.

Before you begin

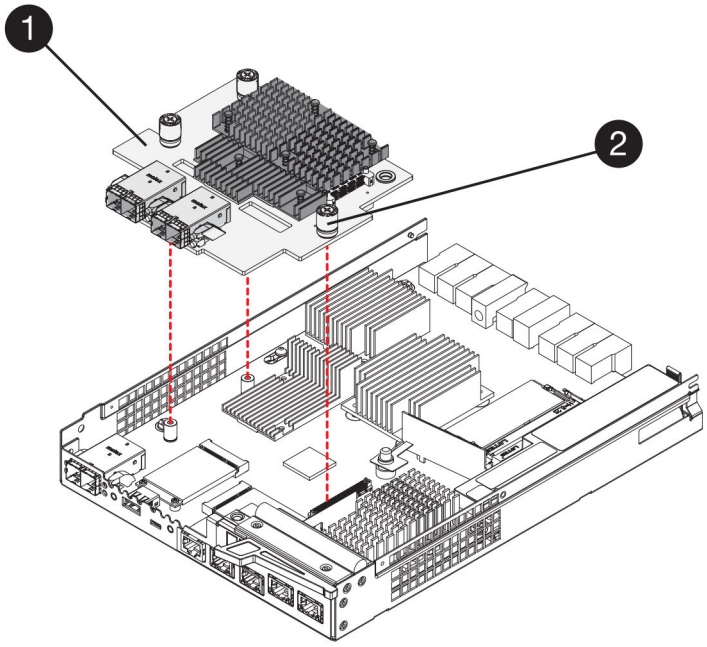
- You must have a replacement controller canister with the same part number as the controller canister you are replacing.
- You must have a #1 Phillips screwdriver.
- You have an ESD wristband, or you have taken other antistatic precautions.

Steps

1. Using a #1 Phillips screwdriver, remove the four screws that attach the blank faceplate to the replacement controller canister, and remove the faceplate.
2. Align the three thumbscrews 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 thumbscrews.

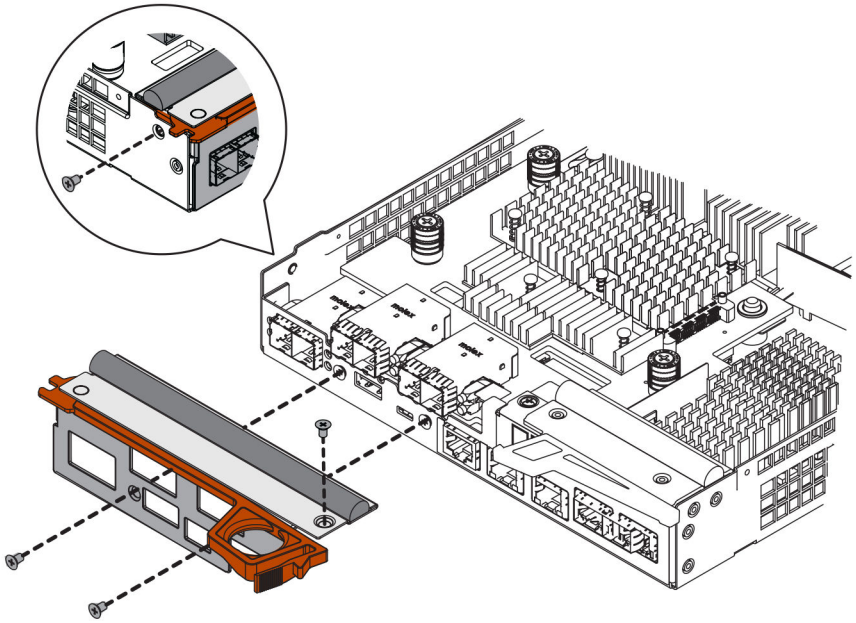


1 Host interface card (HIC) 2 Thumbscrews

4. Hand-tighten the HIC thumbscrews.

   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 controller canister to the new controller canister with four screws.



After you finish

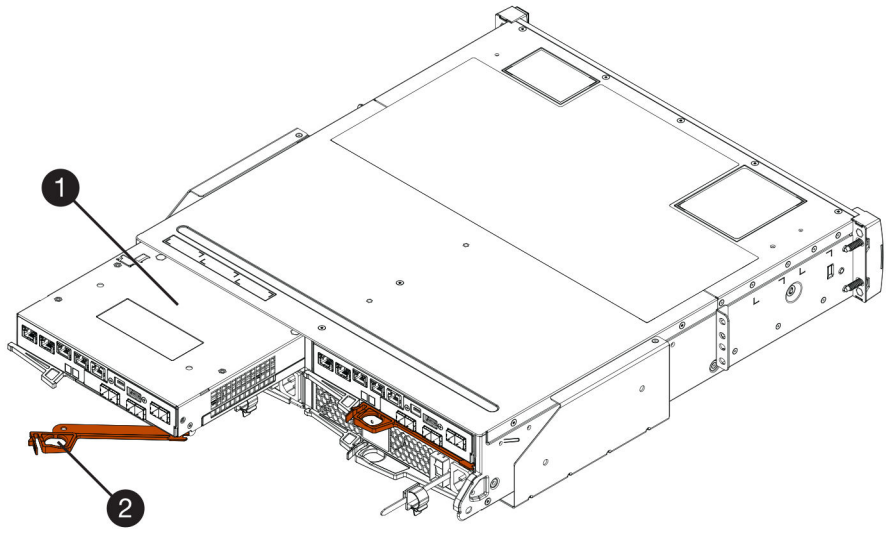
Go to *Step 3: Install new controller canister (duplex)* on page 31.

Step 3: Install new controller canister (duplex)

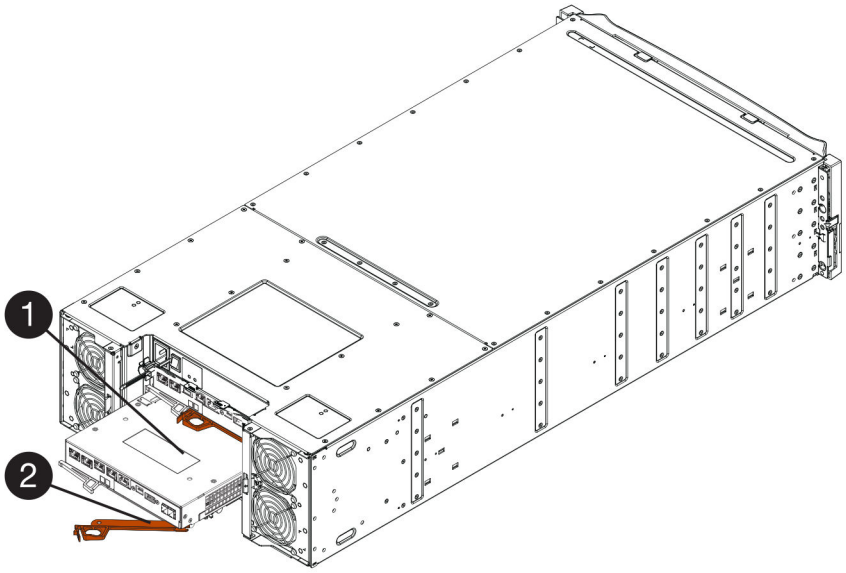
After installing the battery and the host interface card (HIC), if one was initially installed, you can install the new controller canister into the controller shelf.

Steps

1. Reinstall the cover on the controller canister by sliding the cover from back to front until the button clicks.
2. Turn the controller canister over, so that the removable cover faces down.
3. With the cam handle in the open position, slide the controller canister all the way into the controller shelf.



1 Controller canister 2 Cam handle



1 Controller canister 2 Cam handle

4. Move the cam handle to the left to lock the controller canister in place.
5. Install the SFPs from the original controller in the host ports on the new 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.
6. 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 will adopt the IP address of the controller you removed.

After you finish

Go to *Complete controller replacement (duplex)* on page 32.

Complete controller replacement (duplex)

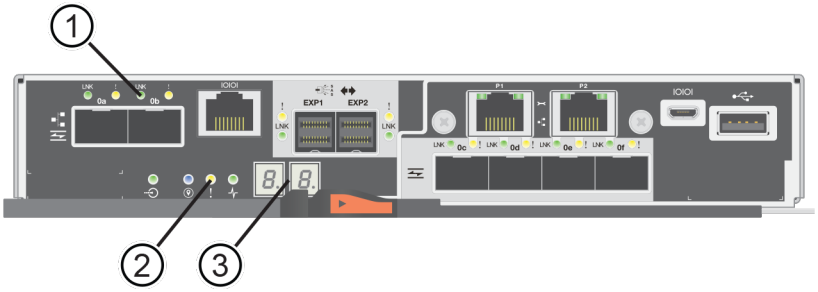
You complete the controller replacement by placing the controller online and confirming that the storage array is working correctly. Then, you can collect support data and resume operations.

Steps

1. As the controller boots, check the controller LEDs and the seven-segment display.

   When communication with the other controller is reestablished:

   - The seven-segment display shows the repeating sequence **OS**, **OL**, ***blank*** to indicate that the controller is offline.
   - The amber Attention LED remains on.
   - The Host Link LEDs might be on, blinking, or off, depending on the host interface.



1 Host Link LEDs 2 Attention LED (Amber) 3 Seven-segment display

2. Check the codes on the controller's seven-segment display as it comes back online. If the display shows one of the following repeating sequences, immediately remove the controller.

   - **OE**, **L0**, ***blank*** (mismatched controllers)
   - **OE**, **L6**, ***blank*** (unsupported HIC)

Attention: Possible loss of data access – If the controller you just installed shows one these codes, and the other controller is reset for any reason, the second controller also could lock down.

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. If required, redistribute all volumes back to their preferred owner.

   a. Select **Storage > Volumes**.

   b. Select **More > Redistribute volumes**.

5. Click **Hardware > Support > Upgrade Center** to ensure that the latest version of SANtricity OS software (controller firmware) is installed.

   As needed, install the latest version.

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.

Canisters

Canisters consist of three different types: power-fan canisters (power supplies) that supply a redundant power source and adequate cooling in a 12-drive or 24-drive controller shelf or drive shelf; power canisters that are used for power redundancy in a 60-drive controller shelf or drive shelf; and fan canisters that are used for cooling the 60-drive controller shelf or drive shelf.

Overview and requirements

This topic provides an overview of the canister types and describes the requirements you need to know about before replacing a canister.

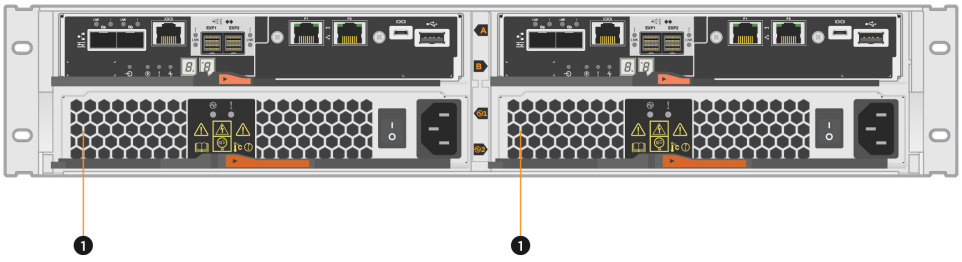
Power supply overview

Each 24-drive controller shelf or drive shelf includes two power supplies with integrated fans. These are referred to as *power-fan canisters* in SANtricity System Manager. If a power-fan canister fails, you must replace it as soon as possible to ensure that the shelf has a redundant power source and adequate cooling.

You replace a power supply in the following shelves:

- E5724 controller shelf
- DE224C drive shelf

The following figure shows an example E5724 controller shelf with two power supplies (power-fan canisters). The DE224C drive shelves are identical, but they include I/O modules (IOMs) instead of controller canisters.



1 Controller shelf with two power supplies (power-fan canisters) below the controller canisters.

The *Replace power supply* topics do not describe how to replace a failed power-fan canister in a DE1600 or DE5600 drive tray, which might be connected to the E5700 or E2800 controller shelves. For instructions for those drive tray models, refer to *Replacing a Power-Fan Canister in the DE1600 Drive Tray or the DE5600 Drive Tray*, available from the *NetApp E-Series and SANtricity Resource page*.

Power canister overview

Each 60-drive controller shelf or drive shelf includes two power canisters for power redundancy.

You can replace a power canister in the following shelves:

- E5760 controller shelves
- DE460C drive shelf

The *Replace power canister* topics do not describe how to replace a failed power canister in a DE6600 drive tray, which might be connected to the controller shelf.

The following figure shows the back of a DE460C drive shelf with the two power canisters:



The following figure shows a power canister:



Fan canister overview

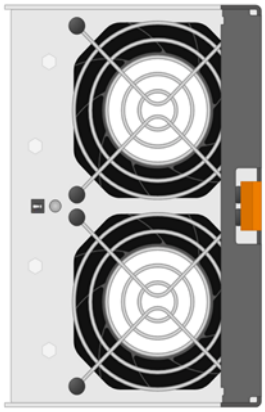
Each 60-drive controller shelf or drive shelf includes two fan canisters.

You can replace a fan canister in the following shelves:

- E5760 controller shelves
- DE460C drive shelf

The *Replace fan canister* topics do not describe how to replace a failed fan canister in a DE6600 drive tray, which might be connected to the controller shelf.

The following figure shows a fan canister:



The following figure shows the back of a DE460C shelf with two fan canisters:



Attention: Possible equipment damage — If you replace a fan canister with the power turned on, you must complete the replacement procedure within 30 minutes to prevent the possibility of overheating the equipment.

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 (power-fan canister) that is supported for your controller shelf or drive shelf model.
- You have an ESD wristband, or you have taken other antistatic precautions.
- You can replace a power supply (power-fan canister) while your storage array is powered on and performing host I/O operations, as long as the following conditions are true:
  - The second power supply (power-fan canister) in the shelf has an 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.

    Attention: If the second power supply (power-fan canister) in the shelf does not have Optimal status or if the Recovery Guru indicates that it is not OK to remove the power-fan canister, contact technical support.

Requirements for replacing a power canister

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

- You have a replacement power canister that is supported for your controller shelf or drive shelf model.
- You have one power canister that is installed and running.
- You have an ESD wristband, or you have taken other antistatic precautions.
- You can replace a power canister while your storage array is powered on and performing host I/O operations, as long as the following conditions are true:
  - The other power canister in the shelf has Optimal status.

    Note: While you perform the procedure, the other power canister supplies power to both fans to ensure that the equipment does not overheat.

  - 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.

    Attention: If the second power canister in the shelf does not have Optimal status or if the Recovery Guru indicates that it is not OK to remove the power canister, contact technical support.

Requirements for replacing a fan canister

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

- You have a replacement fan canister (fan) that is supported for your controller shelf or drive shelf model.
- You have one fan canister that is installed and running.
- You have an ESD wristband, or you have taken other antistatic precautions.
- If you perform this procedure with the power turned on, you must complete it within 30 minutes to prevent the possibility of overheating the equipment.
- You can replace a fan canister while your storage array is powered on and performing host I/O operations, as long as the following conditions are true:
  - The second fan canister in the shelf has an 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.

    Attention: If the second fan canister in the shelf does not have Optimal status or if the Recovery Guru indicates that it is not OK to remove the fan canister, contact technical support.

Replace power supply (24-drive)

Each 24-drive controller shelf or drive shelf includes two power supplies with integrated fans. These are referred to as *power-fan canisters* in SANtricity System Manager. If a power-fan canister fails, you must replace it as soon as possible to ensure that the shelf has a redundant power source and adequate cooling.

Steps

1. Prepare to replace power supply on page 38
   You prepare to replace a power supply in a 24-drive controller shelf or drive shelf by collecting support data about your storage array and locating the failed component. The power supply is referred to as a power-fan canister in SANtricity System Manager.
2. Remove failed power supply on page 40
   You remove a failed power supply so you can replace it with a new one. When you remove a power supply (referred to in SANtricity System Manager as a *power-fan canister*), you turn off power, disconnect the power cord, and slide the part out of the shelf.
3. Install new power supply on page 41
   You install a new power supply to replace the failed one. When you install a power supply (referred to in SANtricity System Manager as a *power-fan canister*), you slide the part into the shelf, close the cam handle, reconnect the power cord, and reapply power.
4. Complete power supply replacement on page 41
   You complete the power supply replacement by confirming that the new power supply (referred to in SANtricity System Manager as a *power-fan canister*) is working correctly. Then, you can gather support data and resume normal operations.

Related concepts

Power supply overview on page 34
Requirements for replacing a power supply on page 36

Prepare to replace power supply

You prepare to replace a power supply in a 24-drive controller shelf or drive shelf by collecting support data about your storage array and locating the failed component. The power supply is referred to as a power-fan canister in SANtricity System Manager.

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.
- The amber Attention LED on the power supply must be on, indicating that the power supply or its integrated fan has a fault. Contact technical support for assistance if both power supplies in the shelf have their amber Attention LEDs on.

About this task

This task describes how to prepare to replace a power supply for the following controller shelves:

- E5724 controller shelf
- DE224C drive shelf

You can replace a power supply while your storage array is powered on and performing host I/O operations, as long as the second power supply in the shelf has an Optimal status and the **OK to remove** field in the Details area of the Recovery Guru in SANtricity System Manager displays **Yes**.

Steps

1. 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`.

2. From SANtricity System Manager, determine which power supply has failed. You can find this information in the Details area of the Recovery Guru, or you can review the information displayed for the shelf.

   a. Select **Hardware**.

   b. Look at the power and fan icons to the right of the **Shelf** drop-down lists to determine which shelf has the failed power supply.

      If a component has failed, either or both icons are red.

   c. When you find the shelf with a red icon, select **Show back of shelf**.

   d. Select either power supply.

   e. On the **Power Supplies** and **Fans** tabs, look at the statuses of the power-fan canisters, the power supplies, and the fans to determine which power supply must be replaced.

      A component with a **Failed** status must be replaced.

      Attention: If the second power supply canister in the shelf does not have **Optimal** status, do not attempt to hot-swap the failed power supply. Instead, contact technical support for assistance.

3. From the back of the storage array, look at the Attention LEDs to locate the power supply you need to remove.

   You must replace the power supply that has its Attention LED on.



Power LED: If it is **solid green**, the power supply is functioning correctly. If it is **Off**, the power supply failed, the AC switch is turned off, the AC power cord is not properly installed, or the AC power cord input voltage is not within margin (there is a problem at the source end of the AC power cord).

Attention LED: If it is **solid amber**, the power supply or its integrated fan has a fault.

After you finish

Go to *Remove failed power supply* on page 40.

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 (referred to in SANtricity System Manager as a *power-fan canister*), you turn off power, 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. 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.

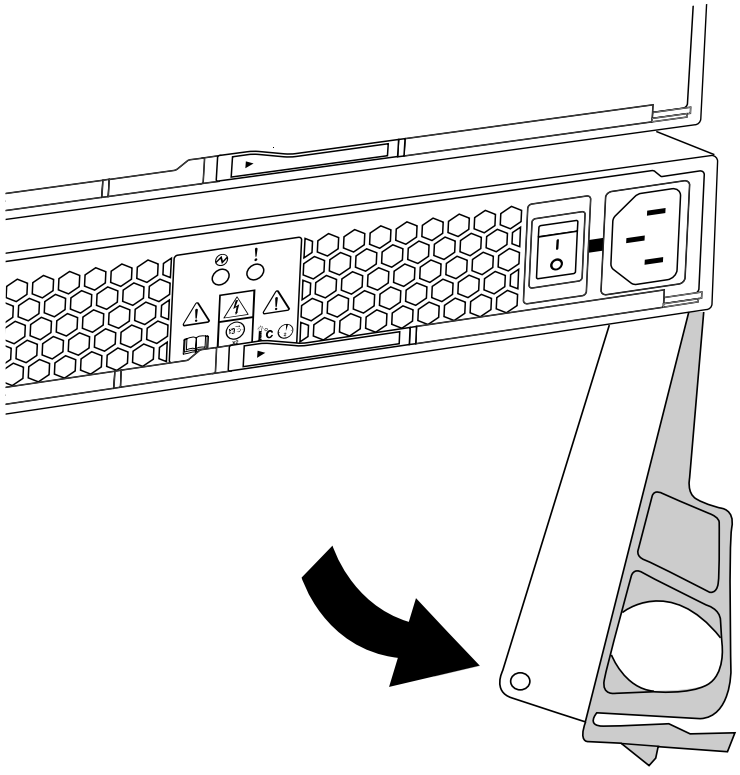
2. Turn off the power supply and disconnect the power cables:

   a. Turn off the power switch on the power supply.

   b. Open the power cord retainer, and then unplug the power cord from the power supply.

   c. Unplug the power cord from the power source.

3. Squeeze the latch on the power supply cam handle, and then open the cam handle to fully release the power supply from the mid plane.



4. Use the cam handle to slide the power supply out of the system.

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

   As you remove the power supply, a flap swings into place to block the empty bay, helping to maintain air flow and cooling.

After you finish

Go to *Install new power supply* on page 41.

Install new power supply

You install a new power supply to replace the failed one. When you install a power supply (referred to in SANtricity System Manager as a *power-fan canister*), you slide the part into the shelf, close the cam handle, reconnect the power cord, and reapply power.

Before you begin

- You have a replacement power supply that is supported for your controller shelf or drive shelf model.
- You have unpacked the replacement power supply.

Steps

1. Make sure that the on/off switch of the new power supply is in the **Off** position.
2. 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.

3. Close the cam handle so that the latch clicks into the locked position and the power supply is fully seated.
4. Reconnect the power supply cabling:

   a. Reconnect the power cord to the power supply and the power source.

   b. Secure the power cord to the power supply using the power cord retainer.

5. Turn on the power to the new power-fan canister.

After you finish

Go to *Complete power supply replacement* on page 41.

Complete power supply replacement

You complete the power supply replacement by confirming that the new power supply (referred to in SANtricity System Manager as a *power-fan canister*) is working correctly. Then, you can gather support data and resume normal operations.

Steps

1. On the new power supply, check that the green Power LED is on and the amber Attention LED is OFF.

2. From the Recovery Guru in SANtricity System Manager, select **Recheck** to ensure the problem has been resolved.
3. If a failed power supply is still being reported, repeat the steps in *Remove power supply* on page 40 and *Install new power supply* on page 41. If the problem continues to persist, contact technical support.
4. Remove the antistatic protection.
5. 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`.
6. Return the failed part to NetApp, as described in the RMA instructions shipped with the kit.

Result

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

Replace power canister (60-drive)

Each 60-drive controller shelf or drive shelf includes two power canisters for power redundancy. If a power canister fails, you must replace it as soon as possible to ensure that the shelf has a redundant power source.

Steps

1. Prepare to replace power canister on page 43
   You prepare to replace a power canister in a 60-drive controller shelf or drive shelf by collecting support data about your storage array and locating the failed component.
2. Remove failed power canister on page 44
   You remove a failed power canister so you can replace it with a new one. When you remove a power canister, you turn off power, disconnect the power cord, and slide the component out of the shelf.
3. Install new power canister on page 45
   You install a new power canister to replace the failed one. When you install a power canister, you slide the component into the shelf, close the cam handle, reconnect the power cord, and reapply power.
4. Complete power canister replacement on page 45
   You complete the power canister replacement by confirming that the new power canister is working correctly. Then, you can gather support data and resume normal operations.

Related concepts

Power canister overview on page 34
Requirements for replacing a power canister on page 37

Prepare to replace power canister

You prepare to replace a power canister in a 60-drive controller shelf or drive shelf by collecting support data about your storage array and locating the failed component.

Before you begin

- You have reviewed 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.
- You have checked that the amber Attention LED on the power canister is on, indicating that the canister has a fault. Contact technical support for assistance if both power canisters in the shelf have their amber Attention LEDs on.

About this task

This task describes how to prepare to replace a power canister for the following controller shelves:

- E5760 controller shelf
- DE460C drive shelf

You can replace a power canister while your storage array is powered on and performing host I/O operations, as long as the second power canister in the shelf has an Optimal status and the **OK to remove** field in the Details area of the Recovery Guru in SANtricity System Manager displays **Yes**.

While you perform this task, the other power canister supplies power to both fans to ensure that the equipment does not overheat.

Steps

1. 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`.
2. From SANtricity System Manager, determine which power canister has failed.
   a. Select **Hardware**.
   b. Look at the power  icon to the right of the **Shelf** drop-down lists to determine which shelf has the failed power canister.

      If a component has failed, this icon is red.
   c. When you find the shelf with a red icon, select **Show back of shelf**.
   d. Select either power canister or the red power icon.
   e. On the **Power Supplies** tab, look at the statuses of the power canisters to determine which power canister must be replaced.

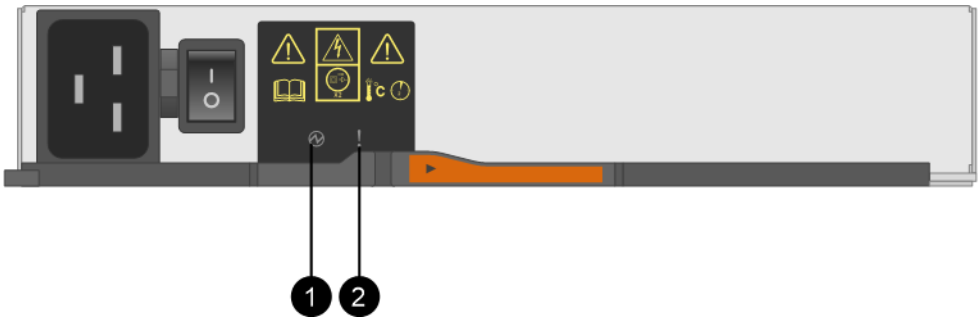
      A component with a **Failed** status must be replaced.

      Attention: If the second power canister in the shelf does not have **Optimal** status, do not attempt to hot-swap the failed power canister. Instead, contact technical support for assistance.

Note: You can also find information about the failed power canister in the Details area of the Recovery Guru, or you can review the information displayed for the shelf, or you can review the Event Log under Support and filter by Component Type.

3. From the back of the storage array, look at the Attention LEDs to locate the power canister you need to remove.

   You must replace the power canister that has its Attention LED on.



1 Power LEDs. If it is **Solid green**, the power canister is functioning correctly. If it is **Off**, the power canister failed, the AC switch is turned off, the AC power cord is not properly installed, or the AC power cord input voltage is not within margin (there is a problem at the source end of the AC power cord).

2 Attention LED. If it is **Solid amber**, the power canister has a fault, or there is no input power to this power canister, but the other power canister is operating.

After you finish

Go to *Remove failed power canister* on page 44.

Remove failed power canister

You remove a failed power canister so you can replace it with a new one. When you remove a power canister, you turn off power, disconnect the power cord, and slide the component out of the shelf.

Before you begin

- You have one power canister that is installed and running.
- You have an ESD wristband, or you have taken other antistatic precautions.

Steps

1. Put on antistatic protection.
2. Unpack the new power canister, and set it on a level surface near the shelf.

   Save all packing materials for use when returning the failed power canister.
3. Turn off the power switch on the power canister that you need to remove.
4. Open the power cord retainer of the power canister that you need to remove, and then unplug the power cord from the power canister.

5. Press the orange latch on the power canister cam handle, and then open the cam handle to fully release the power canister from the mid plane.
6. Use the cam handle to slide the power canister out of the shelf.

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

After you finish

Go to *Install new power canister* on page 45.

Install new power canister

You install a new power canister to replace the failed one. When you install a power canister, you slide the component into the shelf, close the cam handle, reconnect the power cord, and reapply power.

Before you begin

- You have a replacement power canister that is supported for your controller shelf or drive shelf model.
- You have checked that the on/off switch of the new power canister is in the Off position.

Steps

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

   Attention: Do not use excessive force when sliding the power canister into the system; you can damage the connector.
2. Close the cam handle so that the latch clicks into the locked position and the power canister is fully seated.
3. Reconnect the power cord to the power canister, and secure the power cord to the power canister using the power cord retainer.
4. Turn on the power to the new power canister.

After you finish

Go to *Complete power canister replacement* on page 45.

Complete power canister replacement

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

Steps

1. On the new power canister, check that the green Power LED is on and the amber Attention LED is OFF.
2. From the Recovery Guru in SANtricity System Manager, select **Recheck** to ensure the problem has been resolved.
3. If a failed power canister is still being reported, repeat the steps in *Remove failed power canister* on page 44 and *Install new power canister* on page 45. If the problem continues to persist, contact technical support.

4. Remove the antistatic protection.
5. 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`.
6. Return the failed part to NetApp, as described in the RMA instructions shipped with the kit.

Result

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

Replace fan canister (60-drive)

Each 60-drive controller shelf or drive shelf includes two fan canisters. If a fan canister fails, you must replace it as soon as possible to ensure that the shelf has adequate cooling.

Steps

1. Prepare to replace fan canister on page 46
   You prepare to replace a fan canister in a 60-drive controller shelf or drive shelf by collecting support data about your storage array and locating the failed component.
2. Remove failed fan canister and install new one on page 48
   You remove a failed fan canister so you can replace it with a new one.
3. Complete fan canister replacement on page 50
   You complete the fan canister replacement by confirming that the new fan canister is working correctly. Then, you can gather support data and resume normal operations.

Related concepts

Fan canister overview on page 35
Requirements for replacing a fan canister on page 37

Prepare to replace fan canister

You prepare to replace a fan canister in a 60-drive controller shelf or drive shelf by collecting support data about your storage array and locating the failed component.

Before you begin

- You have reviewed 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.
- You have checked that the amber Attention LED on the fan canister is on, indicating that the fan has a fault. Contact technical support for assistance if both fan canisters in the shelf have their amber Attention LEDs on.

About this task

This task describes how to prepare to replace a fan canister for the following controller shelves:

- E5760 controller shelf

- DE460C drive shelf

Attention: Possible equipment damage — If you perform this procedure with the power turned on, you must complete it within 30 minutes to prevent the possibility of overheating the equipment.

Steps

1. 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`.
2. From SANtricity System Manager, determine which fan canister has failed.
   a. Select **Hardware**.
   b. Look at the fan  icon to the right of the **Shelf** drop-down lists to determine which shelf has the failed fan canister.

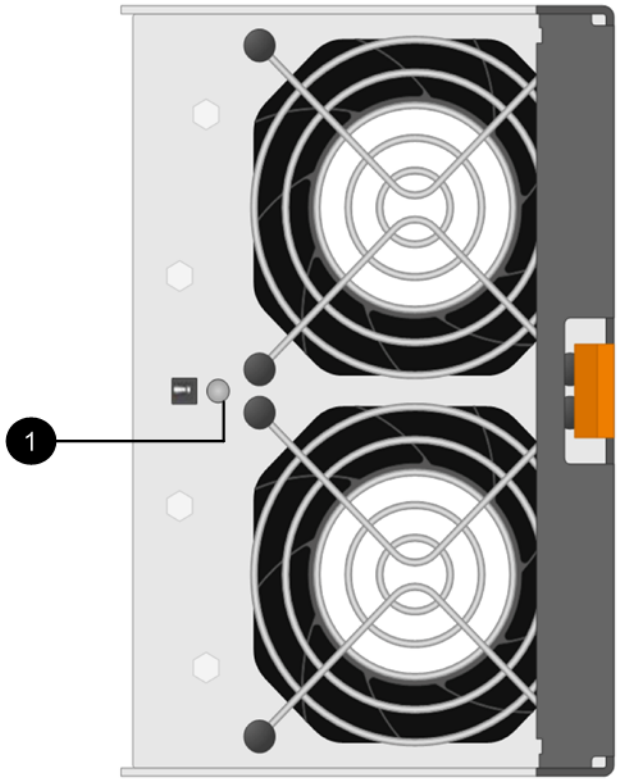
      If a component has failed, this icon is red.
   c. When you find the shelf with a red icon, select **Show back of shelf**.
   d. Select either fan canister or the red fan icon.
   e. On the **Fans** tab, look at the statuses of the fan canisters to determine which fan canister must be replaced.

      A component with a **Failed** status must be replaced.

      Attention: If the second fan canister in the shelf does not have **Optimal** status, do not attempt to hot-swap the failed fan canister. Instead, contact technical support for assistance.

   You can also find information about the failed fan canister in the Details area of the Recovery Guru, or you can review the Event Log under Support and filter by Component Type.
3. From the back of the storage array, look at the Attention LEDs to locate the fan canister you need to remove.

   You must replace the fan canister that has its Attention LED on.



1 Attention LED. If this LED displays as **Solid amber**, then the fan has a fault.

After you finish

Go to *Remove failed power canister and install new one* on page 48.

Remove failed fan canister and install new one

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

Before you begin

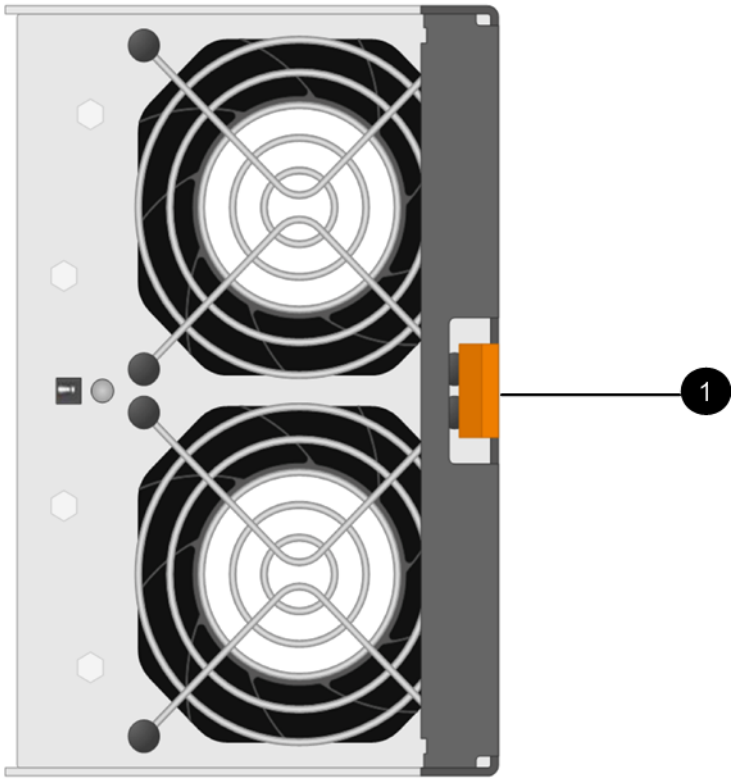
- If you do not turn off the power to your storage array, ensure that you remove and replace the fan canister within 30 minutes to prevent the system from overheating.
- You have an ESD wristband, or you have taken other antistatic precautions.

Steps

1. Unpack the new fan canister, and place it on a level surface near the shelf.

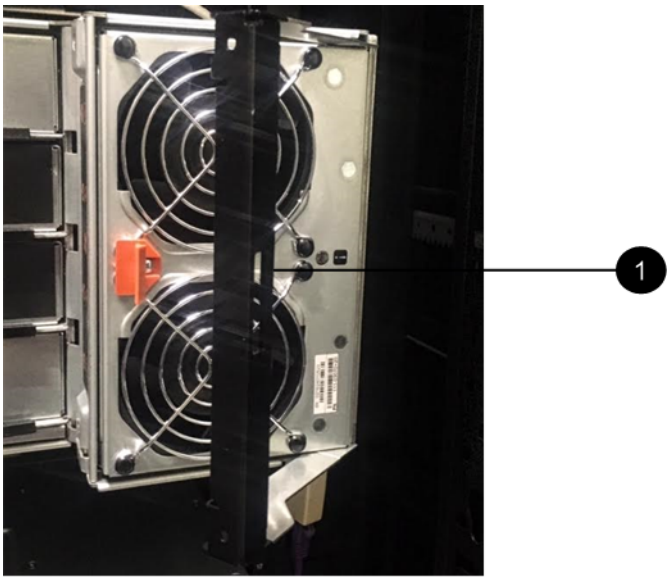
   Save all packing material for use when returning the failed fan.

2. Press the orange tab to release the fan canister handle.



1 Tab that you press to release the fan canister handle.

3. Use the fan canister handle to pull the fan canister out of the shelf.



1 Handle to pull the fan canister out.

4. Slide the replacement fan canister all the way into the shelf, and then move the fan canister handle until it latches with the orange tab.

After you finish

Go to *Complete fan canister replacement* on page 50.

Complete fan canister replacement

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

Steps

1. Check the amber Attention LED on the new fan canister.

   Note: After you replace the fan canister, the Attention LED stays on (solid amber) while the firmware checks that the fan canister was installed correctly. The LED goes off after this process is complete.

2. From the Recovery Guru in SANtricity System Manager, select **Recheck** to ensure the problem has been resolved.
3. If a failed fan canister is still being reported, repeat the steps in *Remove failed fan canister and install new one* on page 48. If the problem persists, contact technical support.
4. Remove the antistatic protection.
5. 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`.
6. Return the failed part to NetApp, as described in the RMA instructions shipped with the kit.

Result

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

Drives

A drive is an electromagnetic mechanical 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.

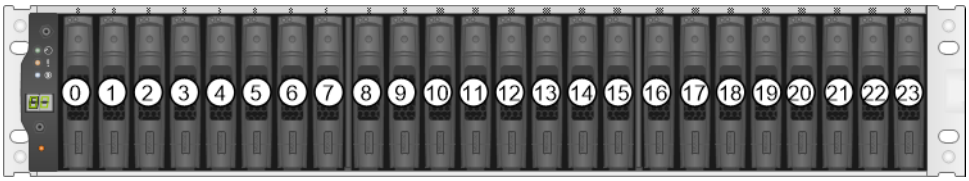
Drives overview

You can replace a drive in either a 24-drive or 60-drive controller shelf or drive shelf.

24-drive shelves

The figures show how the drives are numbered in each type of shelf (the shelf's front bezel or end caps have been removed).

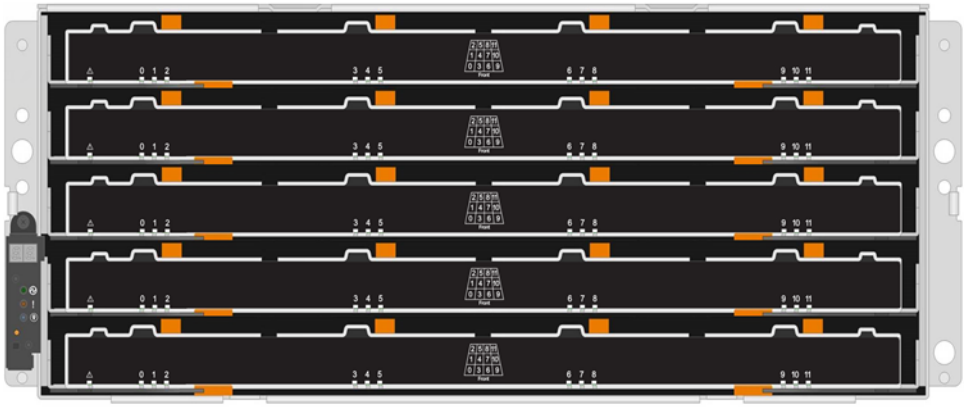
Drive numbering in an E5724 controller shelf or DE224C drive shelf



Note: Your E5724 storage array might include one or more SAS-2 legacy expansion drive trays, including the DE5600 24-drive tray or the DE6600 60-drive tray. For instructions for replacing a drive in one of these drive trays, see *Replacing a Drive in E2660, E2760, E5460, E5560, or E5660 Drive Trays* and *Replacing a Drive in E2600, E2700, E5400, E5500, and E5600 12-Drive or 24-Drive Trays*.

60-drive shelves

Both the E5760 controller shelf and the DE460C drive shelf consist of five drive drawers that each contain 12 drive slots. Drive drawer 1 is at the top, and drive drawer 5 is at the bottom.



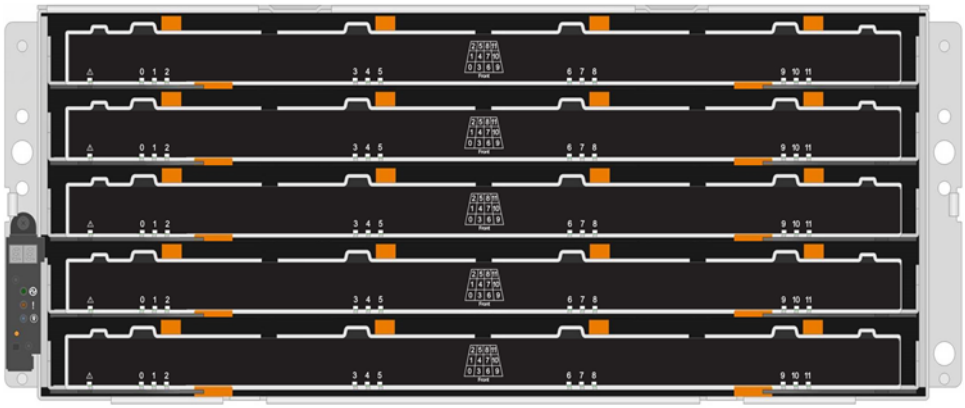
For both an E5760 controller shelf drawer and a DE460C drive shelf drawer, drives are numbered from 0 to 11 in each drive drawer within the shelf.



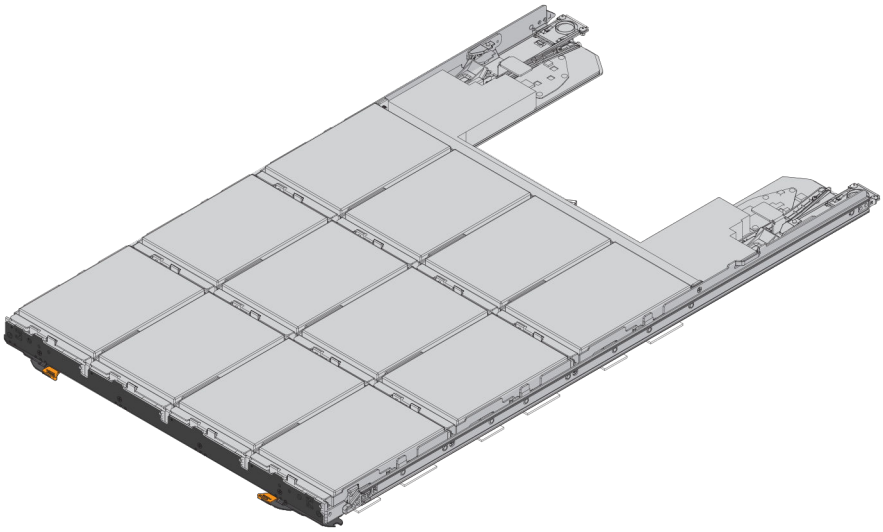
Note: Your E5760 storage array might include one or more SAS-2 legacy expansion drive trays, including the DE1600 12-drive tray, the DE5600 24-drive tray, or the DE6600 60-drive tray. For instructions for replacing a drive in one of these drive trays, see *Replacing a Drive in E2660, E2760, E5460, E5560, or E5660 Trays* and *Replacing a Drive in E2600, E2700, E5400, E5500, and E5600 12-Drive or 24-Drive Trays*.

Drive drawer overview

You can replace a drive drawer in a E5760 controller shelf and a DE460C drive shelf. Each of these 60-drive shelves has five drive drawers.



Each of the five drawers can hold up to 12 drives.



Requirements for handling 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.
  - Do not insert a metal tool or knife into the ESD bag.
    Open the ESD bag by hand or cut the top off with a pair of scissors.
  - 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.

Replace drive (24-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 (24-drive) on page 54
   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 failed drive (24-drive) on page 55
   You remove a failed drive to replace it with a new one.
3. Install new drive (24-drive) on page 56
   You install a new drive to replace the failed one. Install the replacement drive as soon as possible after removing the failed drive. Otherwise, there is a risk that the equipment might overheat.
4. Complete drive replacement (24-drive) on page 56
   You complete the drive replacement to confirm that the new drive is working correctly.

Related concepts

Drives overview on page 51
Requirements for handling drives on page 53

Prepare to replace drive (24-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 drive (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 failed drive (24-drive)* on page 55.

Remove failed drive (24-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 the *Requirements for handling drives* on page 53 topic.

About this task

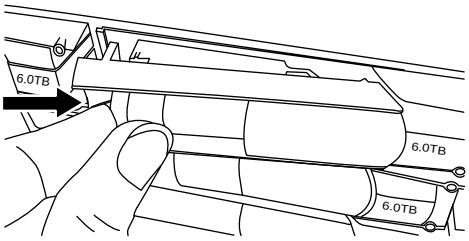
When you remove a drive, you must slide the drive partly out of the shelf and wait for the drive to spin down. Then, you can remove the drive completely.

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 release button on the failed drive.



   - For drives in E5724 controller shelves or DE224C drive shelves, the release button is located at the top of the drive.

   The cam handle on the drive springs open partially, and the drive releases from the midplane.

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 (24-drive)* on page 56.

Install new drive (24-drive)

You install a new drive to replace the failed one. Install the replacement drive as soon as possible after removing the failed drive. Otherwise, there is a risk that the equipment might overheat.

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 (24-drive)* on page 56.

Complete drive replacement (24-drive)

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.

Replace drive (60-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 operations.

Steps

1. Prepare to replace drive (60-drive) on page 57
   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 failed drive (60-drive) on page 60
   You remove a failed drive to replace it with a new one.
3. Install new drive (60-drive) on page 61
   You install a new drive to replace the failed one. Install the replacement drive as soon as possible after removing the failed drive. Otherwise, there is a risk that the equipment might overheat.
4. Complete drive replacement (60-drive) on page 62
   You complete the drive replacement to confirm that the new drive is working correctly.

Related concepts

Drives overview on page 51
Requirements for handling drives on page 53

Prepare to replace drive (60-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.

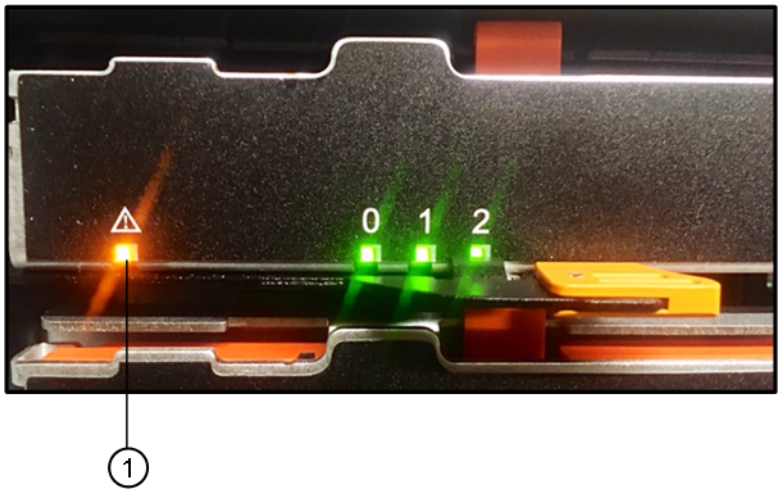
   For example, do not attempt to replace a hard disk drive (HDD) with a solid-state disk (SSD). Similarly, if you are replacing a secure-capable drive, make sure the replacement drive is also secure-capable.

3. If needed, use SANtricity System Manager to locate the drive within the storage array.

a. If the shelf has a bezel, remove it so you can see the LEDs.

b. From the drive's context menu, select **Turn on locator light**.

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



1 Attention LED

c. Unlatch the drive drawer by pulling on both levers.

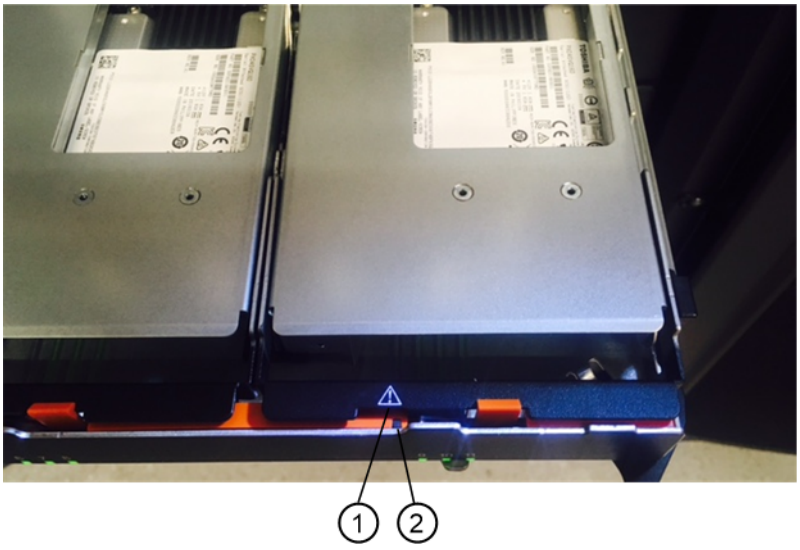
d. Using the extended levers, carefully pull the drive drawer out until it stops.

e. Look at the top of the drive drawer to find the Attention LED in front of each drive.



1 Attention LED light on for the drive on the top right side

The drive drawer Attention LEDs are on the left side in front of each drive, with an attention icon on the drive handle just behind the LED.



1 Attention icon 2 Attention LED

After you finish

Go to *Remove failed drive (60-drive)* on page 60.

Remove failed drive (60-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 the *Requirements for handling drives* on page 53 topic.

About this task

When you remove a drive from an E5760 controller shelf or a DE460C drive shelf, you must lift the drive partly out of the drawer 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 for the next time you need to send a drive back.

2. Release the drive drawer levers from the center of the appropriate drive drawer by pulling both towards the sides of the drawer.
3. Carefully pull on the extended drive drawer levers to pull out the drive drawer to its full extension without removing it from the enclosure.
4. Gently pull back the orange release latch that is in front of the drive you want to remove.

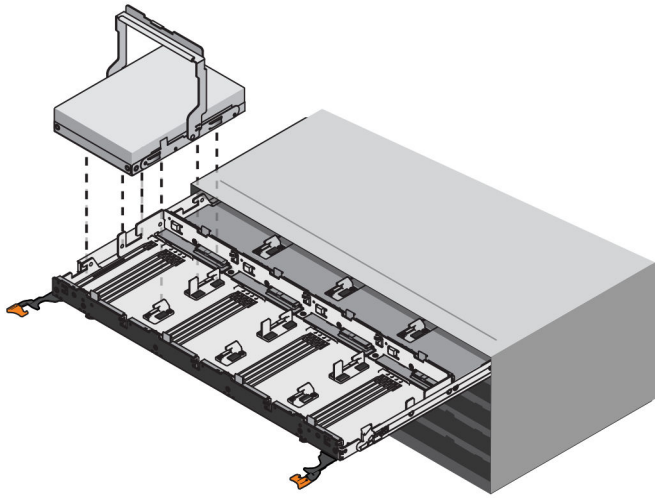
   The cam handle on the drive springs open partially, and the drive is released from the drawer.



1 Orange release latch

5. Open the cam handle, and lift out the drive slightly.
6. Wait 30 seconds.

7. Use the cam handle to lift the drive from the shelf.



8. Place the drive on an antistatic, cushioned surface away from magnetic fields.
9. 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 (60-drive)* on page 61.

Install new drive (60-drive)

You install a new drive to replace the failed one. Install the replacement drive as soon as possible after removing the failed drive. Otherwise, there is a risk that the equipment might overheat.

Before you begin

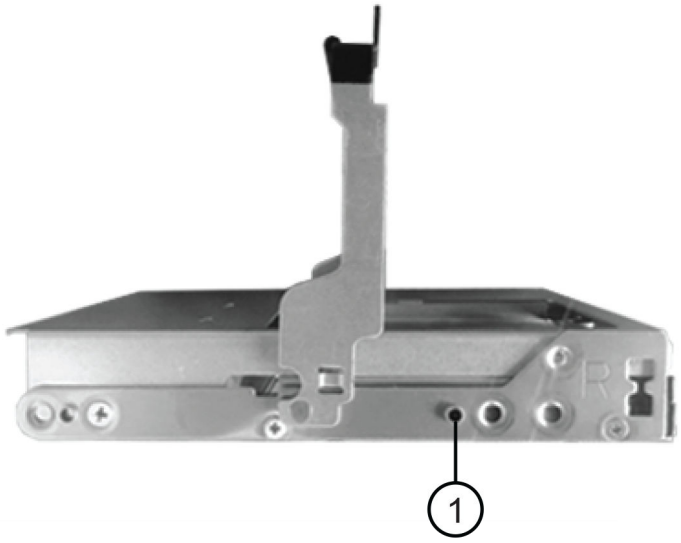
- You have a replacement drive that is supported by NetApp for your controller shelf or drive shelf.

About this task

Attention: Possible loss of data access – When pushing the drive drawer back into the enclosure, never slam the drawer shut. Push the drawer in slowly to avoid jarring the drawer and causing damage to the storage array.

Steps

1. Raise the cam handle on the new drive to vertical.
2. Align the two raised buttons on each side of the drive carrier with the matching gap in the drive channel on the drive drawer.



1 Raised button on the right side of the drive carrier

3. Lower the drive straight down, and then rotate the cam handle down until the drive snaps into place under the orange release latch.
4. Carefully push the drive drawer back into the enclosure. Push the drawer in slowly to avoid jarring the drawer and causing damage to the storage array.
5. Close the drive drawer by pushing both levers towards the center.

   The green Activity LED for the replaced drive on the front of the drive drawer comes on when the drive is inserted correctly.

   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 (60-drive)* on page 62.

Complete drive replacement (60-drive)

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.

Replace drive drawer (60-drive)

The steps to replace a failed drive drawer in an E5760 controller shelf or a DE460C drive shelf depend on whether the volumes in the drawer are protected by Drawer Loss Protection. If all volumes in the drive drawer are in disk pools or volume groups that have Drawer Loss Protection, you can perform this procedure online. Otherwise, you must stop all host I/O activity and power off the shelf before replacing the drive drawer.

Steps

1. Prepare to replace drive drawer (60-drive) on page 64
   You prepare to replace a drive drawer by determining if you can perform the replacement procedure while the drive shelf is online or if you need to stop host I/O activity and power off any of the shelves that are powered on. If you are replacing a drawer in a shelf with Drawer Loss Protection, there is no need to stop host I/O activity and power off any of the shelves.
2. Remove cable chains on page 66
   You remove both cable chains so you can remove and replace a failed drive drawer. The left and right cable chains allow the drawers to slide in and out.
3. Remove failed drive drawer (60-drive) on page 71
   You remove a failed drive drawer to replace it with a new one. Removing a drive drawer entails sliding the drawer partially out, recording the locations of the drives, removing the drives, and removing the drive drawer.
4. Install new drive drawer (60-drive) on page 73
   You install a new drive drawer to replace the failed one. Installing a drive drawer into a drive tray entails sliding the drawer into the empty slot, installing the drives, and replacing the front bezel.
5. Attach cable chains on page 74
   You must attach the cable chains so you can safely re-install the drives in the drive drawer.

6. Complete drive drawer replacement (60-drive) on page 77
   You complete the drive drawer replacement by reinserting the drives and replacing the front bezel in the correct order.

Related concepts

Drive drawer overview on page 52

Requirements for handling drives on page 53

Prepare to replace drive drawer (60-drive)

You prepare to replace a drive drawer by determining if you can perform the replacement procedure while the drive shelf is online or if you need to stop host I/O activity and power off any of the shelves that are powered on. If you are replacing a drawer in a shelf with Drawer Loss Protection, there is no need to stop host I/O activity and power off any of the shelves.

Before you begin

- You must have installed SANtricity Storage Manager on a management station, so you can use the storage array's command line interface (CLI).
- Make sure the drive shelf meets all of these conditions:
  - The drive shelf cannot be over temperature.
  - Both fans must be installed and have a status of Optimal.
  - All drive shelf components must be in place.
  - The volumes in the drive drawer cannot be in a Degraded state.

    Attention: Possible loss of data access – If a volume is already in a Degraded state, and you remove drives from the drive drawer, the volume can fail.

Steps

1. Determine if the drive shelf is powered on.
   - If the power is off, you do not need to issue the CLI command. Go to *Remove cable chains* on page 66.
   - If the power is on, go to the next step.
2. Type the following command on the command line, and press **Enter**:

```
SMcli <ctlr_IP1> -p "array_password" -c "set tray [trayID] drawer
[drawerID]
serviceAllowedIndicator=on;"
```

   where:

   - *<ctlr_IP1>* is the identifier of the controller.
   - *array_password* is the password for the storage array. You must enclose the value for *array_password* in double quotation marks ("").
   - [*trayID*] is the identifier of the drive shelf that contains the drive drawer that you want to replace. Drive shelf ID values are 0 to 99. You must enclose the value for *trayID* in square brackets.

- [*drawerID*] is the identifier of the drive drawer that you want to replace. Drawer ID values are 1 (top drawer) to 5 (bottom drawer). You must enclose the value for *drawerID* in square brackets.

Example

This command ensures you can remove the top-most drawer in drive shelf 10:

```
SMcli <ctlr_IP1> -p "safety-1" -c "set tray [10] drawer [1]
serviceAllowedIndicator=forceOnWarning;"
```

3. Determine if you need to stop host I/O activity, as follows:

   - If the command succeeds, you do not need to stop host I/O activity. All drives in the drawer are in pools or volume groups with Drawer Loss Protection. Go to *Remove cable chains* on page 66.

     Attention: Possible damage to drives – Wait 30 seconds after the command completes before you open the drive drawer. Waiting 30 seconds allows the drives to spin down, which prevents possible damage to the hardware.

   - If a warning is displayed indicating that this command could not be completed, you must stop host I/O activity before removing the drawer. The warning is displayed because one or more drives in the affected drawer are in pools or volume groups without Drawer Loss Protection. To avoid losing data, you must complete the next steps to stop host I/O activity and to power off the drive shelf and the controller shelf.

4. 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.

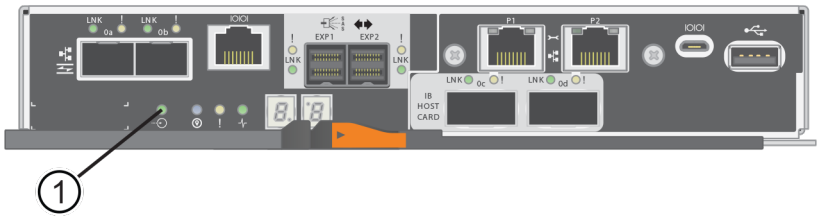
   Note: The exact steps to stop host I/O operations depend on the host operating system and the configuration, which are beyond the scope of these instructions. If you are not sure how to stop host I/O operations in your environment, consider shutting down the host.

5. If the storage array participates in a mirroring relationship, stop all host I/O operations on the secondary storage array.

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

6. 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.



1 Cache Active LED

7. From the Home page of SANtricity System Manager, select **View Operations in Progress**.
8. Wait for all operations to complete before continuing with the next step.
9. Power off the shelves as follows:

   If you are replacing a drawer in a shelf **with** Drawer Loss Protection:

   There is NO need to power off any of the shelves.

   You can perform the replace procedure while the drive drawer is online, because the `Set Drawer Service Action Allowed Indicator` CLI command completed successfully.

   If you are replacing a drawer in a *controller* shelf **without** Drawer Loss Protection:

   a. Turn off both power switches on the controller shelf.

   Wait for all LEDs on the controller shelf to go dark.

   If you are replacing a drawer in an *expansion* drive shelf **without** Drawer Loss Protection:

   a. Turn off both power switches on the controller shelf.

   b. Wait for all LEDs on the controller shelf to go dark.

   c. Turn off both power switches on the drive shelf.

   Wait two minutes for drive activity to stop.

After you finish

Go to *Remove cable chains* on page 66.

Remove cable chains

You remove both cable chains so you can remove and replace a failed drive drawer. The left and right cable chains allow the drawers to slide in and out.

Before you begin

- You have issued the `Set Drawer Attention Indicator` CLI command, or you have stopped host I/O activity and powered off the drive shelf and controller shelf.
- You have an ESD wristband, or you have taken other antistatic precautions.
- You have a flashlight.

About this task

Each drive drawer has left and right cable chains. The metal ends on the cable chains slide into corresponding vertical and horizontal guide rails inside the enclosure, as follows:

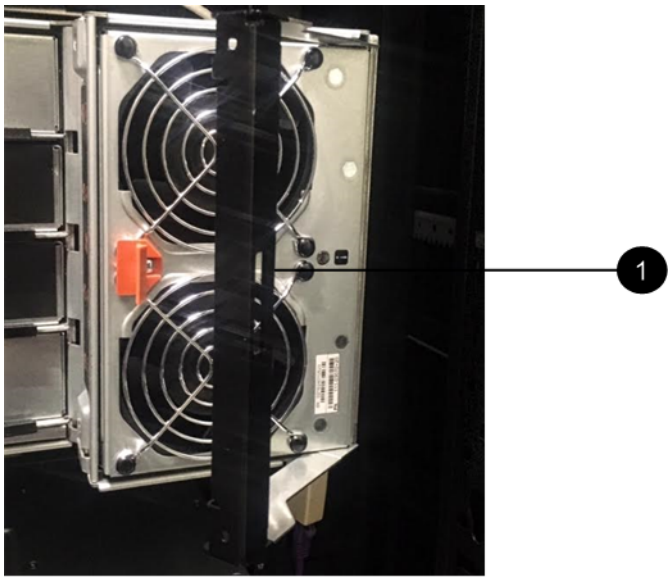
- The left and right vertical guide rails connect the cable chain to the enclosure's midplane.
- The left and right horizontal guide rails connect the cable chain to the individual drawer.

Attention: Possible hardware damage — If the drive tray is powered on, the cable chain is energized until both ends are unplugged. To avoid shorting out the equipment, do not allow the unplugged cable chain connector to touch the metal chassis if the other end of the cable chain is still plugged in.

Steps

1. From the rear of the drive shelf, remove the right fan canister:
   a. Press the orange tab to release the fan canister handle.

      The figure shows the handle for the fan canister extended and released from the orange tab on the left.

      1 Fan canister handle

   b. Using the handle, pull the fan canister out of the drive tray, and set it aside.
   c. If the tray is powered on, ensure that the left fan goes to its maximum speed.

      Attention: Possible equipment damage due to overheating – If the tray is powered on, do not remove both fans at the same time. Otherwise, the equipment might overheat.

2. Determine which cable chain to disconnect:
   - If the power is on, the amber Attention LED on the front of the drawer indicates the cable chain you need to disconnect.
   - If the power is off, you must manually determine which of the five cable chains to disconnect.

   The figure shows the right side of the drive shelf with the fan canister removed. With the fan canister removed, you can see the five cable chains and the vertical and horizontal connectors for each drawer.

The top cable chain is attached to drive drawer 1. The bottom cable chain is attached to drive drawer 5. The callouts for drive drawer 1 are provided.



1 Cable chain 2 Vertical connector (connected to midplane) 3 Horizontal connector (connected to drawer)

3. For easy access, use your finger to move the cable chain on the right side to the left.
4. Disconnect any of the right cable chains from their corresponding vertical guide rail.
   a. Using a flashlight, locate the orange ring on the end of the cable chain that is connected to the vertical guide rail in the enclosure.



1 Orange ring on vertical guide rail 2 Cable chain, partially removed

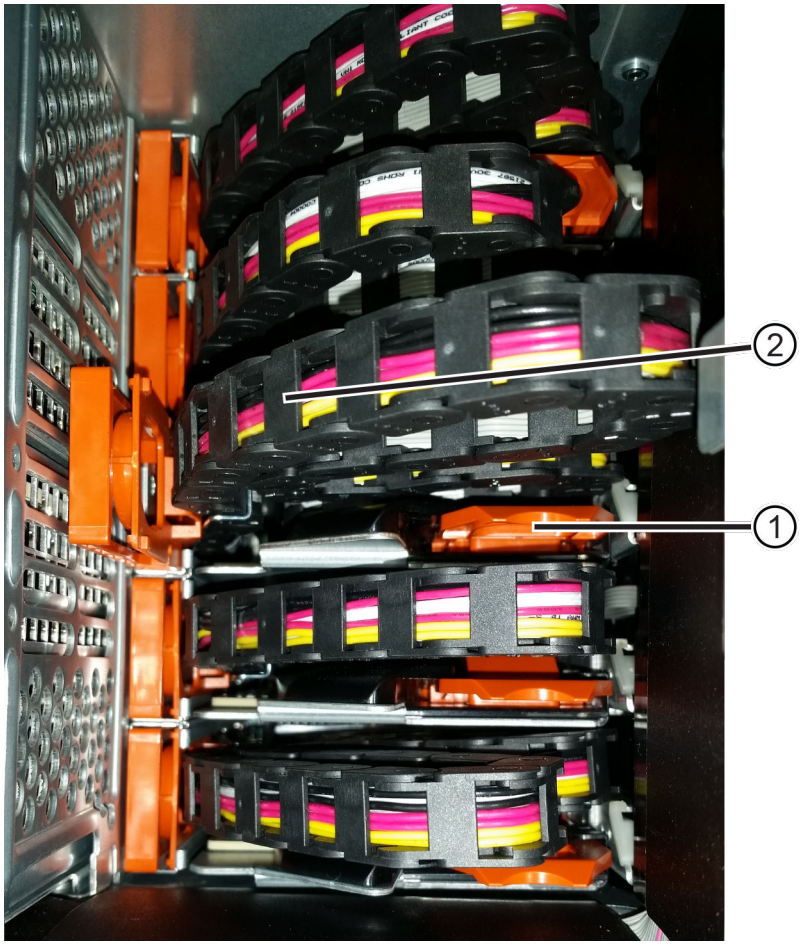
b. To unlatch the cable chain, insert your finger into the orange ring and press towards the middle of the system.

c. To unplug the cable chain, carefully pull your finger toward you approximately 1 inch (2.5 cm). Leave the cable chain connector within the vertical guide rail. (If the drive tray is powered on, do not allow the cable chain connector to touch the metal chassis.)

5. Disconnect the other end of the cable chain:

a. Using a flashlight, locate the orange ring on the end of the cable chain that is attached to the horizontal guide rail in the enclosure.

The figure shows the horizontal connector on the right and the cable chain disconnected and partially pulled out on the left side.



1 Orange ring on horizontal guide rail 2 Cable chain, partially removed

b. To unlatch the cable chain, gently insert your finger into the orange ring and push down.

   The figure shows the orange ring on the horizontal guide rail (see item 1 in the figure above), as it is pushed down so that the rest of the cable chain can be pulled out of the enclosure.

c. Pull your finger toward you to unplug the cable chain.

6. Carefully pull the entire cable chain out of the drive shelf.

7. Replace the right fan canister:

a. Slide the fan canister all the way into the shelf.

b. Move the fan canister handle until it latches with the orange tab.

c. If the drive shelf is receiving power, confirm that the amber Attention LED on the back of the fan is not illuminated and that air is coming out the back of the fan.

   The LED could remain on for as long as a minute after you reinstall the fan while both fans settle into the correct speed.

   If the power is off, the fans do not run and the LED is not on.

8. From the back of the drive shelf, remove the left fan canister.

9. If the drive shelf is receiving power, ensure that the right fan goes to its maximum speed.

Attention: Possible equipment damage due to overheating – If the shelf is powered on, do not remove both fans at the same time. Otherwise, the equipment might overheat.

10. Disconnect the left cable chain from its vertical guide rail:
    a. Using a flashlight, locate the orange ring on the end of the cable chain attached to the vertical guide rail.
    b. To unlatch the cable chain, insert your finger into the orange ring.
    c. To unplug the cable chain, pull toward you approximately 1 inch (2.5 cm). Leave the cable chain connector within the vertical guide rail.

       Attention: Possible hardware damage — If the drive tray is powered on, the cable chain is energized until both ends are unplugged. To avoid shorting out the equipment, do not allow the unplugged cable chain connector to touch the metal chassis if the other end of the cable chain is still plugged in.

11. Disconnect the left cable chain from the horizontal guide rail, and pull the entire cable chain out of the drive shelf.

    If you are performing this procedure with the power on, all LEDs turn off when you disconnect the last cable chain connector, including the amber Attention LED.

12. Replace the left fan canister. If the drive shelf is receiving power, confirm that the amber LED on the back of the fan is not illuminated and that air is coming out the back of the fan.

    The LED could remain on for as long as a minute after you reinstall the fan while both fans settle into the correct speed.

After you finish

Go to *Remove failed drive drawer (60-drive)* on page 71.

Remove failed drive drawer (60-drive)

You remove a failed drive drawer to replace it with a new one. Removing a drive drawer entails sliding the drawer partially out, recording the locations of the drives, removing the drives, and removing the drive drawer.

Before you begin

- You have an ESD wristband, or you have taken other antistatic precautions.
- You have removed the right and left cable chains for the drive drawer.
- You have replaced the right and left fan canisters.
- You have obtained a permanent marker to note the exact location of each drive as you remove the drive from the drawer.

About this task

Attention: Possible loss of data access – Magnetic fields can destroy all data on the drive and cause irreparable damage to the drive circuitry. To avoid loss of data access and damage to the drives, always keep drives away from magnetic devices.

Steps

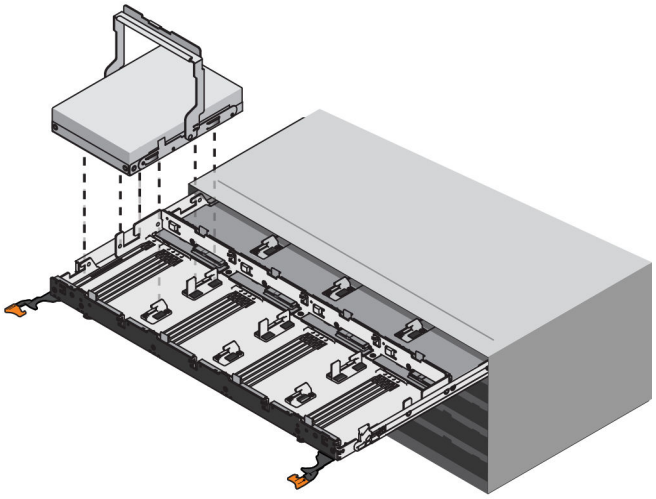
1. Remove the bezel from the front of the drive shelf.
2. Unlatch the drive drawer by pulling out on both levers.

3. Using the extended levers, carefully pull the drive drawer out until it stops. Do not completely remove the drive drawer from the drive shelf.
4. If volumes have already been created and assigned, use a permanent marker to note the exact location of each drive. For example, using the following drawing as a reference, write the appropriate slot number on the top of each drive.

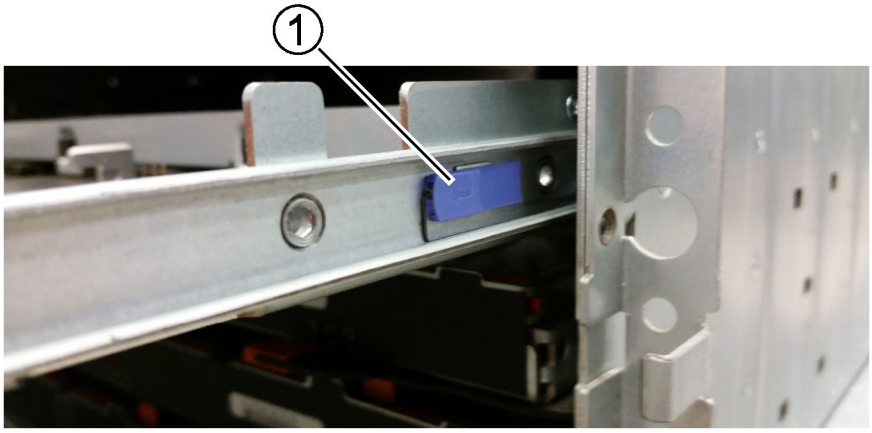


Attention: Possible loss of data access – Make sure to record the exact location of each drive before removing it.

5. Remove the drives from the drive drawer:
   a. Gently pull back the orange release latch that is visible on the center front of each drive.
   b. Raise the drive handle to vertical.
   c. Use the handle to lift the drive from the drive drawer.



   d. Place the drive on a flat, static-free surface and away from magnetic devices.
6. Remove the drive drawer:
   a. Locate the plastic release lever on each side of the drive drawer.



1. Drive drawer release lever

b. Disengage both release levers by pulling the latches toward you.

c. While holding both release levers, pull the drive drawer toward you.

d. Remove the drive drawer from the drive shelf.

After you finish

Go to *Install new drive drawer (60-drive)* on page 73.

Install new drive drawer (60-drive)

You install a new drive drawer to replace the failed one. Installing a drive drawer into a drive tray entails sliding the drawer into the empty slot, installing the drives, and replacing the front bezel.

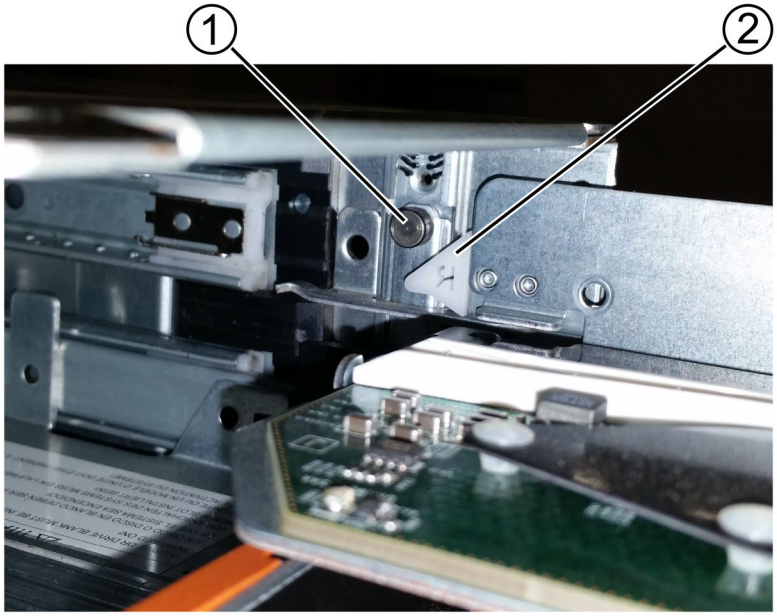
Before you begin

- You know where to install each drive.
- You must have a replacement drive drawer.
- You must have a flashlight.

Steps

1. From the front of the drive shelf, shine a flashlight into the empty drawer slot, and locate the lock-out tumbler for that slot.

   The lock-out tumbler assembly is a safety feature that prevents you from being able to open more than one drive drawer at one time.



1 Lock-out tumbler 2 Drawer guide

2. Position the replacement drive drawer in front of the empty slot and slightly to the right of center.

   Positioning the drawer slightly to the right of center helps to ensure that the lock-out tumbler and the drawer guide are correctly engaged.

3. Slide the drive drawer into the slot, and ensure that the drawer guide slides under the lock-out tumbler.

   Attention: Risk of equipment damage – Damage occurs if the drawer guide does not slide under the lock-out tumbler.

4. Carefully push the drive drawer all the way in until the latch fully engages.

   Experiencing a higher level of resistance is normal when pushing the drawer closed for the first time.

   Attention: Risk of equipment damage — Stop pushing the drive drawer if you feel binding. Use the release levers at the front of the drawer to slide the drawer back out. Then, reinsert the drawer into the slot, ensure the tumbler is above the rail, and the rails are aligned correctly.

After you finish

Go to *Attach cable chains* on page 74.

Attach cable chains

You must attach the cable chains so you can safely re-install the drives in the drive drawer.

Before you begin

- You have installed the new drive drawer.
- You have two replacement cable chains, marked as LEFT and RIGHT (on the horizontal connector next to the drive drawer).

About this task

When attaching a cable chain, reverse the order you used when disconnecting the cable chain. You must insert the chain's horizontal connector into the horizontal guide rail in the enclosure before inserting the chain's vertical connector into the vertical guide rail in the enclosure.

Steps

1. From the back of the drive shelf, remove the fan canister on the right side, and set it aside.
2. If the shelf is powered on, ensure that the left fan goes to its maximum speed.

   Attention: Possible equipment damage due to overheating – If the shelf is powered on, do not remove both fans at the same time. Otherwise, the equipment might overheat.

3. Attach the right cable chain:
   a. Locate the horizontal and vertical connectors on the right cable chain and the corresponding horizontal guide rail and vertical guide rail inside the enclosure.
   b. Align both cable chain connectors with their corresponding guide rails.
   c. Slide the cable chain's horizontal connector onto the horizontal guide rail, and push it in as far as it can go.

      Attention: Risk of equipment malfunction — Make sure to slide the connector into the guide rail. If the connector rests on the top of the guide rail, problems might occur when the system runs.

      The figure shows the horizontal and vertical guide rails for the second drive drawer in the enclosure.



1 Horizontal guide rail 2 Vertical guide rail

d. Slide the vertical connector on the right cable chain into the vertical guide rail.

e. After you have reconnected both ends of the cable chain, carefully pull on the cable chain to verify that both connectors are latched.

Attention: Risk of equipment malfunction — If the connectors are not latched, the cable chain might come loose during drawer operation.

4. Reinstall the right fan canister. If the drive shelf is receiving power, confirm that the amber LED on the back of the fan is now off and that air is now coming out of the back.

   The LED could remain on for as long as a minute after you reinstall the fan while the fan settles into the correct speed.

5. From the back of the drive shelf, remove the fan canister on the left side of the shelf.

6. If the shelf is powered on, ensure that the right fan goes to its maximum speed.

   Attention: Possible equipment damage due to overheating – If the shelf is powered on, do not remove both fans at the same time. Otherwise, the equipment might overheat.

7. Reattach the left cable chain:
   a. Locate the horizontal and vertical connectors on the cable chain and their corresponding horizontal and vertical guide rails inside the enclosure.
   b. Align both cable chain connectors with their corresponding guide rails.
   c. Slide the cable chain's horizontal connector into the horizontal guide rail and push it in as far as it will go.

      Attention: Risk of equipment malfunction — Make sure to slide the connector within the guide rail. If the connector rests on the top of the guide rail, problems might occur when the system runs.

   d. Slide the vertical connector on the left cable chain into the vertical guide rail.
   e. After you reconnect both ends of the cable chain, carefully pull on the cable chain to verify that both connectors are latched.

      Attention: Risk of equipment malfunction — If the connectors are not latched, the cable chain might come loose during drawer operation.

8. Reinstall the left fan canister. If the drive shelf is receiving power, confirm that the amber LED on the back of the fan is now off and that air is now coming out of the back.

   The LED could remain on for as long as a minute after you reinstall the fan while both fans settle into the correct speed.

After you finish

Go to *Complete drive drawer replacement* on page 77.

Complete drive drawer replacement (60-drive)

You complete the drive drawer replacement by reinserting the drives and replacing the front bezel in the correct order.

Before you begin

- You know where to install each drive.
- You have already replaced the drive drawer.
- The new drawer cables have been installed.

About this task

Attention: Possible loss of data access – You must install each drive in its original location in the drive drawer.

Steps

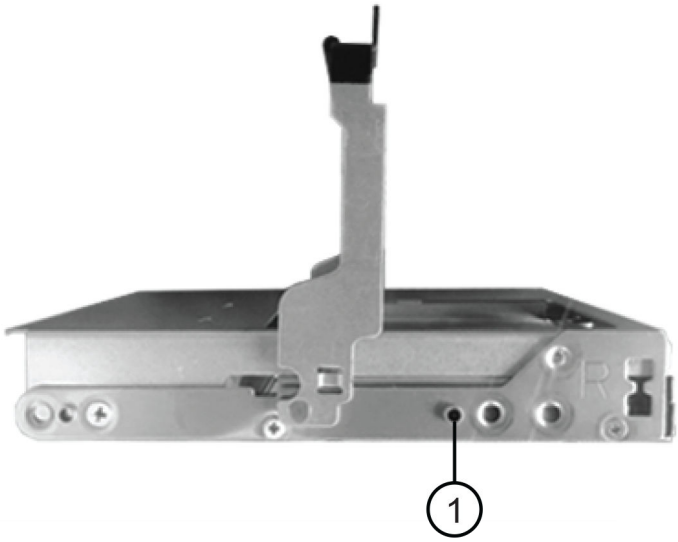
1. Reinstall the drives in the drive drawer:
   a. Unlatch the drive drawer by pulling out on both levers at the front of the drawer.
   b. Using the extended levers, carefully pull the drive drawer out until it stops. Do not completely remove the drive drawer from the drive shelf.
   c. Determine which drive to install in each slot by using the notes you made when removing the drives.



d. Raise the handle on the drive to vertical.

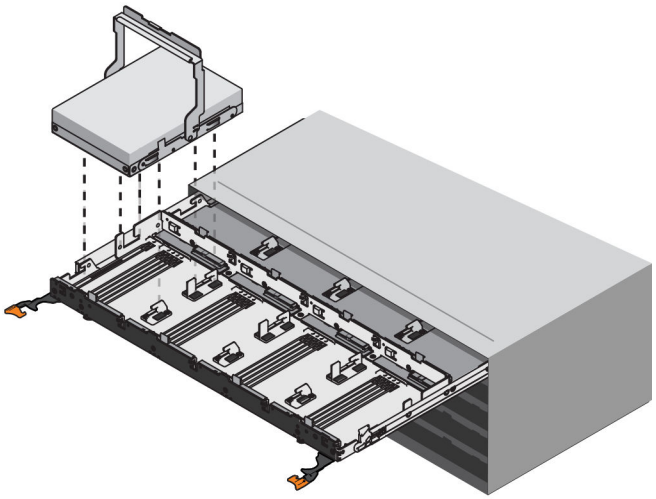
e. Align the two raised buttons on each side of the drive with the notches on the drawer.

The figure shows the right-side view of a drive, showing the location of the raised buttons.



1 Raised button on the right side of the drive

f. Lower the drive straight down, making sure the drive is pressed all the way down into the bay, and then rotate the drive handle down until the drive snaps into place.



g. Repeat these steps to install all the drives.

2. Slide the drawer back into the drive shelf by pushing it from the center and closing both levers.

   Attention: Risk of equipment malfunction – Make sure to completely close the drive drawer by pushing both levers. You must completely close the drive drawer to allow proper airflow and prevent overheating.

3. Attach the bezel to the front of the drive shelf.

4. If you have powered down one or more shelves, reapply power:

   - **If you replaced a drive drawer in a *controller* shelf without Drawer Loss Protection**:

     a. Turn on both power switches on the controller shelf.

     b. Wait 10 minutes for the power-on process to complete.

     c. Confirm that both fans come on and that the amber LED on the back of the fans is off.

   - **If you replaced a drive drawer in an *expansion* drive shelf without Drawer Loss Protection**:

     a. Turn on both power switches on the drive shelf.

     b. Confirm that both fans come on and that the amber LED on the back of the fans is off.

     c. Wait two minutes before applying power to the controller shelf.

     d. Turn on both power switches on the controller shelf.

     e. Wait 10 minutes for the power-on process to complete.

     f. Confirm that both fans come on and that the amber LED on the back of the fans is off.

Result

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

Host interface cards

A host interface card (HIC) can optionally be installed within a controller canister. The E5700 controller includes built-in host ports on the controller card itself, as well as host ports on the optional HIC. Host ports that are built into the controller are called baseboard host ports. Host ports that are built into the HIC are called HIC ports.

Overview and requirements

This topic provides an overview of the host interface card and describes the requirements you need to know about before adding, upgrading or replacing a HIC.

Host interface card overview

You can add, upgrade, or replace a HIC in the E5724 controller shelf and the E5760 controller shelf:

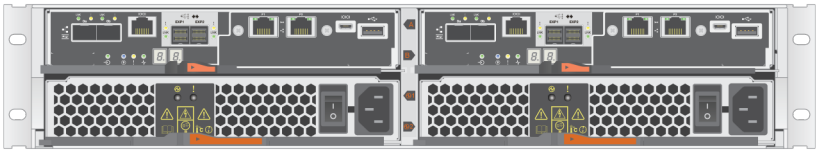
The E5700 controller has two SFP+ (optical) baseboard ports and you can install the following HICs:

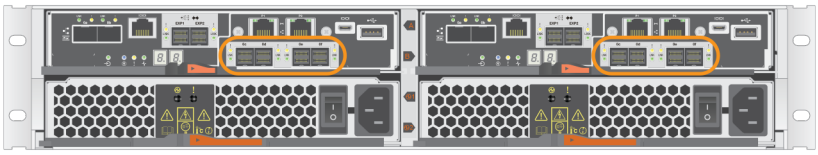
- **Four-port SFP+ (optical) HIC** with a maximum data rate and protocol of 8 GB, 16 GB, or 32 Gb Fibre Channel (FC)
- **Four-port SFP28 HIC** with a maximum data rate and protocol of 10 Gbps, 25 Gbps iSCSI
- **Four-port SAS HIC** with a maximum data rate and protocol of 6Gbps, 12 Gbps SAS
- **Two-port QSFP28 HIC** with a maximum data rate and protocol of 56 Gbps, 100 Gbps InfiniBand (iSER/SRP)

Important: If the controller has SFP+ (optical) baseboard ports and you add an SFP+ (optical) HIC, the new HIC ports usually default to the host protocol used by the baseboard host ports. For example, if you add a four-port SFP+ HIC to a controller that has FC baseboard ports, the new HIC ports should default to FC. However, you must confirm the protocol of the new SFP+ HIC ports before connecting them to data hosts. In certain cases, you might need to apply a feature pack to convert the HIC ports from iSCSI to FC or from FC to iSCSI.

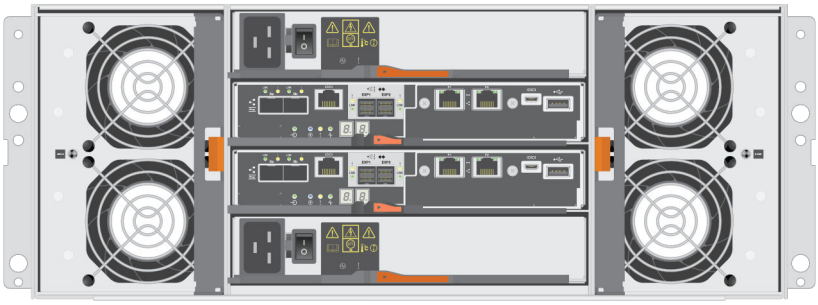
Add HIC

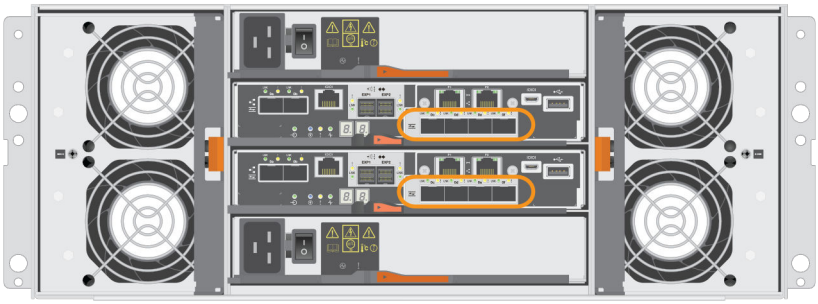
You can add host interface cards (HICs) to E5700 controller shelves that have only baseboard host ports. Adding HICs allows you to increase the number of host ports in your storage array and can provide additional host protocols. The following figures show an E5724 controller shelf with two controller canisters before and after adding a HIC into each controller.





The following figures show an E5760 controller shelf with two controller canisters before and after adding a HIC into each controller.

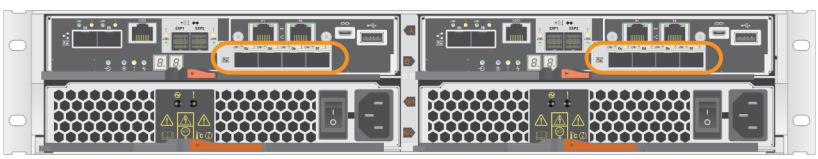


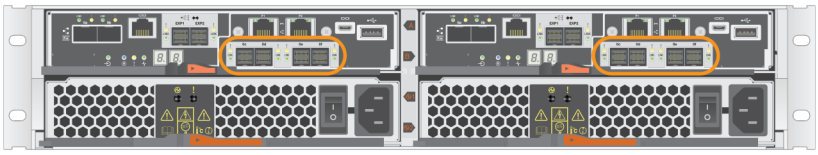


Note: The figures show example controller canisters with example HICs. You might have different types and numbers of baseboard ports and HIC ports.

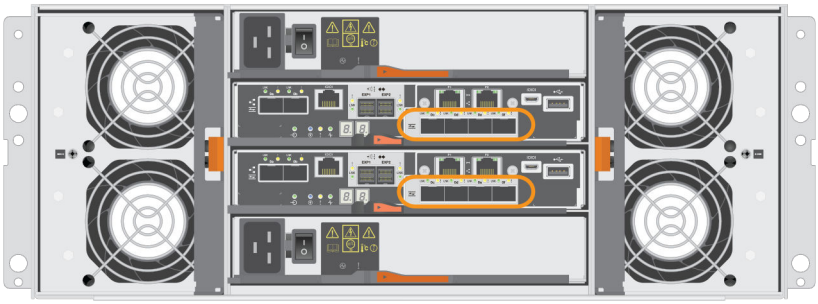
Upgrade HIC

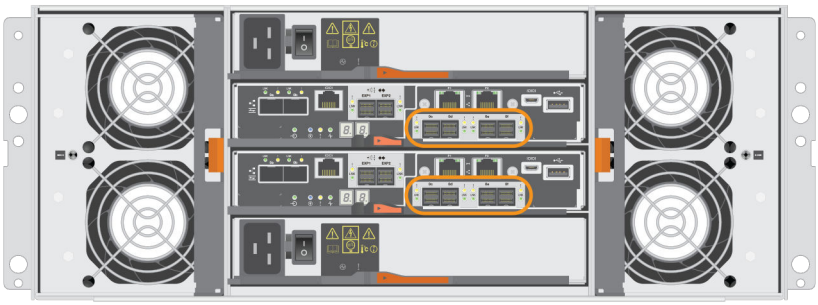
You change the host protocol by upgrading the HIC currently installed in an E5700 controller canister with a different type of HIC. The following figures show an E5724 controller shelf before and after a HIC upgrade. The two HICs in the first figure have four SFP+ (optical) host ports, and the two HICs in the second figure have four SAS ports.





The following figures show an E5760 controller shelf before and after a HIC upgrade. The two HICs in the first figure have four SFP+ (optical) host ports, and the two HICs in the second figure have four SAS ports.

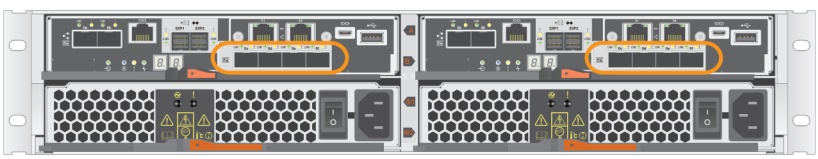




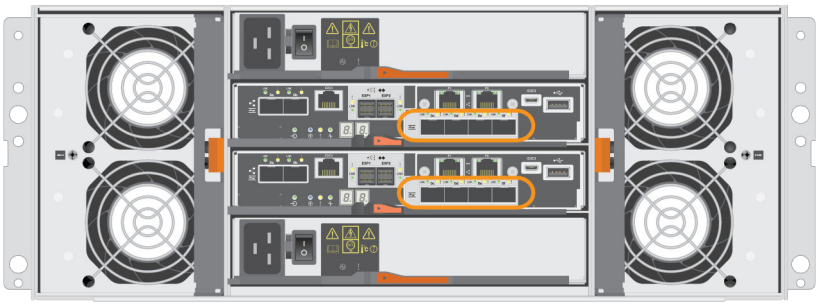
Note: The figures show example controller canisters with example HICs. You might have different types and numbers of baseboard ports and HIC ports.

Replace HIC

When you replace a failed host interface card (HIC) in an E5700 controller shelf, you must remove the controller canister, replace the HIC, and reinstall the controller canister. The following figure shows an E5724 controller shelf with two controller canisters, each with a HIC.



The following figure shows an E5760 controller shelf with two controller canisters, each with a HIC.



Note: The figures show two example controller canisters with example HICs in each controller shelf. You might have different types and numbers of baseboard ports and HIC ports.

The following is an overview of the steps to replace a HIC in an E5700 controllers (E5724 or E5760):

1. Take the controller offline
2. Remove the controller canister
3. Replace the battery
4. Replace the controller canister
5. Bring the controller online

Requirements for adding, upgrading or replacing a HIC

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

- You have scheduled a downtime maintenance window for this procedure. The power must be off when you install HICs, so you cannot access data on the storage array until you have successfully completed this procedure. (In a duplex configuration, this is because both controllers must have the same HIC configuration when they are powered on.)
- You have two HICs must be compatible with your controllers.
  For duplex configurations (two controllers), the HICs installed in the two controller canisters must be identical. 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.

Add host interface cards

You add host interface cards (HICs) to increase the number of host ports in your storage array and to provide additional host protocols. When you add HICs, you must power off the storage array, install the HIC, and reapply power. You can add HICs to E5700 controller canisters that only have baseboard host ports.

Steps

1. Prepare to add host interface cards on page 84
   You prepare to add host interface cards by backing up the storage array's configuration database, collecting support data, and stopping host I/O operations. Then, you can power down the controller shelf.
2. Add host interface card on page 86
   You add a host interface card (HIC) to increase the number of host ports in your storage array. If you are adding HICs to a duplex configuration, repeat all steps to remove the second controller canister, install the second HIC, and reinstall the second controller canister.
3. Complete adding a host interface card on page 92
   You complete the process of adding a host interface card (HIC) by checking the controller LEDs and seven-segment display, and then confirming that the controller's status is Optimal.

Related concepts

Host interface card overview on page 80
Requirements for adding, upgrading or replacing a HIC on page 83

Prepare to add host interface cards

You prepare to add host interface cards by backing up the storage array's configuration database, collecting support data, and stopping host I/O operations. Then, you can power down the controller shelf.

Before you begin

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

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. 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. Open the Enterprise Management Window (EMW) for SANtricity Storage Manager on your management station.

b. Select the storage array.

c. Select **Tools** > **Execute Script**.

d. Type the following command in the text box.

```
save storageArray dbmDatabase sourceLocation=onboard
contentType=all file="filename";
```

In this command, *filename* is the file path and file name to which you want to save the database. Enclose the file name in double quotation marks (" "). For example:

```
file="C:\Program Files\CLI\logs\dbmdata.zip"
```

This command does not automatically append a file extension to the saved file. You must specify a file extension when entering the file name.

e. Select **Tools** > **Verify and Execute**.

3. 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`.

4. 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.

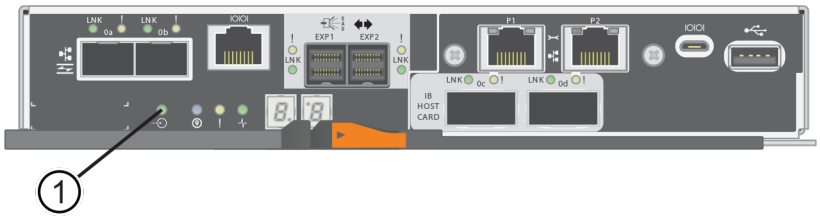
   Note: The exact steps to stop host I/O operations depend on the host operating system and the configuration, which are beyond the scope of these instructions. If you are not sure how to stop host I/O operations in your environment, consider shutting down the host.

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

5. If the storage array participates in a mirroring relationship, stop all host I/O operations on the secondary storage array.

6. 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.



1 Cache Active LED

7. 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.
8. Power down the controller shelf.
   a. Turn off both power switches on the controller shelf.
   b. Wait for all LEDs on the controller shelf to turn off.

After you finish

Go to *Add host interface card* on page 86.

Add host interface card

You add a host interface card (HIC) to increase the number of host ports in your storage array. If you are adding HICs to a duplex configuration, repeat all steps to remove the second controller canister, install the second HIC, and reinstall the second controller canister.

Steps

1. Step 1: Remove controller canister on page 86
   Remove the controller canister so you can add the new host interface card.
2. Step 2: Install host interface card on page 88
   Install the HIC to increase the number of host ports in your storage array.
3. Step 3: Reinstall controller canister on page 91
   Reinstall the controller canister into the controller shelf after installing the new HIC.

Step 1: 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 have labels to identify each cable that is connected to the controller canister.
- You have an ESD wristband, or you have taken other antistatic precautions.

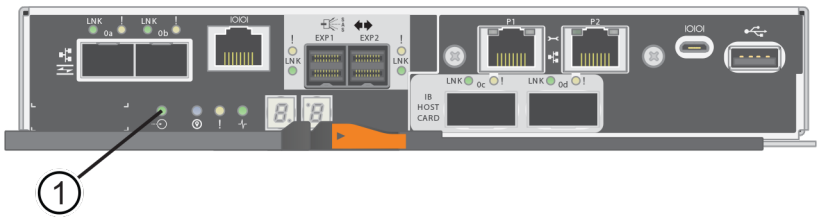
Steps

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. Confirm that the Cache Active LED on the back of the controller is off.

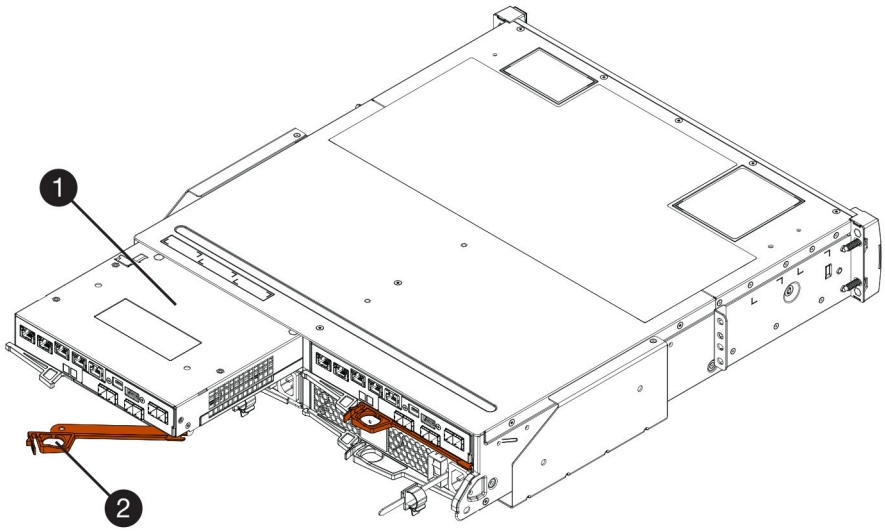
   The green Cache Active LED on the back of the controller is on when cached data needs to be written to the drives. You must wait for this LED to turn off before removing the controller canister.



1 Cache Active LED

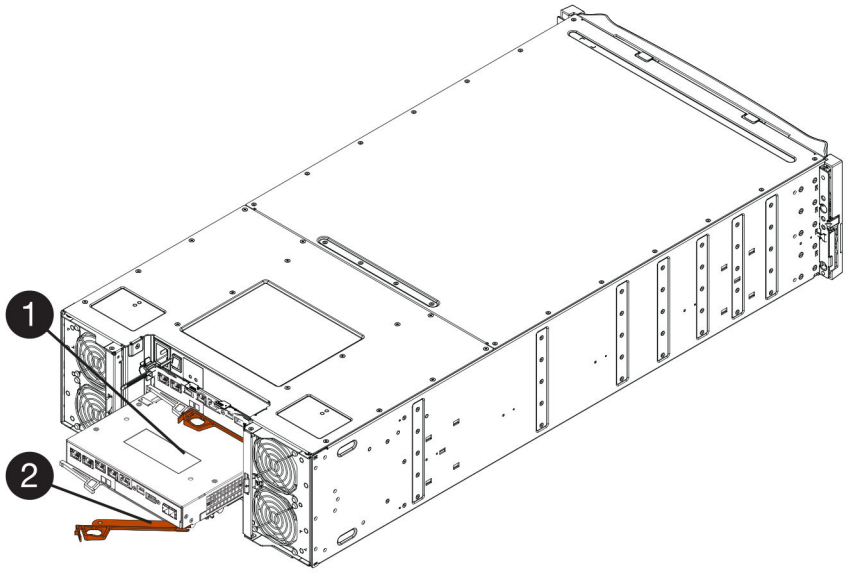
4. Squeeze the latch on the cam handle until it releases, and then open the cam handle to the right to release the controller canister from the shelf.

   The following figure is an example of an E5724 controller shelf:



1 Controller canister 2 Cam handle

The following figure is an example of an E5760 controller shelf:



1 Controller canister 2 Cam handle

5. Using two hands and the cam handle, slide the controller canister out of the shelf.

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

   If you are removing the controller canister from an E5724 controller shelf, a flap swings into place to block the empty bay, helping to maintain air flow and cooling.

6. Turn the controller canister over, so that the removable cover faces up.
7. Place the controller canister on a flat, static-free surface.

After you finish

Go to *Step 2: Install host interface card* on page 88.

Step 2: Install 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 one or two HICs, based on whether you have one or two controllers in your storage array. The HICs must be compatible with your controllers.

About this task

Attention: Possible loss of data access – Never install a HIC in an E5700 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 will cause the controllers to lock down when you apply power.

Steps

1. Unpack the new HIC and the new HIC faceplate.
2. Press the button on the cover of the controller canister, and slide the cover off.
3. Confirm that the green LED inside the controller (by the DIMMs) 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.

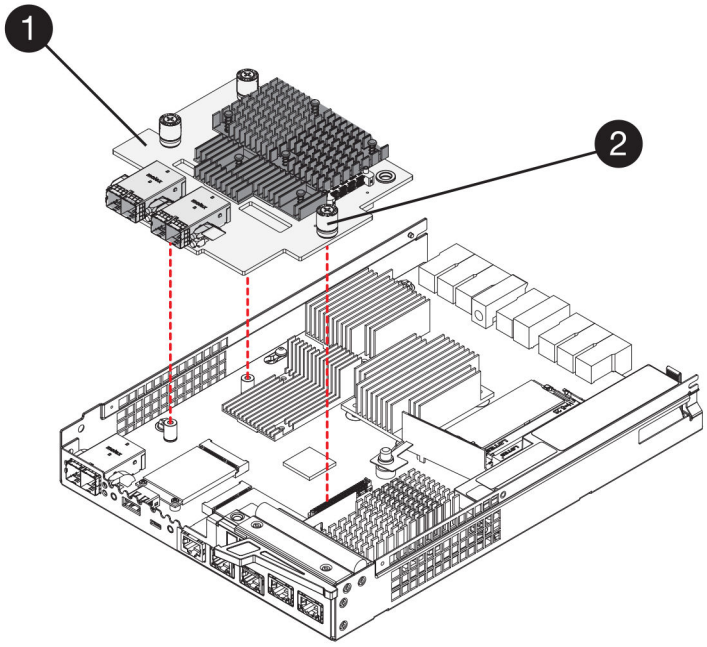


1 Internal Cache Active LED 2 Battery

4. Using a #1 Phillips screwdriver, remove the four screws that attach the blank faceplate to the controller canister, and remove the faceplate.
5. Align the three thumbscrews 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.
6. 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 thumbscrews.

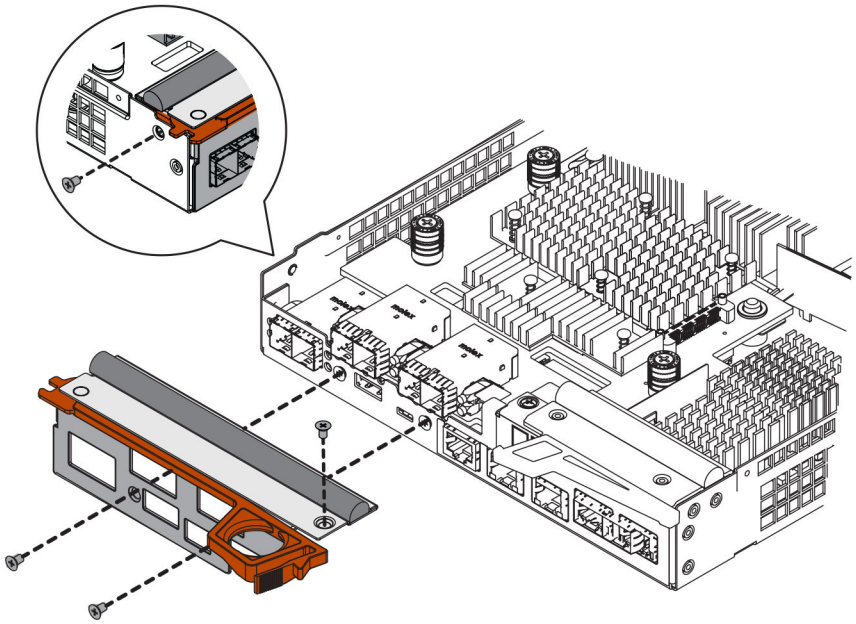


1	Host interface card (HIC)	2	Thumbscrews

7. Hand-tighten the HIC thumbscrews.

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

8. Using a #1 Phillips screwdriver, attach the new HIC faceplate to the controller canister with the four screws you removed previously.



After you finish

Go to *Step 3: Reinstall controller canister* on page 91.

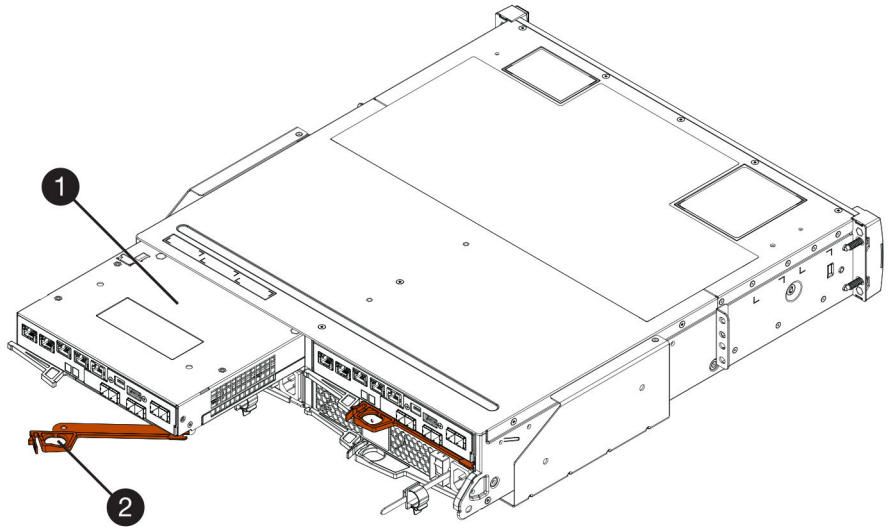
Step 3: Reinstall controller canister

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

Steps

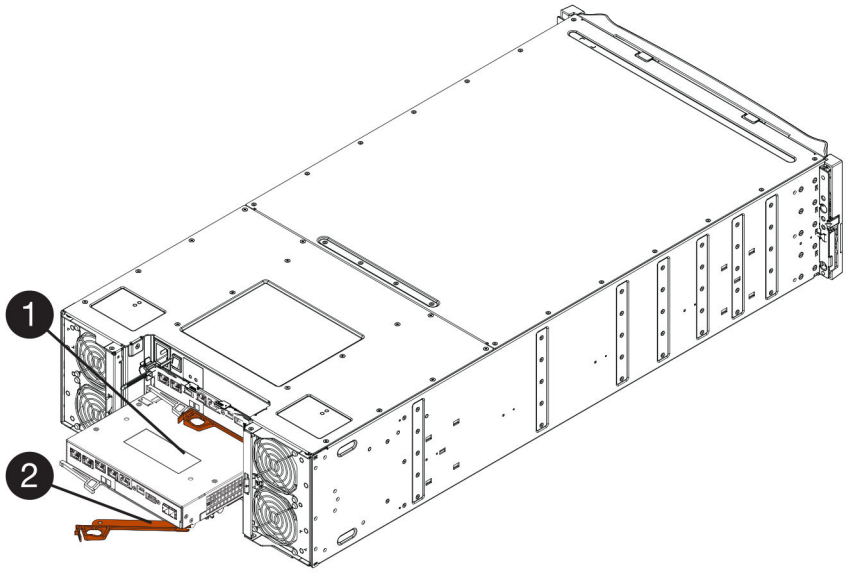
1. Turn the controller canister over, so that the removable cover faces down.
2. With the cam handle in the open position, slide the controller canister all the way into the controller shelf.

   The following figure is an example of an E5724 controller shelf:



1 Controller canister 2 Cam handle

The following figure is an example of an E5760 controller shelf:



1 Controller canister 2 Cam handle

3. Move the cam handle to the left to lock the controller canister in place.
4. Reconnect all the cables you removed.

   Attention: Do not connect data cables to the new HIC ports at this time.

5. (Optional) If you are adding HICs to a duplex configuration, repeat all steps to remove the second controller canister, install the second HIC, and reinstall the second controller canister.

After you finish

Go to *Complete adding a host interface card* on page 92.

Complete adding a host interface card

You complete the process of adding a host interface card (HIC) by checking the controller LEDs and seven-segment display, and then confirming that the controller's status is Optimal.

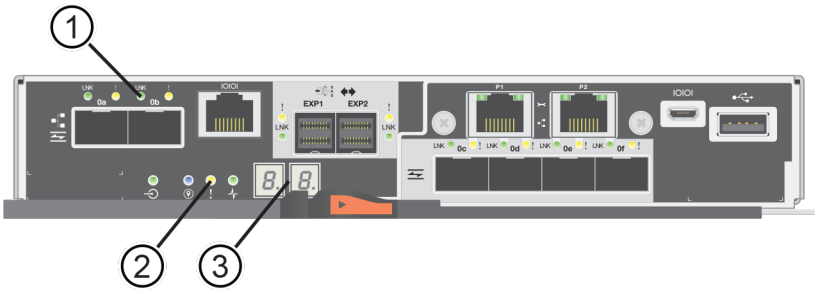
Before you begin

- You have installed any new host hardware needed for the new host ports, such as switches or host bus adapters (HBAs).
- 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* and the *NetApp Hardware Universe*.
- You have installed SANtricity System 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.

Steps

1. Turn on the two power switches at the back of the controller shelf.
   - Do not turn off the power switches during the power-on process, which typically takes 90 seconds or less to complete.
   - The fans in each shelf are very loud when they first start up. The loud noise during start-up is normal.
2. As the controller boots, check the controller LEDs and seven-segment display.
   - The seven-segment display shows the repeating sequence **OS**, **Sd**, ***blank*** to indicate that the controller is performing Start-of-day (SOD) processing. After a controller has successfully booted up, its seven-segment display should show the tray ID.
   - The amber Attention LED on the controller turns on and then turns off, unless there is an error.
   - The green Host Link LEDs remain off until you connect the host cables.

   Note: The figure shows an example controller canister. Your controller might have a different number and a different type of host ports.



1 Host Link LEDs 2 Attention LED (Amber) 3 Seven-segment display

3. From SANtricity System Manager, confirm that the controller's status is Optimal.

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

   Note: If you cannot resolve the problem, contact technical support.
4. If the new HIC ports require SFP+ transceivers, install these SFPs.
5. If you installed a HIC with SFP+ (optical) ports, confirm the new ports have the host protocol you expect.
   a. From SANtricity System Manager, select **Hardware**.
   b. If the graphic shows the drives, 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**.

g. Review the details shown for the HIC ports (the ports labelled **e0*x*** or **0*x*** in HIC Location **slot 1**) to determine if you are ready to connect the host ports to the data hosts:

If the new HIC ports have the protocol you expect:

You are ready to connect the new HIC ports to the data hosts; go to the step below.

If the new HIC ports do not have the protocol you expect:

You must apply a software feature pack before you can connect the new HIC ports to the data hosts. See *Converting the Protocol of E5700 Host Ports*. Then, use the instructions in that document to connect the host ports to the data hosts and to resume operations.

6. Connect the cables from the controller's host ports to the data hosts.

If you need instructions for configuring and using a new host protocol, refer to the *Linux express configuration*, *Windows express configuration*, or *VMware express configuration*.

Result

The process of adding a host interface card to 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. When you upgrade the HICs, you must power off the storage array, remove the existing HIC from each controller, install a new HIC, and reapply power.

Steps

1. Prepare to upgrade host interface cards on page 95
   You prepare to upgrade host interface cards (HICs) by backing up the storage array's configuration database, collecting support data, and stopping host I/O operations. Then, you can power down the controller shelf.
2. Upgrade host interface card on page 96
   You upgrade a host interface card (HIC) to increase the number of host ports or to change host protocols. If you are upgrading HICs in a duplex configuration, repeat all steps to remove the other controller canister, remove the HIC, install the new HIC, and replace the second controller canister.
3. Complete upgrading a host interface card upgrade on page 104
   You complete the process of upgrading a host interface card by checking the controller LEDs and seven-segment display and confirming that the controller's status is Optimal.

Related concepts

Host interface card overview on page 80

Requirements for adding, upgrading or replacing a HIC on page 83

Prepare to upgrade host interface cards

You prepare to upgrade host interface cards (HICs) by backing up the storage array's configuration database, collecting support data, and stopping host I/O operations. Then, you can power down the controller shelf.

Before you begin

- You have scheduled a downtime maintenance window for this procedure. The power must be off when you install HICs, so you cannot access data on the storage array until you have successfully completed this procedure. (In a duplex configuration, this is because both controllers must have the same HIC configuration when they are powered on.)
- You have installed SANtricity Storage Manager on a management station, so you can use the storage array's command line interface (CLI).

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. 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. Open the Enterprise Management Window (EMW) for SANtricity Storage Manager on your management station.

   b. Select the storage array.

   c. Select **Tools** > **Execute Script**.

   d. Type the following command in the text box.

   ```
   save storageArray dbmDatabase sourceLocation=onboard
   contentType=all file="filename";
   ```

   In this command, *`filename`* is the file path and file name to which you want to save the database. Enclose the file name in double quotation marks (" "). For example:

   ```
   file="C:\Program Files\CLI\logs\dbmdata.zip"
   ```

   This command does not automatically append a file extension to the saved file. You must specify a file extension when entering the file name.

   e. Select **Tools** > **Verify and Execute**.

3. 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**.

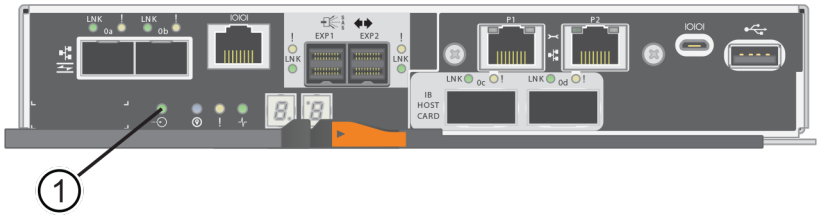
   The file is saved in the Downloads folder for your browser with the name `support-data.7z`.

4. 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 data because the storage array will not be accessible.
5. If the storage array participates in a mirroring relationship, stop all host I/O operations on the secondary storage array.
6. 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.



1 Cache Active LED

7. 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.
8. Power down the controller shelf.
   a. Turn off both power switches on the controller shelf.
   b. Wait for all LEDs on the controller shelf to turn off.

After you finish

Go to *Upgrade host interface card* on page 96.

Upgrade host interface card

You upgrade a host interface card (HIC) to increase the number of host ports or to change host protocols. If you are upgrading HICs in a duplex configuration, repeat all steps to remove the other controller canister, remove the HIC, install the new HIC, and replace the second controller canister.

Steps

1. Step 1: Remove controller canister on page 97

Remove the controller canister so you can upgrade 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.

2. Step 2: Remove a host interface card on page 99
   Remove the original host interface card so you can replace it with an upgraded one.
3. Step 3: Install host interface card on page 101
   Install the new HIC to increase the number of host ports in your storage array.
4. Step 4: Reinstall controller canister on page 102
   Reinstall the controller canister into the controller shelf.

Step 1: 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 have an ESD wristband, or you have taken other antistatic precautions.

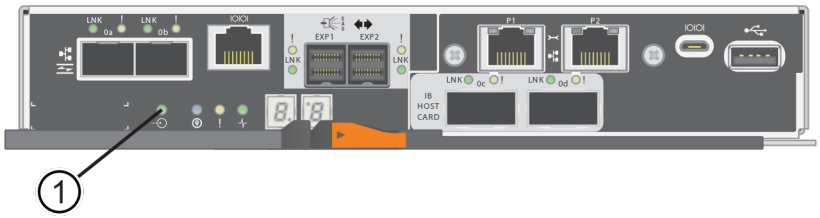
Steps

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.

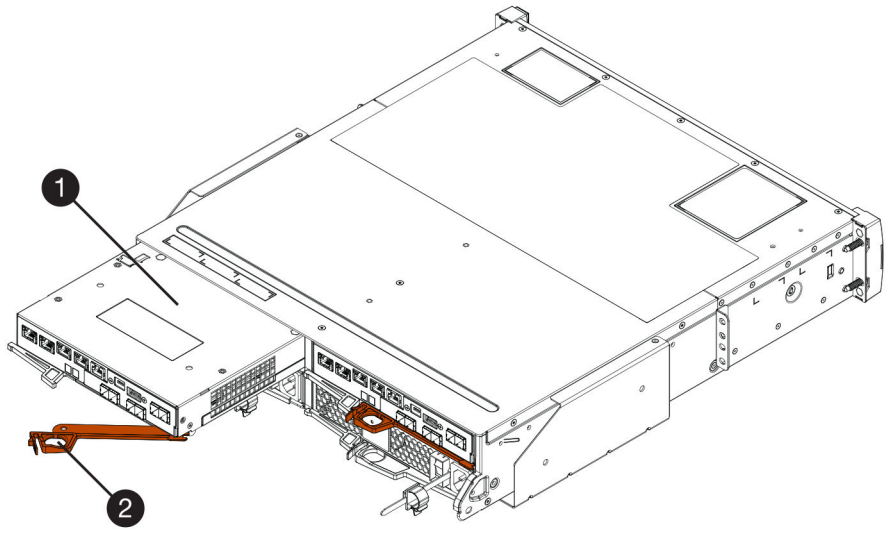
   The green Cache Active LED on the back of the controller is on when cached data needs to be written to the drives. You must wait for this LED to turn off before removing the controller canister.



1 Cache Active LED

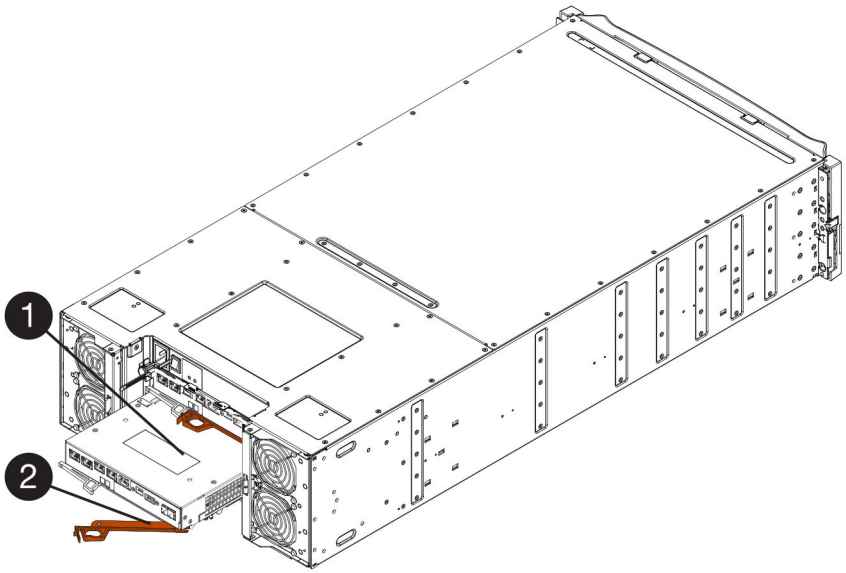
5. Squeeze the latch on the cam handle until it releases, and then open the cam handle to the right to release the controller canister from the shelf.

   The following figure is an example of an E5724 controller shelf:



1 Controller canister 2 Cam handle

The following figure is an example of an E5760 controller shelf:



1 Controller canister 2 Cam handle

6. Using two hands and the cam handle, slide the controller canister out of the shelf.

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

   If you are removing the controller canister from an E5724 controller shelf, a flap swings into place to block the empty bay, helping to maintain air flow and cooling.

7. Turn the controller canister over, so that the removable cover faces up.
8. Place the controller canister on a flat, static-free surface.

After you finish

Go to *Step 2: Remove a host interface card* on page 99.

Step 2: Remove a 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.

Steps

1. Remove the controller canister's cover by pressing down on the button and sliding the cover off.
2. Confirm that the green LED inside the controller (between the battery and the DIMMs) is off.

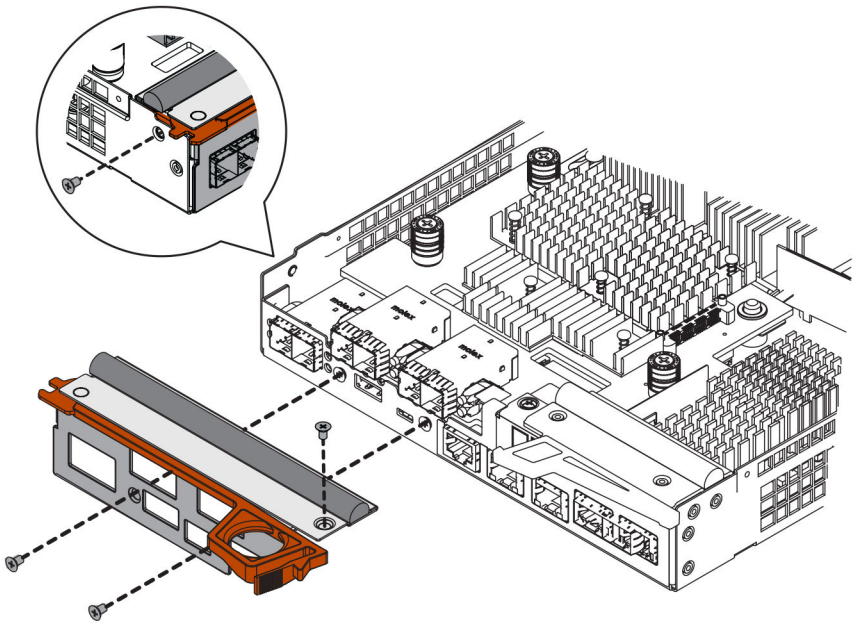
   If this green LED is on, the controller is still using battery power. You must wait for this LED to go off before removing any components.



1 Internal Cache Active LED 2 Battery

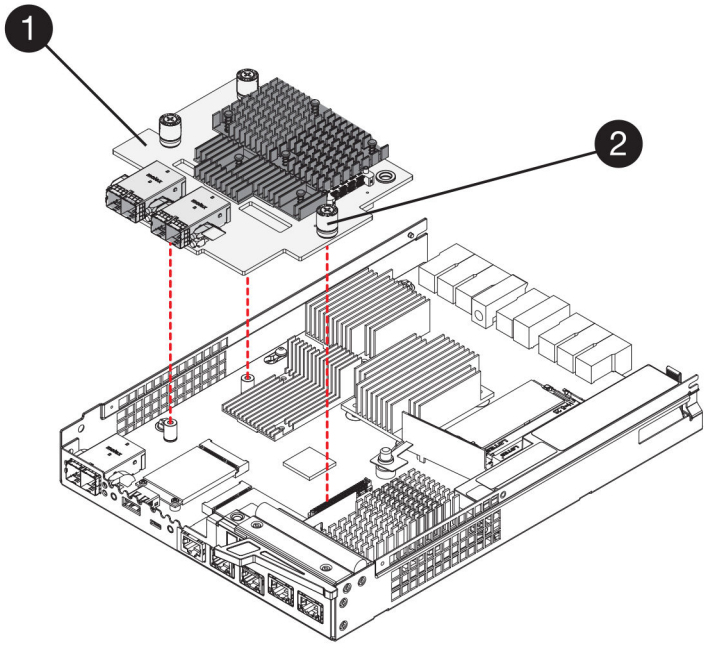
3. Using a #1 Phillips screwdriver, remove the screws that attach the HIC faceplate to the controller canister.

   There are four screws: one on the top, one on the side, and two on the front.



4. Remove the HIC faceplate.
5. Using your fingers or a Phillips screwdriver, loosen the three thumbscrews that secure the HIC to the controller card.
6. Carefully detach the HIC from the controller card by lifting the card up and sliding it back.

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



1 Host interface card (HIC) 2 Thumbscrews

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

After you finish

Go to *Step 3: Install host interface card* on page 101.

Step 3: Install host interface card

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

Before you begin

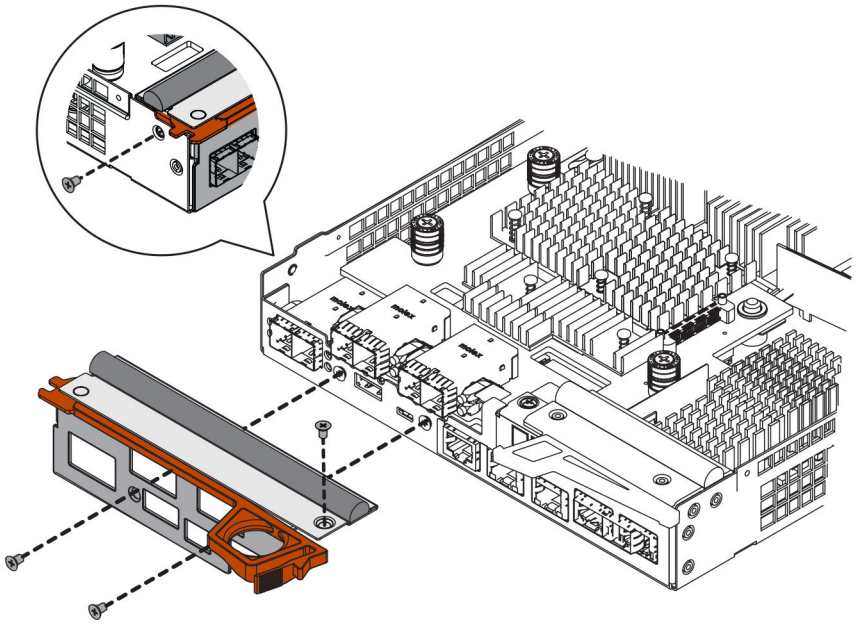
- You have an ESD wristband, or you have taken other antistatic precautions.
- You have a #1 Phillips screwdriver.
- You have one or two HICs, based on whether you have one or two controllers in your storage array. The HICs must be compatible with your controllers.

About this task

Attention: Possible loss of data access – Never install a HIC in an E5700 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 will cause the controllers to lock down when you apply power.

Steps

1. Unpack the new HIC and the new HIC faceplate.
2. Using a #1 Phillips screwdriver, remove the four screws that attach the HIC faceplate to the controller canister, and remove the faceplate.

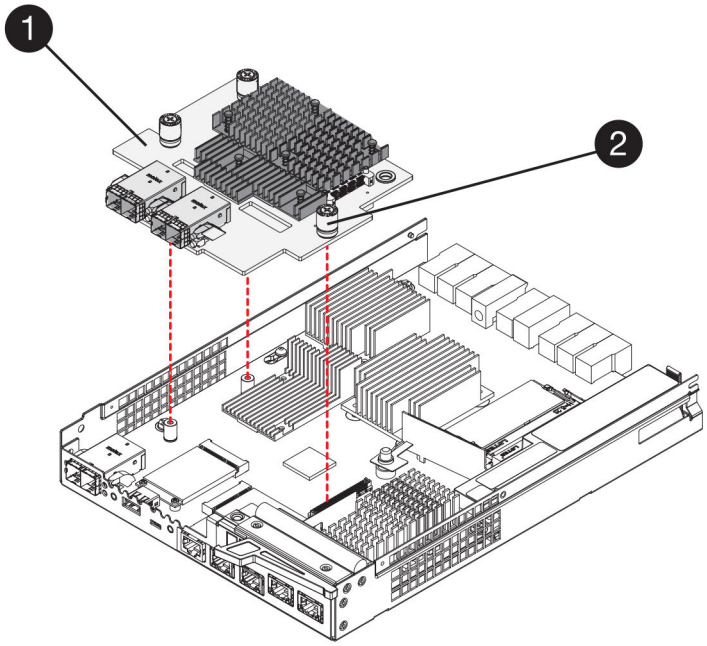


3. Align the three thumbscrews on the HIC with the corresponding holes on the controller, and align the connector on the bottom of the HIC with the HIC interface connector on the controller card.

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

4. 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 thumbscrews.



1 Host interface card (HIC) 2 Thumbscrews

5. Hand-tighten the HIC thumbscrews.

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

6. Using a #1 Phillips screwdriver, attach the new HIC faceplate to the controller canister with the four screws you removed previously.

After you finish

Go to *Step 4: Reinstall controller canister* on page 102.

Step 4: Reinstall controller canister

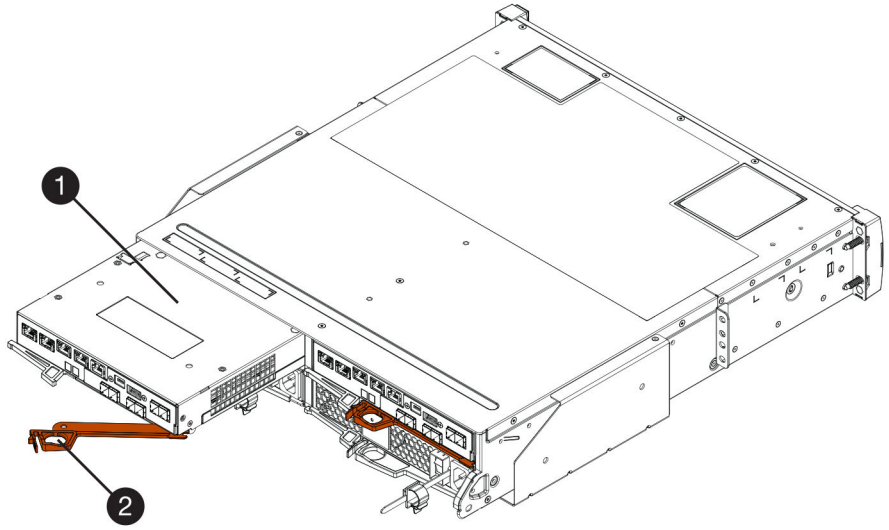
You reinstall the controller canister into the controller shelf after installing the new host interface card (HIC).

Steps

1. Reinstall the cover on the controller canister by sliding the cover from back to front until the button clicks.

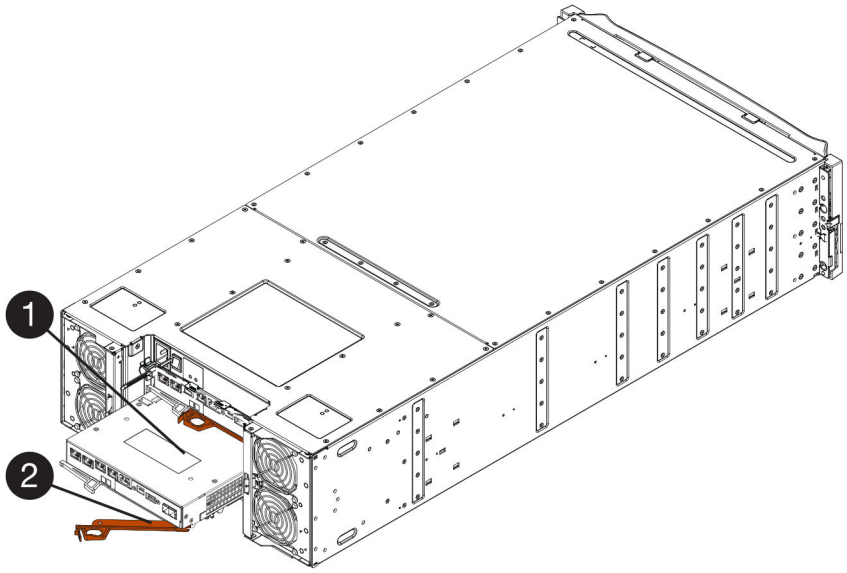
2. Turn the controller canister over, so that the removable cover faces down.
3. With the cam handle in the open position, slide the controller canister all the way into the controller shelf.

   The following figure is an example of an E5724 controller shelf:



1 Controller canister 2 Cam handle

   The following figure is an example of an E5760 controller shelf:



1 Controller canister 2 Cam handle

4. Move the cam handle to the left to lock the controller canister in place.

5. Reconnect all the cables you removed.

   Attention: Do not connect data cables to the new HIC ports at this time.

6. (Optional) If you are upgrading HICs in a duplex configuration, repeat all steps to remove the other controller canister, remove the HIC, install the new HIC, and replace the second controller canister.

After you finish

Go to *Complete upgrading a host interface card* on page 104.

Complete upgrading a host interface card upgrade

You complete the process of upgrading a host interface card by checking the controller LEDs and seven-segment display and confirming that the controller's status is Optimal.

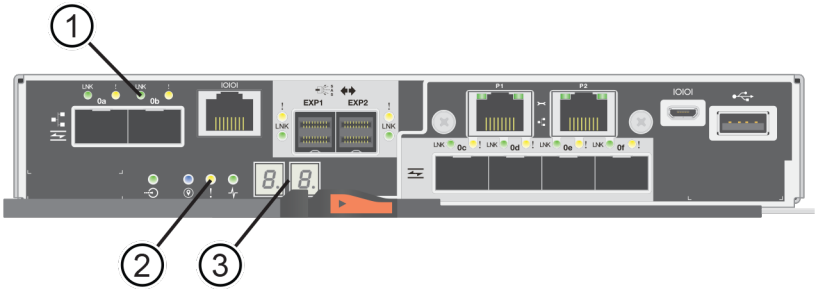
Before you begin

- You have installed any new host hardware needed for the new host ports, such as switches or host bus adapters (HBAs).
- 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*.

Steps

1. Turn on the two power switches at the back of the controller shelf.
   - Do not turn off the power switches during the power-on process, which typically takes 90 seconds or less to complete.
   - The fans in each shelf are very loud when they first start up. The loud noise during start-up is normal.
2. As the controller boots, check the controller LEDs and seven-segment display.
   - The seven-segment display shows the repeating sequence **OS**, **Sd**, ***blank*** to indicate that the controller is performing Start-of-day (SOD) processing. After a controller has successfully booted up, its seven-segment display should show the tray ID.
   - The amber Attention LED on the controller turns on and then turns off, unless there is an error.
   - The green Host Link LEDs remain off until you connect the host cables.

   Note: The figure shows an example controller canister. Your controller might have a different number and a different type of host ports.



1 Host Link LEDs 2 Attention LED (amber) 3 Seven-segment display

3. From SANtricity System Manager, confirm that the controller's status is Optimal.

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

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

4. If the new HIC ports require SFP+ transceivers, install these SFPs.
5. Connect the cables from the controller's host ports to the data hosts.

Result

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

Replace host interface card

You replace a host interface card (HIC) that has failed. If two controllers are present, each controller must have identical HICs.

Steps

1. Place controller offline (duplex) on page 106
   If you have a duplex configuration, you must place the affected controller offline so you can safely remove the failed HIC. You must back up the configuration and collect support data first. Then, you can take the affected controller offline.
2. Replace host interface card on page 107
   You replace a host interface card (HIC) to replace the failed HIC with a new one. If you are replacing HICs in a duplex configuration, repeat all steps to remove the second controller canister, install the second HIC, and reinstall the second controller canister.
3. Place controller online (duplex) on page 114
   You bring the controller online to confirm the storage array is working correctly. Then, you can collect support data and resume operations.

Related concepts

Host interface card overview on page 80

Requirements for adding, upgrading or replacing a HIC on page 83

Place controller offline (duplex)

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

Before you begin

- Your storage array must have two controllers. The controller that you are not placing offline must be online (in the optimal state).
- You have verified that no volumes are in use or that you have a multipath driver installed on all hosts using these volumes.
- From SANtricity System Manager, you have verified the details in the Recovery Guru to confirm that you have a failed HIC and to ensure no other items must be addressed before you can remove and replace the HIC.

About this task

Perform this task only if your storage array has two controllers (duplex configuration).

Steps

1. From the Details area of the Recovery Guru, determine which of the controller canisters has the failed HIC.
2. 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. Open the Enterprise Management Window (EMW) for SANtricity Storage Manager on your management station.

   b. Select the storage array.

   c. Select **Tools** > **Execute Script**.

   d. Type the following command in the text box.

   ```
   save storageArray dbmDatabase sourceLocation=onboard
   contentType=all file="filename";
   ```

   In this command, *`filename`* is the file path and file name to which you want to save the database. Enclose the file name in double quotation marks (" "). For example:

   ```
   file="C:\Program Files\CLI\logs\dbmdata.zip"
   ```

   This command does not automatically append a file extension to the saved file. You must specify a file extension when entering the file name.

   e. Select **Tools** > **Verify and Execute**.

3. 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`.

4. If the controller is not already offline, take it offline now using either SANtricity System Manager or the Enterprise Management Window's (EMW) script editor:

   - To use 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 System Manager Unavailable message is displayed. Select **Connect to an alternate network connection** to automatically access SANtricity System Manager using the other controller.

   - To use script editor in the EMW:

     a. Open the Enterprise Management Window (EMW) in SANtricity Storage Manager on your local host.

     b. Select the storage array.

     c. Select **Tools > Execute Script**.

     d. Type one of the following commands in the text box.

     ```
     For controller A: set controller [a] availability=offline
     ```

     ```
     For controller B: set controller [b] availability=offline
     ```

     e. Select **Tools > Verify and Execute**.

     The system attempts to take the controller offline.

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

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

After you finish

Go to *Replace host interface card* on page 107.

Replace host interface card

You replace a host interface card (HIC) to replace the failed HIC with a new one. If you are replacing HICs in a duplex configuration, repeat all steps to remove the second controller canister, install the second HIC, and reinstall the second controller canister.

Steps

1. Step 1: Remove controller canister on page 108
   You remove the controller canister so you can add 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.

2. Step 2: Install host interface card on page 110
   You install a host interface card (HIC) to replace the failed one with a new HIC.
3. Step 3: Reinstall controller canister on page 112
   After installing the host interface card (HIC), you reinstall the controller canister into the controller shelf.

Step 1: Remove controller canister

You remove the controller canister so you can add 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

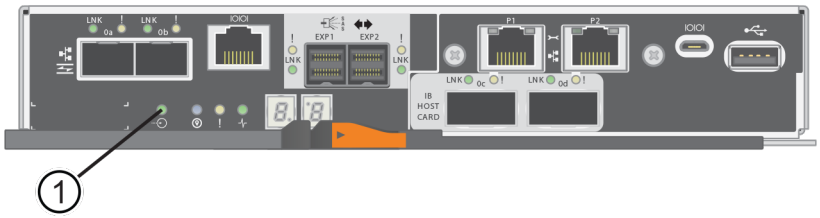
- You have scheduled a downtime maintenance window for this procedure. The power must be off when you install HICs, so you cannot access data on the storage array until you have successfully completed this procedure. (In a duplex configuration, both controllers must have the same HIC configuration when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

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. Confirm that the Cache Active LED on the back of the controller is off.

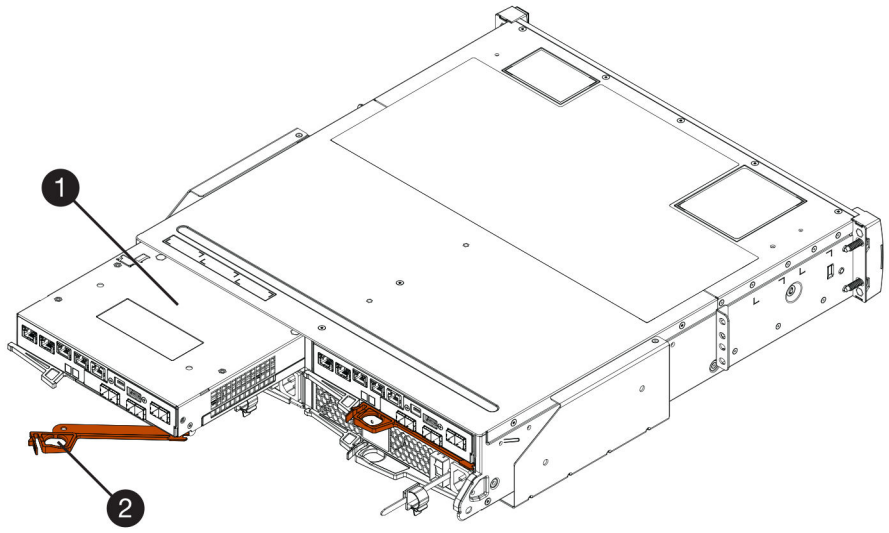
   The green Cache Active LED on the back of the controller is on when cached data needs to be written to the drives. You must wait for this LED to turn off before removing the controller canister.



1 Cache Active LED

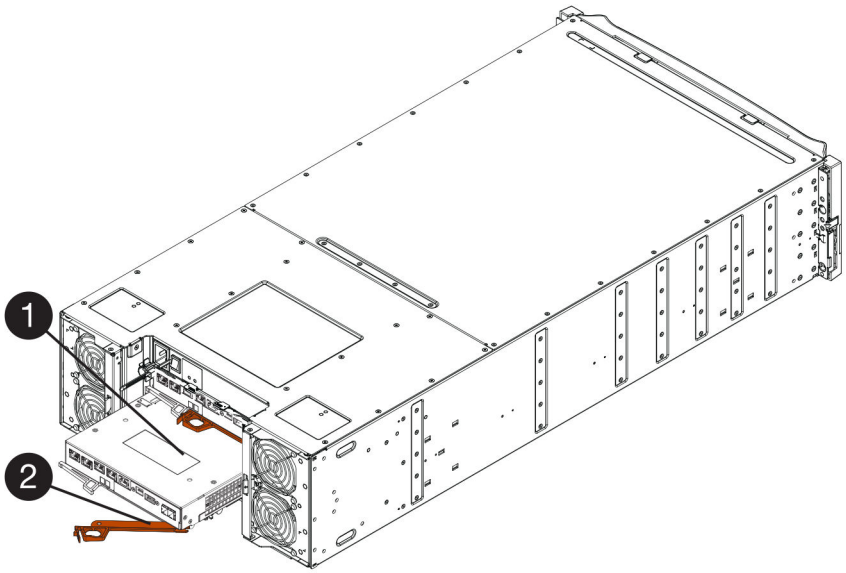
4. Squeeze the latch on the cam handle until it releases, and then open the cam handle to the right to release the controller canister from the shelf.

   The following figure is an example of an E5724 controller shelf:



1 Controller canister 2 Cam handle

The following figure is an example of an E5760 controller shelf:



1 Controller canister 2 Cam handle

5. Using two hands and the cam handle, slide the controller canister out of the shelf.

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

   If you are removing the controller canister from an E5724 controller shelf, a flap swings into place to block the empty bay, helping to maintain air flow and cooling.

6. Turn the controller canister over, so that the removable cover faces up.

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

After you finish

Go to *Step 2: Install host interface card* on page 110.

Step 2: Install host interface card

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

Before you begin

- You have an ESD wristband, or you have taken other antistatic precautions.
- You have a #1 Phillips screwdriver.
- You have one or two HICs, based on whether you have one or two controllers in your storage array. The HICs must be compatible with your controllers.

About this task

Attention: Possible loss of data access – Never install a HIC in an E5700 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. Press the button on the cover of the controller canister, and slide the cover off.
3. Confirm that the green LED inside the controller (by the DIMMs) 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.



1 Internal Cache Active LED 2 Battery

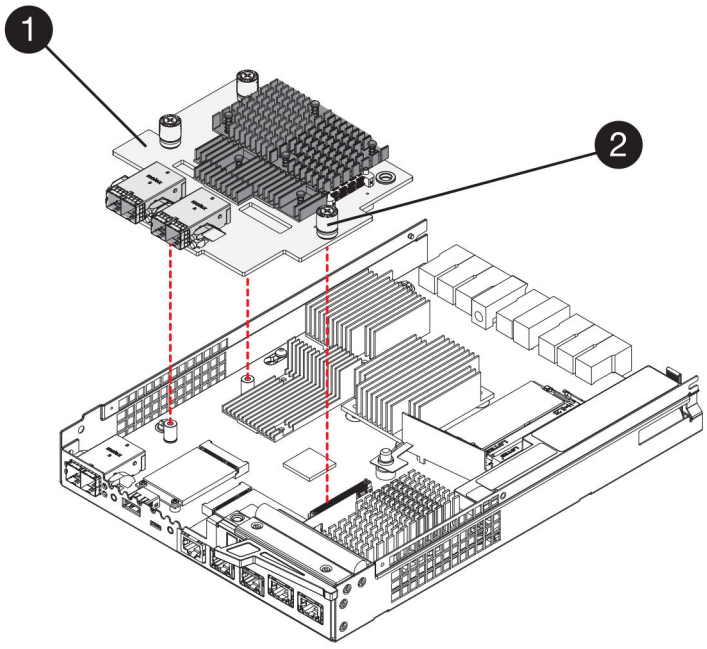
4. Using a #1 Phillips screwdriver, remove the four screws that attach the blank faceplate to the controller canister, and remove the faceplate.

5. Align the three thumbscrews 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.

6. 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 thumbscrews.

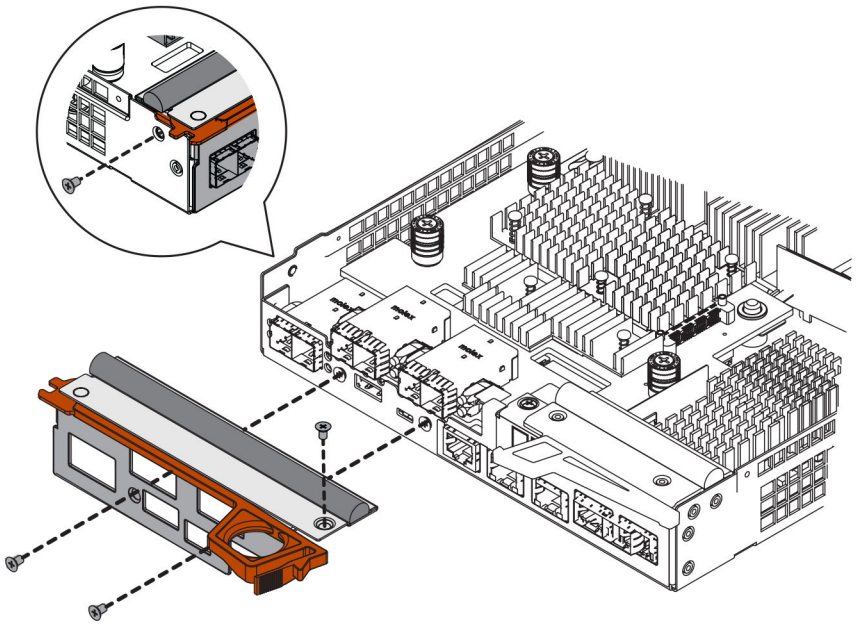


1 Host interface card (HIC) 2 Thumbscrews

7. Hand-tighten the HIC thumbscrews.

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

8. Using a #1 Phillips screwdriver, attach the new HIC faceplate to the controller canister with the four screws you removed previously.



After you finish

Go to *Step 3: Reinstall controller canister* on page 112.

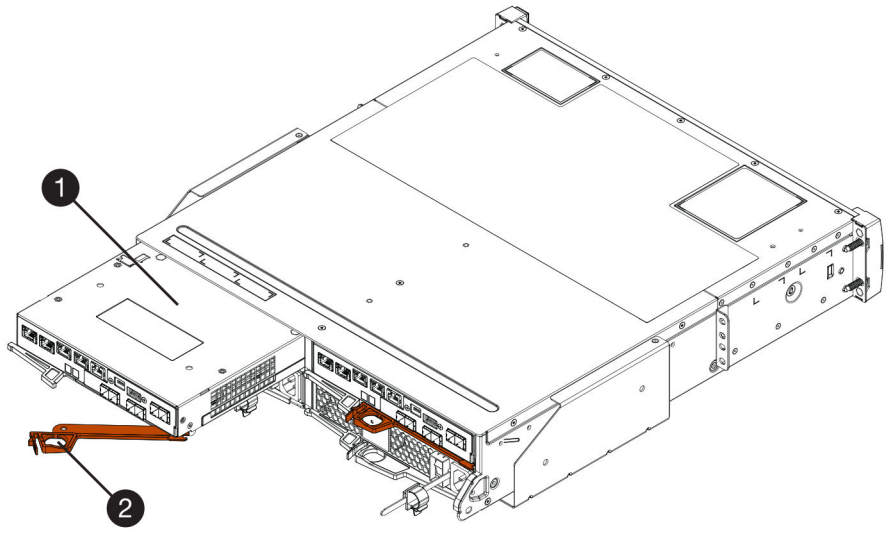
Step 3: Reinstall controller canister

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

Steps

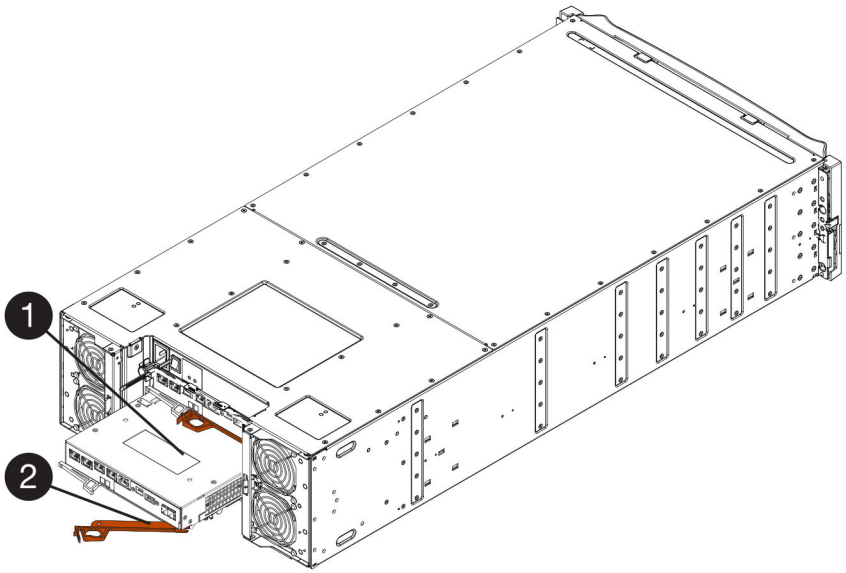
1. Turn the controller canister over, so that the removable cover faces down.
2. With the cam handle in the open position, slide the controller canister all the way into the controller shelf.

   The following figure is an example of an E5724 controller shelf:



1 Controller canister 2 Cam handle

The following figure is an example of an E5760 controller shelf:



1 Controller canister 2 Cam handle

3. Move the cam handle to the left to lock the controller canister in place.
4. Reconnect all the cables you removed.

   Attention: Do not connect data cables to the new HIC ports at this time.

5. (Optional) If you are adding HICs to a duplex configuration, repeat all steps to remove the second controller canister, install the second HIC, and reinstall the second controller canister.

After you finish

Go to *Place controller online (duplex)* on page 114.

Place controller online (duplex)

You bring the controller online to confirm the storage array is working correctly. Then, you can collect support data and resume operations.

About this task

Perform this task only if your storage array has two controllers.

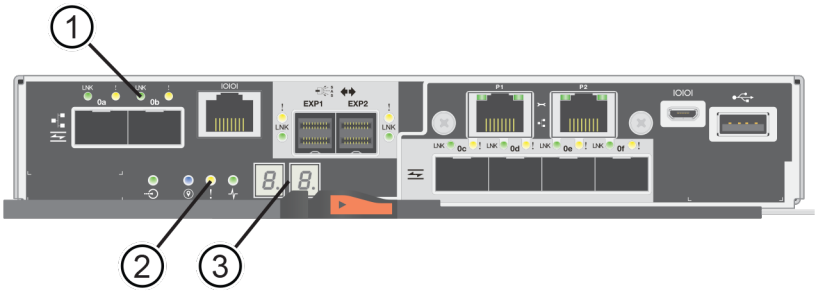
Steps

1. As the controller boots, check the controller LEDs and the seven-segment display.

   Note: The figure shows an example controller canister. Your controller might have a different number and a different type of host ports.

   When communication with the other controller is reestablished:

   - The seven-segment display shows the repeating sequence **OS**, **OL**, ***blank*** to indicate that the controller is offline.
   - The amber Attention LED remains lit.
   - The Host Link LEDs might be on, blinking, or off, depending on the host interface.



1 Host Link LEDs 2 Attention LED (amber) 3 Seven-segment display

2. Bring the controller online using either SANtricity System Manager or the Enterprise Management Window's (EMW) script editor:

   - To use SANtricity System Manager:

     a. Select **Hardware**.

     b. If the graphic shows the drives, select **Show back of shelf**.

     c. Select the controller you want to place online.

     d. Select **Place Online** from the context menu, and confirm that you want to perform the operation.

     The system places the controller online.

   - To use script editor in the EMW:

     a. Open the Enterprise Management Window (EMW) in SANtricity Storage Manager on your local host.

b. Select the storage array.

c. Select **Tools > Execute Script**.

d. Type one of the following commands in the text box.

```
For controller A: set controller [a] availability=online;
```

```
For controller B: set controller [b] availability=online;
```

e. Select **Tools > Verify and Execute**.

The system places the controller online.

3. Check the codes on the controller's seven-segment display as it comes back online. If the display shows one of the following repeating sequences, immediately remove the controller.

- **OE**, **L0**, ***blank*** (mismatched controllers)
- **OE**, **L6**, ***blank*** (unsupported HIC)

Attention: Possible loss of data access – If the controller you just installed shows one of these codes, and the other controller is reset for any reason, the second controller could also lock down.

4. 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 check that the HIC and the controller canister are installed correctly. If necessary, remove and reinstall the controller canister and the HIC.

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

5. 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`.

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

Contact technical support at *NetApp Support*, 888-463-8277 (North America), 00-800-44-638277 (Europe), or +800-800-80-800 (Asia/Pacific) if you need the RMA number.

Result

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

Host port protocol

You can convert the protocol of a host to a different protocol so that compatibility and communication can be established.

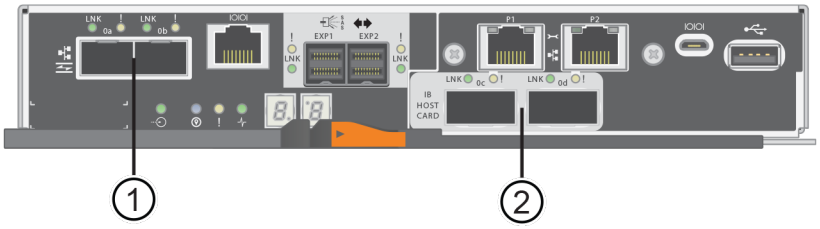
Overview and requirements

Learn about the E5700 baseboard host ports and the requirements you need to know about before converting the host protocol.

Host protocol overview

You can convert the host port protocol of the baseboard host ports in the E5700 controller shelf.

The following figure shows the E5700 with its SFP+ (optical) baseboard host ports ❶ and the optional two IB HIC ports. ❷



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, and you will not be able to 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. Your NetApp Sales Representative can help you determine what hardware you need and help you order the correct parts.
- If you are attempting to change the baseboard host ports of your storage array, and it currently uses dual-protocol (also referred to as *unified*) SFP transceivers that you purchased from NetApp, you do not need to change your SFP transceivers.
- Dual-protocol SFP transceivers support both FC (at 4 Gbps, 8 Gbps, or 16 Gbps) and iSCSI (at 10 Gbps), but they do not support 1 Gbps iSCSI. See *Determine whether you have dual-protocol SFPs* on page 118 to determine what type of SFP transceivers are installed.

Considerations for changing the host protocol

The considerations for changing the host protocol depend on the starting and ending protocols of the baseboard host ports and the HIC ports.

If you use a Mirroring feature or the Data Assurance (DA) feature, you must understand what happens to these features when you change the host port protocol.

Note: The following considerations apply only if you are converting a storage array that has already been in use. These considerations do not apply if you are converting a new storage array that does not yet have hosts and volumes defined.

Converting from FC to iSCSI

- Asynchronous Mirroring requires both the local storage array and the remote storage array to use the same protocol.
  - If you are currently using Asynchronous Mirroring through the baseboard, you must deactivate Asynchronous Mirroring relationships using those ports before applying the feature pack.
  - Refer to the online help for SANtricity System Manager to delete all mirror consistency groups and remove all mirrored pairs from the local and remote storage arrays. In addition, follow the instructions in the online help to deactivate Asynchronous Mirroring.

    Note: If your configuration contains SAN Boot hosts connected to the FC baseboard ports, check the *NetApp Interoperability Matrix Tool* to ensure that the configuration is supported on iSCSI. If it is not, you cannot convert the host protocol to iSCSI.
- The Synchronous Mirroring feature is not supported for iSCSI.
  - If you are currently using Synchronous Mirroring relationships via the baseboard ports, you must deactivate those Synchronous Mirroring relationships.
  - Refer to the online help for SANtricity System Manager to remove all synchronous mirrored pairs, which removes mirror relationships on the local storage array and on the remote storage array. In addition, follow the instructions in the online help to deactivate Synchronous Mirroring.

    Attention: If you do not deactivate Synchronous Mirroring relationships before converting to iSCSI, your system will lose data access and data loss might occur.

Converting from iSCSI to FC

- Asynchronous Mirroring requires both the local storage array and the remote storage array to use the same protocol. If you are currently using Asynchronous Mirroring with the baseboard ports, you must deactivate Asynchronous Mirroring before changing the protocol.
- Refer to the online help for SANtricity System Manager to delete all mirror consistency groups and remove all mirrored pairs from the local and remote storage arrays. In addition, follow the instructions in the online help to deactivate Asynchronous Mirroring.

Converting IB-iSER to/from IB-SRP

- You do not have to make any changes to your hardware when you convert from/to iSER to SRP.
- The Data Assurance (DA) feature is not supported for SRP.
- The DA feature is not supported for IB-SRP. If you are currently using this feature via the IB-HIC and you want to convert those ports from iSER to SRP, you must permanently disable DA on all

volumes. Refer to the online help for SANtricity System Manager to change the settings for a volume to permanently disable the data assurance setting.

Note: After it has been disabled, DA cannot be re-enabled on the volume.

- Confirm the following:
  - SANtricity System Manager is accessible via web browser.
  - The storage system is running SANtricity OS (controller firmware) version 08.40.11.00 or later.

Mirroring operations need same host protocol

Mirroring operations are not affected if the host ports being used for mirroring keep the same protocol after you apply the feature pack. Even so, before applying the feature pack, you should confirm that all mirror consistency groups are synchronized. After applying the feature pack, you should test the communication between the local storage array and the remote storage array. Refer to the online help for SANtricity System Manager if you have questions on how to do this.

Change host protocol

You can convert the host port protocol of the baseboard host ports from Fibre Channel (FC) to iSCSI or from iSCSI to FC. If you have an Infiniband (IB) HIC, you can also convert the protocol of the IB HIC from iSER to InfiniBand, SRP to InfiniBand, NVMe to InfiniBand, or from NVMe to RoCE.

Steps

1. Determine whether you have dual-protocol SFPs on page 118
   Use SANtricity System Manager to determine what type of SFP transceivers you have. Because these SFPs can be used with both FC and iSCSI protocols, they are referred to as *dual-protocol* or *unified* SFPs.
2. Obtain the feature pack on page 120
   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.
3. Stop host I/O on page 131
   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.
4. Change the feature pack on page 132
   You change the feature pack to convert the host protocol of the baseboard host ports, the IB HIC ports, or both types of ports.
5. Complete host protocol conversion on page 133
   After converting the protocol of the host ports, you need to perform additional steps before you can use the new protocol. The steps you might need to complete depend on the starting and ending protocols of the baseboard host ports and the HIC ports.

Determine whether you have dual-protocol SFPs

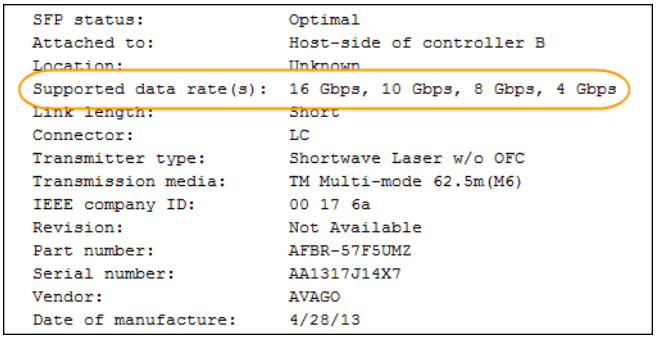
Use SANtricity System Manager to determine what type of SFP transceivers you have. Because these SFPs can be used with both FC and iSCSI protocols, they are referred to as *dual-protocol* or *unified* SFPs.

About this task

If your current SFPs support data rates of 16 Gbps and 10 Gbps, you can continue to use them after converting the host port protocol.

Steps

1. From SANtricity System Manager, select **Support**.
2. Select the **Support Center** tile.
3. On the **Support Resources** tab, locate and select the **Storage Array Profile** link.
4. Type **SFP** in the text box, and click **Find**.
5. For each SFP listed in the Storage Array Profile, locate the entry for **Supported data rate(s)**.



6. Refer to the table to determine whether you can reuse the SFPs, as follows:

Supported data rate(s)	SFP type	Supported protocol
16 Gbps, 10 Gbps, 8 Gbps, 4 Gbps	Dual-protocol	• **FC:** 16 Gbps, 8 Gbps, 4 Gbps • **iSCSI:** 10 Gbps
10 Gbps	10 Gbps	iSCSI only
16 Gbps, 8 Gbps, 4 Gbps	16 Gbps	FC only

- If you have dual-protocol SFPs, you can continue using them after you convert the protocol.

  Note: The dual-protocol SFPs do not support 1 Gb iSCSI. If you are converting host ports to iSCSI, be aware that the dual-protocol SFPs support only a 10 Gb link to the connected port.

- If you have 16 Gbps SFPs, and you are converting host ports to iSCSI, you must remove the SFPs and replace them with dual-protocol or 10 Gbps SFPs after converting the protocol. As needed, you can also use 10 Gbps iSCSI copper by using a special Twin-Ax cable with SFPs.
- If you have 10 Gbps SFPs, and you are converting host ports to FC, you must remove the SFPs from these ports and replace them with dual-protocol or 16 Gbps SFPs after converting the protocol.

After you finish

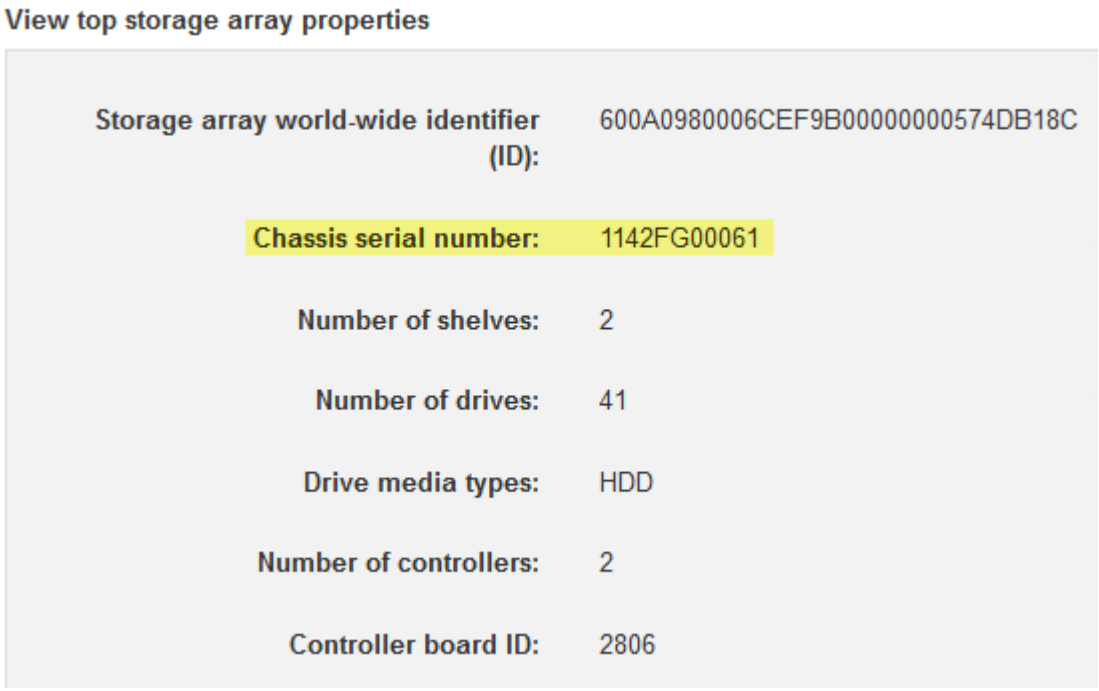
Go to *Obtain the feature pack key* on page 120.

Obtain the feature pack

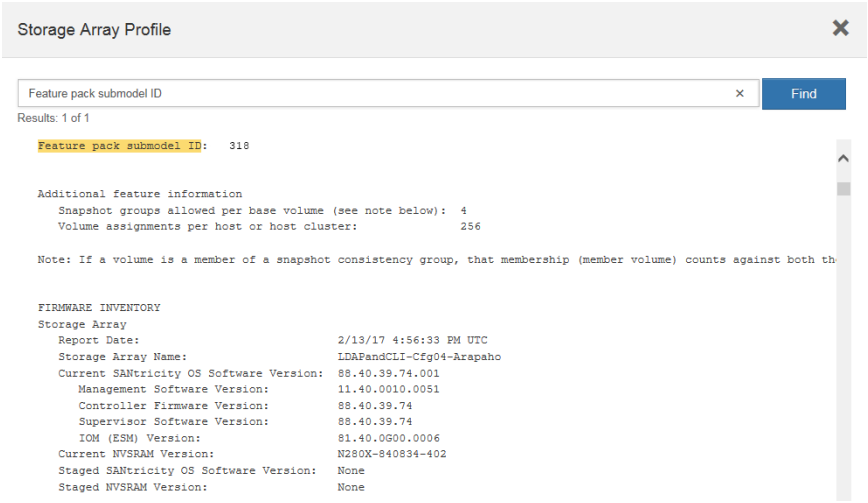
To obtain the feature pack, you need the serial number from the controller shelf, a Feature Activation Code, and the Feature Enable Identifier for the storage array.

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.



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 table below. Then, copy that Feature Activation Code to a text file.

   Note: If you are not using the IB HIC, you can ignore the *HIC Ports* column in the following tables:

Table 1: Encryption Capable Feature Activation Codes (Baseboard Port Only Conversions)

Starting configuration		Ending Configuration		Feature Activation Code
Controller submodel ID	**Ports to Convert**	**Controller Submodel ID**	**Ports Converted To**	
360	FC baseboard ports	362	iSCSI baseboard ports	SGL-2SB-ZEX13
362	iSCSI baseboard ports	360	FC baseboard ports	5GI-4TB-ZW3HL

Table 2: Encryption Capable Feature Activation Codes

Starting configuration			Ending configuration			Feature Activation Code
Controller submodel ID	**Baseboard ports**	**HIC ports**	**Controller submodel ID**	**Baseboard ports**	**HIC ports**	
360	FC	iSER	361	FC	SRP	UGG-XSB-ZCZKU
			362	iSCSI	iSER	SGL-2SB-ZEX13
			363	iSCSI	SRP	VGN-LTB-ZGFCT
			382	FC	NVMe over InfiniBand	KGI-ISB-ZDHQF
			383	iSCSI	NVMe over InfiniBand	ZGQ-5TB-ZHVU4
			403	FC	NVMe over RoCE	YGH-BHK-Z8EKB
			404	iSCSI	NVMe over RoCE	0GK-UHK-Z9VVE
361	FC	SRP	360	FC	iSER	JGS-0TB-ZID1V
			362	iSCSI	iSER	UGX-RTB-ZLBPV
			363	iSCSI	SRP	2G1-BTB-ZMRYN
			382	FC	NVMe over InfiniBand	TGV-8TB-ZKTH6
			383	iSCSI	NVMe over InfiniBand	1G3-UTB-Z09D4
			403	FC	NVMe over RoCE	JGM-EIK-ZAC6Q
			404	iSCSI	NVMe over RoCE	BGP-XIK-ZCTJW

Starting configuration			Ending configuration			Feature Activation Code
Controller submodel ID	**Baseboard ports**	**HIC ports**	**Controller submodel ID**	**Baseboard ports**	**HIC ports**	
362	iSCSI	iSER	360	FC	iSER	5GI-4TB-ZW3HL
			361	FC	SRP	EGL-NTB-ZXKQ4
			363	iSCSI	SRP	HGP-QUB-Z1ICJ
			382	FC	NVMe over InfiniBand	BGN-7UB-ZY1YY
			383	iSCSI	NVMe over InfiniBand	BGS-AUB-Z2YNG
			403	FC	NVMe over RoCE	1GW-LIK-ZG9HN
			404	iSCSI	NVMe over RoCE	LGZ-5IK-ZHPQ5
363	iSCSI	SRP	360	FC	iSER	SGU-TUB-Z3G2U
			361	FC	SRP	FGX-DUB-Z5WF7
			362	iSCSI	SRP	LG3-GUB-Z7V17
			382	FC	NVMe over InfiniBand	YGZ-WUB-Z6ERJ
			383	iSCSI	NVMe over InfiniBand	NG5-ZUB-Z8C8J
			403	FC	NVMe over RoCE	WG2-0IK-ZI75U
			404	iSCSI	NVMe over RoCE	6G5-8IK-ZKNB2

Starting configuration			Ending configuration			Feature Activation Code
Controller submodel ID	**Baseboard ports**	**HIC ports**	**Controller submodel ID**	**Baseboard ports**	**HIC ports**	
382	FC	NVMe over InfiniBand	360	FC	iSER	3GN-TVB-ZINKM
			361	FC	SRP	4GK-AUB-ZG69H
			362	iSCSI	iSER	BGP-DVB-ZJ4YC
			363	iSCSI	SRP	BGU-GVB-ZM3KW
			383	iSCSI	NVMe over InfiniBand	4GX-ZVB-ZNJVD
			403	FC	NVMe over RoCE	IGR-IIK-ZDBRB
			404	iSCSI	NVMe over RoCE	SGU-2IK-ZER14
383	iSCSI	NVMe over InfiniBand	360	FC	iSER	TGS-WVB-ZKL9T
			361	FC	SRP	RGZ-JVB-Z017I
			362	iSCSI	iSER	WG2-3VB-ZQHLF
			363	iSCSI	SRP	QG7-6VB-ZSF8M
			382	FC	NVMe over InfiniBand	PGA-PVB-ZUWMX
			403	FC	NVMe over RoCE	5G7-RIK-ZL5PE
			404	iSCSI	NVMe over RoCE	XGA-BIK-ZML25

Starting configuration			Ending configuration			Feature Activation Code
Controller submodel ID	**Baseboard ports**	**HIC ports**	**Controller submodel ID**	**Baseboard ports**	**HIC ports**	
403	FC	NVMe over RoCE	360	FC	iSER	BGC-UIK-Z03GR
			361	FC	SRP	LGF-EIK-ZPJRX
			362	iSCSI	iSER	PGJ-HIK-ZSIDZ
			363	iSCSI	SRP	1GM-1JK-ZTYQX
			382	FC	NVMe over InfiniBand	JGH-XIK-ZQ142
			383	iSCSI	NVMe over InfiniBand	PG0-KJK-ZUGW5
			404	iSCSI	NVMe over RoCE	QGR-4JK-ZWWDR
404	iSCSI	NVMe over RoCE	360	FC	iSER	3GT-NJK-ZXEQK
			361	FC	SRP	3GW-7JK-ZYU21
			362	iSCSI	iSER	WG2-AJK-Z2SMY
			363	iSCSI	SRP	NG4-TJK-Z3A47
			382	FC	NVMe over InfiniBand	9GY-QJK-ZZC9X
			383	iSCSI	NVMe over InfiniBand	UG7-DJK-Z5QBW
			403	FC	NVMe over RoCE	BG9-WJK-Z68R7

Table 3: Non-Encryption Feature Activation Codes (Baseboard Port Only Conversions)

Starting configuration		Ending Configuration		Feature Activation Code
Controller submodel ID	**Ports to Convert**	**Controller Submodel ID**	**Ports Converted To**	
365	FC baseboard ports	367	iSCSI baseboard ports	9GU-2WB-Z503D
367	iSCSI baseboard ports	366	FC baseboard ports	XG8-XTB-ZQ7XS

Table 4: Non-Encryption Feature Activation Codes

Starting configuration			Ending configuration			Feature Activation Code
Controller submodel ID	**Baseboard ports**	**HIC ports**	**Controller submodel ID**	**Baseboard ports**	**HIC ports**	
365	FC	iSER	366	FC	SRP	PGR-IWB-Z48PC
			367	iSCSI	iSER	9GU-2WB-Z503D
			368	iSCSI	SRP	SGJ-IWB-ZJFE4
			384	FC	NVMe over InfiniBand	DGH-YWB-ZHX5H
			385	iSCSI	NVMe over InfiniBand	UGM-2XB-ZKV0B
			405	FC	NVMe over RoCE	WGC-GJK-Z7PU2
			406	iSCSI	NVMe over RoCE	YGE-ZJK-Z869A

Starting configuration			Ending configuration			Feature Activation Code
Controller submodel ID	**Baseboard ports**	**HIC ports**	**Controller submodel ID**	**Baseboard ports**	**HIC ports**	
366	FC	SRP	365	FC	iSER	YG0-LXB-ZLD26
			367	iSCSI	iSER	SGR-5XB-ZNTFB
			368	iSCSI	SRP	PGZ-5WB-Z8M0N
			384	FC	NVMe over InfiniBand	DGW-LWB-Z76KE
			385	iSCSI	NVMe over InfiniBand	KG2-0WB-Z9477
			405	FC	NVMe over RoCE	3GH-JJK-ZANJQ
			406	iSCSI	NVMe over RoCE	9GJ-3JK-ZB4ZK
367	iSCSI	iSER	365	FC	iSER	QG6-ETB-ZPPPT
			366	FC	SRP	XG8-XTB-ZQ7XS
			368	iSCSI	SRP	SGB-HTB-ZS0AH
			384	FC	NVMe over InfiniBand	TGD-1TB-ZT5TL
			385	iSCSI	NVMe over InfiniBand	9GG-KTB-ZUM15
			405	FC	NVMe over RoCE	8GR-QKK-ZFJTP
			406	iSCSI	NVMe over RoCE	6GT-AKK-ZGZ8R

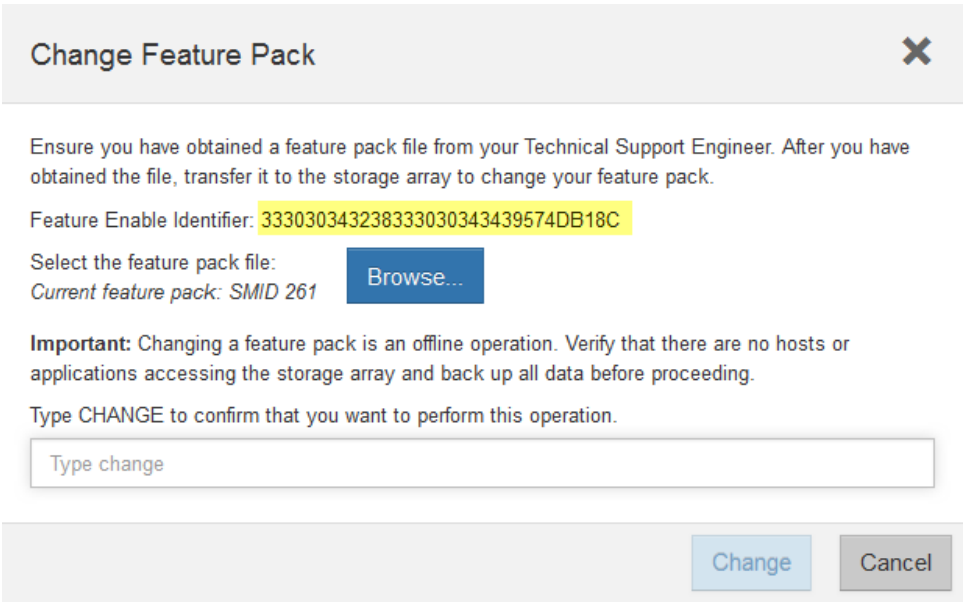
Starting configuration			Ending configuration			Feature Activation Code
Controller submodel ID	**Baseboard ports**	**HIC ports**	**Controller submodel ID**	**Baseboard ports**	**HIC ports**	
368	iSCSI	SRP	365	FC	iSER	LG8-JUB-ZATLD
			366	FC	SRP	LGA-3UB-ZBAX1
			367	iSCSI	SRP	NGF-7UB-ZE8KX
			384	FC	NVMe	3GI-QUB-ZFP1Y
			385	iSCSI	NVMe over InfiniBand	8GD-NUB-ZDRCD
			405	FC	NVMe over RoCE	2GV-TKK-ZIHI6
			406	iSCSI	NVMe over RoCE	PGY-DKK-ZJXVA
384	FC	NVMe over InfiniBand	365	FC	iSER	SGF-SVB-ZWU9M
			366	FC	SRP	7GH-CVB-ZYBGV
			367	iSCSI	iSER	6GK-VVB-ZZSRN
			368	iSCSI	SRP	RGM-FWB-Z195H
			385	iSCSI	NVMe over Infiniband	FGP-YWB-Z3QK0
			405	FC	NVMe over RoCE	VGM-NKK-ZDLDK
			406	iSCSI	NVMe over RoCE	ZG0-7KK-ZE2H4

Starting configuration			Ending configuration			Feature Activation Code
Controller submodel ID	**Baseboard ports**	**HIC ports**	**Controller submodel ID**	**Baseboard ports**	**HIC ports**	
385	iSCSI	NVMe over InfiniBand	365	FC	iSER	GG5-8WB-ZBKEM
			366	FC	SRP	KG7-RWB-ZC2RZ
			367	iSCSI	iSER	NGC-VWB-ZFZEN
			368	iSCSI	SRP	4GE-FWB-ZGGQJ
			384	FC	NVMe over InfiniBand	1G9-CWB-ZDIZR
			405	FC	NVMe over RoCE	NG1-WKK-ZLFAI
			406	iSCSI	NVMe over RoCE	NG4-GKK-ZMWNI
405	FC	NVMe over RoCE	365	FC	iSER	MG6-ZKK-ZNDVC
			366	FC	SRP	WG9-JKK-ZPUAR
			367	iSCSI	iSER	NGE-MKK-ZRSW9
			368	iSCSI	SRP	TGG-6KK-ZT9BU
			384	FC	NVMe over InfiniBand	AGB-3KK-ZQBLR
			385	iSCSI	NVME over InfiniBand	JGJ-PKK-ZUQG2
			406	iSCSI	NVMe over RoCE	3GL-9KK-ZV7VF

Starting configuration			Ending configuration			Feature Activation Code
Controller submodel ID	**Baseboard ports**	**HIC ports**	**Controller submodel ID**	**Baseboard ports**	**HIC ports**	
406	iSCSI	NVMe over RoCE	365	FC	iSER	6G0-SLK-ZW098
			366	FC	SRP	CGQ-CLK-ZY5FS
			367	iSCSI	iSER	NGV-FLK-Z132Q
			368	iSCSI	SRP	RGY-YLK-Z3KLD
			384	FC	NVMe over InfinBand	5GT-VLK-ZZMPZ
			385	iSCSI	NVMe over InfiniBand	ZG1-ILK-Z42WN
			405	FC	NVMe over RoCE	GG3-2LK-Z5I3I

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.



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* on page 131.

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.

About this task

This task applies only if you are converting a storage array that has already been in use.

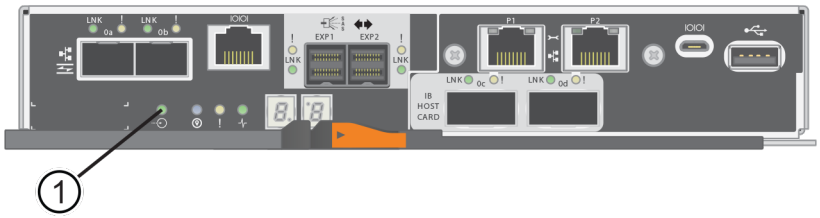
Steps

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, the host application might lose data because the storage array will not be accessible.
2. If the storage array participates in a mirroring relationship, stop all host I/O operations on the secondary storage array.
3. 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.



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

After you finish

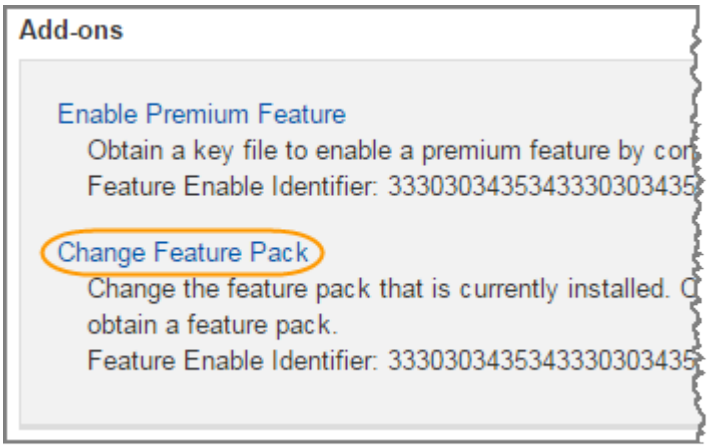
Go to *Change the feature pack* on page 132.

Change the feature pack

You change the feature pack to convert the host protocol of the baseboard host ports, the IB HIC ports, or both types of 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**.

g. Review the details shown for the baseboard ports and the HIC ports (labeled “slot 1”), and confirm that each type of port has the protocol you expect.

After you finish

Go to *Complete host protocol conversion* on page 133.

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. The steps you might need to complete depend on the starting and ending protocols of the baseboard host ports and the HIC ports.

Choices

- Complete FC to iSCSI conversion on page 133
  If you previously had FC host ports and you converted to iSCSI, you might need to modify your existing configuration to support iSCSI. The following procedure is only applicable if there is no iSCSI HIC present.
- Complete iSCSI to FC conversion on page 135
  If you previously had iSCSI host ports and you converted to FC, you might need to modify your existing configuration to support FC. The following procedure is only applicable if no FC HIC is present.
- Complete IB-iSER to/from IB-SRP, NVMe over InfiniBand, or NVMe over RoCE conversion on page 136
  After you apply the feature pack key to convert the protocol used by your InfiniBand iSER HIC port to/from SRP, NVMe over InfiniBand, or NVMe over RocE, you need to configure the host to use the appropriate protocol.

Complete FC to iSCSI conversion

If you previously had FC host ports and you converted to iSCSI, you might need to modify your existing configuration to support iSCSI. The following procedure is only applicable if there is no iSCSI HIC present.

About this task

This task applies only if you are converting a storage array that has already been in use.

This task does not apply if you are converting a new storage array that does not yet have hosts and volumes defined. If you converted the host-port protocol of a new storage array, see *Cabling E-Series hardware* to install cables and SFPs. Then, follow the instructions in the *Linux express configuration*, *Windows express configuration*, or *VMware express configuration* to complete the setup for each protocol.

Steps

1. Configure the switches.

You should configure the switches used to transport iSCSI traffic according to the vendor's recommendations for iSCSI. These recommendations might include both configuration directives as well as code updates.

2. From SANtricity System Manager, select **Hardware > Configure iSCSI ports**.
3. Select the port settings.

   You can set up your iSCSI network in many ways. Consult your network administrator for tips on selecting the best configuration for your environment.
4. Update the host definitions in SANtricity System Manager.

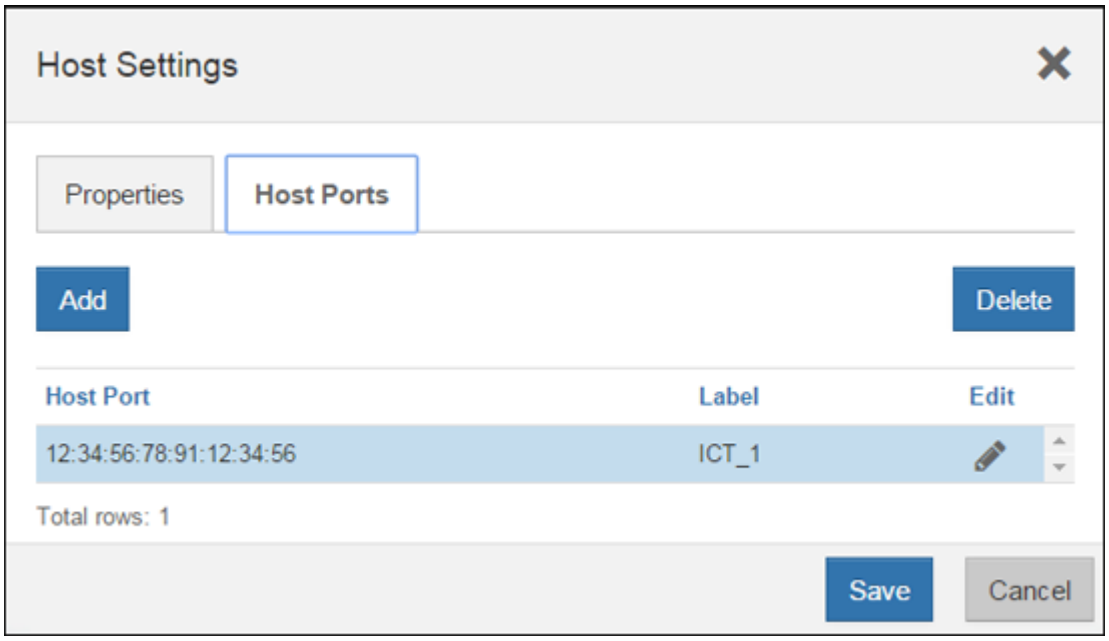
   Note: If you need instructions to add hosts or host clusters, refer to the online help for SANtricity System Manager.

   a. Select **Storage > Hosts**.

   b. Select the host to which the port will be associated, and click **View/Edit Settings**.

      The Host Settings dialog box appears.

   c. Click the **Host Ports** tab.



   d. Click **Add**, and use the **Add Host Port** dialog box to associate a new host port identifier to the host.

      The length of the host port identifier name is determined by the host interface technology. FC host port identifier names must have 16 characters. iSCSI host port identifier names have a maximum of 223 characters. The port must be unique. A port number that has already been configured is not allowed.

   e. Click **Delete**, and use the **Delete Host Port** dialog box to remove (unassociate) a host port identifier.

      The **Delete** option does not physically remove the host port. This option removes the association between the host port and the host. Unless you remove the host bus adapter or the iSCSI initiator, the host port is still recognized by the controller.

   f. Click **Save** to apply your changes to the host port identifier settings.

g. Repeat these steps to add and remove any additional host port identifiers.

5. Reboot the host or perform a rescan so that the host properly discovers the LUNs.
6. Remount volumes or start using block volume.

After you finish

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

Complete iSCSI to FC conversion

If you previously had iSCSI host ports and you converted to FC, you might need to modify your existing configuration to support FC. The following procedure is only applicable if no FC HIC is present.

About this task

This task applies only if you are converting a storage array that has already been in use.

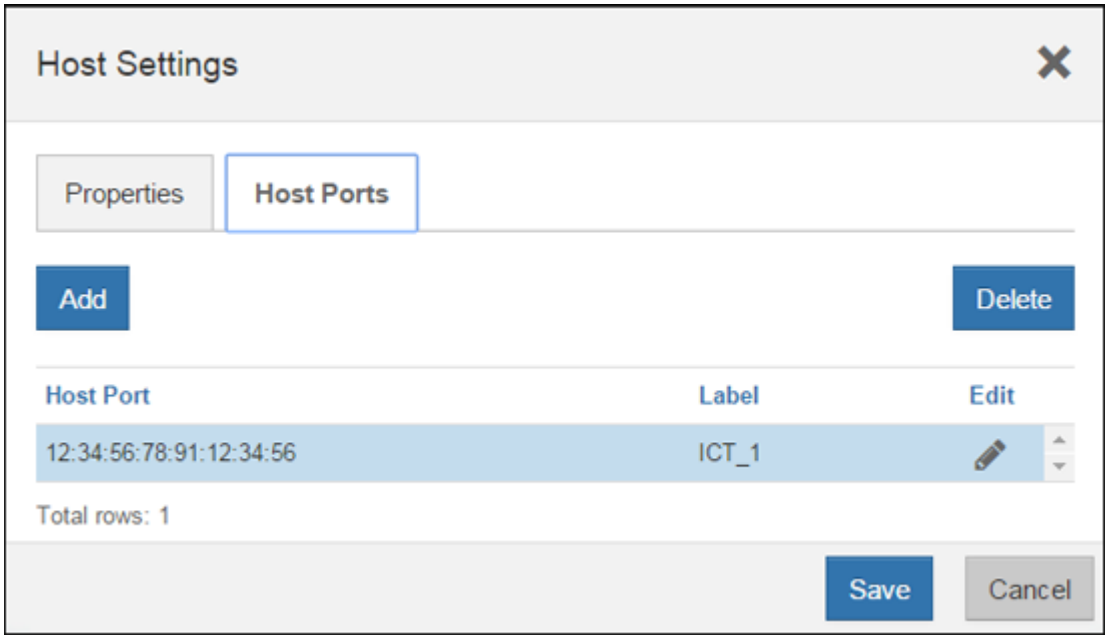
This task does not apply if you are converting a new storage array that does not yet have hosts and volumes defined. If you converted the host-port protocol of a new storage array, see *Cabling E-Series hardware* to install cables and SFPs. Then, follow the instructions in the *Linux express configuration*, *Windows express configuration*, or *VMware express configuration* to complete the setup for each protocol.

Steps

1. Install the HBA utility and determine initiator WWPNs.
2. Zone the switches.

   Zoning the switches enables the hosts to connect to the storage and limits the number of paths. You zone the switches using the management interface of the switches.
3. Update the host definitions in SANtricity System Manager.
   a. Select **Storage > Hosts**.
   b. Select the host to which the port will be associated, and click **View/Edit Settings**.

      The Host Settings dialog box appears.
   c. Click the **Host Ports** tab.



d. Click **Add**, and use the **Add Host Port** dialog box to associate a new host port identifier to the host.

   The length of the host port identifier name is determined by the host interface technology. FC host port identifier names must have 16 characters. iSCSI host port identifier names have a maximum of 223 characters. The port must be unique. A port number that has already been configured is not allowed.

e. Click **Delete**, and use the **Delete Host Port** dialog box to remove (unassociate) a host port identifier.

   The **Delete** option does not physically remove the host port. This option removes the association between the host port and the host. Unless you remove the host bus adapter or the iSCSI initiator, the host port is still recognized by the controller.

f. Click **Save** to apply your changes to the host port identifier settings.

g. Repeat these steps to add and remove any additional host port identifiers.

4. Reboot the host or perform a rescan so that the host properly discovers mapped storage.
5. Remount volumes or start using block volume.

After you finish

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

Complete IB-iSER to/from IB-SRP, NVMe over InfiniBand, or NVMe over RoCE conversion

After you apply the feature pack key to convert the protocol used by your InfiniBand iSER HIC port to/from SRP, NVMe over InfiniBand, or NVMe over RocE, you need to configure the host to use the appropriate protocol.

Steps

1. Configure the host to use the SRP, iSER, or NVMe protocol.

   For step-by-step instructions on how to configure the host to use SRP, iSER, or NVMe, see the *Linux Express Configuration* .

2. To connect the host to the storage array for an SRP configuration, you must enable the InfiniBand driver stack with the appropriate options.

   Specific settings might vary between Linux distributions. 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.

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