



Maintain **SG6000** hardware

StorageGRID Appliances

NetApp
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Maintain SG6000 storage appliance hardware

Maintain SG6000 appliance

You might need to perform maintenance procedures on the SG6000 appliance.

Procedures specific to maintaining your SG6000 appliance are in this section and assume that the appliance has already been deployed as a Storage Node in a StorageGRID system.

See [Common procedures](#) for maintenance procedures that are used by all appliances.

See [Set up hardware](#) for maintenance procedures that are also performed during initial appliance installation and configuration.

To prevent service interruptions, confirm that all other Storage Nodes are connected to the grid before shutting down the appliance or shut down the appliance during a scheduled maintenance window when periods of service disruption are acceptable. See the information about [monitoring node connection states](#).



If you have ever used an ILM rule that creates only one copy of an object, you must shut down the appliance during a scheduled maintenance window. Otherwise, you might temporarily lose access to those objects during any maintenance procedure that takes a storage node out of service. See the information about [managing objects with information lifecycle management](#).

Maintenance configuration procedures

Upgrade SANtricity OS on SG6000 storage controllers

To ensure optimal functioning of the storage controller, you must upgrade to the latest maintenance release of the SANtricity OS that is qualified for your StorageGRID appliance.

Consult the [NetApp Interoperability Matrix Tool \(IMT\)](#) to determine which version you should be using.

Download the new SANtricity OS Software file from [NetApp Downloads: StorageGRID Appliance](#).

Use one of the following procedures based on the version of SANtricity OS currently installed:

- If the storage controller is using SANtricity OS 08.42.20.00 (11.42) or newer, use the Grid Manager to perform the upgrade.

[Upgrade SANtricity OS on storage controllers using Grid Manager](#)

- If the storage controller is using a SANtricity OS version older than 08.42.20.00 (11.42), use maintenance mode to perform the upgrade.

[Upgrade SANtricity OS on storage controllers using maintenance mode](#)



When upgrading the SANtricity OS for your storage appliance, you must follow the instructions in the StorageGRID documentation. If you use any other instructions, your appliance could become inoperable.

Upgrade SANtricity OS on SG6000 storage controllers using Grid Manager

For storage controllers currently using SANtricity OS 08.42.20.00 (11.42) or newer, you must use the Grid Manager to apply an upgrade.

Before you begin

- You have consulted the [NetApp Interoperability Matrix Tool \(IMT\)](#) to confirm that the SANtricity OS version you are using for the upgrade is compatible with your appliance.
- You have the [Maintenance or Root access permission](#).
- You are signed in to the Grid Manager using a [supported web browser](#).
- You have the provisioning passphrase.
- You have access to [NetApp Downloads: StorageGRID Appliance](#).

About this task

You can't perform other software updates (StorageGRID software upgrade or a hotfix) until you have completed the SANtricity OS upgrade process. If you attempt to start a hotfix or a StorageGRID software upgrade before the SANtricity OS upgrade process has finished, you are redirected to the SANtricity OS upgrade page.

The procedure will not be complete until the SANtricity OS upgrade has been successfully applied to all applicable nodes that have been selected for the upgrade. It might take more than 30 minutes to load the SANtricity OS on each node (sequentially) and up to 90 minutes to reboot each StorageGRID storage appliance. Any nodes in your grid that don't use SANtricity OS will not be affected by this procedure.



The following steps are only applicable when you are using the Grid Manager to perform the upgrade. The storage controllers in the appliance can't be upgraded using the Grid Manager when the controllers are using SANtricity OS older than 08.42.20.00 (11.42).



This procedure will automatically upgrade the NVSRAM to the most recent version associated with the SANtricity OS upgrade. You don't need to apply a separate NVSRAM upgrade file.



Be sure to apply the latest StorageGRID hotfix before you begin this procedure. See [StorageGRID hotfix procedure](#) for details.

Steps

1. Download the new SANtricity OS Software file from [NetApp Downloads: StorageGRID Appliance](#).
Be sure to choose the SANtricity OS version for your storage controllers.
2. Select **MAINTENANCE** > **System** > **Software update**.

Software update

You can upgrade StorageGRID software, apply a hotfix, or upgrade the SANtricity OS software on StorageGRID storage appliances. NetApp recommends you apply the latest hotfix before and after each software upgrade. Some hotfixes are required to prevent data loss.

The screenshot shows three distinct update options, each in a white box with a blue header and a blue arrow button at the bottom. The first option is 'StorageGRID upgrade' with the description 'Upgrade to the next StorageGRID version and apply the latest hotfix for that version.' The second is 'StorageGRID hotfix' with 'Apply a hotfix to your current StorageGRID software version.' The third is 'SANtricity OS update' with 'Update the SANtricity OS software on your StorageGRID storage appliances.'

3. In the SANtricity OS update section, select **Update**.

The SANtricity OS upgrade page appears and lists the details for each appliance node including:

- Node name
- Site
- Appliance model
- SANtricity OS version
- Status
- Last upgrade status

4. Review the information in the table for all of your upgradable appliances. Confirm that all storage controllers have **Nominal** status. If the status for any controller is **Unknown**, go to **Nodes > appliance node > Hardware** to investigate and resolve the issue.
5. Select the SANtricity OS upgrade file you downloaded from the NetApp Support Site.
 - a. Select **Browse**.
 - b. Locate and select the file.
 - c. Select **Open**.

The file is uploaded and validated. When the validation process is done, the file name is shown with a green check mark next to the **Browse** button. Don't change the file name because it is part of the verification process.

6. Enter the provisioning passphrase and select **Continue**.

A warning box appears stating that your browser's connection might be lost temporarily as services on nodes that are upgraded are restarted.

7. Select **Yes** to stage the SANtricity OS upgrade file to the primary Admin Node.

When the SANtricity OS upgrade starts:

a. The health check is run. This process checks that no nodes have the status of Needs Attention.



If any errors are reported, resolve them and select **Start** again.

b. The SANtricity OS Upgrade Progress table appears. This table shows all Storage Nodes in your grid and the current stage of the upgrade for each node.



The table shows all appliance Storage Nodes. Software-based Storage Nodes aren't displayed. Select **Approve** for all nodes that require the upgrade.

SANtricity OS

1 Upload files — 2 Upgrade

Approved nodes are added to a queue and upgraded sequentially. Each node can take up to 30 minutes, which includes updating NVSRAM. When the upgrade is complete, the node is rebooted.

Select **Approve all** or approve nodes one at a time. To remove nodes from the queue, select **Remove all** or remove nodes one at a time. If the uploaded file doesn't apply to an approved node, the upgrade process skips that node and moves to the next node in the queue.

Optionally, select **Skip nodes and finish** to end the upgrade and skip any unapproved nodes.

SANtricity OS upgrade file: RCB_11.70.3_280x_6283a64d.dlp

0 out of 3 completed

Node name	Current version	Progress	Stage	Details	Status	Actions
10-224-2-24-S1	08.40.60.01	<div style="width: 100%;"></div>	Waiting for you to approve		Nominal	Approve
lab-37-sgws-quanta-10	08.73.00.00	<div style="width: 100%;"></div>	Waiting for you to approve		Nominal	Approve
storage-7	98.72.09.00	<div style="width: 100%;"></div>	Waiting for you to approve		Nominal	Approve

8. Optionally, sort the list of nodes in ascending or descending order by:

- Node name
- Current version
- Progress
- Stage
- Status

You can also enter a term in the Search box to search for specific nodes.

9. Approve the grid nodes you are ready to add to the upgrade queue. Approved nodes are upgraded one at a time.



Don't approve the SANtricity OS upgrade for an appliance Storage Node unless you are sure the node is ready to be stopped and rebooted. When the SANtricity OS upgrade is approved on a node, the services on that node are stopped and the upgrade process begins. Later, when the node is finished upgrading, the appliance node is rebooted. These operations might cause service interruptions for clients that are communicating with the node.

- Select the **Approve All** button to add all Storage Nodes to the SANtricity OS upgrade queue.



If the order in which nodes are upgraded is important, approve nodes or groups of nodes one at a time and wait until the upgrade is complete on each node before approving the next node.

- Select one or more **Approve** buttons to add one or more nodes to the SANtricity OS upgrade queue. The **Approve** button is disabled if the Status is not Nominal.

After you select **Approve**, the upgrade process determines if the node can be upgraded. If a node can be upgraded, it is added to the upgrade queue.

For some nodes, the selected upgrade file is intentionally not applied and you can complete the upgrade process without upgrading these specific nodes. Nodes intentionally not upgraded show a stage of Complete (upgrade attempted) and list the reason the node was not upgraded in the Details column.

10. If you need to remove a node or all nodes from the SANtricity OS upgrade queue, select **Remove** or **Remove All**.

When the stage progresses beyond Queued, the **Remove** button is hidden and you can no longer remove the node from the SANtricity OS upgrade process.

11. Wait while the SANtricity OS upgrade is applied to each approved grid node.
 - If any node shows a stage of Error while the SANtricity OS upgrade is applied, the upgrade has failed for the node. With the assistance of technical support, you might need to place the appliance in maintenance mode to recover it.
 - If the firmware on the node is too old to be upgraded with the Grid Manager, the node shows a stage of Error with the details that you must use maintenance mode to upgrade SANtricity OS on the node. To resolve the error, do the following:
 - a. Use maintenance mode to upgrade SANtricity OS on the node that shows a stage of Error.
 - b. Use the Grid Manager to restart and complete the SANtricity OS upgrade.

When the SANtricity OS upgrade is complete on all approved nodes, the SANtricity OS Upgrade Progress table closes and a green banner shows the number of nodes upgraded, and the date and time the upgrade completed.

12. If a node can't be upgraded, note the reason shown in the Details column and take the appropriate action.



The SANtricity OS upgrade process will not be complete until you approve the SANtricity OS upgrade on all the listed Storage Nodes.

Reason	Recommended action
Storage Node was already upgraded.	No further action required.
SANtricity OS upgrade is not applicable to this node.	The node does not have a storage controller that can be managed by the StorageGRID system. Complete the upgrade process without upgrading the node displaying this message.
SANtricity OS file is not compatible with this node.	The node requires a SANtricity OS file different than the one you selected. After completing the current upgrade, download the correct SANtricity OS file for the node and repeat the upgrade process.

13. If you want to end approving nodes and return to the SANtricity OS page to allow for an upload of a new SANtricity OS file, do the following:

a. Select **Skip Nodes and Finish**.

A warning appears asking if you are sure you want to finish the upgrade process without upgrading all applicable nodes.

b. Select **OK** to return to the **SANtricity OS** page.

c. When you are ready to continue approving nodes, [download the SANtricity OS](#) to restart the upgrade process.



Nodes already approved and upgraded without errors remain upgraded.

14. Repeat this upgrade procedure for any nodes with a stage of Complete that require a different SANtricity OS upgrade file.



For any nodes with a status of Needs Attention, use maintenance mode to perform the upgrade.

Related information

[NetApp Interoperability Matrix Tool](#)

[Upgrade SANtricity OS on storage controllers using maintenance mode](#)

Upgrade SANtricity OS on SG6000 storage controllers using maintenance mode

For storage controllers currently using SANtricity OS older than 08.42.20.00 (11.42), you must use the maintenance mode procedure to apply an upgrade.

Before you begin

- You have consulted the [NetApp Interoperability Matrix Tool \(IMT\)](#) to confirm that the SANtricity OS version you are using for the upgrade is compatible with your appliance.
- If the StorageGRID appliance is running in a StorageGRID system, you have placed the SG6000-CN controller into [maintenance mode](#).



Maintenance mode interrupts the connection to the storage controller.

About this task

Don't upgrade the SANtricity OS or NVSRAM in the E-Series controller on more than one StorageGRID appliance at a time.



Upgrading more than one StorageGRID appliance at a time might cause data unavailability, depending on your deployment model and ILM policies.

Steps

1. Confirm that the appliance is in [maintenance mode](#).
2. From a service laptop, access SANtricity System Manager and sign in.
3. Download the new SANtricity OS Software file and NVSRAM file to the management client.



The NVSRAM is specific to the StorageGRID appliance. Don't use the standard NVSRAM download.


4. Follow the instructions in the *Upgrading SANtricity OS* guide or the SANtricity System Manager online help to upgrade the firmware and NVSRAM.



Activate the upgrade files immediately. Don't defer activation.

5. If this procedure completed successfully and you have additional procedures to perform while the node is in maintenance mode, perform them now. When you are done, or if you experienced any failures and want to start over, select **Advanced > Reboot Controller**, and then select one of these options:
 - Select **Reboot into StorageGRID**
 - Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in maintenance mode. Select this option if you experienced any failures during the procedure and want to start over. After the node finishes rebooting into maintenance mode, restart from the appropriate step in the procedure that failed.



It can take up to 20 minutes for the appliance to reboot and rejoin the grid. To confirm that the reboot is complete and that the node has rejoined the grid, go back to the Grid Manager. The Nodes page should display a normal status (green check mark icon  to the left of the node name) for the

appliance node, indicating that no alerts are active and the node is connected to the grid.

Name	Type	Object data used	Object metadata used	CPU usage
StorageGRID Deployment	Grid	0%	0%	—
Data Center 1	Site	0%	0%	—
✓ DC1-ADM1	Primary Admin Node	—	—	21%
✓ DC1-ARC1	Archive Node	—	—	8%
✓ DC1-G1	Gateway Node	—	—	10%
✓ DC1-S1	Storage Node	0%	0%	29%

Related information

[NetApp Interoperability Matrix Tool](#)

[Upgrade SANtricity OS on storage controllers using Grid Manager](#)

Upgrade drive firmware using SANtricity System Manager

Upgrade SG6000 drive firmware using SANtricity System Manager using the online method

Use the SANtricity System Manager online method to upgrade the firmware on the drives in your appliance to make sure you have all the latest features and bug fixes.

Before you begin

- The storage appliance has an Optimal status.
- All drives have an Optimal status.



Don't upgrade the drive firmware on more than one StorageGRID appliance at a time. Doing so might cause data unavailability, depending on your deployment model and ILM policy.

About this task

The drives are upgraded one at a time while the appliance is performing I/O. This method does not require you to place the appliance in maintenance mode. However, system performance might be impacted and the upgrade might take several hours longer than the offline method.



Drives belonging to volumes that don't have redundancy must be updated using the [offline method](#). The offline method should be used for any drive associated with flash read cache (for example, SSD drives in the SG6060), or any pool or volume group that is currently degraded.

There are two types of drives: SSD and HDD. You must use the [offline method](#) to upgrade the firmware on the SSDs (for example, SSD drives in the SG6060). You can use either the online or offline method to upgrade the firmware on HDDs.

Steps

1. Access SANtricity System Manager using one of these methods:
 - Use the StorageGRID Appliance Installer and select **Advanced > SANtricity System Manager**
 - Use the Grid Manager and select **NODES > Storage Node > SANtricity System Manager**
 - Use SANtricity System Manager by browsing to the storage controller IP:

`https://Storage_Controller_IP`

2. Enter the SANtricity System Manager administrator username and password, if required.
3. Verify the drive firmware version currently installed in the storage appliance:
 - a. From SANtricity System Manager, select **SUPPORT > Upgrade Center**.
 - b. Under Drive Firmware upgrade, select **Begin Upgrade**.

The Upgrade Drive Firmware page displays the drive firmware files currently installed.

- c. Note the current drive firmware revisions and drive identifiers in the Current Drive Firmware column.

Upgrade Drive Firmware

1 Select Upgrade Files

Review your current drive firmware and select upgrade files below...

[What do I need to know before upgrading drive firmware?](#)

Current Drive Firmware
MS02, KPM51VUG800G

Total rows: 1 |

In this example:

- The drive firmware revision is **MS02**.
 - The drive identifier is **KPM51VUG800G**.
- d. Select **View drives** in the Associated Drives column to display where these drives are installed in your storage appliance.

- e. Close the Upgrade Drive Firmware window.
4. Download and prepare the available drive firmware upgrade:
 - a. Under Drive Firmware upgrade, select **NetApp Support**.
 - b. On the NetApp Support Site, select the **Downloads** tab, and then select **E-Series Disk Drive Firmware**.

The E-Series Disk Firmware page displays.

- c. Search for each **Drive Identifier** installed in your storage appliance and verify that each drive identifier has the latest firmware revision.
 - If the firmware revision is not a link, this drive identifier has the latest firmware revision.
 - If one or more drive part numbers are listed for a drive identifier, a firmware upgrade is available for these drives. You can select any link to download the firmware file.

Drive Part Number	Descriptions	Drive Identifier	Firmware Rev. (Download)	Notes and Config Info	Release Date
<input type="text" value="Drive Part Number"/>	<input type="text" value="Descriptions"/>	<input type="text" value="KPM51VUG800G"/>	<input type="text" value="Firmware Rev. (Download)"/>		
E-X4041C	SSD, 800GB, SAS, PI	KPM51VUG800G	MS03	MS02 Fixes Bug 1194908 MS03 Fixes Bug 1334862	04-Sep-2020

- d. If a later firmware revision is listed, select the link in the Firmware Rev. (Download) column to download a .zip archive containing the firmware file.
- e. Extract (unzip) the drive firmware archive files you downloaded from the Support site.
5. Install the drive firmware upgrade:
 - a. From SANtricity System Manager, under Drive Firmware upgrade, select **Begin Upgrade**.
 - b. Select **Browse**, and select the new drive firmware files that you downloaded from the Support site.

Drive firmware files have a filename similar to
 D_HUC101212CSS600_30602291_MS01_2800_0002.dlp.

You can select up to four drive firmware files, one at a time. If more than one drive firmware file is compatible with the same drive, you get a file conflict error. Decide which drive firmware file you want to use for the upgrade and remove the other one.

- c. Select **Next**.

Select Drives lists the drives that you can upgrade with the selected firmware files.

Only drives that are compatible appear.

The selected firmware for the drive appears in the **Proposed Firmware** column. If you must change this firmware, select **Back**.

- d. Select **Upgrade all drives online** — Upgrades the drives that can support a firmware download while the storage array is processing I/O. You don't have to stop I/O to the associated volumes using these drives when you select this upgrade method.



An online upgrade can take several hours longer than an offline upgrade.

You must use the [offline method](#) to upgrade the firmware on SSDs.

- e. In the first column of the table, select the drive or drives you want to upgrade.

The best practice is to upgrade all drives of the same model to the same firmware revision.

- f. Select **Start** and confirm that you want to perform the upgrade.

If you need to stop the upgrade, select **Stop**. Any firmware downloads currently in progress complete. Any firmware downloads that have not started are canceled.



Stopping the drive firmware upgrade might result in data loss or unavailable drives.

- g. (Optional) To see a list of what was upgraded, select **Save Log**.

The log file is saved in the downloads folder for your browser with the name `latest-upgrade-log-timestamp.txt`.

[If required, troubleshoot driver firmware upgrade errors.](#)

Upgrade SG6000 drive firmware using SANtricity System Manager using the offline method

Use the SANtricity System Manager offline method to upgrade the firmware on the drives in your appliance to make sure you have all the latest features and bug fixes.

Before you begin

- The storage appliance has an Optimal status.
- All drives have an Optimal status.
- You have [placed the StorageGRID appliance into maintenance mode](#).



While the appliance is in maintenance mode, I/O (input/output) activity to the storage controller is stopped to make disruptive storage operations safe.



Don't upgrade the drive firmware on more than one StorageGRID appliance at a time. Doing so might cause data unavailability, depending on your deployment model and ILM policy.

About this task

The drives are upgraded in parallel while the appliance is in maintenance mode. If the pool or volume group does not support redundancy or is degraded, you must use the offline method to upgrade the drive firmware. You should also use the offline method for any drive associated with flash read cache, or any pool or volume group that is currently degraded. The offline method upgrades firmware only while all I/O activity is stopped on the drives to be upgraded. To stop I/O activity, place the node into maintenance mode.

The offline method is faster than the online method and will be significantly faster when many drives in a single

appliance need upgrades. However, it requires that nodes be taken out of service, which might require scheduling a maintenance window and monitoring progress. Choose the method that is the best fit for your operational procedures and the number of drives that need to be upgraded.



There are two types of drives: SSD and HDD. You must use the offline method to upgrade the firmware on the SSDs (for example, SSD drives in the SG6060). You can use either the online or offline method to upgrade the firmware on HDDs.

Steps

1. Confirm that the appliance is in [maintenance mode](#).



If you are upgrading the firmware in SSD drives that are part of a cache group, you must ensure that no I/O is sent to any cached volumes while the upgrade is in progress. When the appliance is in maintenance mode, no I/O is sent to any volumes while the upgrade is in progress.

2. Access SANtricity System Manager using one of these methods:
 - Use the StorageGRID Appliance Installer and select **Advanced > SANtricity System Manager**
 - Use the Grid Manager and select **NODES > Storage Node > SANtricity System Manager**
 - Use SANtricity System Manager by browsing to the storage controller IP:

`https://Storage_Controller_IP`

3. Enter the SANtricity System Manager administrator username and password, if required.
4. Verify the drive firmware version currently installed in the storage appliance:
 - a. From SANtricity System Manager, select **SUPPORT > Upgrade Center**.
 - b. Under Drive Firmware upgrade, select **Begin Upgrade**.

The Upgrade Drive Firmware page displays the drive firmware files currently installed.

- c. Note the current drive firmware revisions and drive identifiers in the Current Drive Firmware column.

Upgrade Drive Firmware

1 Select Upgrade Files

Review your current drive firmware and select upgrade files below...

[What do I need to know before upgrading drive firmware?](#)

Current Drive Firmware

MS02, KPM51VUG800G

Total rows: 1 |

In this example:

- The drive firmware revision is **MS02**.
- The drive identifier is **KPM51VUG800G**.

- d. Select **View drives** in the Associated Drives column to display where these drives are installed in your storage appliance.
- e. Close the Upgrade Drive Firmware window.

5. Download and prepare the available drive firmware upgrade:

- a. Under Drive Firmware upgrade, select **NetApp Support**.
- b. On the NetApp Support Site, select the **Downloads** tab, and then select **E-Series Disk Drive Firmware**.

The E-Series Disk Firmware page displays.

- c. Search for each **Drive Identifier** installed in your storage appliance and verify that each drive identifier has the latest firmware revision.
 - If the firmware revision is not a link, this drive identifier has the latest firmware revision.
 - If one or more drive part numbers are listed for a drive identifier, a firmware upgrade is available for these drives. You can select any link to download the firmware file.

Drive Part Number	Descriptions	Drive Identifier	Firmware Rev. (Download)	Notes and Config Info	Release Date
<input type="text" value="Drive Part Number"/>	<input type="text" value="Descriptions"/>	<input type="text" value="KPM51VUG800G"/>	<input type="text" value="Firmware Rev. (Download)"/>		
E-X4041C	SSD, 800GB, SAS, PI	KPM51VUG800G	MS03	MS02 Fixes Bug 1194908 MS03 Fixes Bug 1334862	04-Sep-2020

- d. If a later firmware revision is listed, select the link in the Firmware Rev. (Download) column to download a .zip archive containing the firmware file.

- e. Extract (unzip) the drive firmware archive files you downloaded from the Support site.

6. Install the drive firmware upgrade:

- a. From SANtricity System Manager, under Drive Firmware upgrade, select **Begin Upgrade**.
- b. Select **Browse**, and select the new drive firmware files that you downloaded from the Support site.

Drive firmware files have a filename similar to

D_HUC101212CSS600_30602291_MS01_2800_0002.dlp.

You can select up to four drive firmware files, one at a time. If more than one drive firmware file is compatible with the same drive, you get a file conflict error. Decide which drive firmware file you want to use for the upgrade and remove the other one.

- c. Select **Next**.

Select Drives lists the drives that you can upgrade with the selected firmware files.

Only drives that are compatible appear.

The selected firmware for the drive appears in the **Proposed Firmware** column. If you must change this firmware, select **Back**.

- d. Select **Upgrade all drives offline (parallel)** — Upgrades the drives that can support a firmware download only while all I/O activity is stopped on any volumes that use the drives.



You must place the appliance into maintenance mode before using this method. You should use the **Offline** method to upgrade the drive firmware.



If you want to use the Offline (parallel) upgrade, don't proceed unless you are certain that the appliance is in maintenance mode. Failure to place the appliance into maintenance mode before initiating an offline drive firmware update might cause data loss.

- e. In the first column of the table, select the drive or drives you want to upgrade.

The best practice is to upgrade all drives of the same model to the same firmware revision.

- f. Select **Start** and confirm that you want to perform the upgrade.

If you need to stop the upgrade, select **Stop**. Any firmware downloads currently in progress complete. Any firmware downloads that have not started are canceled.



Stopping the drive firmware upgrade might result in data loss or unavailable drives.


- g. (Optional) To see a list of what was upgraded, select **Save Log**.

The log file is saved in the downloads folder for your browser with the name `latest-upgrade-log-timestamp.txt`.

[If required, troubleshoot driver firmware upgrade errors.](#)

7. After the procedure completes successfully, perform any additional maintenance procedures while the node is in maintenance mode. When you are done, or if you experienced any failures and want to start over, go to the StorageGRID Appliance Installer and select **Advanced > Reboot Controller**. Then select one of these options:
- **Reboot into StorageGRID.**
 - **Reboot into Maintenance Mode.** Reboot the controller and keep the node in maintenance mode. Select this option if there were any failures during the procedure and you want to start over. After the node finishes rebooting into maintenance mode, restart from the appropriate step in the procedure that failed.

It can take up to 20 minutes for the appliance to reboot and rejoin the grid. To confirm that the reboot is complete and that the node has rejoined the grid, go back to the Grid Manager. The Nodes page

should display a normal status (green check mark icon  to the left of the node name) for the appliance node, indicating that no alerts are active and the node is connected to the grid.

View the list and status of sites and grid nodes.

Search...

Total node count: 14

Name	Type	Object data used	Object metadata used	CPU usage
StorageGRID Deployment	Grid	0%	0%	—
^ Data Center 1	Site	0%	0%	—
✓ DC1-ADM1	Primary Admin Node	—	—	21%
✓ DC1-ARC1	Archive Node	—	—	8%
✓ DC1-G1	Gateway Node	—	—	10%
✓ DC1-S1	Storage Node	0%	0%	29%

Troubleshoot drive firmware upgrade errors

Troubleshoot errors that can occur when using SANtricity System Manager to upgrade the firmware on the drives in your appliance.

- **Failed assigned drives**

- One reason for the failure might be that the drive does not have the appropriate signature. Make sure that the affected drive is an authorized drive. Contact technical support for more information.
- When replacing a drive, make sure that the replacement drive has a capacity equal to or greater than the failed drive you are replacing.
- You can replace the failed drive while the storage array is receiving I/O.

- **Check storage array**

- Make sure that an IP address has been assigned to each controller.
- Make sure that all cables connected to the controller aren't damaged.
- Make sure that all cables are tightly connected.

- **Integrated hot spare drives**

This error condition must be corrected before you can upgrade the firmware.

- **Incomplete volume groups**

If one or more volume groups or disk pools are incomplete, you must correct this error condition before you can upgrade the firmware.

- **Exclusive operations (other than background media/parity scan) currently running on any volume groups**

If one or more exclusive operations are in progress, the operations must complete before the firmware can be upgraded. Use System Manager to monitor the progress of the operations.

- **Missing volumes**

You must correct the missing volume condition before the firmware can be upgraded.

- **Either controller in a state other than Optimal**

One of the storage array controllers needs attention. This condition must be corrected before the firmware can be upgraded.

- **Mismatched Storage Partition information between Controller Object Graphs**

An error occurred while validating the data on the controllers. Contact technical support to resolve this issue.

- **SPM Verify Database Controller check fails**

A storage partitions mapping database error occurred on a controller. Contact technical support to resolve this issue.

- **Configuration Database Validation (If supported by the storage array's controller version)**

A configuration database error occurred on a controller. Contact technical support to resolve this issue.

- **MEL Related Checks**

Contact technical support to resolve this issue.

- **More than 10 DDE Informational or Critical MEL events were reported in the last 7 days**

Contact technical support to resolve this issue.

- **More than 2 Page 2C Critical MEL Events were reported in the last 7 days**

Contact technical support to resolve this issue.

- **More than 2 Degraded Drive Channel Critical MEL events were reported in the last 7 days**

Contact technical support to resolve this issue.

- **More than 4 critical MEL entries in the last 7 days**

Contact technical support to resolve this issue.

Turn SG6000-CN controller identify LED on and off

The blue identify LED on the front and back of the controller can be turned on to help locate the appliance in a data center.

Before you begin

You have the BMC IP address of the controller you want to identify.

Steps

1. Access the controller BMC interface.

2. Select **Server Identify**.

The current status of the identify LED is selected.

3. Select **ON** or **OFF**, and then select **Perform Action**.

When you select **ON**, the blue identify LEDs light on the front (shown) and rear of the appliance.



If a bezel is installed on the controller, it might be difficult to see the front identify LED.

4. Turn the LED on and off as needed.

Related information

[Verify Fibre Channel HBA to replace](#)

[Locate controller in data center](#)

[Access BMC interface](#)

Locate SG6000-CN controller in data center

Locate the controller so that you can perform hardware maintenance or upgrades.

Before you begin

- You have determined which controller requires maintenance.

(Optional) To help locate the controller in your data center, [turn on the blue identify LED](#).

Steps

1. Find the controller requiring maintenance in the data center.
 - Look for a lit blue identify LED on the front or rear of the controller.

The front identify LED is behind the controller front bezel and might be difficult to see if the bezel is installed.



- Check the tags attached to the front of each controller for a matching part number.
- 2. Remove the controller front bezel, if one is installed, to access the front panel controls and indicators.
- 3. Optional: [Turn off the blue identify LED](#) if you used it to locate the controller.
 - Press the identify LED switch on the controller front panel.
 - Use the controller BMC interface.

Related information

[Remove Fibre Channel HBA](#)

[Remove SG6000-CN controller from cabinet or rack](#)

[Shut down SG6000-CN controller](#)

Power SG6000-CN controller off and on

You can shut down the SG6000-CN controller and power it back on to perform maintenance.

Shut down SG6000-CN controller

Shut down the SG6000-CN controller to perform hardware maintenance.

Before you begin

- You have physically located the SG6000-CN controller requiring maintenance in the data center. See [Locate controller in data center](#).

About this task

To prevent service interruptions, confirm that all other Storage Nodes are connected to the grid before shutting down the controller or shut down the controller during a scheduled maintenance window when periods of service disruption are acceptable. See the information about [monitoring node connection states](#).



If you have ever used an ILM rule that creates only one copy of an object, you must shut down the controller during a scheduled maintenance window. Otherwise, you might temporarily lose access to those objects during this procedure. See information about managing objects with information lifecycle management.

Steps

1. Shut down the SG6000-CN controller.



You must perform a controlled shut down of the appliance by entering the commands specified below. It is a best practice to perform a controlled shutdown when possible to avoid unnecessary alerts, ensure full logs are available, and avoid service disruptions.

- a. If you have not already logged into the grid node, log in using PuTTY or another ssh client:
 - i. Enter the following command: `ssh admin@grid_node_IP`
 - ii. Enter the password listed in the `Passwords.txt` file.
 - iii. Enter the following command to switch to root: `su -`
 - iv. Enter the password listed in the `Passwords.txt` file.

When you are logged in as root, the prompt changes from `$` to `#`.

- b. Shut down the SG6000-CN controller:
`shutdown -h now`

This command might take up to 10 minutes to complete.

2. Use one of the following methods to verify that the SG6000-CN controller is powered off:

- Look at the blue power LED on the front of the controller and confirm that it is off.



- Look at the green LEDs on both power supplies in the rear of the controller and confirm that they blink at a regular rate (approximately one blink per second).

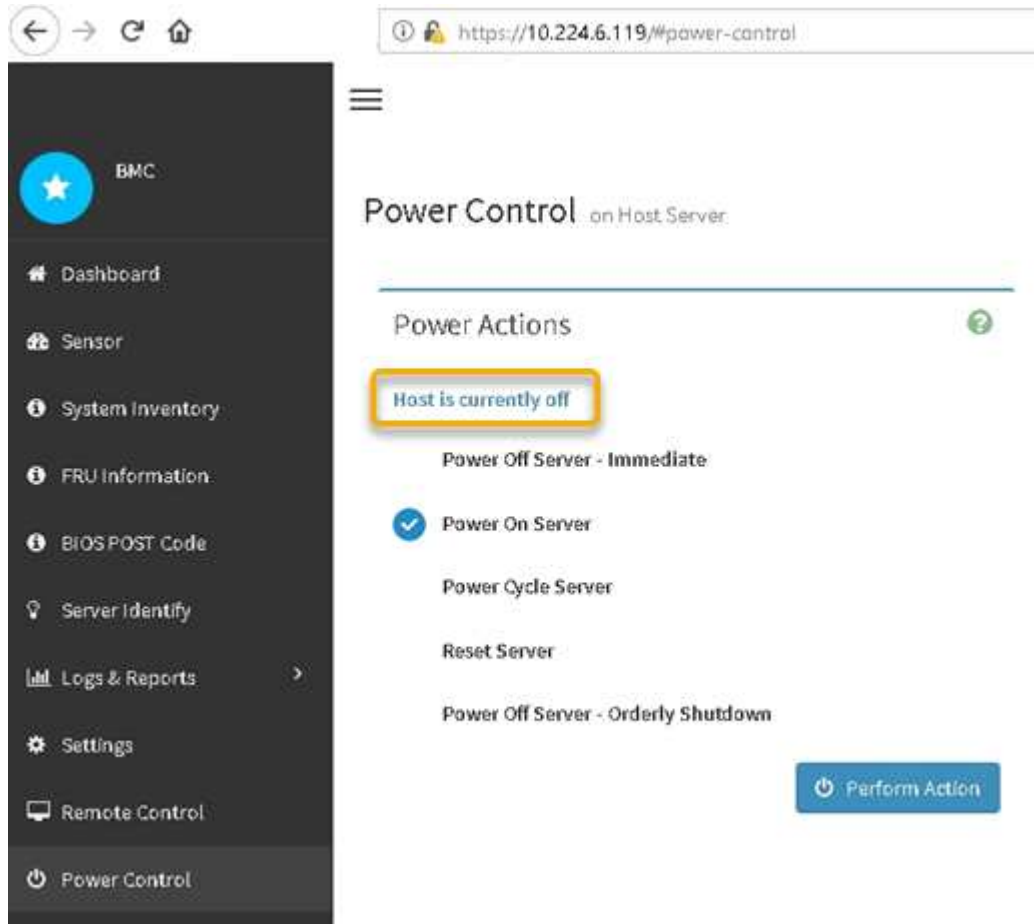


- Use the controller BMC interface:
 - i. Access the controller BMC interface.

[Access BMC interface](#)

- ii. Select **Power Control**.

- iii. Verify that the Power Actions indicates that the host is currently off.



Power on SG6000-CN controller and verify operation

Power on the controller after completing maintenance.

Before you begin

- You have installed the controller in a cabinet or rack and connected the data and power cables.

[Reinstall SG6000-CN controller into cabinet or rack](#)

- You have physically located the controller in the data center.

[Locate controller in data center](#)

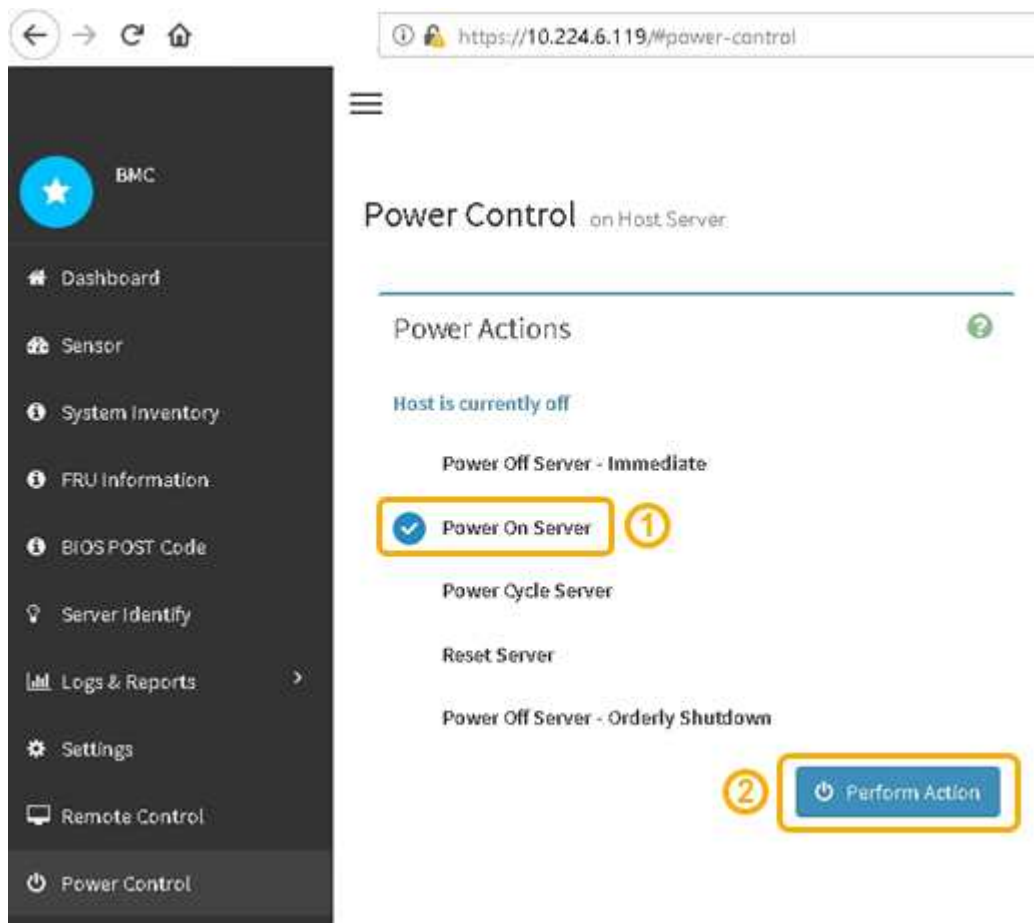
Steps

1. Power on the SG6000-CN controller and monitor the controller LEDs and boot-up codes using one of the following methods:

- Press the power switch on the front of the controller.



- Use the controller BMC interface:
 - i. Access the controller BMC interface.
- [Access BMC interface](#)
- ii. Select **Power Control**.
- iii. Select **Power On Server** and then select **Perform Action**.



Use the BMC interface to monitor start-up status.

- 2. Confirm that the appliance controller displays in the Grid Manager and with no alerts.

It might take up to 20 minutes for the controller to display in the Grid Manager.

3. Confirm that the new SG6000-CN controller is fully operational:

a. Log in to the grid node using PuTTY or another ssh client:

- i. Enter the following command: `ssh admin@grid_node_IP`
- ii. Enter the password listed in the `Passwords.txt` file.
- iii. Enter the following command to switch to root: `su -`
- iv. Enter the password listed in the `Passwords.txt` file.

When you are logged in as root, the prompt changes from `$` to `#`.

b. Enter the following command and verify that it returns the expected output:

```
cat /sys/class/fc_host/*/port_state
```

Expected output:

```
Online
Online
Online
Online
```

If the expected output is not returned, contact technical support.

c. Enter the following command and verify that it returns the expected output:

```
cat /sys/class/fc_host/*/speed
```

Expected output:

```
16 Gbit
16 Gbit
16 Gbit
16 Gbit
```

If the expected output is not returned, contact technical support.

d. From the Nodes page in Grid Manager, make sure that the appliance node is connected to the grid and does not have any alerts.



Don't take another appliance node offline unless this appliance has a green icon.

4. Optional: Install the front bezel, if one was removed.

Related information

- [Remove SG6000-CN controller from cabinet or rack](#)
- [View status indicators](#)

Change link configuration of SG6000-CN controller

You can change the Ethernet link configuration of the SG6000-CN controller. You can change the port bond mode, the network bond mode, and the link speed.

Before you begin

The appliance has been [placed in maintenance mode](#).

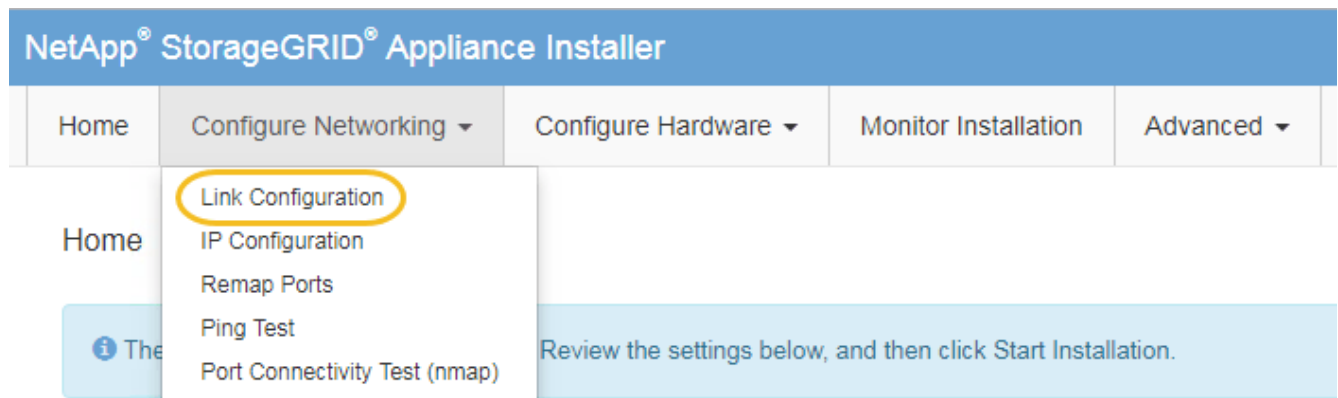
About this task

Options for changing the Ethernet link configuration of the SG6000-CN controller include:

- Changing **Port bond mode** from Fixed to Aggregate, or from Aggregate to Fixed
- Changing **Network bond mode** from Active-Backup to LACP, or from LACP to Active-Backup
- Enabling or disabling VLAN tagging, or changing the value of a VLAN tag
- Changing the link speed.

Steps

1. From the StorageGRID Appliance Installer, select **Configure Networking > Link Configuration**.



2. Make the desired changes to the link configuration.

For more information about the options, see [Configure network links](#).

3. When you are satisfied with your selections, click **Save**.



You might lose your connection if you made changes to the network or link you are connected through. If you aren't reconnected within 1 minute, re-enter the URL for the StorageGRID Appliance Installer using one of the other IP addresses assigned to the appliance:

`https://Appliance_Controller_IP:8443`

If you made changes to the VLAN settings, the subnet for the appliance might have changed. If you need to change the IP addresses for the appliance, follow the [Configure IP addresses](#) instructions.

[Configure StorageGRID IP addresses](#)


4. Select **Configure Networking > Ping Test** from the menu.
5. Use the Ping Test tool to check connectivity to IP addresses on any networks that might have been

affected by the link configuration changes you made in the [link configuration changes](#) step.

In addition to any other tests you choose to perform, confirm that you can ping the Grid Network IP address of the primary Admin Node, and the Grid Network IP address of at least one other Storage Node. If necessary, return to the [link configuration changes](#) step and correct any link configuration issues.

6. When you are satisfied that your link configuration changes are working and you have additional procedures to perform while the node is in maintenance mode, perform them now. When you are done, or if you experienced any failures and want to start over, select **Advanced > Reboot Controller**, and then select one of these options:
 - Select **Reboot into StorageGRID**
 - Select **Reboot into Maintenance Mode** to reboot the controller with the node remaining in maintenance mode. Select this option if you experienced any failures during the procedure and want to start over. After the node finishes rebooting into maintenance mode, restart from the appropriate step in the procedure that failed.



It can take up to 20 minutes for the appliance to reboot and rejoin the grid. To confirm that the reboot is complete and that the node has rejoined the grid, go back to the Grid Manager. The **NODES** page should display a normal status (green check mark icon  to the left of the node name) for the appliance node, indicating that no alerts are active and the node is connected to the grid.

Nodes

View the list and status of sites and grid nodes.

Search...

Total node count: 14

Name	Type	Object data used	Object metadata used	CPU usage
StorageGRID Deployment	Grid	0%	0%	—
^ Data Center 1	Site	0%	0%	—
✓ DC1-ADM1	Primary Admin Node	—	—	21%
✓ DC1-ARC1	Archive Node	—	—	8%
✓ DC1-G1	Gateway Node	—	—	10%
✓ DC1-S1	Storage Node	0%	0%	29%

Hardware procedures

Add expansion shelf to deployed SG6060

To increase storage capacity, you can add one or two expansion shelves to an SG6060 that is already deployed in a StorageGRID system.

Before you begin

- You must have the provisioning passphrase.
- You must be running StorageGRID 11.4 or later.
- You have the expansion shelf and two SAS cables for each expansion shelf.
- You have physically located the storage appliance where you are adding the expansion shelf in the data center.

[Locate controller in data center](#)

About this task

To add an expansion shelf, you perform these high-level steps:

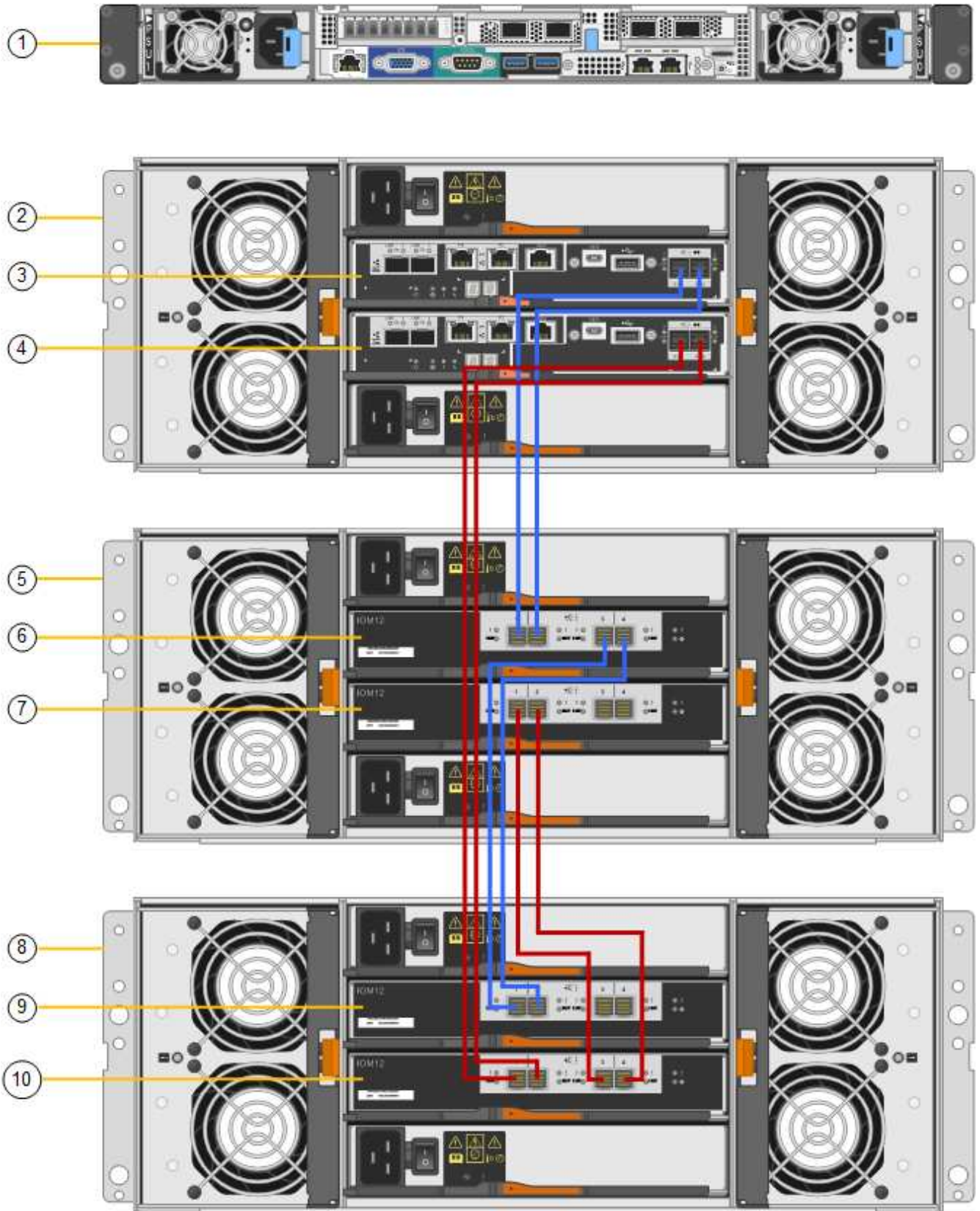
- Install the hardware in the cabinet or rack.
- Place the SG6060 into maintenance mode.
- Connect the expansion shelf to the E2860 controller shelf or to another expansion shelf.
- Start the expansion using the StorageGRID Appliance Installer
- Wait until the new volumes are configured.

Completing the procedure for one or two expansion shelves should take one hour or less per appliance node. To minimize downtime, the following steps instruct you to install the new expansion shelves and drives before placing the SG6060 into maintenance mode. The remaining steps should take approximately 20 to 30 minutes per appliance node.

Steps

1. Follow the instructions for [installing 60-drive shelves into a cabinet or rack](#).
2. Follow the instructions for [installing the drives](#).
3. From the Grid Manager, [place the SG6000-CN controller into maintenance mode](#).
4. Connect each expansion shelf to the E2860 controller shelf as shown in the diagram.

This drawing shows two expansion shelves. If you have only one, connect IOM A to controller A and connect IOM B to controller B.



Callout	Description
1	SG6000-CN

Callout	Description
2	E2860 controller shelf
3	Controller A
4	Controller B
5	Expansion shelf 1
6	IOM A for expansion shelf 1
7	IOM B for expansion shelf 1
8	Expansion shelf 2
9	IOM A for expansion shelf 2
10	IOM B for expansion shelf 2

5. Connect the power cords and apply power to the expansion shelves.
 - a. Connect a power cord to each of the two power supply units in each expansion shelf.
 - b. Connect the two power cords in each expansion shelf to two different PDUs in the cabinet or rack.
 - c. Turn on the two power switches for each expansion shelf.
 - Don't turn off the power switches during the power-on process.
 - The fans in the expansion shelves might be very loud when they first start up. The loud noise during start-up is normal.
6. Monitor the Home page of the StorageGRID Appliance Installer.

In approximately five minutes, the expansion shelves finish powering up and are detected by the system. The Home page shows the number of new expansion shelves detected, and the Start Expansion button is enabled.

The screenshot shows examples of the messages that could appear on the Home page, depending on the number of existing or new expansion shelves, as follows:

- The banner circled at the top of the page indicates the total number of expansion shelves detected.
 - The banner indicates the total number of expansion shelves, whether the shelves are configured and deployed or new and unconfigured.
 - If no expansion shelves are detected, the banner will not appear.
- The message circled at the bottom of the page indicates an expansion is ready to be started.
 - The message indicates the number of new expansion shelves StorageGRID detects. "Attached" indicates that the shelf is detected. "Unconfigured" indicates that the shelf is new and not yet configured using the StorageGRID Appliance Installer.



Expansion shelves that are already deployed aren't included in this message. They are included in the count in the banner at the top of the page.

- The message will not appear if new expansion shelves aren't detected.

The screenshot displays the NetApp configuration interface with several sections:

- Message Banner:** Two blue informational messages are shown at the top, both highlighted with a yellow border. The first message states: "The expansion is ready to be started. Make sure this page accurately indicates the number of new storage shelves you are trying to add, then click Start Expansion." The second message states: "The storage system contains 2 expansion shelves."
- This Node:** A configuration section with a "Node type" dropdown menu set to "Storage" and a "Node name" text field containing "NetApp-SGA". Below these fields are "Cancel" and "Save" buttons.
- Primary Admin Node connection:** A section with a checked "Enable Admin Node discovery" checkbox, a "Primary Admin Node IP" text field containing "172.16.4.71", and a "Connection state" label indicating "Connection to 172.16.4.71 ready". "Cancel" and "Save" buttons are located at the bottom.
- Installation:** A section with a "Current state" label and a text box containing "Ready to start configuration of 1 attached but unconfigured expansion shelf." Below this is a blue "Start Expansion" button, which is also highlighted with a yellow border.

7. As necessary, resolve any issues described in the messages on the Home page.

For example, use SANtricity System Manager to resolve any storage hardware issues.

8. Verify that the number of expansion shelves displayed on the Home page matches the number of expansion shelves you are adding.



If the new expansion shelves have not been detected, verify that they are properly cabled and powered up.

9. Click **Start Expansion** to configure the expansion shelves and make them available for object storage.

10. Monitor the progress of the expansion shelf configuration.

Progress bars appear on the web page, just as they do during initial installation.

1. Configure storage			Running
Step	Progress	Status	
Connect to storage controller	<div style="width: 100%; height: 10px; background-color: green;"></div>	Complete	
Clear existing configuration	<div style="width: 100%; height: 10px; background-color: green;"></div>	Skipped	
Configure volumes	<div style="width: 30%; height: 10px; background-color: blue;"></div>	Creating volume StorageGRID-obj-22	
Configure caching	<div style="width: 0%; height: 10px; background-color: gray;"></div>	Pending	
Configure host settings	<div style="width: 0%; height: 10px; background-color: gray;"></div>	Pending	

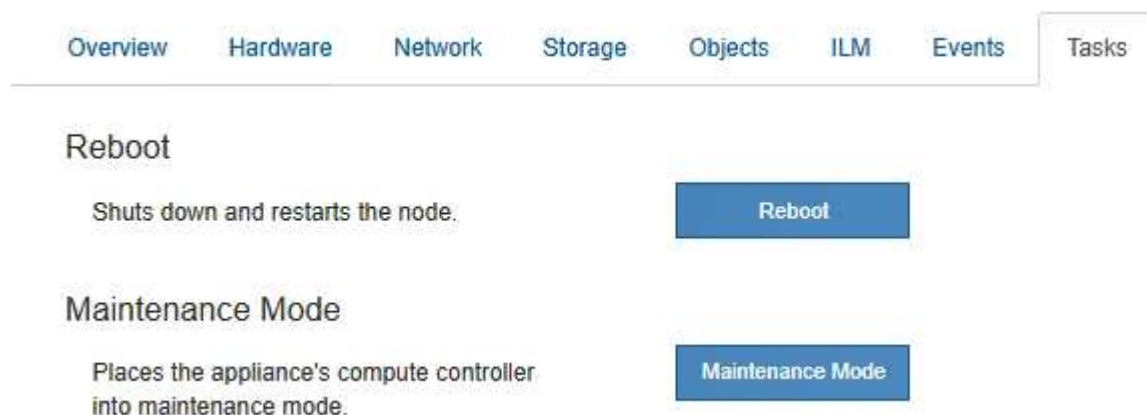
2. Complete storage expansion			Pending

When configuration is complete, the appliance automatically reboots to exit maintenance mode and rejoin the grid. This process can take up to 20 minutes.



To retry the expansion shelf configuration if it fails, go to the StorageGRID Appliance Installer, select **Advanced > Reboot Controller**, and then select **Reboot into Maintenance Mode**. After the node reboots, retry the [expansion shelf configuration](#).

When the reboot is complete, the **Tasks** tab looks like the following screenshot:



11. Verify the status of the appliance Storage Node and the new expansion shelves.

- a. In the Grid Manager, select **NODES** and verify that the appliance Storage Node has a green check mark icon.

The green check mark icon means that no alerts are active and the node is connected to the grid. For a description of node icons, see [Monitor node connection states](#).

- b. Select the **Storage** tab and confirm that 16 new object stores are shown in the Object Storage table for each expansion shelf you added.
- c. Verify that each new expansion shelf has a shelf status of Nominal and a configuration status of Configured.

Replace storage controller in the SG6000

You might need to replace an E2800 series controller or an EF570 controller if it is not functioning optimally or if it has failed.

Before you begin

- You have a replacement controller with the same part number as the controller you are replacing.
- You have labels to identify each cable that is connected to the controller.
- You have an ESD wristband, or you have taken other antistatic precautions.
- You have a #1 Phillips screwdriver.
- You have physically located the storage appliance where you are replacing the controller in the data center.

[Locate controller in data center](#)



Don't rely on the E-Series instructions to replace a controller in the StorageGRID appliance, because the procedures aren't the same.

About this task

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

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



If both controllers in the shelf have their Attention LEDs on, contact technical support for assistance.

If your appliance contains two storage controllers, you can replace one of the controllers while your appliance is powered on and performing read/write operations, as long as the following conditions are true:

- The second controller 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.



When possible, place the appliance into maintenance mode for this replacement procedure to minimize the potential impact of unforeseen errors or failures.



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

When you replace a controller, you must remove the battery from the original controller and install it in the replacement controller. In some cases, you might also need to remove the host interface card from the original controller and install it in the replacement controller.



The storage controllers in most appliance models don't include host interface cards (HIC).

Step 1: Prepare the replacement controller

Prepare the replacement E2800A or E2800B controller.

Steps

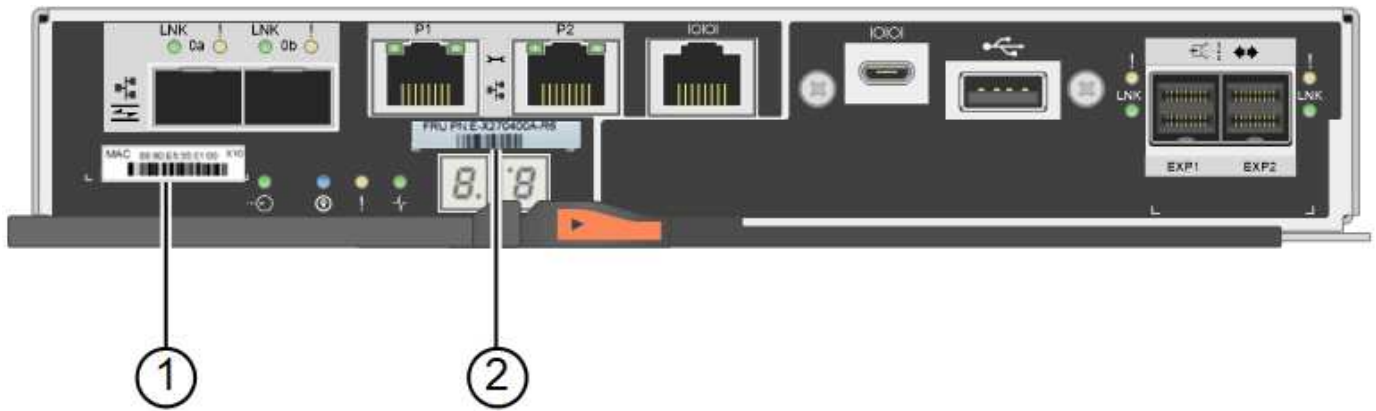
1. Unpack the new controller, and set it on a flat, static-free surface.

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

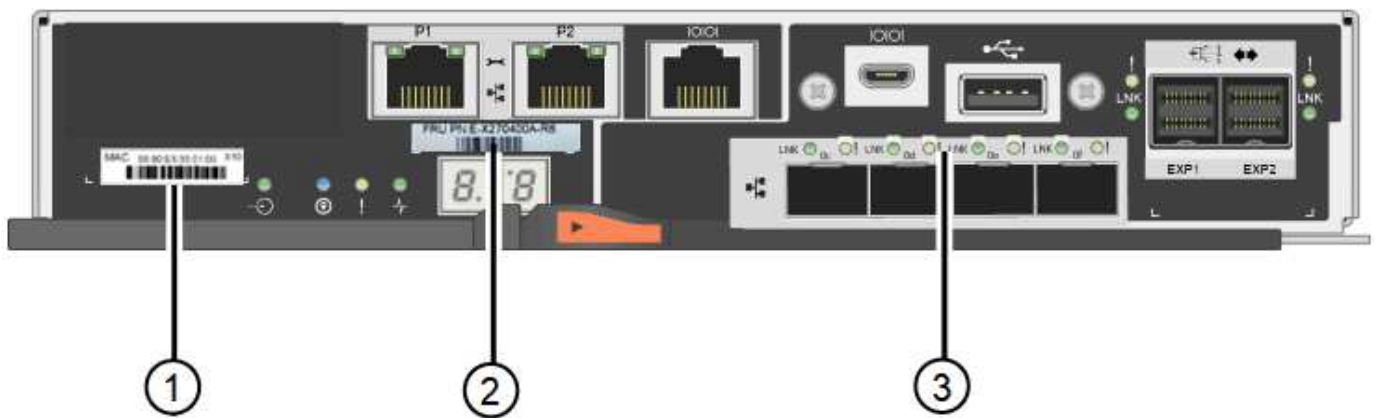
2. Locate the MAC address and FRU part number labels on the back of the replacement controller.

These figures show the E2800A controller and the E2800B controller. The procedure for replacing the E2800 series controllers and the EF570 controller is identical.

E2800A storage controller:



E2800B storage controller:



Label	component	Description
1	MAC address	The MAC address for management port 1 ("P1 on the E2800A and 0a on the E2800B"). If you used DHCP to obtain the original controller's IP address, you will need this address to connect to the new controller.
2	FRU part number	The FRU part number. This number must match the replacement part number for the currently installed controller.
3	4-port HIC	The 4-port host interface card (HIC). This card must be moved to the new controller when you perform the replacement. Note: the E2800A controller does not have a HIC.

Step 2: Take the controller offline

Prepare to remove the failed controller and take it offline.

Steps

1. Prepare to remove the controller. You use SANtricity System Manager to perform these steps.
 - a. Confirm that the replacement part number for the failed controller is the same as the FRU part number for the replacement controller.

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, you can look on the **Base** tab for the controller.



Possible loss of data access — If the two part numbers aren't the same, don't attempt this procedure.

- b. Back up the configuration database.

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

- c. Collect support data for the appliance.



Collecting support data before and after replacing a component ensures you can send a full set of logs to technical support if the replacement does not resolve the problem.

- d. Take the controller you plan to replace offline.

2. Power off the controller shelf.

Step 3: Remove the controller

Remove the failed controller from the appliance.

Steps

1. Put on an ESD wristband or take other antistatic precautions.
2. Label the cables and then disconnect the cables and SFPs.



To prevent degraded performance, don't twist, fold, pinch, or step on the cables.

3. Release the controller from the appliance by squeezing the latch on the cam handle until it releases, and then open the cam handle to the right.
4. Using two hands and the cam handle, slide the controller out of the appliance.



Always use two hands to support the weight of the controller.

5. Place the controller on a flat, static-free surface with the removable cover facing up.
6. Remove the cover by pressing down on the button and sliding the cover off.

Step 4: Move battery to the new controller

Remove the battery from the failed controller, and install it into the replacement controller.

Steps

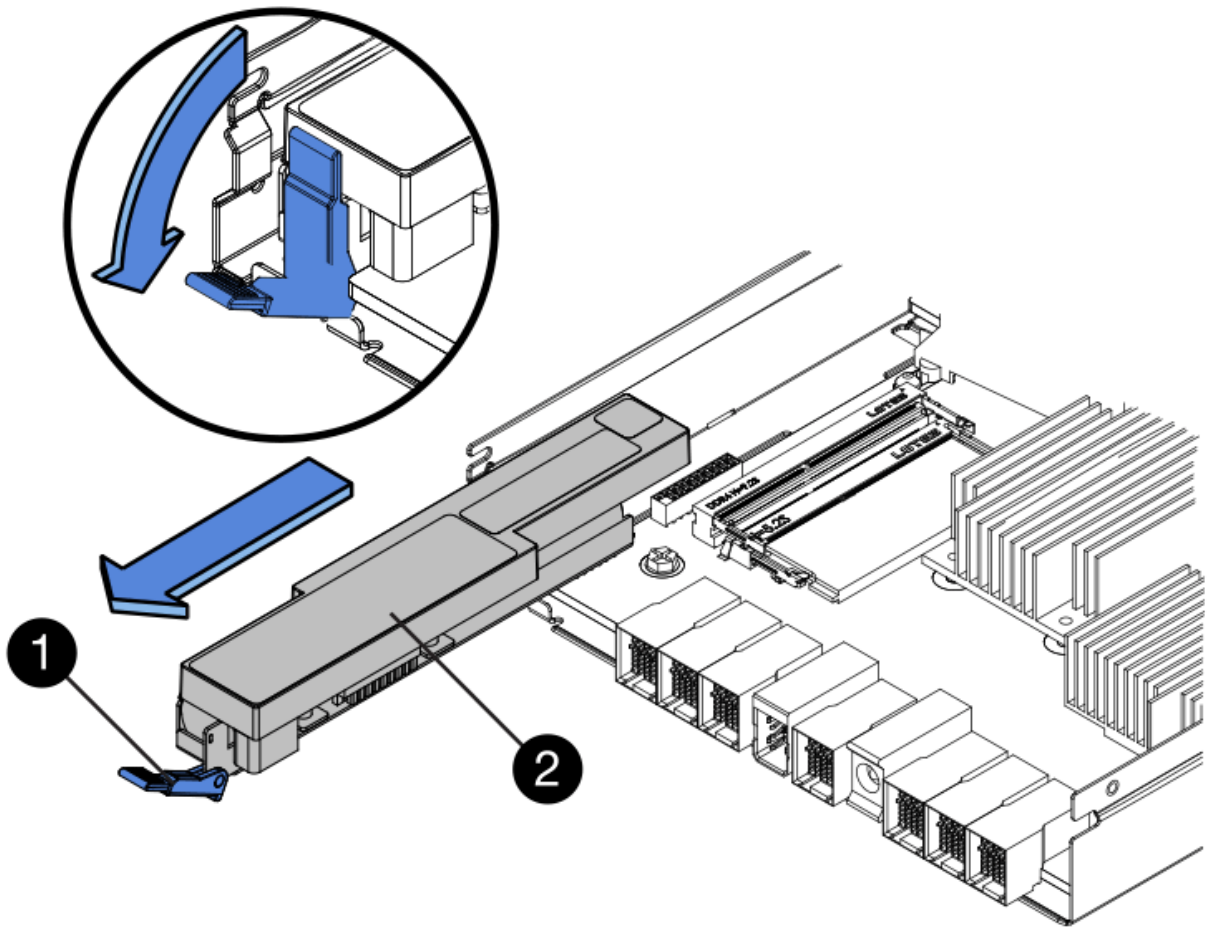
1. Confirm that the green LED inside the controller (between the battery and the DIMMs) is off.

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.



Item	Description
1	Internal Cache Active LED
2	Battery

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



Item	Description
1	Battery release latch
2	Battery

4. Lift up on the battery, and slide it out of the controller.
5. Remove the cover from the replacement controller.
6. Orient the replacement controller so that the slot for the battery faces toward you.
7. Insert the battery into the controller 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, and slide the top of the battery beneath the small alignment pin on the left side of the controller.

8. 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.

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



Possible hardware damage — The metal flange at the front of the battery must be completely inserted into the slot on the controller (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.

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



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



10. Replace the controller cover.

Step 5: Move HIC to new controller, if needed

If the failed controller includes a host interface card (HIC), move the HIC from the failed controller to the replacement controller.

A separate HIC is used for the E2800B controller only. The HIC is mounted to the main controller board and includes two SPF connectors.



The illustrations in this procedure show a 2-port HIC. The HIC in your controller might have a different number of ports.

E2800A

An E2800A controller does not have a HIC.

Replace the E2800A controller cover, and go to [Step 6: Replace controller](#)

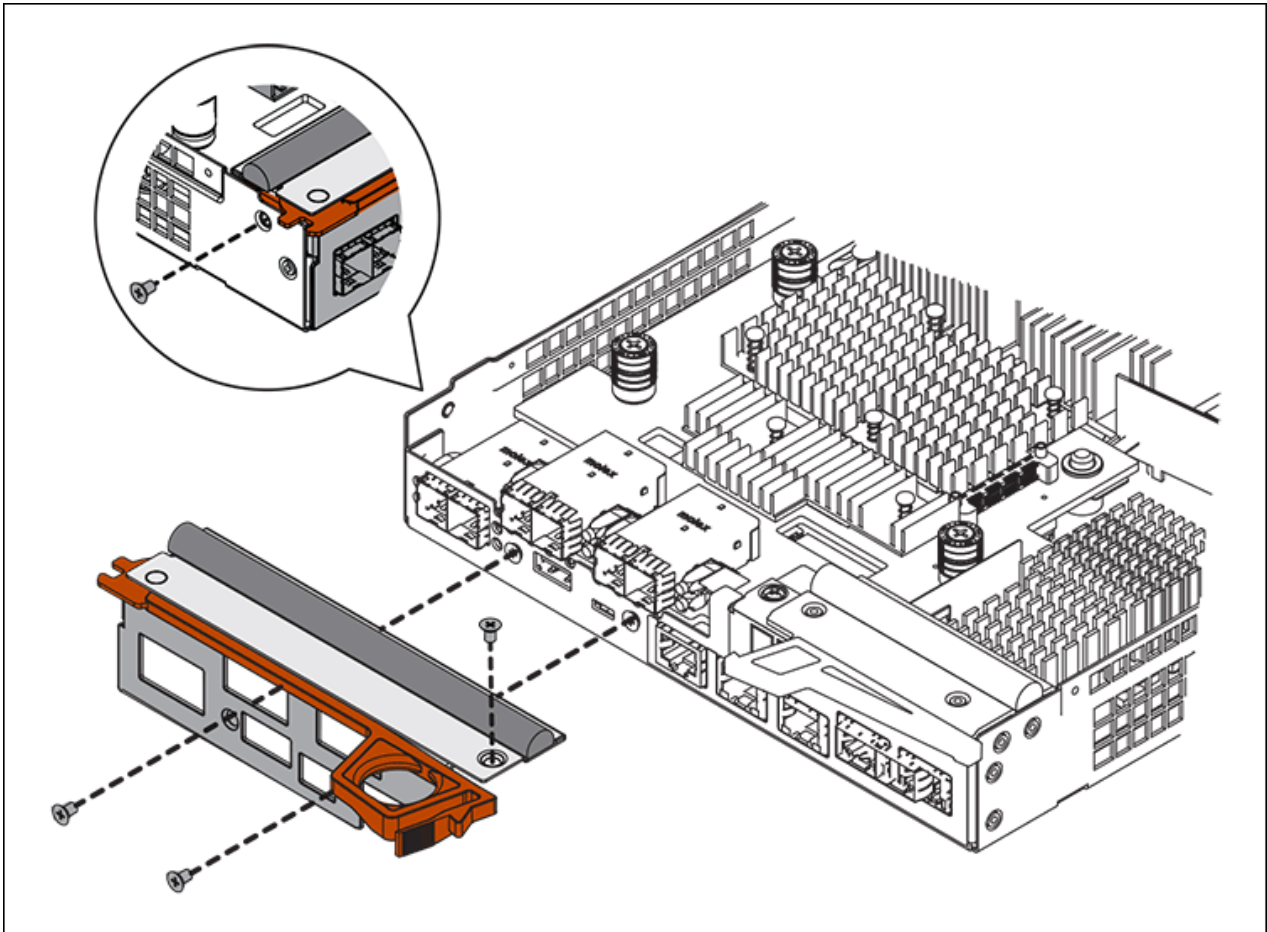
E2800B

Move the HIC from the failed E2800B controller to the replacement controller.

Steps

1. Remove any SFPs from the HIC.
2. Using a #1 Phillips screwdriver, remove the screws that attach the HIC faceplate to the controller.

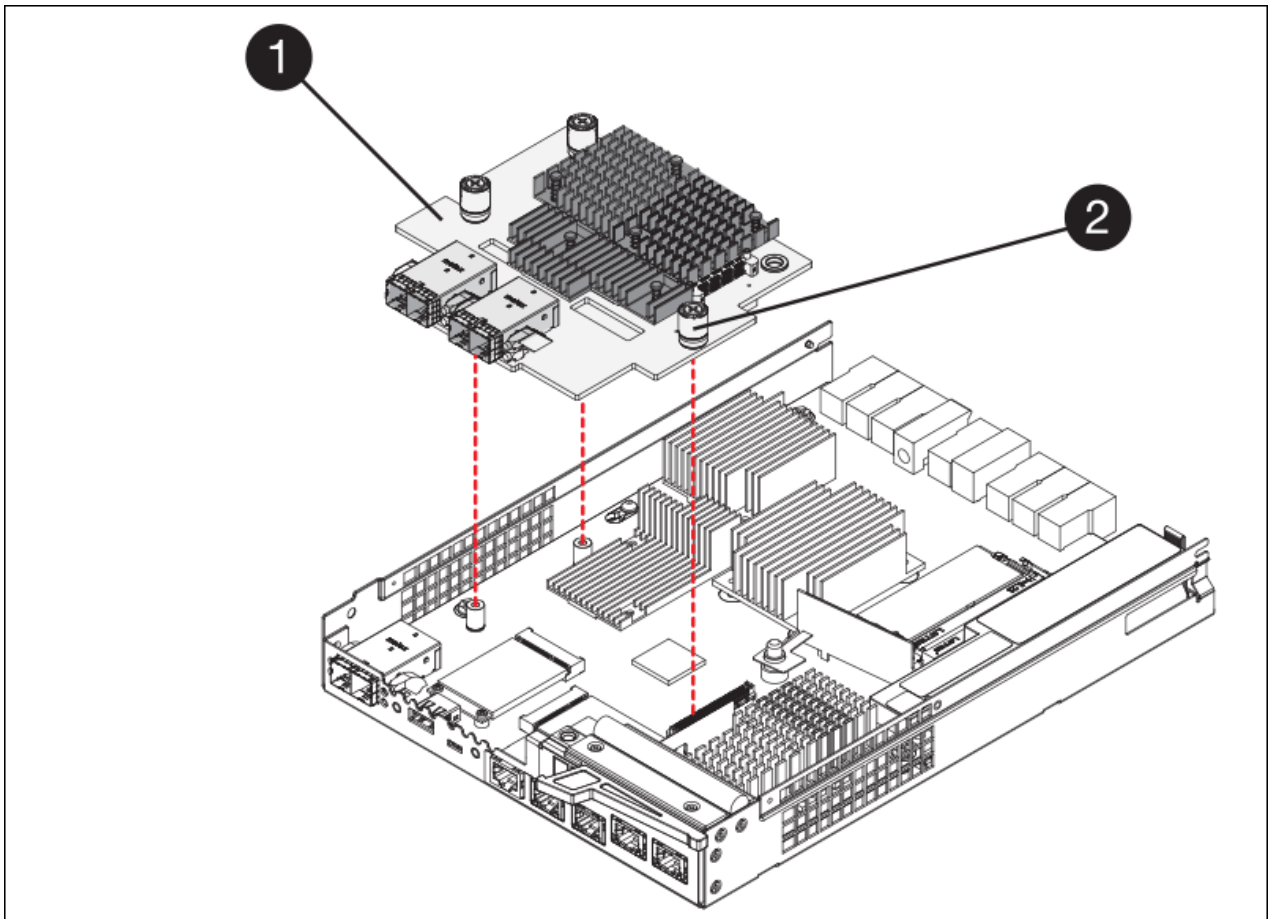
There are four screws: one on the top, one on the side, and two on the front.



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



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



Label	Description
1	Host interface card
2	Thumbscrews

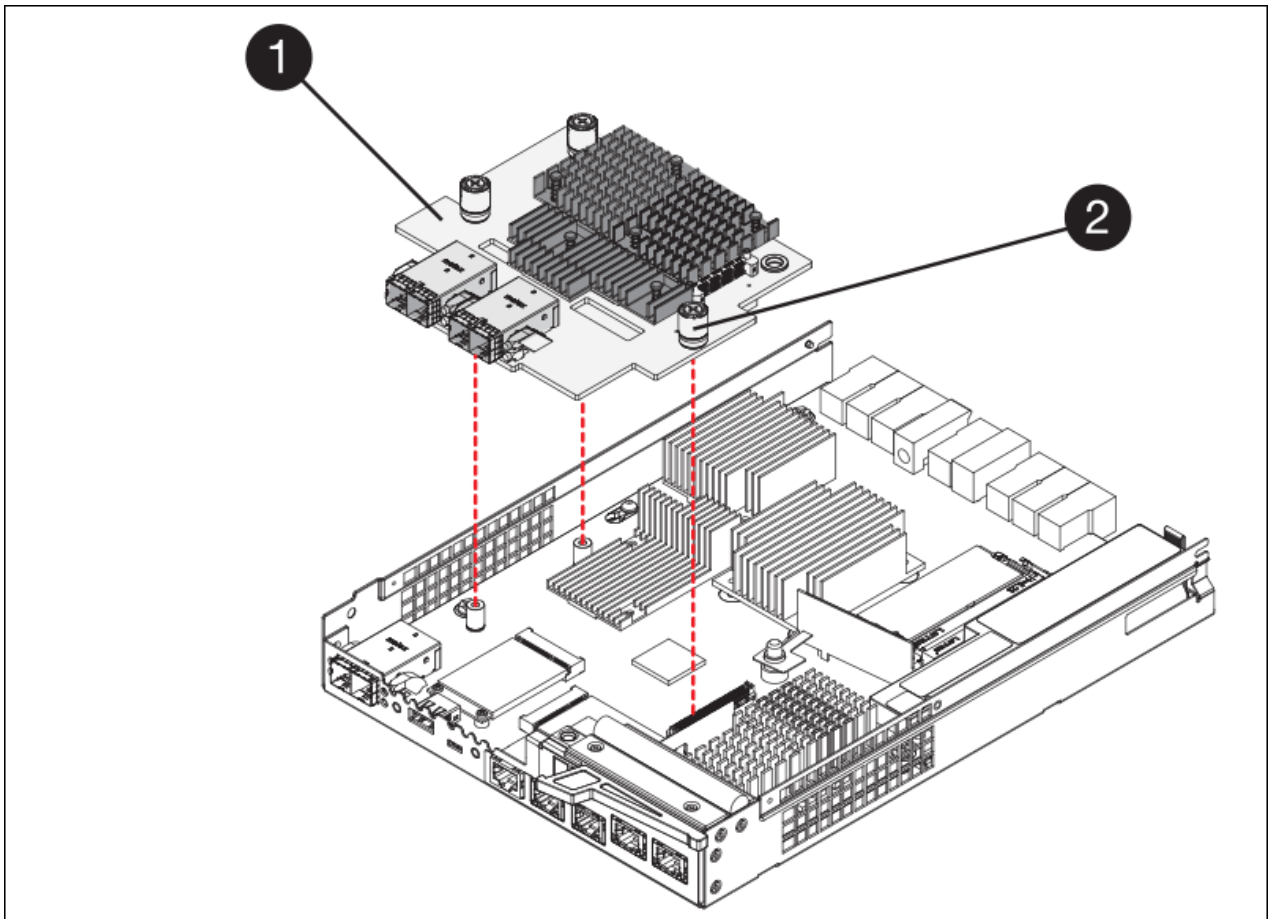
6. Place the HIC on a static-free surface.
7. Using a #1 Phillips screwdriver, remove the four screws that attach the blank faceplate to the replacement controller, and remove the faceplate.
8. Align the three thumbscrews on the HIC with the corresponding holes on the replacement controller, and align 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.

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



Possible equipment damage — Be careful not to pinch the gold ribbon connector for the controller LEDs between the HIC and the thumbscrews.

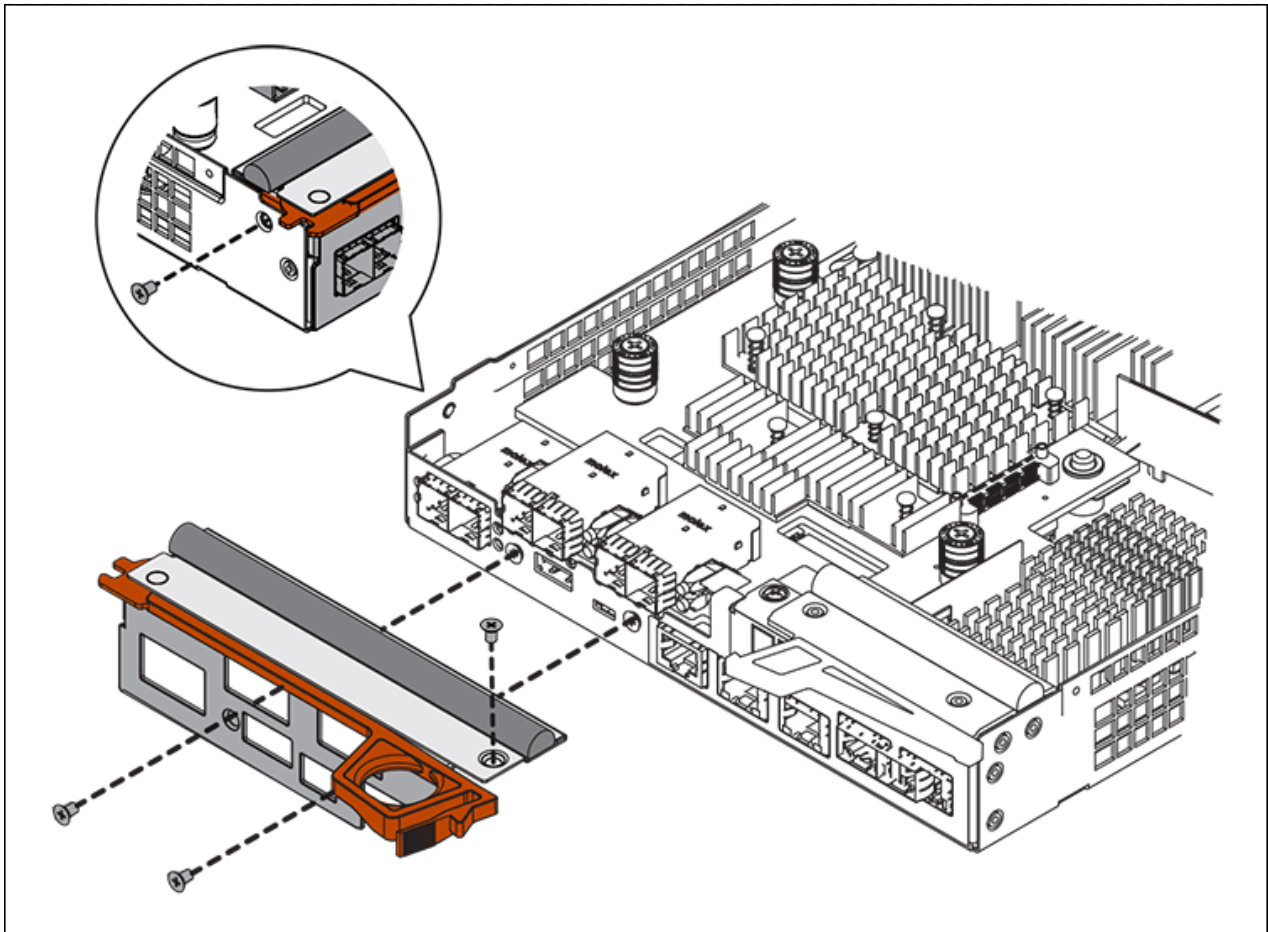


Label	Description
1	Host interface card
2	Thumbscrews

10. Hand-tighten the HIC thumbscrews.

Don't use a screwdriver, or you might over tighten the screws.

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



12. Reinstall any removed SFPs into the HIC.

Step 6: Replace controller

Install the replacement controller and verify that it has rejoined the grid.

Steps

1. Install the replacement controller into the appliance.
 - a. Turn the controller over, so that the removable cover faces down.
 - b. With the cam handle in the open position, slide the controller all the way into the appliance.
 - c. Move the cam handle to the left to lock the controller in place.
 - d. Replace the cables and SFPs.
 - e. Power on the controller shelf.
 - f. 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.



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.

2. Bring the controller online using 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.
 - e. Verify that the seven-segment display shows a state of 99.
3. Confirm that the new controller is Optimal, and collect support data.

After replacing the part, return the failed part to NetApp, as described in the RMA instructions shipped with the kit. See the [Part Return & Replacements](#) page for further information.

Replace hardware components in SG6000 storage controller shelf

If a hardware problem occurs, you might need to replace a component in the storage controller shelf.

Before you begin

- You have the E-Series hardware replacement procedure.
- You have physically located the storage appliance where you are replacing storage shelf hardware components in the data center.

[Locate controller in data center](#)

About this task

To replace the battery in the storage controller, see the steps in the instructions for [replacing a storage controller](#). Those instructions describe how to remove a controller from the appliance, remove the battery from the controller, install the battery, and replace the controller.

For instructions for the other field replaceable units (FRUs) in the controller shelves, access the [E-Series procedures for system maintenance](#).

FRU	See instructions
Battery	StorageGRID (these instructions): Replacing a storage controller
Drive	E-Series: <ul style="list-style-type: none"> • Replace drive (60-drive) • Replace drive (12-drive or 24-drive)
Power canister	E-Series <ul style="list-style-type: none"> • Replace power canister (60-drive) • Replace power supply (12-drive or 24-drive)
Fan canister (60-drive shelves only)	E-Series: Replace fan canister (60-drive)

FRU	See instructions
Drive drawer (60-drive shelves only)	E-Series: Replace drive drawer (60-drive)

After replacing the part, return the failed part to NetApp, as described in the RMA instructions shipped with the kit. See the [Part Return & Replacements](#) page for further information.

Replace hardware components in optional SG6000 60-drive expansion shelf

You might need to replace an input/output module, a power supply, or a fan in the expansion shelf.

Before you begin

- You have the E-Series hardware replacement procedure.
- You have physically located the storage appliance where you are replacing expansion shelf hardware components in the data center.

[Locate controller in data center](#)

About this task

To replace an input/output module (IOM) in a 60-drive expansion shelf, see the steps in the instructions for [replacing a storage controller](#).

To replace a power supply or a fan in a 60-drive expansion shelf, access the E-Series procedures for maintaining 60-drive hardware.

FRU	See E-Series instructions for
Input/output module (IOM)	Replacing an IOM
Power canister	Replace power canister (60-drive)
Fan canister	Replace fan canister (60-drive)

Replace SG6000-CN controller

You might need to replace the SG6000-CN controller if it is not functioning optimally or if it has failed.

Before you begin

- You have a replacement controller with the same part number as the controller you are replacing.
- You have labels to identify each cable that is connected to the controller.
- You have physically located the controller to replace in the data center.

[Locate controller in data center](#)

About this task

The appliance Storage Node will not be accessible when you replace the SG6000-CN controller. If the SG6000-CN controller is functioning sufficiently, you can perform a controlled shutdown at the start of this procedure.



If you are replacing the controller before installing StorageGRID software, you might not be able to access the StorageGRID Appliance Installer immediately after completing this procedure. While you can access the StorageGRID Appliance Installer from other hosts on the same subnet as the appliance, you can't access it from hosts on other subnets. This condition should resolve itself within 15 minutes (when any ARP cache entries for the original controller time out), or you can clear the condition immediately by purging any old ARP cache entries manually from the local router or gateway.

Steps

1. Display the current configurations of the appliance and record them.
 - a. Log in to the appliance to be replaced:
 - i. Enter the following command: `ssh admin@grid_node_IP`
 - ii. Enter the password listed in the `Passwords.txt` file.
 - iii. Enter the following command to switch to root: `su -`
 - iv. Enter the password listed in the `Passwords.txt` file.

When you are logged in as root, the prompt changes from `$` to `#`.

- b. Enter: `run-host-command ipmitool lan print` to display the current BMC configurations for the appliance.
2. If the SG6000-CN controller is functioning sufficiently to allow for a controlled shutdown, [shut down the SG6000-CN controller](#).
3. If any of the network interfaces on this StorageGRID appliance are configured for DHCP, you might need to update the permanent DHCP lease assignments on the DHCP servers to reference the MAC addresses of the replacement appliance. The update ensures the appliance is assigned the expected IP addresses. See [Update MAC address references](#).
4. Remove and replace the SG6000-CN controller:
 - a. Label the cables and then disconnect the cables and any SFP+ or SFP28 transceivers.



To prevent degraded performance, don't twist, fold, pinch, or step on the cables.

- b. Remove the failed controller from the cabinet or rack.
 - c. Install the replacement controller into the cabinet or rack.
 - d. Replace the cables and any SFP+ or SFP28 transceivers.
 - e. Power on the controller and [monitor the controller LEDs](#) and [boot-up codes](#).

When the controller starts, it automatically installs pending updates for the controller and appliance components. Installation of these updates can take an hour or more to complete, and the controller might reboot multiple times.



Do not manually reboot the appliance unless you are certain that it is *not* in the middle of a firmware update.

You can connect a [monitor](#) or [service laptop](#) to the SG6000-CN controller to monitor update installation progress.



A service-laptop connection might not be available at some stages of the installation process.

5. If the appliance where you replaced the controller used a key management server (KMS) to encrypt data, additional configuration might be required before the node can join the grid. If the node does not automatically join the grid, make sure that these configuration settings have transferred to the new controller and manually configure any settings that don't have the expected configuration:

- [Configure network links](#)
- [Configure StorageGRID IP addresses](#)
- [Configure node encryption for the appliance](#)

6. Log in to the appliance with the replaced controller:

- a. Enter the following command: `ssh admin@grid_node_IP`
- b. Enter the password listed in the `Passwords.txt` file.
- c. Enter the following command to switch to root: `su -`
- d. Enter the password listed in the `Passwords.txt` file.

7. Restore BMC network connectivity for the appliance. There are two options:

- Use static IP, netmask, and gateway
- Use DHCP to obtain an IP, netmask, and gateway
 - a. To restore the BMC configuration to use a static IP, netmask, and gateway, enter the following commands:

```
run-host-command ipmitool lan set 1 ipsrc static
```

```
run-host-command ipmitool lan set 1 ipaddr Appliance_IP
```

```
run-host-command ipmitool lan set 1 netmask Netmask_IP
```

```
run-host-command ipmitool lan set 1 defgw ipaddr Default_gateway
```

- b. To restore the BMC configuration to use DHCP to obtain an IP, netmask, and gateway, enter the following command:

```
run-host-command ipmitool lan set 1 ipsrc dhcp
```

8. After restoring BMC network connectivity, connect to the BMC interface to audit and restore any additional custom BMC configuration you might have applied. For example, you should confirm the settings for SNMP trap destinations and email notifications. See [Configure BMC interface](#).

9. Confirm that the appliance node appears in the Grid Manager and that no alerts appear.

After replacing the part, return the failed part to NetApp, as described in the RMA instructions shipped with the kit. See the [Part Return & Replacements](#) page for further information.

Related information

[Install SG6000-CN into cabinet or rack](#)

[View status indicators](#)

[View boot-up codes for SG6000-CN controller](#)

Replace one or both power supplies in the SG6000-CN controller

The SG6000-CN controller has two power supplies for redundancy. If one of the power supplies fails, you must replace it as soon as possible to ensure that the compute controller has redundant power. Both power supplies operating in the controller must be the same model and wattage.

Before you begin

- You have determined the physical location in the data center of the controller with the power supply to be replaced.

[Locating the controller in a data center](#)

- If you are replacing only one power supply:
 - You have unpacked the replacement power supply unit and ensured that it is the same model and wattage as the power supply unit you are replacing.
 - You have confirmed that the other power supply is installed and running.
- If you are replacing both power supplies at the same time:
 - You have unpacked the replacement power supply units and ensured they are the same model and wattage.

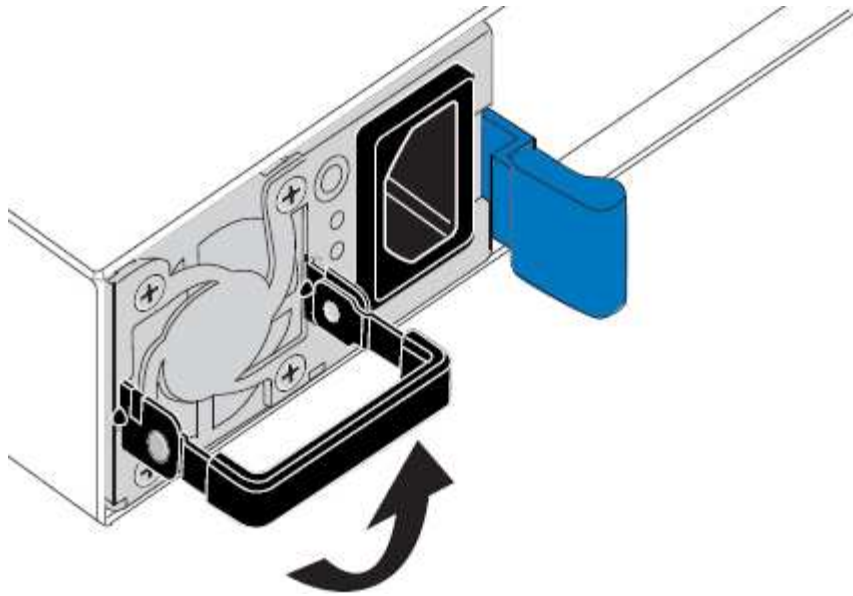
About this task

The figure shows the two power supply units for the SG6000-CN controller, which are accessible from the back of the controller. Use this procedure to replace one or both of the power supplies. If you are replacing both power supplies, you must first perform a controlled shut down of the appliance.

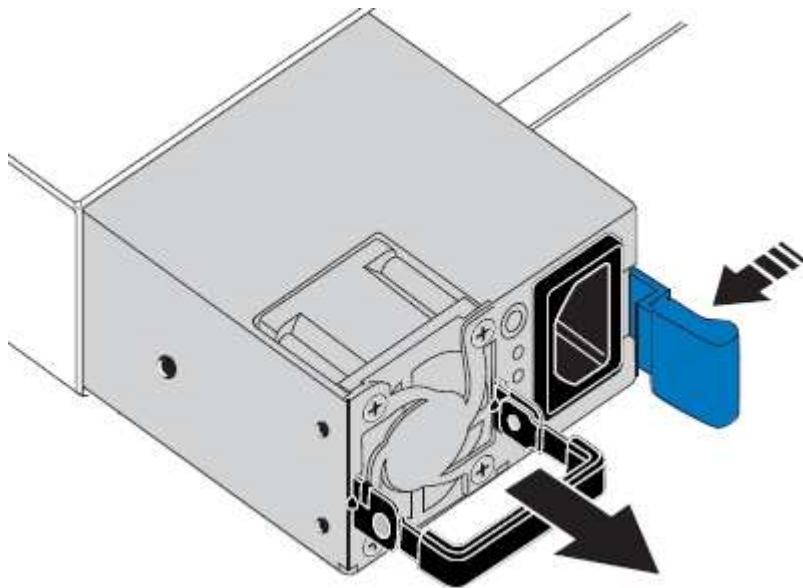


Steps

1. If you are replacing only one power supply, you don't need to shut down the appliance. Go to the [Unplug the power cord](#) step. If you are replacing both power supplies at the same time, do the following before unplugging the power cords:
 - a. [Shut down the appliance](#).
2. Unplug the power cord from each power supply to be replaced.
3. Lift the cam handle on the first supply to be replaced.



4. Press the blue latch and pull the power supply out.

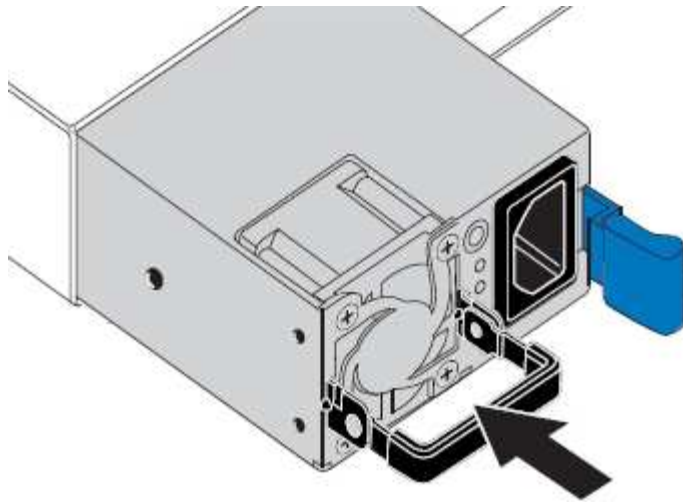


5. With the blue latch on the right, slide the replacement power supply into the chassis.



Both power supplies must be the same model and wattage.

Ensure that the blue latch is on the right side when you slide the replacement unit in.



6. Push the cam handle down to secure the replacement power supply.
7. If you are replacing both power supplies, repeat steps 2 through 6 to replace the second power supply.
8. [Connect the power cords to the replaced units and apply power.](#)

After replacing the part, return the failed part to NetApp, as described in the RMA instructions shipped with the kit. See the [Part Return & Replacements](#) page for further information.

Relocate SG6000-CN controller in cabinet or rack

Remove the SG6000-CN controller from a cabinet or rack to access the top cover or to move the appliance to a different location, then reinstall the controller into a cabinet or rack when hardware maintenance is complete.

Remove SG6000-CN controller from cabinet or rack

Remove the SG6000-CN controller from a cabinet or rack to access the top cover or to move the controller to a different location.

Before you begin

- You have labels to identify each cable that is connected to the SG6000-CN controller.
- You have physically located the SG6000-CN controller where you are performing maintenance in the data center.

[Locate controller in data center](#)

- You have [shut down the SG6000-CN controller](#).



Don't shut down the controller using the power switch.

Steps

1. Label and then disconnect the controller power cables.
2. Wrap the strap end of the ESD wristband around your wrist, and secure the clip end to a metal ground to prevent static discharge.
3. Label and then disconnect the controller data cables and any SFP+ or SFP28 transceivers.



To prevent degraded performance, don't twist, fold, pinch, or step on the cables.

4. Loosen the two captive screws on the controller front panel.



5. Slide the SG6000-CN controller forward out of the rack until the mounting rails are fully extended and you hear the latches on both sides click.

The controller top cover is accessible.

6. Optional: If you are fully removing the controller from the cabinet or rack, follow the instructions for the rail kit to remove the controller from the rails.

After replacing the part, return the failed part to NetApp, as described in the RMA instructions shipped with the kit. See the [Part Return & Replacements](#) page for further information.

Reinstall SG6000-CN controller into cabinet or rack

Reinstall the controller into a cabinet or rack when hardware maintenance is complete.

Before you begin

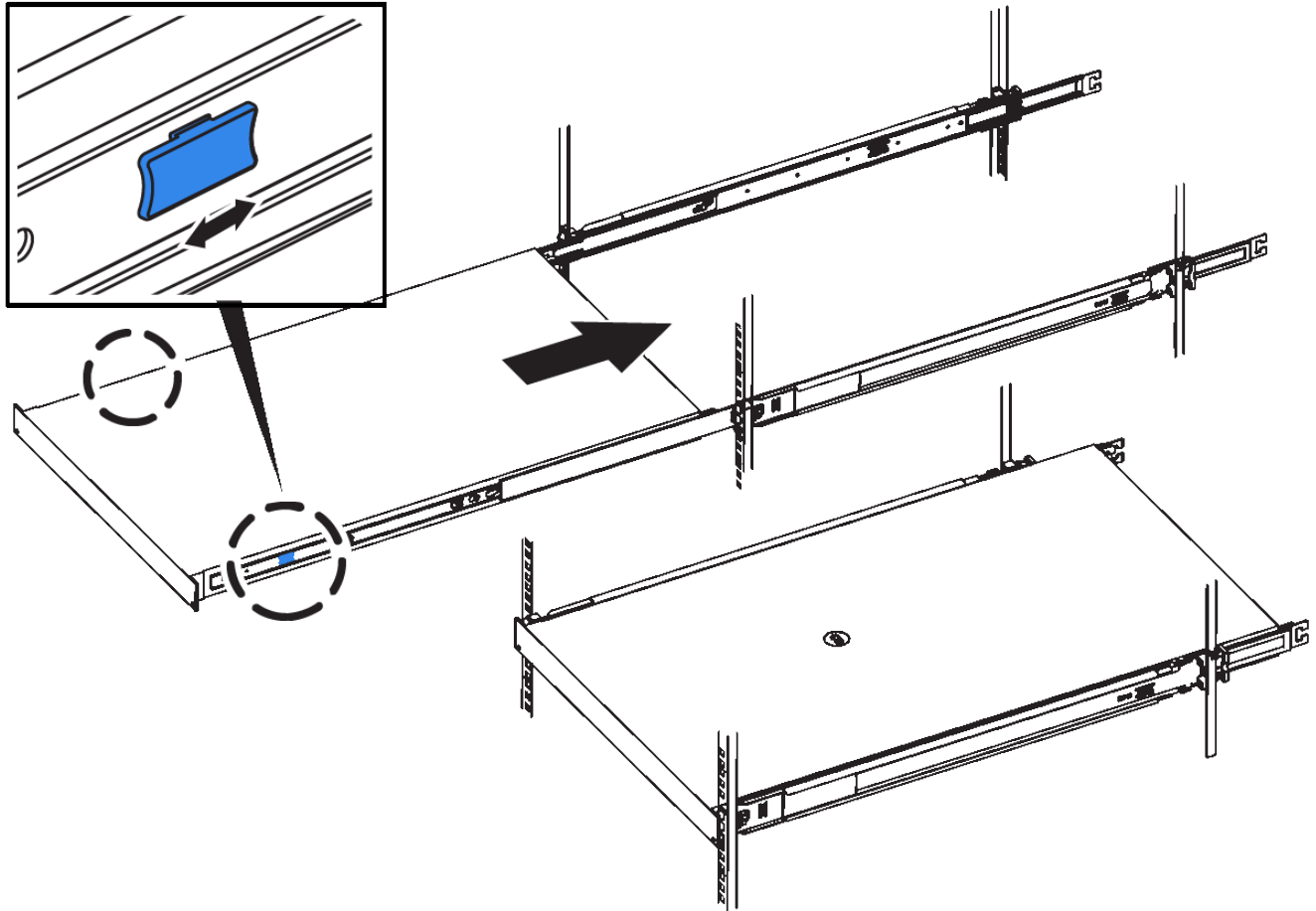
You have reinstalled the controller cover.

Reinstall SG6000-CN controller cover

Steps

1. Press the blue rail releases both rack rails at the same time and slide the SG6000-CN controller into the rack until it is fully seated.

When you can't move the controller any further, pull the blue latches on both sides of the chassis to slide the controller all the way in.



Don't attach the front bezel until after you power on the controller.

2. Tighten the captive screws on the controller front panel to secure the controller in the rack.



3. Wrap the strap end of the ESD wristband around your wrist, and secure the clip end to a metal ground to prevent static discharge.
4. Reconnect the controller data cables and any SFP+ or SFP28 transceivers.



To prevent degraded performance, don't twist, fold, pinch, or step on the cables.

Cable appliance

5. Reconnect the controller power cables.

Connect power cords and apply power (SG6000)

After you finish

The controller can be restarted [restarted](#).

Replace SG6000 controller cover

Remove the appliance cover to access internal components for maintenance, and replace the cover when you are finished.

Remove SG6000-CN controller cover

Remove the controller cover to access internal components for maintenance.

Before you begin

Remove the controller from the cabinet or rack to access the top cover.

Remove SG6000-CN controller from cabinet or rack

Steps

1. Make sure that the SG6000-CN controller cover latch is not locked. If necessary, turn the blue plastic latch lock one-quarter turn in the unlock direction, as shown on the latch lock.
2. Rotate the latch up and back toward the rear of the SG6000-CN controller chassis until it stops; then, carefully lift the cover from the chassis and set it aside.



Wrap the strap end of an ESD wristband around your wrist and secure the clip end to a metal ground to prevent static discharge when working inside the SG6000-CN controller.

After replacing the part, return the failed part to NetApp, as described in the RMA instructions shipped with the kit. See the [Part Return & Replacements](#) page for further information.

Reinstall SG6000-CN controller cover

Reinstall the controller cover when internal hardware maintenance is complete.

Before you begin

You have completed all maintenance procedures inside the controller.

Steps

1. With the cover latch open, hold the cover above the chassis and align the hole in the top cover latch with the pin in the chassis. When the cover is aligned, lower it onto the chassis.



2. Rotate the cover latch forward and down until it stops and the cover fully seats into the chassis. Verify that there are no gaps along the front edge of the cover.

If the cover is not fully seated, you might not be able to slide the SG6000-CN controller into the rack.

3. Optional: Turn the blue plastic latch lock one-quarter turn in the lock direction, as shown on the latch lock, to lock it.

After you finish

[Reinstall the controller in the cabinet or rack.](#)

Replace Fibre Channel HBA in SG6000

You might need to replace a Fibre Channel HBA if it is not functioning optimally or if it has failed.

Verify Fibre Channel HBA to replace

If you are unsure which Fibre Channel host bus adapter (HBA) to replace, complete this procedure to identify it.

Before you begin

- You have the serial number of the storage appliance or SG6000-CN controller where the Fibre Channel HBA needs to be replaced.



If the serial number of the storage appliance containing the Fibre Channel HBA you are replacing starts with the letter Q, it will not be listed in the Grid Manager. You must check the tags attached to the front of each SG6000-CN controller in the data center until you find a match.

- You are signed in to the Grid Manager using a [supported web browser](#).

Steps

1. From the Grid Manager, select **NODES**.
2. From the table on the Nodes page, select an appliance Storage Node.

3. Select the **Hardware** tab.

Check the **Storage appliance chassis serial number** and the **Compute controller serial number** in the StorageGRID Appliance section. See if one of these serial numbers matches the serial number of the storage appliance where you are replacing the Fibre Channel HBA. If either serial number matches, you have found the correct appliance.

StorageGRID Appliance

Appliance model: ?	SG5660	
Storage controller name: ?	StorageGRID-SGA-Lab11	
Storage controller A management IP: ?	10.224.2.192	
Storage controller WWID: ?	600a098000a4a707000000005e8ed5fd	
Storage appliance chassis serial number: ?	1142FG000135	
Storage controller firmware version: ?	08.40.60.01	
Storage hardware: ?	Nominal	
Storage controller failed drive count: ?	0	
Storage controller A: ?	Nominal	
Storage controller power supply A: ?	Nominal	
Storage controller power supply B: ?	Nominal	
Storage data drive type: ?	NL-SAS HDD	
Storage data drive size: ?	2.00 TB	
Storage RAID mode: ?	RAID6	
Storage connectivity: ?	Nominal	
Overall power supply: ?	Nominal	
Compute controller serial number: ?	SV54365519	
Compute controller CPU temperature: ?	Nominal	
Compute controller chassis temperature: ?	Nominal	

Storage shelves

Shelf chassis serial number ?	Shelf ID ?	Shelf status ?	IOM status ?
SN SV13304553	0	Nominal	N/A

- If the StorageGRID Appliance section does not display, the node selected is not a StorageGRID appliance. Select a different node from the tree view.
- If the Appliance Model is not SG6060 or SG6060X, select a different node from the tree view.
- If the serial numbers don't match, select a different node from the tree view.

4. After you locate the node where the Fibre Channel HBA needs to be replaced, write down the Compute controller BMC IP address listed the StorageGRID Appliance section.

You can use this IP address to [turn on the compute controller identify LED](#), to help you locate the appliance in the data center.

Remove Fibre Channel HBA

You might need to replace the Fibre Channel host bus adapter (HBA) in the SG6000-CN controller if it is not functioning optimally or if it has failed.

Before you begin

- You have the correct replacement Fibre Channel HBA.
- You have [determined which SG6000-CN controller contains the Fibre Channel HBA to replace](#).
- You have [physically located the SG6000-CN controller](#) in the data center.
- You have [shut down the SG6000-CN controller](#).



A controlled shutdown is required before you remove the controller from the rack.

- You have [removed the controller from the cabinet or rack](#).
- You have [removed the controller cover](#).

About this task

To prevent service interruptions, confirm that all other Storage Nodes are connected to the grid before starting the Fibre Channel HBA replacement or replace the adapter during a scheduled maintenance window when periods of service disruption are acceptable. See the information about [monitoring node connection states](#).

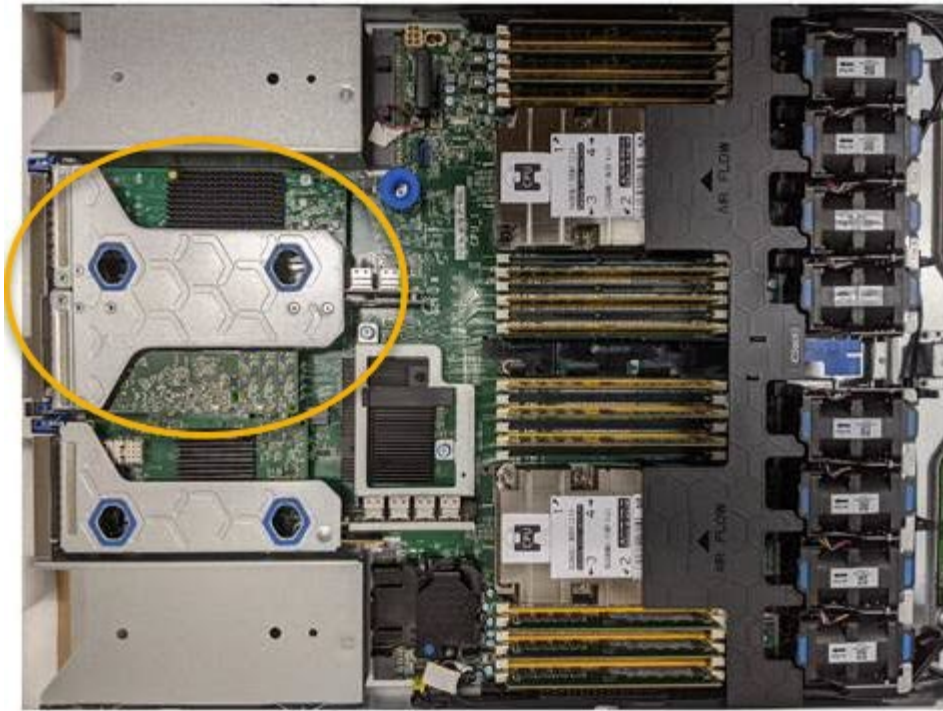


If you have ever used an ILM rule that creates only one copy of an object, you must replace the Fibre Channel HBA during a scheduled maintenance window. Otherwise, you might temporarily lose access to those objects during this procedure.

See information about [why you should not use single-copy replication](#).

Steps

1. Wrap the strap end of the ESD wristband around your wrist, and secure the clip end to a metal ground to prevent static discharge.
2. Locate the riser assembly at the rear of the controller that contains the Fibre Channel HBA.



3. Grasp the riser assembly through the blue-marked holes and carefully lift it upwards. Move the riser assembly toward the front of the chassis as you lift it to allow the external connectors in its installed adapters to clear the chassis.
4. Place the riser card on a flat anti-static surface with the metal frame side down to access the adapters.



There are two adapters in the riser assembly: a Fibre Channel HBA and an Ethernet network adapter. The Fibre Channel HBA is indicated in the illustration.

5. Open the blue adapter latch (circled) and carefully remove the Fibre Channel HBA from the riser assembly. Rock the adapter slightly to help remove the adapter from its connector. Don't use excessive force.
6. Place the adapter on a flat anti-static surface.

After you finish

[Install the replacement Fibre Channel HBA.](#)

After replacing the part, return the failed part to NetApp, as described in the RMA instructions shipped with the kit. See the [Part Return & Replacements](#) page for further information.

Reinstall Fibre Channel HBA

The replacement Fibre Channel HBA is installed into the same location as the one that was removed.

Before you begin

- You have the correct replacement Fibre Channel HBA.
- You have removed the existing Fibre Channel HBA.

[Remove Fibre Channel HBA](#)

Steps

1. Wrap the strap end of the ESD wristband around your wrist, and secure the clip end to a metal ground to prevent static discharge.
2. Remove the replacement Fibre Channel HBA from its packaging.
3. With the blue adapter latch in the open position, align the Fibre Channel HBA with its connector on the riser assembly; then, carefully press the adapter into the connector until it is fully seated.



There are two adapters in the riser assembly: a Fibre Channel HBA and an Ethernet network adapter. The Fibre Channel HBA is indicated in the illustration.

4. Locate the alignment hole on the riser assembly (circled) that aligns with a guide pin on the system board to ensure correct riser assembly positioning.



5. Position the riser assembly in the chassis, making sure that it aligns with the connector and guide pin on the system board; then, insert the riser assembly.

6. Carefully press the riser assembly in place along its center line, next to the blue-marked holes, until it is fully seated.
7. Remove the protective caps from the Fibre Channel HBA ports where you will be reinstalling cables.

After you finish

If you have no other maintenance procedures to perform in the controller, [reinstall the controller cover](#).

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